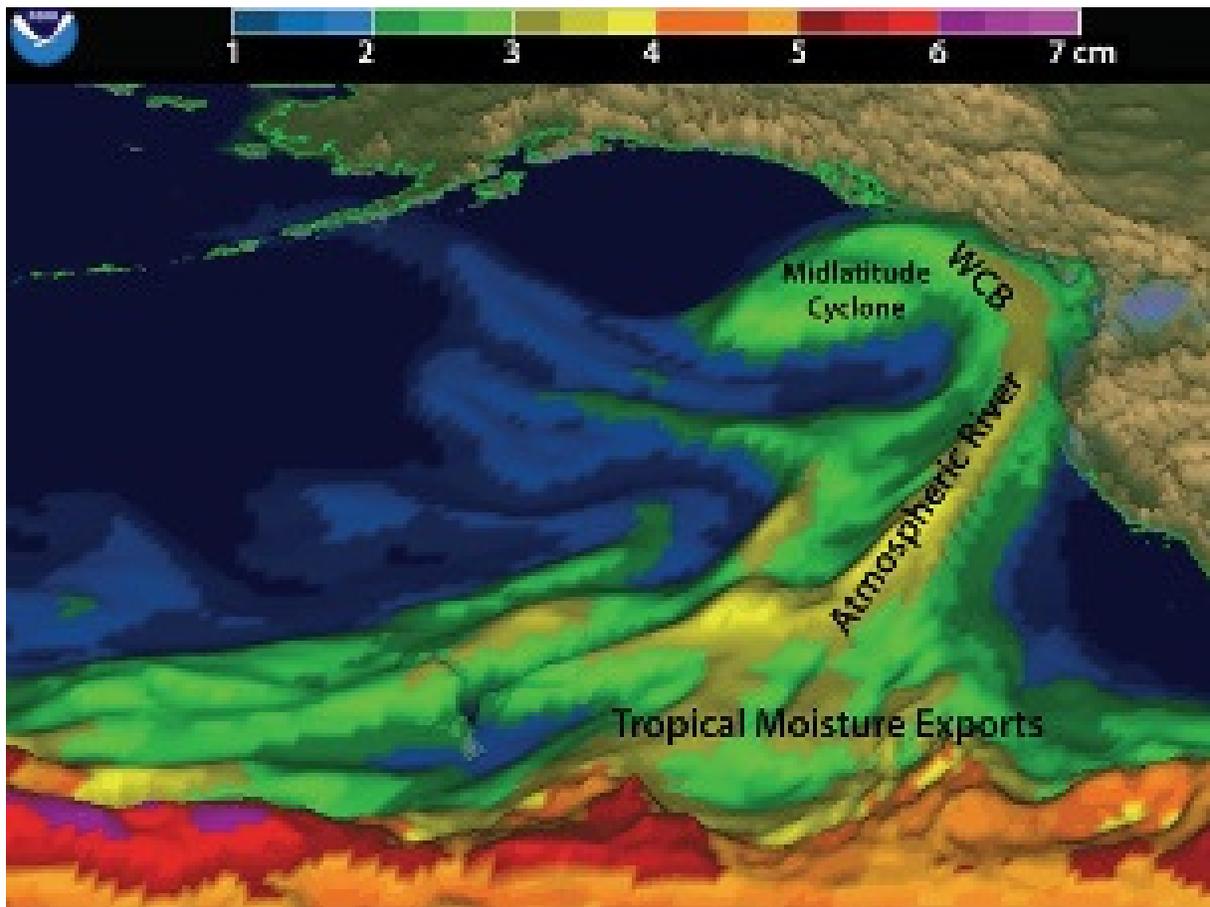




the partnership
for water sustainability in bc

Flood, drought, fire, wind and cold – because extreme events are becoming the norm.....

Communities need to progress along a continuum to achieve
“Sustainable Watershed Systems, through Asset Management”



DID YOU KNOW THAT: The impact of the Pineapple Express is magnified because 7% additional water volume is conveyed by atmospheric rivers for each degree of global temperature rise!

Planning for a water-resilient future: Governments of Canada and British Columbia fund water balance tools and resources for climate adaptation action –

To learn about an array of 11 online tools, visit the rebuilt waterbalance.ca website!

