POLIS Project on Ecological Governance
watersustainabilityproject

Building Professional Capacity for a Water-Sensitive Future in Ontario

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December 2012

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Preface

This paper has been prepared to provide a concise and integrated summary of emerging research on social and process changes in water management. It is designed to build on existing literature and practice by offering ideas for the application of current research insights. The paper is structured to first provide an overview, in Section 1, of the rationale for considering the social processes that enable the implementation of innovative water practices. This is followed, in Section 2, by a series of recommendations and examples of relevant activities in a range of jurisdictions. The recommendations are woven throughout the text of Section 2 and divided into three broad categories: networks, collaboration, and continuing education.

This paper is intended to emphasize the importance of experiential knowledge and social knowledge sharing in hopes that both local and provincial decision-makers will consider budgeting sufficient time and resources for these often overlooked activities. In the interest of a more integrated dynamic between community and government, this paper is also intended to inform community groups and offer insight into activities they may choose to organize themselves or advocate for at the local level.

Section 1—Background

1.1 A Water-Sensitive Future

As urban communities grow and as the climate changes, existing water and wastewater infrastructure is increasingly strained. Capital costs of large, inefficient, centralized, and often overbuilt infrastructure threaten to overwhelm municipal budgets. Experts agree that this centralized approach to water service provision needs to be adjusted to new climatic uncertainties and water management realities (Blomquist 2005; Brooks 2006; Brown 2007; Starkl 2009).

In the future, water-sensitive cities will use rainwater where it falls, match water quality to the service required, and mimic nature's principles of recycling as a model for water use. This concept,

referred to as water-sensitive urban design (WSUD), attempts to ensure "that urban water management is sensitive to natural hydrological and ecological cycles. It integrates urban planning with the management, protection, and conservation of the urban water cycle" (National Water Commission of Australia, 2012). WSUD is also sometimes referred to as low-impact development or green infrastructure. In this paper, however, water efficiency and recycling are also considered important aspects of WSUD.

To achieve a water sensitive future, both experts and governments recognize the need for collaborative, integrated decision-making processes. These processes will be crucial for solving increasingly complex future water issues. In the handbook *Peeling Back the Pavement: A Blueprint for Reinventing Rainwater Management in Canada's Communities*, Porter-Bopp et al. (2011) identified governance reform as a way to address the integrated nature of our water challenges. The authors suggest that "we don't always recognize cities as ecosystems, but they are" (Porter-Bopp et al, 2011). Just as ecosystems are comprised of a network of interactions among organisms, and between organisms and the environment, the urban water cycle is also highly interconnected. Land-use decisions impact water quality and quantity, while water efficiency initiatives impact wastewater and stormwater. Water sensitive practices (e.g. rainwater harvesting, permeable surfaces) are therefore relevant to a wide variety of municipal departments beyond water departments, including building, planning, transportation and parking, and economic development.

Future-looking cities concerned with their environmental sustainability and water use are using interdisciplinary teams to integrate new ideas into master planning processes. For example, the City of Philadelphia's *Green City, Clean Waters* is the largest green stormwater infrastructure program in the United States, according to Porter-Bopp et al. (2011). Fourteen municipal departments helped to develop the program along with the Philadelphia Water Department, which already integrates water, wastewater, and stormwater utilities (Philadelphia Water Department, 2011).

1.2 The Implementation Gap

In Canada, policy research and legislation widely suggest a need to transition to elements of WSUD and more integrated governance structures (see, for example, Brandes, 2005; Green Infrastructure Ontario Coalition and Ecojustice, 2012; Porter-Bopp et al., 2011; Water Opportunities Act, 2010). Despite a wealth of information and existing legislation, many local, provincial, and federal governments continue to struggle to implement innovative policies or green solutions. Constrained finances, risk-averse decision-makers, and institutional inertia impede the interventions necessary for ensuring a more sustainable future. Further slowing the urban transformation to a water-sensitive future is the rate of innovation diffusion. While new technologies and practices may be known to early adopters like water experts, the new technologies may still be unknown and untested for late adopters, such as plumbers and builders.

It may be that the information on water governance and policy reform, and new technologies and practices is insufficient to generate the necessary momentum for WSUD. How then can the necessary changes be brought about in such a vast sector without waiting for a climate or water crisis to spur action?

