



**the partnership**  
for water sustainability in bc

## **Watershed Moments: Something really good is happening in British Columbia**

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Moving Towards "Sustainable Watershed Systems,  
through Asset Management"



**“Restorative development is within your grasp. You know what to do. Go do it,” urged Bob Sandford, EPCOR Chair for Water and Climate Security, United Nations University Institute, At the Comox Valley Eco-Asset Symposium**



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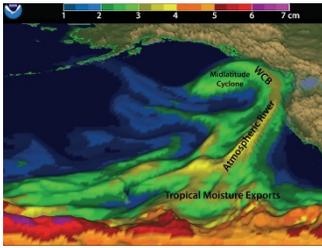
*Bob Sandford is frequently a keynote speaker at ‘water events’ in British Columbia, including **Feast AND Famine** (Metro Vancouver, 2015) and **FLOWnGROW** (Okanagan, 2016).*

*In March 2017, he spoke on Vancouver Island at the **Comox Valley Eco-Asset Symposium: Climate Change, Nature’s Services and Thinking Like a Watershed**. He delivered both a keynote address and closing reflections on what he had heard.*

*Bob Sandford’s ongoing exposure to the sharing and learning that takes place at these events provides him with an observers’ perspective on the transformational impact of such ‘watershed moments’ and how watershed systems thinking is taking root in British Columbia.*



## Showcasing of Whole-System, Water Balance Thinking



### THINK GLOBAL & ACT LOCAL:

*Warming of the atmosphere increases the volume of vapour conveyed by “atmospheric rivers” such as the Pineapple Express.*

*The physics are straightforward: 7% additional water volume for each degree of temperature rise. This is the global part.*

*At the local level in BC, climate change adaptation is very much about water management on the ground.*

*If communities are serious about ensuring RESILIENCY, then the critical strategies and actions are those that relate to water.*

The Comox Valley Symposium was one of two ‘watershed moments’ organized by the stewardship sector during the week of March 13<sup>th</sup> 2017. The other was in the Metro Vancouver region and was titled **Stormwater Impacts Communities and Creeks – What Can We Do?**

The responses to both events widely exceeded expectations. Registrations had to be capped because of venue capacity limits - 160 in the Comox Valley and 100 in North Vancouver - and many people were reluctantly turned away. The Comox Valley Symposium attracted delegates from around the Georgia Basin and from as far afield as the East Kootenays region.

A focal point for both events was the vision for [Sustainable Watershed Systems, through Asset Management](#)<sup>1</sup>. Led by the Partnership for Water Sustainability in BC, this inter-regional initiative is funded under a federal-provincial program. The initiative vision is that communities would integrate **whole-system, water balance** thinking and climate adaptation into drainage infrastructure asset management.

**Convening for Action in North Vancouver:** Hosted by the North Shore Streamkeepers, the workshop attracted participants from communities throughout the Metro Vancouver region, and on a Saturday afternoon!

“Our read of the audience was that they were engaged (we never lost them) and that most learned new and useful things. So many were taking notes!” stated Glen Parker, workshop co-organizer.

“Great ideas emerged from the breakout discussions.

“Afterwards, many people expressed their appreciation for the information, the ability to discuss their ideas, and for the networking that occurred.”

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<sup>1</sup> <http://waterbucket.ca/rm/category/sustainable-watershed-systems/>



**Bob Sandford**

EPCOR Chair for Water & Climate Security  
United Nations University  
Institute for Water,  
Environment and Health

## What Happens on the Land Does Matter!

“One of the things that I have learned over the last two days is that something really good is happening in British Columbia,” stated Bob Sandford when he provided a closing perspective at the Comox Valley Eco-Asset Symposium, held on Vancouver Island.

Bob Sandford was one of the keynote speakers. In his public presentation the evening before the Symposium, he described the changing climate and provided suggestions as to what effects can be expected in a future Comox Valley climate.

“I travel widely, but I have never heard a conversation like what I have heard at the Symposium. And while I am often part of very positive conversations, what was unique (about the Symposium) was the atmosphere of possibilities and hope that I have witnessed here.”



