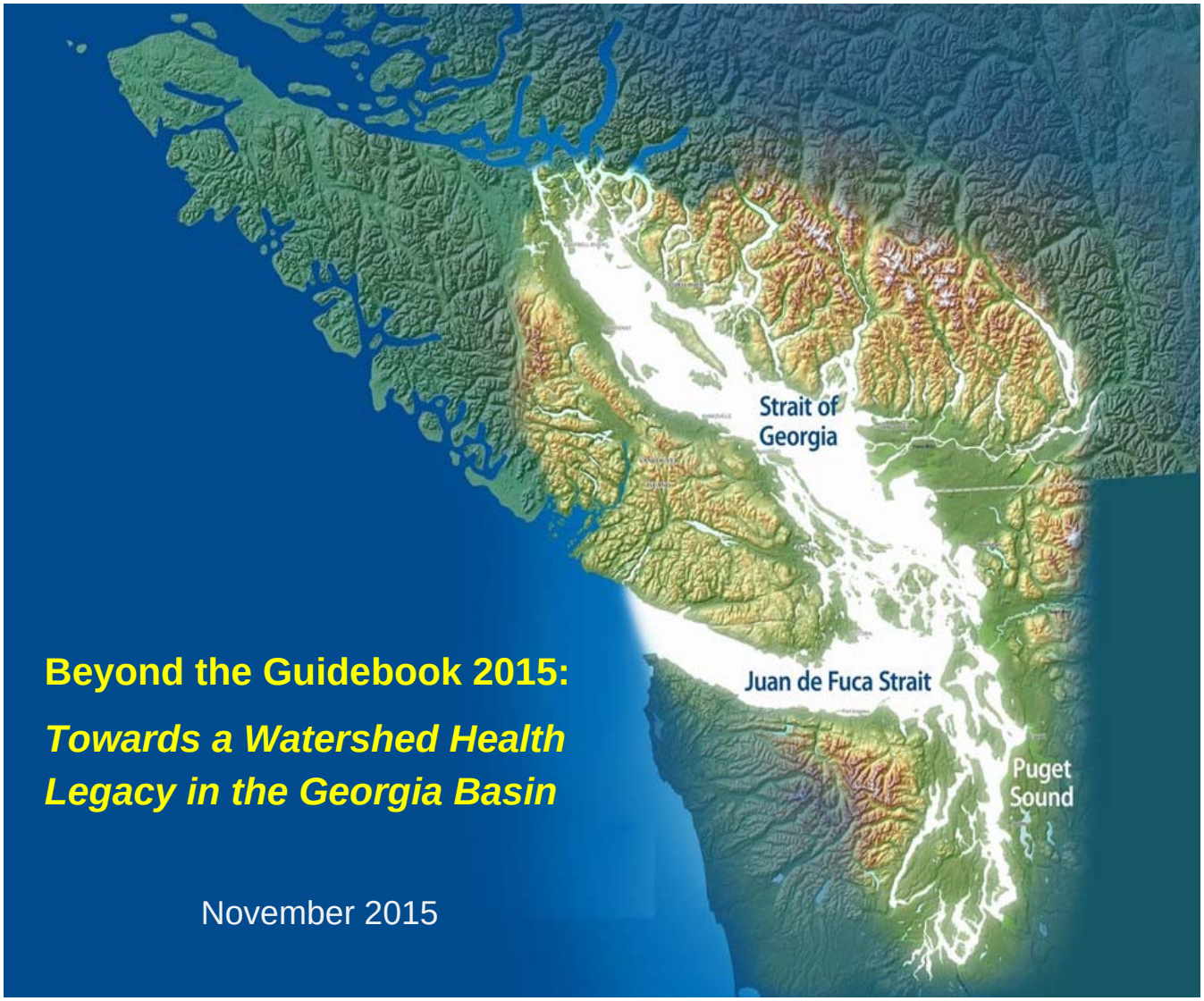
the partnership
for water sustainability in bc

IREI - Inter-Regional Education Initiative

Moving Towards "Sustainable Watershed Systems, through Asset Management"



Beyond the Guidebook 2015:

Towards a Watershed Health Legacy in the Georgia Basin

November 2015

Image Credit: *Georgia Basin Action Plan (2003-2009)*

Acknowledgements

Launched by the Partnership for Water Sustainability in 2012 in collaboration with five regional districts and two provincial ministries. The *Georgia Basin Inter-Regional Education Initiative* (IREI) supports implementation of integrated watershed-based community planning and asset management processes on the east coast of Vancouver Island and in the Lower Mainland.