Local governments in British Columbia already face a \$200 billion challenge for renewal of aging hard infrastructure - such as watermains, sewers and roads. And now, as communities face the increasing impacts of climate change, there is another unfunded liability – the cost to restore watershed hydrology and water resilience in the built environment. British Columbia has arrived at a fork in the road. How, and how quickly, will communities respond? And how will they adapt over time to the New Normal?

[Asset Management for Sustainable Service Delivery: A BC Framework](#)¹ provides a financial driver for local governments to integrate a **whole-system, water balance approach** and climate adaptation into asset management. Outcome-oriented, the BC Framework sets a strategic direction to reduce life-cycle costs and risks. It also encourages ‘design with nature’ actions on the land. The benefits would ripple through time and accumulate to restore the water balance in the built environment.



In March 2017, the governments of Canada and British Columbia announced program funding for [Sustainable Watershed Systems, through Asset Management](#)². This initiative supports the BC Framework. The goal is to transform how local governments and others think about the drainage function - so that they will value ‘watersheds as infrastructure assets’ when making decisions about land use, infrastructure servicing and asset management policies and practices.

¹ http://waterbucket.ca/wscblog/files/2015/01/Asset-Management-for-Sustainable-Service_Delivery_A-Framework_for_BC_Dec-2014_short-version.pdf

² <http://waterbucket.ca/rm/category/sustainable-watershed-systems/>



Ted van der Gulik

President, Partnership
for Water Sustainability

“Climate change is real. Adapting to it begins with an attitude change towards water. Once that happens, it is possible to bridge the gap between talk and action.”

“Still, getting to a water-resilient future will require transformational changes in how we apply hydrologic knowledge, value nature as an asset, and service land.”

“The Partnership mission is to provide local governments with tools and resources that will help them do that.”

The Implementation Challenge: How to Transition from Awareness to Action

The professional development and outreach program led by the Partnership for Water Sustainability in BC (“the Partnership”) is progressing on multiple fronts to develop approaches, tools and resources that would achieve this educational outcome:

Build practitioner capacity to implement a whole-system, water balance approach within the built environment.

The warming of the planet’s atmosphere is causing water to move more quickly and disruptively through the global water cycle. Flood, drought, fire, wind and cold - extreme events are becoming the norm. Instabilities in the water cycle are increasingly apparent.

All one need do is reflect on what British Columbia has experienced in 2015, 2016 and 2017. Impacts are magnified by human interventions.

Program Deliverables: The situation calls for a whole-systems approach to managing the water balance distribution where people live. In September 2017, the Partnership announced that:

- The **Ecological Accounting Protocol** (EAP) approach to valuing watersheds as infrastructure assets is being tested through demonstration applications in the Cowichan and Comox valleys on Vancouver Island.
- Three more guidance documents in the **Watershed Case Profile Series** will be released imminently.
- Three symposium-style events are upcoming in the period November 2017 through April 2018 in the Metro Vancouver, Capital Region and Nanaimo Region.
- And, waterbalance.ca is the homepage for **Sustainable Watershed Systems, through Asset Management**.

A new tool is the **Water Balance Model Desktop** It provides an advanced problem-solving capability. Its appeal is that the process for applying it would help communities create a vision of the desired future water balance for a watershed, and the steps to achieve it.

Water Balance Tools & Calculators

Comprehensive and coordinated use of the 11 decision support tools listed below, and accessible from waterbalance.ca, would assist communities on their journeys to a water-resilient future:



Dr. Charles Rowney

Scientific Authority,
Partnership for Water
Sustainability in BC

Director of Operations,
Center for Infrastructure
Modelling & Management

“The current industry-wide move to on-line computation, propelled by changing approaches to software delivery as a multitude of enterprises commit to The Cloud, is hugely important.

“The leadership shown by the Partnership for Water Sustainability in decisively moving in this direction well over a decade ago has led to a body of knowledge from which others can learn.”

