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Innovation

**Watershed-systems Thinking
Meets Asset Management**

**Reconciliation and BC's
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2016 President's Awards

Sustainable Watershed Systems

Nature's Assets Provide Vital Community Infrastructure Services

Kim Stephens, P.Eng., Glen Brown and Brian Bedford

In North America, community asset management traditionally focuses on hard engineered assets—water mains, sanitary and storm sewers, roads, and so on. However, communities are starting to recognise the value of natural assets and their role in local government service delivery, and to include natural assets in their asset management programs.

Natural assets include urban forests, soils, streams and aquifers, as well as broader watershed systems. Watersheds are natural, integrated systems that absorb

precipitation across a landscape, and convey it slowly via shallow and deep groundwater pathways to streams.

Although not all watershed ecosystem services provide specific community functions, they contribute to community functioning. Aquifers, for example, store drinking water. Trees, soils, green spaces, wetlands and waterways intercept, store, filter, and convey rainwater, and lessen the likelihood and severity of flash floods during storms—often at less cost than hard engineered assets do.

Typical community planning and infrastructure servicing practices in the past have led to extensive hard-landscape surfaces that have eliminated natural drainage and disrupted or short-circuited the water-cycle (water-balance) within urban watersheds. The results include two extremes: drying creeks, wetlands and aquifers, and flash flooding.

Restoring hydrologic integrity, and thus the water balance, is key to a water-resilient future, and one of the aims of BC's new *Water Sustainability Act*. As communities are finding, failure to protect

The New Paradigm

Watersheds as Infrastructure Assets

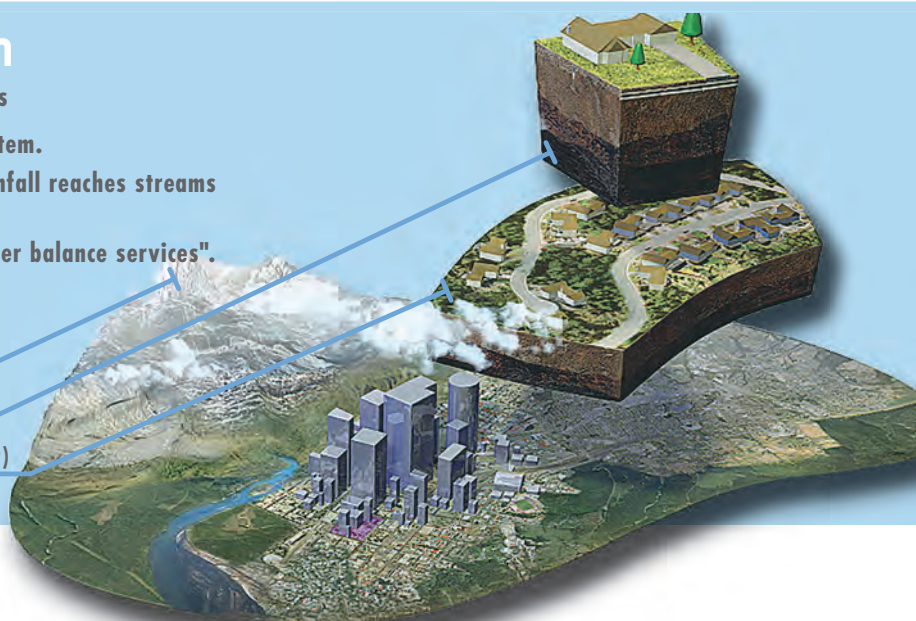
- A watershed is an integrated system.
- The three pathways by which rainfall reaches streams are "infrastructure assets".
- The three pathways provide "water balance services".

The Three Pathways are:

over the land surface

deep vertical to groundwater

shallow horizontal through soil (interflow)



Extensive hard-landscape surfaces can disrupt drainage patterns within urban watersheds, leading to two possible extremes: drying rivers, streams and wetlands (THIS PAGE PROVINCE OF BC CC BY-NC-ND 2.0), and flash flooding and erosion during storms (NEXT PAGE BC MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE CC BY-NC-ND 2.0).



water-balance pathways carries financial, level-of-service and lifecycle costs for taxpayers. These costs include expensive and ongoing fixes in an era when local governments are challenged to fund and replace aging built infrastructure.

On the other hand, protecting functioning water balance pathways in community watersheds can:

- Decrease liability resulting from drought or flood,
- Reduce capital and operational costs, and
- Increase natural watershed/water-balance services at less cost.

As such, communities would benefit from shifting their definitions of

community infrastructure to include entire watersheds. Including the components and pathways of a watershed system among infrastructure assets, managing them as integrated systems to maintain the natural water balance within communities, and protecting them would help communities avoid incurring expensive fixes and unfunded liability. This kind of watershed-systems thinking includes all components of a watershed, and encompasses both human and ecosystem needs.

Shifting Community Asset Management to Include Watersheds

The Partnership for Water Sustainability in BC, a not-for-profit society that promotes and advances the protection

and management of natural and engineered water resources in BC, Asset Management BC, the Union of BC Municipalities, and the Province of BC share a commitment to an integrated, whole-systems approach to community development and infrastructure servicing. These partners are working together to advance integration of watershed assets into everyday community infrastructure planning and management through a recent provincial initiative called *Asset Management for Sustainable Service Delivery: A BC Framework*.