> *'Beyond the Guidebook 2015' is about inter-regional collaboration that is guided by this mantra: "Through sharing and learning, ensure that where we are going is indeed the right way".*

In June 2013, the partnering regions formed an Inter-Regional Leadership Team with members from:

- *Dale Green – Capital Region*
- *Jody Watson – Capital Region*
- *Kate Miller – Cowichan Valley*
- *Keith Lawrence – Cowichan Valley*
- *Mike Donnelly – Nanaimo Region*
- *Julie Pisani – Nanaimo Region*
- *Kris La Rose – Comox Valley*
- *Jack Minard – Comox Valley (representing stewardship sector)*
- *Melony Burton – City of Coquitlam; also representing the Metro Vancouver Region*
- *David Hislop – City of Surrey; also representing the Metro Vancouver Region*

Their substantial contributions to a successful and ongoing process are gratefully acknowledged. The following individuals also made timely and/or material contributions:

- *Peter Law , John Finnie – Partnership for Water Sustainability in BC*
- *Erik Karlsen & Dale Wall – formerly Ministry of Community Development*
- *Glen Brown - Union of BC Municipalities*
- *Lynn Kriwoken, Helene Roberge Jennifer Vigano & Thomas White - Ministry of Environment*
- *Meggin Messenger, Liam Edwards, Cathy Leblanc & Karen Rothe – Ministry of Community, Sport & Cultural Development*

Provincial grant funding has enabled IREI implementation.

Perspectives on 'Creating Our Future' in British Columbia

"This is superlative work (that word combines all of the other adjectives I could use). It records so much in visual and conversational ways that everyone who reads it will see how changes are informed and guided towards collaborative action to achieve real results. You have connected the dots enabling those who were part of the stories to see how they have contributed in so many meaningful ways for themselves and their communities of place and practice. This is a true gift to everyone, individually and writ large."

"The 'convening for action' initiative is the best example of peer driven innovation that I have ever seen. It has led to nothing less than a quiet revolution in how we approach the design and construction of human settlements in British Columbia. When I see an urban stream coming back to life or an innovative approach being taken to new infrastructure, I think of the networks of innovative professionals that not only stand behind this work but also continue to create positive change. I firmly believe that this ability to creatively innovate in support of sustainable practices will enable us to meet a host of future challenges."

Erik Karlsen
Former Chair (2005-2010)
BC Agricultural Land Commission

Former Director
Special Projects
BC Ministry of Community Development

Dale Wall
former Deputy Minister
BC Ministry of Community Development

Preface

'Beyond the Guidebook 2015' is the third in a series that builds on ***Stormwater Planning: A Guidebook for British Columbia****. Structured in four parts, 'Beyond the Guidebook 2015' is a progress report on how local governments on the east coast of Vancouver Island and in the Lower Mainland are 'learning by doing' to implement affordable and effective science-based practices to achieve:*

- ***Watershed Health:*** *Protect and/or restore hydrologic integrity*
- ***Resilient Rainwater Management:*** *Mimic the natural water balance*
- ***Sustainable Service Delivery:*** *Integrate natural systems thinking and adaptation to a changing climate into asset management*

'Beyond the Guidebook 2015' introduces Dr. Daniel Pauly's ***Shifting Baseline Syndrome*** *to explain why communities unwittingly accept incremental and cumulative environmental degradation. It then adapts this thinking to focus on how communities can turn the clock back to replicate desired conditions. This outcome would be achievable through an approach that is being branded as* ***Sustainable Watershed Systems, through Asset Management****. The concluding chapter presents a look ahead at the IREI program road map through 2017.*

CONTEXT: *Released by the Province in 2002, 'Stormwater Planning: A Guidebook for British Columbia' is the provincial foundation for the rainwater component of Liquid Waste Management Plans, a regulatory tool. It is complemented by the 'Beyond the Guidebook Report Series', the 'Beyond the Guidebook Primer Series' and the 'Watershed Case Profile Series'.*

In February 2009, the Ministry of Community Development issued a Circular to all local governments. The Circular drew their attention to the purpose of the Beyond the Guidebook initiative, launched in 2007. Later, the Ministry of Environment's 'Interim Guidelines for Preparing Liquid Waste Management Plans (July 2011)' reinforced the foundational function of the 2002 Guidebook.