**David Stapley**  
Program Manager

Comox Valley  
Conservation Partnership

**Move from Awareness to Action:** “I think it is important to say that you have not gotten everybody in yet. And, as was noted, you do not have full jurisdiction. But, as Emanuel Machado of the Town of Gibsons pointed out, success will require patience, over generations, one step at a time.”

“And we cannot forget that there has been a huge investment in what we now know is an unsustainable status quo. Investment must now be shifted towards restoration that uses the forces of nature itself to help build more efficiently integrated infrastructure that as much as possible maintains itself. What a gift to the world that would be.”

“If you want to live here in perpetuity, then you need to do this. Do not forget the urgency. You have an outstanding example before you in the Town of Gibsons. In my view, restorative development is within your grasp. You know what to do. Go do it,” concluded Bob Sandford.

*“The VALUE of watershed ecosystem services is not well understood. Therefore, these services are not currently considered in land use planning decisions.”*

**Discover Nature’s Infrastructure:** “With cumulative impacts from climate change, urban and resource development escalating, and to address these escalating challenges, the Eco-Asset Symposium was designed to promote the integration of ecological assets into land use planning and practice,” stated David Stapley.



## **Jim Dumont**

Engineering Applications  
Authority, Partnership for  
Water Sustainability in  
British Columbia

*"If communities are to truly benefit from use of nature's assets to provide vital community infrastructure services, then two issues must first be recognized as being impediment to changes in practice.*

*"Issue #1 is widespread lack of understanding of the relationship between flow-duration and stream (watershed) health.*

*"Issue #2 is widespread application of a standard of practice that has led to the current situation of degraded streams, and that has little connection to real-world hydrology."*

## **Bring the 'State of the Art' into 'Standard Practice'**

"Engineering practice is based on very simple formulas and methodologies to calculate peak discharges. None of those engineering analyses capture the environmental value," Jim Dumont informed the Comox Valley audience. He is the Engineering Applications Authority for the Partnership for Water Sustainability.

"And because engineering analyses do not capture environmental value, the engineer cannot tell you what value a natural asset has, nor how important its function is, nor how to maintain that function. Yet we do have scientific and engineering methodologies that would give us those answers. But engineers do not apply state-of-the-art methodologies because they are not in existing guidelines."

"As a result, we are on the horns of a dilemma. On the one hand, we have a standard-of-practice that is generally accepted as not achieving what is best for the environment. On the other hand, we have a state-of-the-art that we really do need to drag into common practice."

### ***How can we maintain ecological values while allowing the stream to be used for drainage:***

"So what is the nub of the issue? In standard practice, only surface runoff is considered, and this has led to degraded streams. The other pathways by which rainfall reaches streams are ignored. Yet we do need to mimic nature. If we are going to disrupt those other pathways when we develop land, we must fix them."

"If communities are to truly benefit from use of nature's assets to provide vital community infrastructure services, then we must change the engineering standard-of-practice to one that is state-of-the-art and reflects real-world hydrology."

"Education is the way to overcome the impediments to changes in practice. This will require education of the public, accountants, engineers and local government staff so that everyone appreciates the relationship between the flow-duration pattern in a stream and the health of the stream," concluded Jim Dumont.

## British Columbia's Whole-System, Water Balance Approach



### Kim A Stephens

Executive Director,  
Partnership for Water  
Sustainability in British  
Columbia

### Whole-System, Water Balance Approach

1. *Understand where the water goes naturally and reproduce those conditions.*
2. *Restore sub-surface **interflow** to maintain hydrologic integrity.*
3. *Maintain the proportion of rainwater entering a stream via each of 3 water balance pathways!*
4. *Replicate the streamflow-duration pattern to mimic the Water Balance*

“The vision for implementation of a whole-system, water balance approach is to protect and/or restore stream and watershed health,” said Kim Stephens, keynote speaker on the day of the Symposium.