One possibility comes from social network and environmental sociology and psychology research. In this research, individuals' preferences and the social processes in which they are embedded are recognized as the basis for change. Individuals influence, and are influenced by, other individuals within their network of personal relationships. Within these social networks, information, opinions, and support are exchanged for navigating challenging professional circumstances. This research

suggests that a renewed focus on providing and moderating opportunities for individual learning, mentoring, and social networks could be an effective mechanism for fostering innovation—particularly in terms of implementation.

The efforts of individuals to implement responsible water strategies—including municipal staff, builders, plumbers, and others—are crucial to the long-term sustainability of water resources, water supplies, and municipal finances. Water practitioners (builders, realtors, technology providers, planners, engineers, plumbers and inspectors) have been identified as a highly influential group and there are some exciting examples of their innovation and initiative (Wolfe, 2009). Yet, these individuals have been generally neglected in the research. For example, most water-efficiency research has focused on the public's inefficient use of water and the barriers (e.g. political will, low cost of water) and tools (e.g. pricing, leak detection, financial incentives) designed to reduce water demand.

How effective practitioners are in their efforts will largely determine the rate at which a water-sensitive future is realized. The question then is: How can water practitioners and related professionals be best supported in engaging in water innovation?[1]

1.3 Experience-Based Learning

Efforts to support water practitioners may suggest a need to deliver additional supplies of information. In some cases, this will be necessary (e.g. where basic knowledge of water sensitive approaches is lacking). But more information is not always the solution. Merely providing data and information does not ensure that practitioners will accept the information or that projects or policies will be successful. This is because the transfer of "explicit knowledge"—knowledge based on evidence that can be easily captured in instructions or formulas—is only one ingredient of decision-making. A lesser-known type of "tacit" knowledge that is interpretive, informal, and experiential is often considered more valuable and influential (Wolfe, 2009).

Therefore any knowledge management approach must be rooted in the perspective that knowledge is fundamentally a human and social process. Recognizing and acting on this reality in the delivery of programs may increase the likelihood that innovative practices or technologies are implemented by both early and late adopters. For example, imagine trying to convince a plumber with written information only (explicit knowledge) that a new toilet design will work when he/she has had to replace hundreds of poorly designed "efficient" toilets over the last ten years. Clearly, this situation would benefit from the transfer of new tacit knowledge—direct positive exposure to a new technology and social exchange with respected and experienced peers.

To further complicate matters, "learning, which mostly upsets beliefs and habits in individuals and in organizations, is hardly likely to be embraced easily or enthusiastically, even though there is a growing and sometimes powerful, recognition of the need for change" (Michael, 1995:470). Practitioners' innovation efforts may be perceived as threats to the organizations in which they work and to the implicit cultural norms of those organizations. An organization's culture can be powerful and have implications for the actions of the individuals operating within its bounds. For example, a water manager with a desire to pilot an innovative solution may encounter resistance

[1] Water innovation in the context of this paper is defined not necessarily as a new invention, but instead as either a) the use of a more water-sensitive design for a particular end use of water and/or b) a better method for increasing the adoption of a given water sensitive technology or practice.

from upper management (the finance department and/or council) if the organizational culture is by nature risk-averse.

This research therefore suggests three elements to support the implementation of water innovations:

1) Recognize and address the influence of experiential knowledge on practitioners' willingness to adopt change.
2) Retain innovative practitioners' tacit knowledge (experience and beliefs) and transfer that knowledge to other individuals seeking to innovate.
3) Provide support for innovators to persevere against institutional inertia.

Finally, thinking toward the future but beyond the parameters of this study, organizations should look towards building capabilities through meaningful, training-based internships, mentorship, career development, and training. These early and ongoing investments will support significant advances in long-term WSUD.

1.4 Who Are the Practitioners?

Much of the water policy research focuses on either government bodies or the public. However, achieving the transformative changes necessary for a water-sensitive future requires looking beyond municipal practitioners to the professionals trusted by the public, including plumbers, builders, and others in the private sector. The risks of over-reliance on municipal governments in an age of rapidly changing government priorities and funding levels suggests that exploring the private sector's contribution to promoting and sustaining water innovation is a logical next step (Cross and Armstrong, 2008; Elton and Wolfe, 2011; Stein et al., 2001; Valente, 1996; Wolfe and Hendriks, 2011).

