

Stormwater management: build a vision, create a legacy

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For thousands of years, urban development has involved cutting and clearing, ditching and draining, and paving and piping. In more recent decades, we've learned that unless we change the way we manage our urban development and stormwater in association with our aquatic ecosystems, we will continue to needlessly foreclose opportunities to sustain our overall community well-being.

With this awareness, the challenge is really about decisions made in our communities on a day-to-day basis, even down to how we develop and use each site. Our society is now setting out to bring about change in the way that land is developed and/or redeveloped – so that people, natural systems, and property can be protected and supported; and then, over time, natural systems can be restored to a healthy condition.

We've begun to look at day-to-day through to long-range decisions with a focus on watersheds, and with reference to an ecosystem perspective. Gary Williams illustrates this perspective as a set of interacting circles linking physical, biological, and human processes.

David Crombie linked watershed/ecosystem perspectives with decision-making for sustainability in his work as Commissioner for the Future of the Toronto Waterfront. He described the ecosystem simply as "home – it's not out there." He also challenged us:

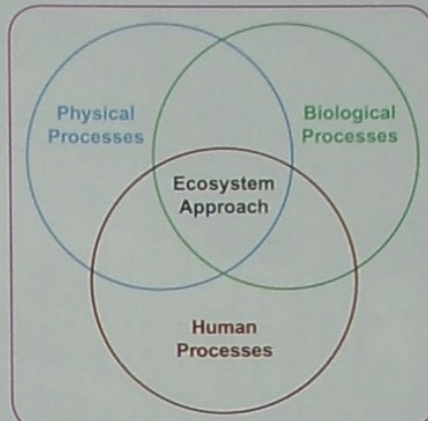
"Unless we regain an awareness of humans as being part of the ecosystem, and unless we respond to that awareness by changing the processes and criteria of decision-making, we will not be able to improve, and we will even lose, the quality of life for which so many generations have laboured."

In an article titled "Stormwater Paradigms", Andy Reese insightfully looks back at why we pursued stormwater management in ways, which unknowingly – at the time – foreclosed opportunities for more sustainable, livable communities. Reese describes a paradigm shift:

"It's what we think is true and right about a certain subject. It's the grid through which we put all information and input about a subject. In fact, it's everything we think is true about something. If we thought there were more to know, we would fit it into our paradigms somewhere. Whether our paradigm is in fact true and effective is not the point. We believe it is."

And we only reluctantly change our ways and agree with someone else's paradigm. Stormwater management is full of cantankerous people with strongly-held opinions."

He then traces nine such shifts against the backdrop of social change. They are:



Ecosystem Approach

Source: Gary Williams

- Paradigm 1 – Run it in ditches
 - Paradigm 2 – Run it in pipes
 - Paradigm 3 – Run it in stormwater pipes
 - Paradigm 4 – Keep it from stormwater pipes
 - Paradigm 5 – Well, just don't cause flooding
 - Paradigm 6 – Oh, and don't pollute either
 - Paradigm 7 – It's the ecology, stupid
 - Paradigm 8 – Water is water is watershed
 - Paradigm 9 – Green and bear it
- Paradigm 3 generally reigned from after World War I until the 1970s or so. The modern urban stormwater infrastructure was born, consisting of an efficient drainage system with catch basins and pipes leading to the nearest stream.

From a British Commonwealth perspective, Paradigm 3 can be described as an enlightened Edwardian view. It is consistent with the Lee report of 1913 that provided the town planning framework for the Vancouver metropolitan region. Apart from the cities of Vancouver, Victoria, and New Westminster, separated sewers were constructed during and after the First World War. Prior to the 1910s, urban runoff would have been heavily contaminated with horse manure... so the difference between sanitary and storm quality likely was not great.

Some time after World War II it became apparent to engineers throughout North America, that the fruit of an efficient stormwater system is downstream flooding and channel erosion. This resulted in a new idea to solve flooding forever: on-site detention (Paradigm 4).

In the 1970s, the literature began to reflect a new concept: stormwater master planning. The idea was that we could construct a hydrology model (how much water, how often?), and a hydraulic model (how fast and high does the water from the hydrology model go?) of a watershed and then do "what if" analyses until we found the perfect solution to flooding problems – current problems and those only imagined. In reflecting on the transition from Paradigm 4 to Paradigm 5, Reese notes that:

"By 1985, hundreds of master plans had been developed, and one or two were actually built the way they were planned. This led to the coining of a new understanding of how the world really works, called the 'Hydro-Illogical Cycle'. In this cycle, local governments proceed from flooding to panic to planning, and then to procrastination until the next flood. 'Round and 'round they go.'"

In the late 1980s, a new breed of paradigms emerged. Each solved the immediate problem of the past paradigm and created a more insidious problem of its own. Knowledge and technology created a real or perceived need for higher, more demanding levels of stormwater management – and regulation.

It's not that these past paradigms have disappeared. They are alive and well in various parts of the North American continent.

Being aware of the new paradigms makes it increasingly less acceptable to do business as usual. The challenge ahead is to define and then actually demonstrate that a healthy watershed approach produces the full range of effective results efficiently.

The authors have identified a tenth paradigm that reaches beyond stormwater and associated professionals to engage broader society. The "Tenth Paradigm" will involve a three-prong attack using a combination of high tech inventions (commercial devices); a focus on the true sources of urban pollution; and, a wholesale transformation of society's relationships with water (like anti-smoking or anti-litter), so that the very fabric of society changes over a generation to appreciate and learn to live with urban nature in all its dimensions.

We can begin to think about the Tenth Paradigm as one involving making decisions aimed at achieving healthy urban watersheds. This reflects the changes taking place in the Georgia Basin (i.e. the region that

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extends from the east coast of Vancouver Island to the eastern end of the Fraser Valley).

From the 1970s through the 1990s, the standard approach to stormwater master planning can be described as "Characterize What We Have" – because the starting point has been data collection and technical analysis. In contrast, deciding what we want means we start with a common understanding and a shared vision of the future *Target Condition* for a healthy watershed. Hence, the Tenth Paradigm is *Build the Vision, Create a Legacy*.

Having a Target Condition provides a direction for the long-term processes of change. An Action Plan then provides a 'road map' for getting there over time by identifying:

- interconnected nature of goals, values and expectations;
- the risks and the opportunities;
- what needs to be done to manage the risks and achieve the opportunities;
- who should be responsible; and
- a general timeline for implementation.

This 'road map' approach addresses the goal of protecting people, natural systems, and property; and then over time striving to move impacted watersheds towards a healthier condition. In the final analysis, the objective may not be to restore all urban watersheds. Rather, achievable and affordable performance targets for improving individual watershed health will be set as part of a stakeholder visioning process.

But fundamental change in the scope of stormwater planning, development standards, construction, and operations will only happen if there

is a broad understanding as to why the changes are needed, what they are, and how they can be practically implemented.

Publicly-supported decision-makers will determine the timing and phasing of change. The ability of consumers and the development community to adapt will then set the pace of change, which will not take place with a single event. Success in one area will be transferred to others. As the full benefits of these changes will be realized decades from now, continuation with *status quo* practices will only result in more lost opportunities; therefore, we must continue the changes if we want to realize a vision for healthier watersheds. ☺

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