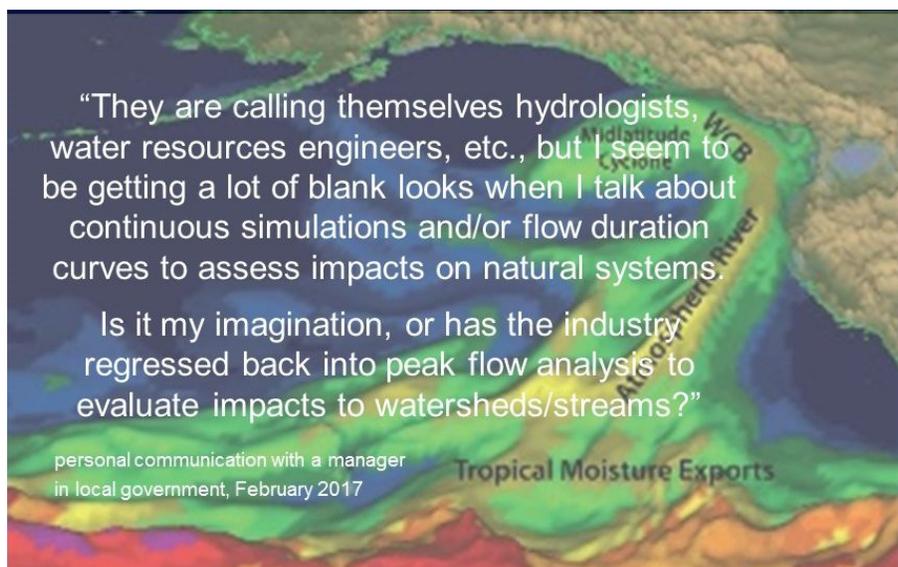
“In 2002, and with publication of *Stormwater Planning: A Guidebook for British Columbia*, a breakthrough resulted from application of science-based understanding to develop the **Water Balance Methodology**. This was a notable milestone in an ongoing process that one day would make possible Sustainable Watershed Systems.

“As of 2017, we can say that BC is progressing. Yet, persistent challenges for practitioners to adopt, change or evolve standards of practice means there is still a substantive disconnect between UNDERSTANDING and IMPLEMENTATION. This gap is a problem.”

**Educate to Bridge the Gap:** ““The whole-system, water balance approach hinges on an understanding of flow-duration. Yet the relationship is not well understood. Education is the way to overcome the impediments to changes in practice,” added Jim Dumont.

“This will require education of the public, accountants, engineers and local government staff so that everyone appreciates the relationship between the flow-duration and the health of the stream.

“A lynch-pin guiding principle for watershed planners and drainage designers must be to replicate the flow-duration pattern in order to limit stream erosion, prevent flooding and improve water quality.”



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Moving Towards “Sustainable Watershed Systems,  
through Asset Management”

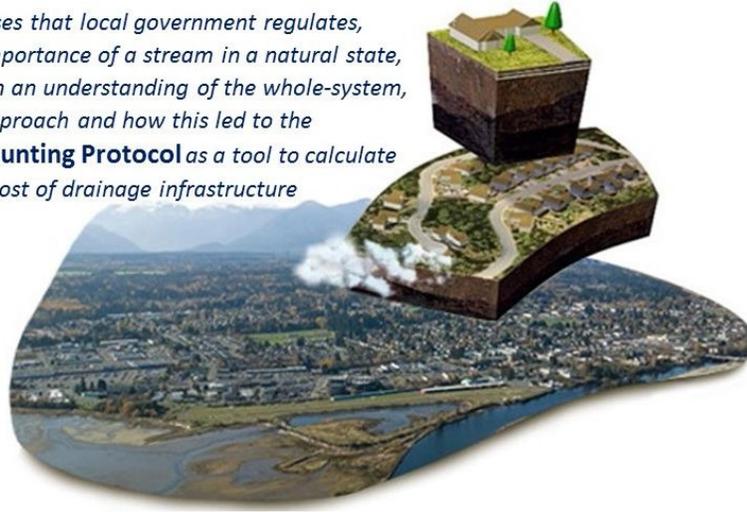
Appendix – article published in the  
Asset Management BC Newsletter