Wolfe and Hendriks (2011) investigated the potential of the building industry to play a greater role in the water efficiency agenda. Their research recommended that local and provincial governments use new policy judiciously and instead look to networking, collaboration, and continuing education.

These were considered points of intervention for encouraging water innovation. Although originally conceived as recommendations for the building sector, this framework parallels more general research on the social basis for knowledge transfer described above and offers a basis for the recommendations made herein.

Section 2—Practitioners Equipped for the 21st Century: Recommendations for Moving Beyond Policies and Programming

There have been many terms (e.g. communities of practice, learning alliances, peer learning groups, knowledge management, social learning) used to describe what is essentially the formation of social-professional networks that emphasize "learning by doing" as a way of doing business. Many of the challenges regarding water that communities will face in the future will be, to some extent, unique, and are unlikely to be resolved with a one-size-fits-all solution. Tackling the "messy" problems of the future—challenges with a high level of uncertainty that may be site-specific—will require learning-by-doing and open information sharing for collective knowledge building. This type of problem solving will also necessitate resilient and resourceful water practitioners.

Thirteen recommendations for building capacity for a water-sensitive future in Ontario—and associated successful on-the-ground examples—are woven throughout the text of this section. Building on Wolfe and Hendriks' research (2011), these recommendations are divided into three broad categories:

- Networks;
- Collaboration; and
- Continuing Education.

2.1 Networks: Communities of Practice & Social Networks

When considering strategies to enhance network opportunities towards a desired end, establishing trust amongst members should be a core priority. Research has shown that trust is important because

> The strength of an interpersonal connection can also affect how easily knowledge is transferred. Individuals who communicate with each other frequently or who have a strong emotional attachment are more likely to share knowledge than those who communicate infrequently or who are not emotionally attached (Reagans and McEvily, 2003).

Introducing a water innovation expert to a network of professionals (e.g. realtors, home builders) may be more successful, for example, if executed through a trusted network champion. Two types of networks are explored in detail in this paper: communities of practice and social networks.

A **community of practice** (CoP) is defined as a group of people who share an interest, craft, or profession. It is through the process of sharing information and experiences with the group that the members learn from each other. The CoP can evolve naturally or can be formally created with a goal of gaining knowledge related to its field. The purpose of CoPs is to "allow people committed to addressing a particular issue or challenge to come together, regardless of their organizational affiliation, to collectively learn and progress organizational goals" (Wenger, 1998). These communities are based on commitment to a change process, rather than affiliation to organizational units (Keen et al., 2006).

In the water community, there are several relevant examples of effective CoPs. One example is the Green Infrastructure Ontario Coalition. It brings together a diverse group of government and industry associations, including conservation authorities, industry associations of landscapers, green roofs, and landscape architects. Its mandate is to encourage the progression of green infrastructure in the province through knowledge transfer and adoption of enabling policy. The Coalition has been active in documenting the benefits of green infrastructure, informing provincial policy, and orchestrating knowledge-sharing events.

Another prominent example of a highly effective community of practice is the Canadian Water and Wastewater Association's Water Efficiency Committee. It consists of municipal water efficiency practitioners, consultants, academics, and senior government staff. This CoP has been very successful in sharing experiential knowledge about water efficiency between diverse municipalities. It does this through monthly meetings, and also by generating novel, research-based knowledge through collaborative projects funded with shared financial resources (Wolfe, 2012).

The Canadian Water and Wastewater Association's Water Efficiency Committee has been credited with providing personal support for practitioners working to overcome the unavoidable adversity experienced in moving forward an innovation agenda. Face-to-face interactions and a sense of "having fun" were identified by participants as critical factors in the ability to support members in overcoming organizational problems, maintain the momentum to finish projects, and offer personal encouragement in difficult situations (Wolfe, 2008). "Under extraordinary conditions, such as the active dismantling of a WDM [water demand management] program or professional, internal-politics attack, social networks also provided invaluable support. An us-against-them mentality was easily kindled and individuals rallied their mentors, professional colleagues, and friends to generate strategies and supporting data or information, or to provide personal encouragement under difficult circumstances" (Wolfe, 2008).