Kim A. Stephens, MEng, PEng,
Executive Director
Partnership for Water Sustainability in BC
November 2015

Incorporated in 2010 as a not-for-profit society, the Partnership embraces shared responsibility and is the hub for a "convening for action" network in the local government setting. The Partnership plays a bridging role between Province, local government and community; and is the steward for the Stormwater Guidebook.

Cascading Objectives

Watershed Health	Protect and/or Restore Hydrologic Integrity
	Watershed Health is a function of how the landscape is altered by humans. A primary measure is the condition of aquatic ecosystems in stream corridors. Altering the land surface short-circuits the water cycle. The result: either too much or too little flow in streams. **'Design with Nature'** requirements for land development maintain a watershed's hydrologic integrity.

Resilient Rainwater Management	Mimic the Natural Water Balance
	Resilient Rainwater Management accounts for all rainfall-days per year. Emphasis is on soil-water interaction, how rainwater reaches streams via three pathways in a watershed (i.e. surface runoff, lateral interflow in shallow soils, deep groundwater), and performance targets for 'design with nature' solutions. These address both water supply and drainage. The technical foundation is the **Water Balance Methodology**.

Sustainable Service Delivery	Integrate Natural Systems Thinking & Adaptation to a Changing Climate Into Asset Management
	Sustainable Service Delivery builds on the principles of Asset Management. It integrates land use, infrastructure servicing, financial and ecological planning. Emphasis is on the **Levels-of-Service** that assets provide, and *'what level is affordable'* over time. Nature is an asset and provides 'services'. The benefits and value of 'design with nature' solutions grow over time.

Create a Legacy

How to Use This Guidance Document

'Beyond the Guidebook 2015' *is structured in four parts to meet the information needs of different audiences. Local government case study experience provides guidance for a collaborative approach to developing integrated solutions that are effective and affordable, create a legacy, and achieve the three cascading objectives for* ***Watershed Health, Resilient Rainwater Management*** *and* ***Sustainable Service Delivery****, namely: 1) protect and/or restore hydrologic integrity; 2) mimic the natural water balance; and 3) integrate natural systems thinking into asset management.*

Title & Tagline	Scope of Each Part
Part A *WHAT:* **Restore Watershed Health in the Built Environment** *HOW:* **Focus on Context, Intent & Results**	Part A is written for the busy reader. It provides the 'big picture' regarding processes and accomplishments over the past two decades. These have encouraged and are helping to instil an integrated land-and-water ethic in the local government setting. The *2014 Across Canada Workshop Series on Resilient Rainwater Management* provided an opportunity for reflection about, and organization of, "the BC storyline" for the evolution of a collaborative approach in the local government setting. Part A introduces and describes the core elements of this "BC storyline". It is structured in a number of theme areas. Part A sets the scene for Parts B, C and D by introducing what is most important in each part.
Part B *WHAT:* **Align with Provincial Policy & Regulatory Framework** *HOW:* **Enable Action by Decision Makers at Local Level**	Part B is written for those who wish to understand the regulatory context in BC. It describes provincial drivers for achieving the Watershed Health Goal (i.e. "create a legacy"): Together, these drivers constitute a policy, program and regulatory framework that enables implementation of watershed-based solutions. But they require integration and coordination to be effective in achieving the Watershed Health Goal. During the late 1960s, BC began its multi-faceted and ongoing journey towards sustainability. Notable milestone years in this journey are 2003 ('the teachable year'), 2008 ('the call to action') and 2014 ('the springboard to implementation'). A unifying theme for these three milestone years is build greener communities.