June 2016

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

## “Sustainable Watershed Systems, through Asset Management”

Applies to land uses that local government regulates, recognizes the importance of a stream in a natural state, and is founded on an understanding of the whole-system, water balance approach and how this led to the **Ecological Accounting Protocol** as a tool to calculate the opportunity cost of drainage infrastructure



### 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

THE OUTCOME:  
A Sustainable Watershed System

## OP-ED: On Sharing a Vision for “Sustainable Watershed Systems, through Asset Management”

By Kim Stephens, M.Eng., P.Eng.<sup>1</sup>, Wally Wells, P.Eng.<sup>2</sup>

Collaboration between Asset Management BC and the Partnership for Water Sustainability in British Columbia had its genesis in a workshop hosted by the Regional District of Nanaimo in September 2010. In the years since, we have aligned efforts to advance our shared vision for *sustainable service delivery*. The journey is ongoing. Our shared mission is to champion standards of practice that will create a water-resilient future. The branding for this desired outcome is:

### Sustainable Watershed Systems, through Asset Management.

**Pathway to a Water-Resilient Future:** The Water Balance of watersheds in urban areas is out of balance. A legacy of past community planning and infrastructure servicing practices is the failure to protect the natural Water Balance. A watershed is an integrated system. Restoring hydrologic integrity, and thus the Water Balance, is the pathway to a water-resilient future. Achieving this will require a long-term commitment by the community at large, successive Municipal Councils and Regional Boards, and generations of land AND water professionals.

**Asset Management for Sustainable Service Delivery: A Framework for BC** is the lynch-pin for a water-resilient future. The BC Framework makes the link between local government services, the infrastructure that supports the delivery of those services, and watershed health.

**Cathedral Thinking:** In embarking on this journey to a water-resilient future, we can learn from our ancestors. The grand creations of antiquity were not designed with a quarterly report or 4-year election term in mind. The builders of great cathedrals in medieval times thought in terms of multiple generations carrying out their work, to complete a dream that would not be realised until long after the originator’s death.

When we think of a cathedral two aspects come to mind: a soaring aspiration; and a grounded structure firmly planted throughout time. Cathedral thinking aptly describes the vision for Sustainable Watershed Systems!

<sup>1</sup> Executive Director, Partnership for Water Sustainability in BC

<sup>2</sup> Executive Director, Asset Management BC



Kim Stephens

Wally Wells

### In the beginning.....

When the Partnership organized, and the Regional District of Nanaimo hosted the **Worth Every Penny Workshop** in 2010, this provided the Province and Asset Management BC with a forum to float the vision for ‘sustainable service delivery’. This event also launched a national *Primer on Worth Every Penny Workshop Series*.

Worth Every Penny had an impact. Its legacy is that it set in motion a chain of outcomes that is rippling through time. It jump-started our conversation. It got us thinking and talking about how local governments could move beyond the engineering and finance perspectives in order to fully integrate land use planning into asset management. It provided us with the inspiration to redefine and frame **unfunded infrastructure liability** in a way that would resonate with Councils and Boards.

**On Starting a Conversation about a New Approach:** The Comox Valley was our pilot region for exploring a new way of thinking about municipal infrastructure. In designing a seminar series in spring 2011 that was open to all local governments on Vancouver Island, the four Comox Valley local governments arrived at this consensus: *All those involved in land development have a role to play in achieving Sustainable Service Delivery. The players include land use and infrastructure professionals.*

We then showcased the Comox Valley learnings at the **2011 State of Vancouver Island Economic Summit**. Our “forum within the Summit” celebrated Comox Valley collaboration, started an Island-wide conversation about Sustainable Service Delivery, and painted the big picture for water sustainability.

Today, it is no accident that asset management and water sustainability are both top priorities for local governments not only on Vancouver Island but across the Province and gaining traction in the rest of the country.

The challenge is 'integration' and getting every discipline to recognize each others' contribution plus get the organization working together on a common path.

The other challenge is communicating and understanding the message. The work environment is changing with time as are the methods of communicating and the form of the messages.