Social networks are similar to CoPs in that they can be used to solve problems by generating and disseminating knowledge. They have been identified as an important construct for transferring experiential knowledge, sustaining the commitment to a water efficiency agenda and sparking innovation. A social network is a social structure made up of a set of actors, such as individuals or organizations, and the ties between these actors. They tend to be more extensive in size and less formally organized than CoPs, while sharing values and objectives. Within social networks, and through the efforts of a network champion, engaging practitioners in dialogue can be immensely powerful.

In this paper, gaps in current CoPs that must be addressed to take WSUD to the next level in Ontario are identified in the areas of green building incentive programs, rainwater harvesting, and watershed scale collaboration and knowledge transfer. A number of potential options therefore exist for establishing new—and participating in existing—networks to increase the capacity of policy-makers, planners, implementers, and adopters of WSUD practices.

Recommendation 1: Provincial Green Building Incentive Working Group

Interviews with municipal staff of green building incentive programs across Ontario revealed low rates of participation in many of these future-looking programs. Ontario's municipal innovators could overcome the initial roadblocks to program uptake by forming a working group to exchange knowledge and coordinate dialogue with builders—many of whom operate across municipal boundaries. Key to the success of this type of initiative is ensuring WSUD is sufficiently represented, both in terms of the professionals involved in the working group and within the incentive programs (i.e. water is not overshadowed by energy reduction initiatives).

Recommendation 2: Provincial Rainwater Harvesting Community of Practice

Rainwater harvesting is frequently proposed as an important practice for water supply and demand management, and also for stormwater management. However, in Ontario the practice of rainwater harvesting remains limited. Building on the network of rainwater harvesting experts and advocates established by a project at the University of Guelph (see Successful Example, Recommendation 11), an ongoing rainwater harvesting CoP could include innovators such as builders, educators, technology providers, architects, water managers, and water efficiency and stormwater management practitioners. The CoP should meet on a regular basis and be facilitated by a municipality, a service provider, academia, or a community organization. The group's objectives could be to identify research needs, share experiences, and work collaboratively to develop or progress new policies, practices, and education to encourage rainwater harvesting in Ontario communities.

Recommendation 3: Watershed-Scale Knowledge Transfer

Conservation Authorities (CAs) in Ontario have the distinct advantage of examining water issues at a watershed scale, enabling them to recognize the cumulative impacts of development decisions and the integrated nature of water, wastewater, and stormwater. In a coordinating role, CAs could bring municipalities together on a regular basis to discuss what is working and what is not working in water efficiency, low-impact development, and urban planning to facilitate opportunities for knowledge transfer from municipalities with more experience to those with less. This type of forum can lead to opportunities to collaborate on initiatives such as educational campaigns and watershed-wide guidelines, and assist municipalities in thinking more holistically about the impacts of upstream building and land-use planning practices on downstream communities. When planning events, informal exchanges should be prioritized. Informal events are preferred because when people are comfortable this type of exchange is often where knowledge is most easily shared and transferred.

Successful Example: Knowledge Exchange in the Grand River Watershed

The Grand River Conservation Authority (GRCA) hosted a knowledge-transfer event in June 2012 aimed at encouraging dialogue between large and small municipalities in the Grand River watershed. Municipalities within the watershed presented on barriers to water demand management, and five municipalities responded with ways they had overcome those barriers. An open peer-to-peer discussion followed each topic where ideas and challenges could be further explored by all municipalities.

Recommendation 4: Engage with Existing CoP's Outside Core Profession

Creating the time and budget for municipal staff to engage in CoPs outside of, but related to, their experience and role can expose them to new ideas and perspectives that may aid in moving beyond limiting beliefs about sustainable practices. For example, water engineering and planning staff who participate in low-impact development CoPs are more likely to understand the links between water and stormwater. WSUD practices may also be validated through exposure to new cultural norms and the experience of sharing with a trusted professional in another field.

Recommendation 5: Break Down the Silos Internally

Integrated planning practice remains a rarity in Ontario, particularly at the municipal level. Working to expand the social network of water practitioners beyond their core area of expertise could nudge water planning towards more integrated solutions. Meetings of working groups on resource areas, such as water, that naturally span different municipal departments—economic development, planning, water efficiency, wastewater, building departments—are essential to maximizing the impact of programs. For example, green housing incentive programs should receive ongoing input from water efficiency, energy efficiency, stormwater or low-impact development, planning, and water and wastewater engineering departments to optimize program design for maximum impact.