How to Use This Guidance Document

Title & Tagline	Scope
Part C *WHAT:* **Influence the Form and Function of the Built Environment** *HOW:* **Develop Tools and Talent, Focus on Outcomes**	Part C is written for those who wish to understand what constitutes the *Water Sustainability Action Plan for BC*, and how Action Plan initiatives influence practitioners in the local government setting. The Action Plan provides a partnership umbrella for those who wish to align actions at the regional and local scales with provincial policy and related program objectives. The Action Plan track record demonstrates what can be accomplished when champions in the local government setting embrace the notion of Shared Responsibility and collaborate for the greater good. The Action Plan has guided the development of web-based tools that support implementation of standards of practice that will maintain or restore healthy watersheds and streams.
Part D *WHAT:* **Local Governments are "Convening for Action" in the Georgia Basin** *HOW:* **Build a Vision, Create a Legacy**	Part D is written for land use, water resource and infrastructure professionals who are interested in and wish to understand the work of local government champions, both organizations and individuals. We all learn from stories and the most compelling ones are based on the experiences of those who are leading in their communities. The members of the Inter-Regional Leadership Team are champions. They are collaborating across regions and leading the move from awareness to action to implement watershed-based solutions. The five collaborating regions view the Watershed Health Goal through complementary lenses that together form a complete picture. These lenses are *watershed plan effectiveness, watershed health assessment, climate change adaptation, sustainable service delivery,* and *sustainable partnerships.*

Next, three theme areas are presented. These provide the reader with an over-arching context:

The Shifting Baseline Syndrome
Why Beyond the Guidebook 2015
Look at a Watershed as a Whole System

The Shifting Baseline Syndrome is….

Relevant to All Aspects of Change

Dr. Daniel Pauly developed the concept of the *Shifting Baseline Syndrome* to describe why each new generation lacks direct knowledge of the historical condition of the environment, and how this lack of understanding plays out as a 'failure to notice change'.

Figure 1 is an adaptation of the image created by Daniel Pauly to illustrate the Shifting Baseline concept. Over time, and without a 'teachable moment' to raise awareness of a change, the net effect of a community's *failure to notice change* is an incremental and typically imperceptible eroding of standards and expectations.

> *Awareness of shifting baselines in BC has been reflected in a number of landmark processes, including the Agricultural Land Reserve Act (1972), Fish Protection Act (1997) and Water Sustainability Act (2014).*

A Short History

Dr. Pauly developed the concept in reference to fisheries management in a one-page paper titled *Anecdotes and the shifting baseline syndrome of fisheries*, published in 1995.

"It's one of my most cited papers, though it's a very short piece. It's like a thinking piece; it has no numbers, no equations," stated Daniel Pauly in a 2010 TED Talk. "We transform the world, but we don't remember it. We adjust our baseline to the new level, and we don't recall what was there."

Mission Possible

Communities can shift the ecological baseline upwards; they can replicate a desired watershed condition. This requires commitment and time.

> *Through a 'regional team approach' that cuts across boundaries, disciplines and sectors….. local governments and partners can implement watershed-based solutions that create a legacy.*

Do Business Differently: In 2014, two landmark developments provided local governments with a fresh impetus to reconcile the *Shifting Baseline Syndrome* and do business differently:

- BC's new **Water Sustainability Act**, passed in May 2014; and
- **Asset Management for Sustainable Service Delivery: A BC Framework**, released in December 2014.

Accepted 'standards of practice' - especially those for engineering, planning and finance - influence the form and function of the Built Environment. The goal of shifting to an ecologically functioning and resilient baseline and creating a watershed legacy will ultimately depend on the nature of change to *standards of practice* and changing to nature.