We will tackle that challenge between now and the September issue of this newsletter. What are your thoughts on communicating the message? Provide your thoughts, views and suggestions to help with what we hope will be a very stimulating article. Send your thoughts to: [info@assetmanagementbc.ca](mailto:info@assetmanagementbc.ca)

**Get It Right at the Front-End**

Choice of words can make or break one's ability to open minds to a new or different way of thinking. Commencing with the 2011 Comox Valley seminars, we changed HOW we communicate with our local government audiences. Emphasis on the 80-20 life-cycle rule for infrastructure costs proved very effective in capturing and focussing attention. It was a 'watershed moment' in our history.

We observed audience *Aha moments* when we would point out that the initial capital cost of infrastructure is about 20% of the life-cycle cost, the other 80% largely represents a future liability, and each year the funding shortfall grows. If communities are struggling to finance

replacement or renewal of core infrastructure for essential water and sewer services, we would add, why would any Council also knowingly take on an unfunded drainage liability (due to impacts on the Water Balance)?

AMBC and the Partnership connected the dots between asset management and water sustainability. Everyone should know that the time to shape future life-cycle costs is at the community planning front-end. Our message was explicit: *get it right at the front-end; avoid a liability.*

As early as 2011, it was becoming clear that protection of a community's natural resources would emerge as a foundation piece for Sustainable Service Delivery. To promote a holistic approach to infrastructure asset management, the Partnership framed three objectives for Sustainable Service Delivery: 1) pay down the legacy cost of engineered infrastructure; 2) reduce the life-cycle cost of new infrastructure; and 3) **mimic the natural Water Balance to forestall life-cycle liabilities.**

**Watershed Systems are Infrastructure Assets**

Fast forward to 2016. Over the years, the BC approach to asset management has learned from and built upon Australian experience, and has now gone to another level with our evolution to **sustainable service delivery**. BC's ability to achieve this bold leap was made possible by the close collaboration between Asset Management BC and the Institute of Public Works Engineering Australasia.

Sustainable Service Delivery is the singular aim. Asset Management is the means to achieve the aim. Suffice to say, BC is at the dawn of a new era.

**Asset Management Continuum for Sustainable Service Delivery**



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

**GROUND ZERO:** In the beginning, there was no Asset Management Plan and a consequence is the 'unfunded infrastructure liability'

**STEP ONE:** They will embrace the BC Framework, with an initial focus on core engineered assets (water supply, sewage, roads, etc.) and embark on an Asset Management Strategy / Plan / Program process

**STEP TWO:** They will think holistically and implement a life-cycle approach to infrastructure decision-making so that Sustainable Service Delivery for engineered assets is standard practice

**STEP THREE:** For the drainage function, they will integrate natural systems thinking and account for the Water Balance Services provided by watershed systems

**Asset Management for Sustainable Service Delivery: A Framework for BC** is indeed a game-changer. Because it is strategically aligned with the province’s capital grants programs, the BC Framework is now transforming how local governments view asset management. This includes fostering an awareness at all levels of local government that **watershed systems are also infrastructure assets**, and therefore need to be protected and managed in the same way that engineered assets are managed.

**Asset Management Continuum:** The Partnership for Water Sustainability is the champion for Step Three as described in the graphic on the previous page. This illustrates the journey as understanding grows and local governments progress towards a **water-resilient future**. Making better decisions starts with an understanding of how to mimic the natural Water Balance through a blend of engineered assets and natural services. Yet, the nub of the educational challenge is this: *practitioner standards of practice are lagging behind science-based understanding.*

**Watershed Systems provide Water Balance Services**

The water-resilient future shown as Step Three on the Asset Management Continuum would be, by definition, a “Sustainable Watershed System”. This phrase is the short-form descriptor for *integration of natural systems thinking AND adaptation to a changing climate into Sustainable Service Delivery*. This outcome drives the curriculum design for the Georgia Basin Inter-Regional Education Initiative (IREI).

**Beyond the Guidebook 2015: Moving Towards “Sustainable Watershed Systems, through Asset Management”**, an IREI deliverable, is third in a series that builds on *Stormwater Planning: A Guidebook for British Columbia* (2002). The Guidebook initiated a science-based approach to mimicking the natural Water Balance. Branding of *Sustainable Watershed Systems* commenced with *Beyond the Guidebook 2015*.