Conversely, green housing incentive programs should also be integrated into water efficiency, supply, wastewater, and stormwater planning. Importantly, regular contact builds trust and strengthens relationships between staff in different departments, effectively broadening their social networks of influence and increasing the likelihood of successful collaborations.

Successful Example: York Region Breaks Down the Silos

York Region completed its Long Term Water Conservation Strategy (LTWCS) in March 2011. York Region aimed to include the public and private sectors, municipal departments, and water, wastewater, and stormwater elements in its planning process. An excerpt from the LTWCS describing the project team illustrates the effort to look beyond water efficiency experts for input:

> The Project Team was led by a senior staff person from the Region's Environmental Services Department with guidance and support provided by other Regional departments for those elements of the strategy applicable to their specialization. For example, guidance and input on green building approaches and options was provided by the Planning Department while the Finance Department provided input and support on full-cost conservation-oriented pricing. Augmenting the staff team are five external consulting firms that have expertise in infrastructure and system design and optimization; public engagement and consultation; Soft Path and scenario development; and conservation programming and strategic planning. (p.48)

During a series of interactive workshops (Water Cafés), York Region sought involvement from stakeholders, including staff from the local Conservation Authority, the planning and engineering departments, and communications experts. Participants offered ideas for water conservation measures and collectively identified appropriate time frames for completing each measure. These workshops served to develop an integrated plan, and also to build relationships between the many different professionals that are required to execute a comprehensive plan.

Recommendation 6: Break Down the Silos Externally

Formal networking events for local champions and stakeholders in WSUD can begin the process of expanding social networks outside one's own organization. This is an activity that municipalities could assume or that could be organized by a community group or professional association interested in furthering WSUD.

Although conferences and workshops are a popular choice, the most effective forms of networking events have an informal element, such as sharing a meal. Care needs to be taken to effectively design the event to encourage conversations between practitioners with diverse experiences in a relaxed setting. Less is more. Techniques can range from icebreaker activities and small group discussions, to facilitating one-to-one lunches or dinners.

Recommendation 7: Look Beyond the Backyard

Knowledge gained from political or geographical contexts different from one's own can be perceived as having little relevance if only context-specific comparisons are considered. However, dialogue between practitioners working toward a common goal (e.g. reducing water demand) but from very different backgrounds can dismantle belief systems and allow challenges to be perceived in new ways. Retreats, tours, "un-conferences," and site visits that take practitioners out of their day-to-day realities and expose them to practitioners who have embraced a different set of approaches are all options. Planned well in advance and with effective follow up afterwards, these events can help broaden horizons and expand social networks

Successful Example: Innovation Tours Lead to New Insights & Capacity

In Australia, a group of practitioners initiated the "Transition to a Water Sensitive City Tour" in 2005, initially travelling to North America. In 2009 another group of young leaders went on a two-week tour of Europe and Singapore to infuse their thinking with fresh ideas and perspectives. In 2012 the tour was repeated, this time with a group of 18 young water professionals from 14 organizations—most of which represented local governments and utilities. They travelled to Singapore, the U.K., Sweden, Germany, and The Netherlands with an aim "to build a network of emerging leaders in Australian cities to positively influence the transition to a water sensitive future" (Water Sensitive Cities 2012 Study Tour, 2012).

A similar initiative led by Angela Evans, Sustainability Facilitator at Canada's Fraser Basin Council, involved 24 professionals touring smart ways to deal with wastewater in British Columbia. The tour was dubbed the "sewage innovations tour" and participants ranged from local councillors to provincial policy staff. Following the tour, Cowichan Lake Councillor Jayne Ingram illustrated the transformational effect this kind of exposure can have, reporting "I now feel quite comfortable talking to the superintendent of Public Works about sewage treatment and what the options are" (Fraser Basin Council, 2012).

A prominent non-profit organization in the United States, The Conservation Fund, coordinates the Green Infrastructure Planning Peer Exchange Program. The program is "designed to facilitate peer-to-peer learning by covering the travel costs for a site visit. These visits can range from one to three days, may include travel for one to five representatives, and can be hosted by either the entity seeking expertise or the entity offering assistance. While formal training is a key component of any learning experience, the objective of the peer exchange program is to further green infrastructure initiatives by delivering valuable opportunities to speak with those who have faced the same challenges and developed possible solutions for delivering on-the-ground results" (Conservation Fund, 2012).