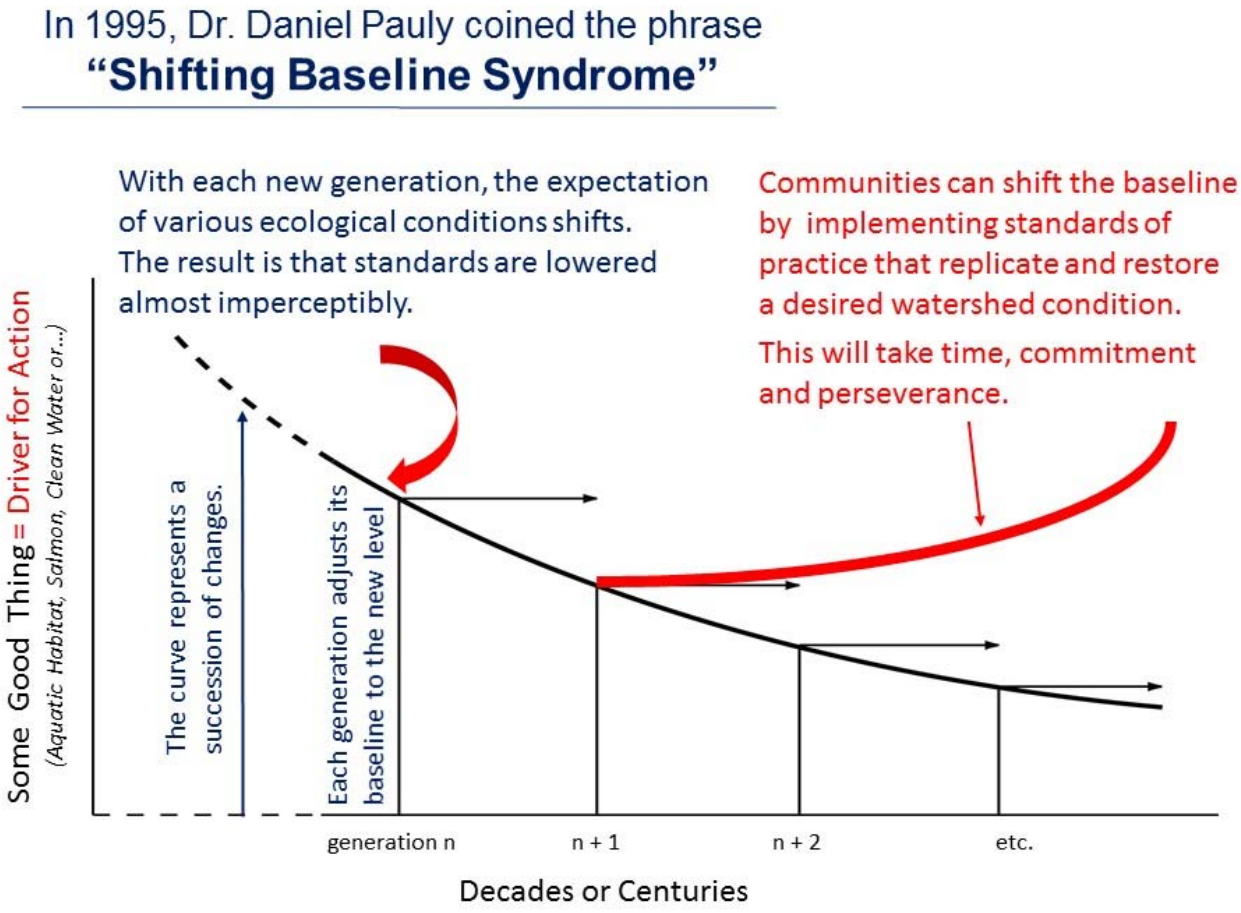


Figure 1

To view Daniel Pauly tell the story of how he came to coin the phrase "Shifting Baseline Syndrome", visit **http://mission-blue.org/2012/03/shifting-baselines-daniel-paulys-ted-talk/**

Why 'Beyond the Guidebook 2015'?

Introduction to the Guidebook Continuum

"The 'salmon crisis' throughout the 1990s decade galvanized awareness in BC that the ecological baseline was shifting, suddenly and dramatically. The ecosystem value of small, headwater streams had not been fully appreciated. The result: streams were being lost as a consequence of rapid population growth and land development.

In response, governments recognized the need to restore and protect watershed and stream health. This set in motion a chain of actions and events. The ripple effects are reverberating through time. Figure 2 identifies milestones along the way.

1997 Fish Protection Act

Washington State research informed the early implementation of BC's *Fish Protection Act (1997)*, the first legislation of its kind in Canada. In the mid-1990s, the pioneer work of Dr. Richard Horner and Dr. Chris May was transformational. Their findings resulted in a *hydrology-based framework* for protecting watershed health (see Table 1 below).