**On Moving from “Understanding” to “Implementation”:** Educating practitioners about Sustainable Watershed Systems is our starting point for bringing standards of practice into line with science-based understanding. We are going back to basics to teach these related concepts:

- a watershed is an **integrated system**, and therefore must be managed as such if urban development is to mimic the natural Water Balance;
- the three Water Balance pathways by which precipitation reaches streams are, by definition, **infrastructure assets**; and,
- the three pathways provide **water balance services** that must be protected to avoid incurring expensive fixes and/or an unfunded liability.

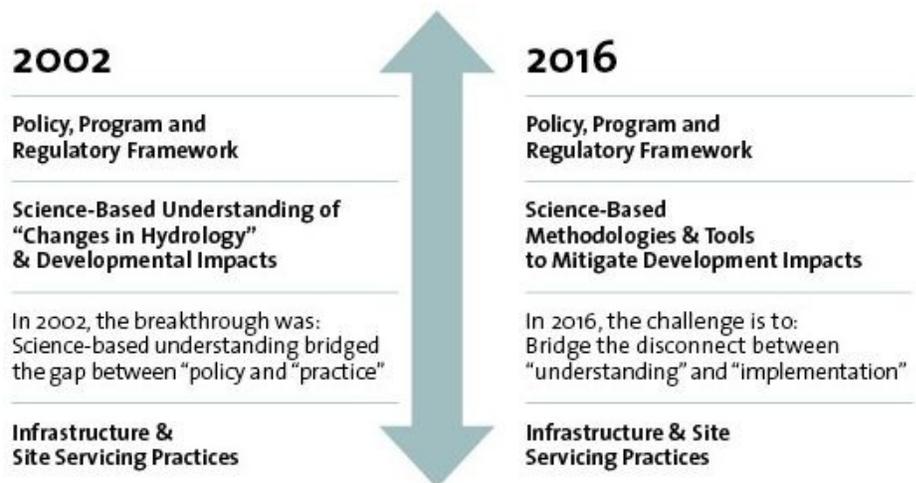
The graphic below conceptualizes the nature of the educational challenge in 2002 versus that in 2016.

**Apply Science-based Understanding**

In 2002, the breakthrough resulted from application of science-based **understanding** to develop the Water Balance Methodology. This allowed us to bridge what was then a yawning gap between POLICY and PRACTICE. This was a notable milestone in the process of creating a provincial policy, program and regulatory framework that makes possible Sustainable Watershed Systems.

**Get It Right & Capitalize on Opportunities:** As of 2016, BC is progressing. Yet, persistent challenges for practitioners to adopt, change or evolve standards of practice means there is still a substantive disconnect between UNDERSTANDING and IMPLEMENTATION. After a decade and a half, a pattern in the local government setting is one of missed opportunities to “get it right” at the time of planning and/or design. This perpetuates inadequate and/or uninformed practices by default.

Communities must capitalize on, not miss, opportunities. Think and act like a watershed. View each property through a watershed lens. Create cumulative benefits, not cumulative impacts! With this mind-set, communities can progress towards Sustainable Watershed Systems.



## What It Means to be Enabled

The Province of BC enables local government. It does not prescribe solutions. The regulatory focus is on outcomes. This bottom-up approach relies on education, enabling tools and collaboration to turn ideas into action.

As the Asset Management Continuum illustrates, the requirements and conditions associated with **Asset Management for Sustainable Service Delivery: A Framework for BC** provide local governments with the financial incentive to re-focus, apply science-based **methodologies and tools**, and “get it right”.

The role of Asset Management BC is to ensure consistency of understanding and application of Sustainable Service Delivery methodologies and tools to meet the goals of the provincial policy and regulatory framework.

The BC Framework encourages an appropriate balance of regulation and education. Over time, the IREI program led by the Partnership for Water Sustainability would support implementation of fully integrated Sustainable Service Delivery by providing the technical foundation for Sustainable Watershed Systems.