2.2 Collaboration

Government staffing is increasingly strained with reduced budgets and a desire to operate efficiently. Municipalities can address this constraint by seeking out and leveraging partnerships with organizations that have developed capacity and expertise in a specific area. Conversely, community organizations with a mandate to serve the public and protect the environment can benefit by seeking out and coordinating collaboration with local governments, business, academia, professional associations, and other organizations to further their reach. Another type of collaborative relationship that can assist municipalities in realizing economies of scale is with other municipalities that share similar interests.

Recommendation 8: Municipal Partnerships

Informal and formal municipal and utility partnerships have been used for a wide variety of activities: joint funding applications for water efficiency programs, co-funded research projects, educational campaigns, and knowledge-sharing. For example, municipalities participating in the Marin-Sonoma Saving Water Partnership in California worked together on state infrastructure grant applications to solicit funding for water conservation measures. In Ontario, the Region of Waterloo, City of Cambridge, City of Guelph, City of Kitchener, and City of Waterloo partnered on an educational campaign to promote municipal tap water (Municipal Tap Water Providers, 2012).

A partnership between municipalities could be used to develop a joint social marketing campaign to encourage homebuyers to consider green homes with WSUD or to increase awareness of a specific green home certification or label (see Maas, 2012). Other possible partnerships could include piloting innovative technology, technology monitoring programs, producing guidelines, customized labelling, or incentive programs.

Recommendation 9: Municipal-Social Enterprise Partnerships

Local social enterprises and community organizations are typically already well-connected to a network of citizens and other stakeholders. Specifically, organizations that are set up for the purpose of delivering education, auditing, and administering financial incentive programs make natural partners in the delivery of innovative municipal programs in a cost-effective manner.

Member organizations of Green Communities Canada typically have experience in delivering a range of education programs to residents, offering energy and/or water auditing services, and in some cases administering incentive programs. For example, in Kitchener local groups, including Community Renewable Energy Waterloo (CREW), REEP Green Solutions, and Faith and the Common Good, have been active in both encouraging and facilitating local programs ranging from the Kitchener Green Housing Incentive Program to the REEP RAIN program, which educates homeowners about stormwater credits in Kitchener and Waterloo.

Successful Example: The RAIN Program

RAIN is a joint community-based social marketing program. The program motivates action toward reducing non-point source pollutants entering Ontario's lakes and rivers via storm sewers. RAIN aims to provide practical solutions to help people reduce the quantity and increase the quality of the water that flows from their properties.

In 2012, the RAIN project in the Cities of Kitchener and Waterloo received funding from the Ontario Ministry of the Environment's Showcasing Water Innovation fund. The project is a four-way partnership with the City of Kitchener, City of Waterloo, REEP Green Solutions, and Green Communities Canada. The cities receive information on practical, on-site stormwater abatement measures that landowners can use to potentially qualify for rebates under the new stormwater utility program. The result is that the cities benefit by seeing a reduction in the volume of water entering stormwater management infrastructure. A social enterprise such as REEP Green Solutions with its strong community connections and a proven record of educating the public means these skills do not have to be reinvented within government. Among REEP's offerings is the REEP House for Sustainable Living, which offers tours and open houses that showcase low-impact development features such as water cisterns, a rain garden, permeable paving, and drought tolerant native plant gardens. In turn, this partnership enabled REEP to secure ongoing funding for its programming, and the associated municipal endorsement benefits the project by enhancing the legitimacy of the message.

RAIN is an example of a win-win partnership between local governments and a social enterprise.

Recommendation 10: Water and Energy Utility Partnerships

The Ontario Power Authority has a mandate to improve energy efficiency as the most cost-effective method of addressing electricity supply issues (Ontario, 2010). Given the relatively large energy consumption of municipal water and wastewater treatment and pumping in Ontario, combined with the use of electricity and natural gas in hot water tanks in homes, it is highly likely that partnerships between energy utilities and water utilities will be considered valuable in the future (Maas, 2010). Given that establishing trust between water utilities and customers influences participation in municipal programs to encourage WSUD, water providers should carefully consider the advantages and disadvantages of relinquishing control of the interface with customers to an energy utility.

