

## SUSTAINABLE WATERSHED SYSTEMS, THROUGH ASSET MANAGEMENT: Embed 'state-of-art' hydrology in engineering 'standard practice'

By Kim Stephens, M.Eng., P.Eng, Executive Director  
Partnership for Water Sustainability in BC

This article is a progress report on implementation of the Georgia Basin Inter-Regional Education Initiative. The IREI is aligned with the vision for **Asset Management for Sustainable Service Delivery: A Framework for BC**. The IREI is about how to implement "Sustainable Watershed Systems, through Asset Management". The IREI is funded by the governments of Canada and British Columbia.

### Driving Change

"The BC Framework sets a strategic direction that refocuses business processes on outcomes that reduce



life-cycle costs and risks. The program goals for the *Georgia Basin Inter-Regional Education Initiative* (IREI) are aligned with this strategic direction," stated the Hon. Peter Fassbender when he announced (in March 2017) funding for the IREI program through 2018.

"Successful implementation province wide of **Sustainable Watershed Systems, through Asset Management**, would represent an evolution in how infrastructure is planned, financed, implemented and maintained in British Columbia."

**IREI Implementation:** A goal of the IREI program is to embed state-of-the-art hydrology in engineering 'standard practice'. Three categories of IREI deliverables are inter-connected and therefore mutually reinforcing:

1. Ecological Accounting Protocol
2. Water Balance Methodology / Model / Express
3. Professional Development & Outreach

The vision is that a program of teaching, training and mentoring would build up practitioner capacity within local governments to achieve, over time, *Sustainable Watershed Systems, through Asset Management*.

Success would be defined as follows: there would be a consistent understanding of WHY and HOW to apply science (evidence)-based methodologies and tools.

### Category 1 – Ecological Accounting Protocol (EAP)

The Ecological Accounting Protocol (EAP) for valuing **watersheds as infrastructure assets** is the lynch-pin for driving change. EAP deals with the monetary value of renewable services provided by natural assets.

Under the EAP framework, the reference to **natural assets** means ecosystems of watersheds. The EAP methodology focuses on drainage and water balance services because this is of direct relevance to local government decision-making.

**Parallel Initiatives:** EAP follows the framework known as the *Principles of Natural Accounting*, currently under development by the Office of National Statistics and Department for Environment, Food and Rural Affairs in the United Kingdom (UK).

The Partnership for Water Sustainability in BC has independently arrived at a valuation strategy that is shared by the UK agencies. Both initiatives have moved from concept to application of the valuation approaches, albeit at different scopes, on a parallel time-line.

**Life-Cycle Demonstration Applications:** The Partnership is moving forward with EAP demonstration applications in the Cowichan and Comox valleys on Vancouver Island. These applications will showcase how to analyze the life-cycle costs, from pre-planning to replacement/renewal, of existing and proposed drainage infrastructure works.

The life-cycle calculation would contribute significantly overall to local government plans for asset management, the sustainability of watershed natural assets, as well as administrative and financial capacity of local government.

### Category 2 – Water Balance Methodology/ Model/ Express

Adopted by the Province in 2002, the Water Balance Methodology is the foundation for a family of online tools for different users at different scales and purposes:

- **Water Balance Methodology** (existing) – independent of software platform or computer model
- **Water Balance Model for BC** (existing) – planners
- **Water Balance Express** (existing) – homeowners
- **Online Watershed Assessment Tool** (ready in 2017) – engineers

Deployment would help local governments bring state-of-the-art hydrology into engineering standard practice.

**Healthy Watersheds:** The driver for using the Water Balance family of tools is this desired outcome: *restore watershed hydrology and re-set the ecological baseline.*

To this end, for example, the Partnership is implementing the *Water Balance Express Cost-Sharing Incentive Program*. By 2018, our goal is to double (to ten) the number of local governments in the Georgia Basin using the Water Balance Express. The tool is a means to an end to influence behaviour at the homeowner scale.

Integrated with Google Maps/Earth, the Express allows a homeowner to create a simulation of their property.

**Category 3 – Professional Development & Outreach**

The Partnership for Water Sustainability provides a type of engagement and outreach with local government that provincial staff no longer provide. Collaboration with participating local governments creates sharing and cross-pollinating opportunities that help eliminate the ‘disconnect between information and implementation’.

IREI program experience since 2012 has shown what works; and how to move forward incrementally and constantly improve.

**Project Goal:** Build local government capacity to transition to Step Three on the Asset Management Continuum (refer to image) so that watersheds are managed as ‘infrastructure assets’ that provide ‘water balance services’. Readers should be aware that:

- **Technical Foundation:** “Stormwater Planning: A Guidebook for BC”, released in 2002.
- **Guidebook Vision:** Community development activities result in cumulative benefits, rather than cumulative impacts.
- **Beyond the Guidebook:** Ongoing initiative to add tools and resources.

**Project Objective:** Disseminate outcomes of EAP, Water Balance Methodology and Express development:

- Add to an existing set of cascading deliverables to meet diversified outreach objectives for informing and educating.
- Teach, train and mentor practitioners so that they would move from sharing to understanding to implementation.

**Outcome and Benefits:** The vision for implementation of a whole-system, water balance approach is to protect and/or restore stream and watershed health:

- Land use and infrastructure practitioners would understand how natural systems support municipal services.
- Communities would avoid an unfunded liability (by limiting stream erosion, preventing flooding, improving water quality), adapt to a changing climate AND reduce life-cycle costs.



**Asset Management Continuum for Sustainable Service Delivery**

**GROUND ZERO:** In the beginning, no **Asset Management Plan** exists. A consequence is an ‘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 the 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**