- **Water Balance Model Desktop (NEW)** - Facilitates application of the Water Balance Methodology (WBM) to establish watershed-specific performance targets. In turn, this would support use of EAP. These are the twin pillars of the whole-system, water balance approach.
- **Water Balance Model Online (ENHANCED)** – A planning tool for assessing green infrastructure effectiveness at neighbourhood or individual property scales. Compare scenarios for runoff reduction. Modules include: Climate Change, Stream Erosion, Tree Canopy Rainfall Interception, Rainwater Harvesting.
- **Water Balance Express (ENHANCED)** – An interactive tool for homeowners. Created to spur changes in practice. Click and drag components. Learn what it means and how to slow, spread and sink rainwater that runs off hard surfaces.
- **QUALHYMO Engine** – Powers the Water Balance family of tools. Continuous and multi-year simulation modelling of hydrologic processes and water quality. Model has watershed, receiving stream and BMP components.
- **Drainage Infrastructure Screening Tool** – Assess level-of-service for conveyance systems. Consider impact of both climate change and land use change at the same time, and with the same tool.
- **BC Water Conservation Calculator** – Developed to support provincial grant applications, this tool is used by communities to demonstrate how fiscal and water savings would be achieved.
- **BC Agriculture Water Calculator** – Developed to support the BC Groundwater Regulation, helps agriculture water users estimate annual irrigation or livestock water demands for farms.
- **Agricultural Irrigation Scheduling Calculator** – Uses real-time evapotranspiration (ET) data from climate stations to determine drip irrigation run times and sprinkler irrigation schedules for agriculture.



Jim Dumont

Engineering Applications
Authority, Partnership for
Water Sustainability in BC

*“The Partnership for
Water Sustainability is
evolving online tools that
support implementation
of the whole-system,
water balance approach.*

*“British Columbia,
Washington State and
California are leaders.
We are moving forward
in parallel on this
journey.*

*“A commonality is that
all three regions are
addressing impacts to the
stream. Washington
State and California have
gone a step further than
BC and mandated Flow-
Duration Analysis as a
regulatory requirement.*

- **Landscape Irrigation Scheduling Calculator** – Uses real-time ET data for climate stations across Canada to determine landscape irrigation system run times.
- **Soil Hydraulic Properties Calculator** – Useful for irrigation design. Select soil type to determine field capacity, wilting point, saturated hydraulic conductivity and maximum water content.
- **Evapotranspiration Calculator** – Obtains real-time ET data for climate stations across Canada. A crop’s water requirement or water usage is directly related to ET.

A Look Ahead

A foundation piece for the Whole-System, Water Balance Approach is understanding how water gets to a stream, and how long it takes.

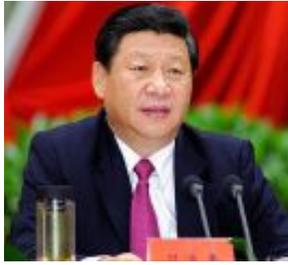
British Columbia’s new Water Sustainability Act will establish regulations pertaining to stream health and aquatic environments. The environmental flows objective may open the door to requiring Flow-Duration Analysis. This would then be a regulatory driver for use of the **Water Balance Model Desktop**.

Flow-Duration Analysis: Over time, Jim Dumont has evolved the Water Balance Methodology to synthesize watershed hydrology and stream dynamics.

“The innovation in BC’s Water Balance Methodology is found in the integration and application of proven scientific and engineering principles,” emphasizes Jim Dumont.

“The methodology provides a logical and straightforward way to assess potential impacts resulting from urban development; and analytically demonstrate the effectiveness of the methods proposed for preventing and/or mitigating those impacts.”

“Real-world success would be defined as reduced stream erosion during wet weather, and sustained ‘environmental flows’ during dry weather,” concludes Jim Dumont.



President Xi Jinping

In 2013, President Xi Jinping offered a new way to think about flooding and drought when he announced that cities should act like sponges. His proclamation came with substantial funding to experiment with ways cities can absorb precipitation.



Dr. Heiko Sieker

Urban Hydrologist,
Germany

"During the past 12 years we made quite good progress to install the 'sponge-city concept' in Germany in the daily planning process."

Be Sure to Apply Tools and Resources!