Recommendation 11: Partnerships with Academia

Partnerships between the private sector, municipalities, and academia can provide opportunities to share the risk associated with an innovative project and infuse the initiative with new ideas and perspectives (Wolfe and Hendriks, 2011). For example, the City of Guelph partnered with the local university to install and monitor several rainwater harvesting systems in the city with an aim to build capacity for large-scale rainwater harvesting. Benefits may include improved access to grant programs, availability of students for monitoring the water savings of a given project, and developing local capacity for a particular technology or practice.

Successful Example: University of Guelph Partnership Creates New Network

In 2005, the City of Guelph partnered with Dr. Khosrow Farahbakhsh at the University of Guelph, along with Reid's Heritage Group, Evolve Builders Group Inc., the Ontario Centres of Excellence, and Canada Mortgage and Housing Corporation (CMHC) to form a partnership to investigate the barriers to rainwater harvesting (RWH) in Ontario and the means for building capacity to overcome these barriers. Upon the formal completion of the project in 2008, the initial partners and a number of additional stakeholders expressed a strong desire to maintain and build upon the momentum that had been generated by the group. As such, Dr. Farahbakhsh and his master's students assembled the interested stakeholders in June of 2008 for a next steps strategy meeting.

One of the more significant gaps identified at the meeting was the need for technical guidance documents for engineers and contractors. A technical review committee was formed from interested members at the meeting and funding proposals were developed and submitted by Dr. Farahbakhsh's group. The major partners for the development of the guidance documents included the Ontario Ministry of Municipal Affairs and Housing, Alberta Municipal Affairs, and CMHC. Through this partnership a national perspective was provided to the guidelines and two province-specific versions were created: the *Ontario Guidelines for Residential Rainwater Harvesting Systems* and *Alberta Guidelines for Residential Rainwater Harvesting Systems*. Another document provided the national guidelines for residential RWH for CMHC. In addition, a one-day course was also developed to provide technical training for various stakeholders engaged in RWH. Through partnership with Toronto and Region Conservation Authority, a technical design tool, which was partially completed as a master's thesis project, was further developed and enhanced.

An organic offshoot that occurred during the development of the guidelines documents was that the technical committee worked together to generate ideas on how the Ontario Building Code could be modified to improve the water savings benefits of RWH and to facilitate easier RWH system retrofits in existing buildings. The group then submitted their recommendations to the Province for consideration in the development in the next edition of the building code. Another beneficial spinoff of this project was that one of the graduate students, Chris Despins, was able to form a consulting company offering rainwater harvesting expertise to municipalities and organizations across Ontario.

2.3 Continuing Education

Enhancing practitioners' proficiency in implementing, cost estimating, and marketing WSUD practices will require the participation and development of an entire ecosystem of trades and professionals. In particular, enhancing the knowledge of the professionals that interact with and are trusted by the public can leverage resources for outreach. Wolfe and Elton (2010) suggested, for

example, that professional plumbers are essential to both preventing faulty installation of water efficient fixtures and "directing innovations beyond existing compliance levels."

Practitioners such as builders, realtors, technology providers, planners, engineers, plumbers, and inspectors will need to be prepared to support WSUD projects from inception to final approval. The most effective way to ensure this support is to engage existing networks, professional associations, and local special interest groups to train and educate their own practitioners.

Informal and formal training for building industry professionals was identified as a core strategy in the practices of innovative builders by Wolfe and Hendriks (2011). Training opportunities can take a variety of forms, many of which, such as college and certification programs, are most logically delivered at the provincial or federal level. However, much can be done at the local level, particularly in terms of raising awareness about water-sensitive practices.

For example, in the Region of Waterloo water efficiency staff are actively working to bring the Green Plumbers program to Canada. They are approaching this by collaborating with a social enterprise (REEP Green Solutions) and an environmental organization (Great Lakes United) to deliver a water-sensitive design session to the local Association of Realtors. The Region has also delivered a workshop on naturalized landscaping to landscape and irrigation professionals.