Launched in 2015, the BC Framework links directly to and provides support and guidance in meeting the asset management requirements under the Gas Tax Fund. Stakeholders such as the Province, Union of BC Municipalities, Local Government Management Association, Government Finance Officers Association, Public Works Association, Planning Institute of BC, BC Water and Waste Association, and others, have endorsed it as *the* framework for asset management in BC.

The role of local government is to deliver services, and the end goal of asset management is achieving sustainable service delivery. The BC Framework is a powerful tool for local governments to focus community planning and infrastructure decision-making processes on beneficial lifecycle outcomes right from the start—making it a game-changer. It encourages local governments to plan for and act to support seamless sustainable delivery of services to their communities—and to protect, preserve, restore, and manage their natural assets in the same way they manage their hard engineered assets.



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Together, the partners strive to integrate watershed-systems thinking into the BC Framework. They look to use the framework to initiate intergenerational processes that institutionalise standards of practice in planning, engineering, environment, and finance that create water-resilient communities. The desired outcome is Sustainable Watershed Systems through Asset Management.

Community Empowerment

The Province recognises that communities are in the best position to meet their own unique needs and local conditions. The BC Framework's top-down and bottom-up approach relies on education, enabling tools, and collaboration to turn ideas into action.

Communities are diverse. Asset management, and the best practices

that support it, must be scalable to community size, character, and capacity. The BC Framework focuses on desired outcomes rather than prescribed methodologies. This gives local governments the flexibility to develop and implement measured and incremental approaches tailored to the needs and capacities of their communities.

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Asset Management Continuum for Sustainable Service Delivery

As understanding grows, local governments will progress incrementally along the Continuum.

Ground Zero: No Asset Management Plan exists. A consequence is unfunded infrastructure liability.

Step One: Local governments embrace the BC Framework, with an initial focus on core engineered assets, and embark on an asset management strategy.

Step Two: Local governments start thinking holistically and implement a life-cycle approach to infrastructure decision-making; sustainable service delivery for engineered assets becomes standard practice.

Step Three: Local governments integrate natural systems thinking and account for the water-balance services provided by watershed systems.

Communities that embrace sustainable service delivery typically seek to address three general objectives:

- To more effectively manage, in the face of scarce resources, the infrastructure and assets that underpin quality of life and economic productivity,
- To contain costs, taxes and risks, and
- To maintain community resilience in the face of challenges, especially climate change and weather extremes.

The BC Framework sets strategic direction for asset management and

its implementation in BC. It gives communities guidance to apply science-based methodologies and tools to plan for sustainability and resilience. Most critically, it encourages communities to think about what asset management entails at the land-use planning stage, when levels of service that can be provided sustainably—fiscally and ecologically—are determined.

Tools and Support

With the BC Framework providing a roadmap for developing holistic,

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The BC Framework encourages local governments to plan for and act to support seamless sustainable delivery of community services and to manage natural assets in the same way they manage hard engineered assets.

integrated and incremental approaches to asset management, community asset management becomes an integrated process that combines skills, expertise and activities with information about a community's physical assets and finances to make informed decisions that support sustainable service delivery. Asset management for sustainable service delivery occurs alongside associated evolution in community thinking. It is a continuous quality-improvement process, is incremental and scalable, and involves three key stages:

1. Assessing capacity, demand and results,
2. Planning what needs to be done,
3. Implementing the plans.

A local government would experience the asset management process for sustainable service delivery as a continuum that leads, in this case, towards a water-resilient future.

Asset Management BC works to ensure understanding and application of sustainable service delivery methodologies, provide related tools and support knowledge transfer. The Georgia Basin Inter-Regional Education Initiative, led by the Partnership for Water Sustainability, supports implementation of fully integrated sustainable service delivery by providing the technical foundation for Sustainable Watershed Systems through Asset Management.



The process includes process components beyond development of a plan that are necessary to:

- Refocus business processes to properly manage community natural infrastructure within the built environment,
- Understand the lifecycle implications of managing built and natural environments as integrated components of a healthy watershed, and
- Inform and educate elected representatives, staff, and the community.

(CONTINUES, PAGE 31)



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Pathway to a Water-resilient Future

A watershed is an integrated system. Protecting headwater streams and groundwater resources in BC requires that communities expand their view from one that looks at a site in isolation to one that considers all sites, the watershed landscape, streams and foreshores, groundwater aquifers, and so on, as an integrated system.

Asset Management for Sustainable Service Delivery: A BC Framework links local government services, the infrastructure that supports service delivery, and watershed health. Achieving sustainable watershed systems through asset management will need long-term commitment by communities, successive municipal councils and regional boards, and generations of land and water professionals. ☒

Partnership for Water Sustainability in BC Executive Director Kim Stephens, P.Eng., has led a series of initiatives related to water sustainability, rainwater management and green infrastructure in the province. Since 2003, he has been responsible for delivering BC's Water Sustainability Action Plan. The Partnership provides services on behalf of government.

Glen Brown was a BC government executive director before becoming the Union of BC Municipalities' General Manager, Victoria Operations. With Wally Wells, Glen helped establish Asset Management BC and led development of Asset Management for Sustainable Service Delivery: A BC Framework.

Brian Bedford is Director, Infrastructure and Engineering, with the BC Ministry of Community, Sport and Cultural Development. He administers infrastructure funding programs for BC local governments, encouraging innovative infrastructure solutions, and supporting asset management.

To learn more about Asset Management for Sustainable Service Delivery: A BC Framework and how to apply it to local community watersheds, attend Stephens et al.'s session, Sustainable Watershed Systems Through Asset Management, October 20 at APEGBC's annual conference.



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