Recent initiatives in China and Berlin show that they too are on a journey where the destination is a water-resilient future. Consider that, in 2013, President Xi Jinping injected a new term into the global urban design vocabulary when he proclaimed that cities should “act like sponges” and launched China’s Sponge City program. And then in August 2017, the Senate of Berlin released its Sponge City Strategy. The common guiding philosophy for both? Mimic nature, restore the water balance, adapt to a changing climate.

The ‘sponge city’ metaphor is powerful and inspirational. As such, China and Berlin are demonstrating that when there is a will, there is a way. Still, the reader should take a moment to reflect upon their drivers for action – floods and droughts! They have learned the hard way that what happens on the land matters. And now, the ‘**new normal**’ of frequently recurring extremes has forced them to tackle the consequences of not respecting the water cycle.

The Challenge: Opportunities for land use and infrastructure servicing practitioners to make a difference are at the time of (re)development. To those individuals the Partnership says: share and learn from those who are leading change; design with nature; ‘get it right’ at the front-end of the project; build-in ‘water resilience’; create a lasting legacy.

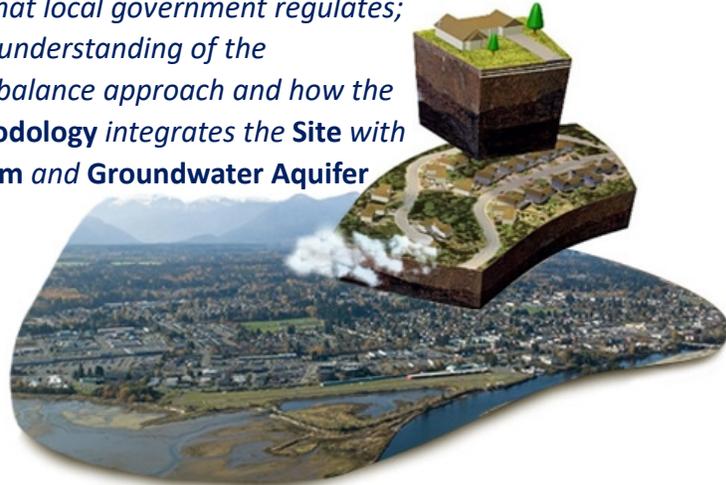
Many land and infrastructure professionals in this province do know in principle what they ought to do. However, there is still a gap between UNDERSTANDING and IMPLEMENTATION. **This results in a capacity-building challenge:** *on the one hand, the Partnership can provide practitioners with water balance tools and resources; it is another matter for those folks to apply the tools and resources.*

Mission Possible: Yes, British Columbia is progressing. Yet communities could do so much more if they would consistently capitalize on rather than miss opportunities. Apply the tools. Do what is right. Learn from experience. Adapt. Pass the baton. The Partnership spotlight is on how to ‘bridge the gap’ between talk and action. As champions for the **Whole-System, Water Balance Approach**, the Partnership is developing tools and resources for use by local governments.

In 2017, an educational goal in British Columbia is that those involved in land use and drainage would understand the vision for.....

Sustainable Watershed Systems, through Asset Management³

Applies to land uses that local government regulates; and is founded on an understanding of the whole-system, water balance approach and how the **Water Balance Methodology integrates the Site with the Watershed, Stream and Groundwater Aquifer**



³ <http://waterbucket.ca/rm/category/sustainable-watershed-systems/>

Asset Management Continuum

Asset management for sustainable service delivery occurs alongside associated evolution in community thinking. It is a continuous quality-improvement process, and incremental.

A local government would experience the asset management process for sustainable service delivery as a continuum leading to a water-resilient future.

Sustainable Watershed Systems would be the outcome in Step Three



Asset Management Continuum for Sustainable Service Delivery

GROUND ZERO: In the beginning, 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 (water supply, sewage, roads) and embark on an **Asset Management Strategy / Plan / Program** process.

STEP TWO: Local governments start thinking holistically and implement a life-cycle approach to infrastructure decision-making so that **Sustainable Service Delivery** for engineered assets becomes standard practice.

STEP THREE: For drainage function, local governments will integrate natural systems thinking and climate adaptation into asset management and account for the **Water Balance Services** provided by watershed systems.

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

logo for 'Asset Management for Sustainable Service Delivery: A BC Framework'

THE OUTCOME:
A Sustainable Watershed System!