Recommendation 12: Building Relationships with Professional Associations

Many local or provincial associations have annual meetings where members are provided with educational seminars. These seminars are often a prerequisite towards a professional certificate. Association meetings are ideal intervention points as attendance is typically high and marketing is often unnecessary. Care should be taken to ensure the presenters and content of presentations are suited to the audience, ideally having an industry professional introduce or deliver the material to increase the likelihood of success. Dialogue, relationship-building, and sharing water expertise with network hubs (i.e. highly connected individuals) is key to effective knowledge transfer and diffusion of innovation into each sector as a whole.

Opportunities to inform the many trades and professionals that influence end-use water decisions include:

- local real estate associations;
- local associations of the Ontario Home Builders Association[1];
- apartment, property, and condo management associations[2];
- landscape associations, local chapters of Landscape Ontario[3];
- local plumbing association chapters[4];
- home inspectors, Ontario Association of Home Inspectors (have local monthly meeting groups)[5]; and
- building and plumbing inspectors, local chapters of Ontario Building Officials Association, local branches of Ontario Plumbing Inspectors Associations.[6]

[1] Ontario Home Builders Association: http://ohba.ca/local_associations
[2] Canada Apartment Buildings Association: http://canadianapartmentbuildings.com/Ontario-apartment-associations
[3] Horticultural Trades Association: http://www.horttrades.com/
[4] United Association: http://www.uacanada.ca/about_find_local.php
[5] Ontario Association of Home Inspectors: http://www.oahi.com/
[6] Ontario Building Officials Associations: http://www.oboa.on.ca/cgi-bin/bod/
Branch info at: http://www.opia.info/members/index.php?option=com_content&view=article&id=179&Itemid=94

Recommendation 13: Technical Training for Practitioners

In-depth training programs are also a valuable addition to municipal water efficiency programs and useful tools for industry associations. They are particularly important for municipalities looking to prepare an industry prior to a new policy change. For example, the Abbotsford Mission Water and Sewer Commission (AMWSC) in British Columbia hosted a workshop run by the American Rainwater Catchment Systems Association (ARCSA), which included a one-day public event and a two-day ARCSA certification course.

Other examples of future-looking training opportunities include:

- **Rainwater Harvesting Training** for practitioners. Training is offered by:
  - CSA[1];
  - ARCSA[2]; and
  - Credit Valley Conservation, Toronto and Region Conservation Authority, and the Canada Green Building Council (offer a collaborative training program).[3]
- **Low Impact Development Techniques Training** (e.g. green roofs, infiltration technologies). Training is offered by:
  - Green Roofs industry association[4];
  - Ontario Green Infrastructure Coalition[5];
  - Green Communities Canada (e.g. through its RAIN program); and
  - Credit Valley Conservation (offers low-impact development construction training).[6]
- **Performing Topsoil Layer Training**. This topic could be informed by:
  - *Soil Management Best Practice Guide for Urban Construction* (Sustainable Technologies Evaluation Program, 2012);
  - the topsoil primers produced in British Columbia (Green Infrastructure Partnership, 2010); and
  - identifying a suitable expert.
- **Industrial and Commercial Water Reuse & Recycling Training**. This can be done by bringing together existing and prospective industries to discuss the benefits, end uses, and incentive programs for recycling water within a facility, or between facilities in close proximity. Discussion of how to overcome obstacles such as financing, sewer-use bylaws, and implementation expertise should be anticipated.

[1] CSA Training: http://www.csa.ca/documents/training/SSP-PRWH-EN.pdf
[2] ARCSA: http://www.arcsa.org/
[3] Rainwater Harvesting Training through CVC, TRCA and CGBC: http://www.connectthedrops.ca/services
[4] Green Roofs Industry Association: http://www.greenroofs.org/
[5] Green Infrastructure Ontario: http://www.greeninfrastructureontario.org/
[6] CVC: http://www.creditvalleyca.ca/low-impact-development/lid-events/

Conclusion

Suggesting that individuals work together or that networking is important is not new—these concepts are well-known to most professionals. The novelty arises from the acknowledgement that action is precipitated and supported in large part through social processes. Recognizing these social processes helps ensure that the social "infrastructure" for practitioners is seen as equally important to new policy, and invested in as part of policy development. This paper is not intended to provide a

comprehensive suite of detailed solutions. However, the recommendations illustrate the types of social processes that can build the professional capacity for WSUD in an intentional manner.

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