When the watershed goal is protection of aquatic resources, Horner and May proved that it is necessary to first mitigate 'changes in hydrology' - that is, changes in how rainwater reaches streams.

Re-Set the Ecological Baseline

By 2002, looking at rainfall differently led the Province to adopt the Water Balance Methodology as the technical foundation for *Stormwater Planning: A Guidebook for British Columbia*, initiate a performance target approach to capturing rain where it falls, and initiate changes in the way rainwater runoff is returned to streams.

The Guidebook vision is that community development activities and further alteration of the Built Environment will result in cumulative benefits, not impacts. In 2002, the Guidebook identified a path forward for local governments.

Beyond the Guidebook: In BC, a 'learn-by-doing' process is opening minds and building confidence that communities can re-set the baseline and can replicate a desired watershed condition.

The *Beyond the Guidebook Series* documents the progress of local government champions who are leading implementation of changes in practice. It takes time to make a difference. Three milestone years along the way are: 2007, 2010 and 2015.

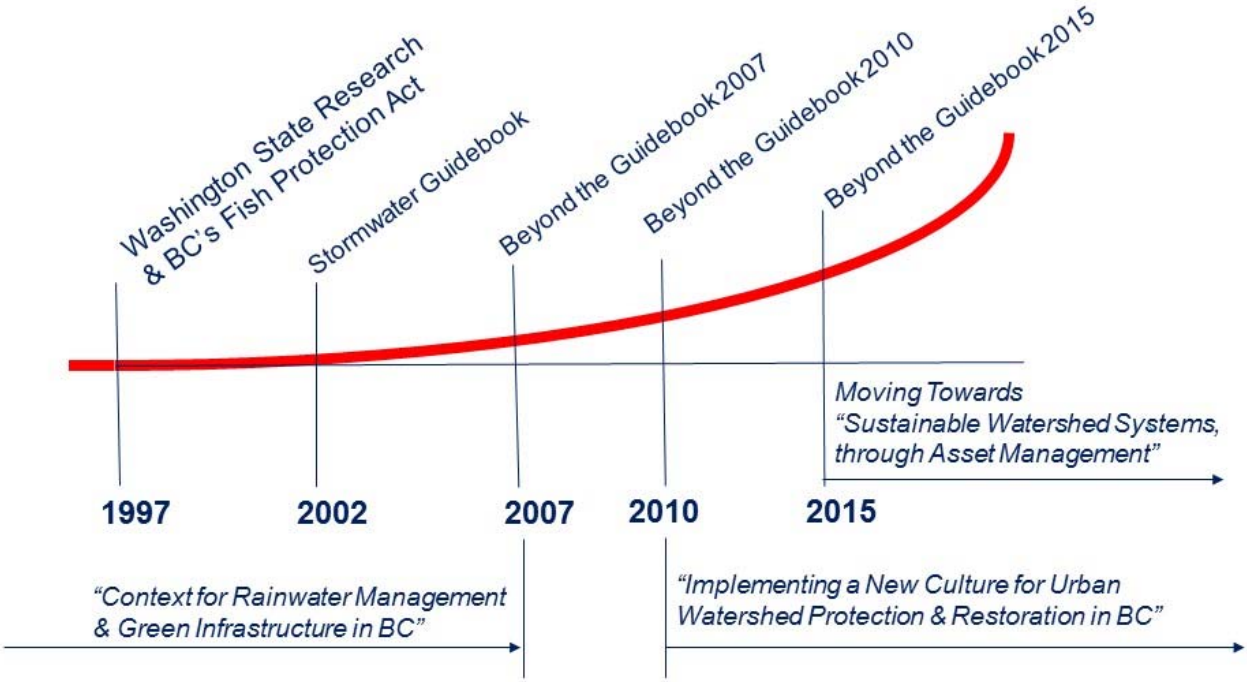
Doing business differently and making a difference is a building blocks process. The titles of the three documents reflect the progress that is being made: ***know the context for action; change the culture and instil a new ethic; create a legacy***.

Table 1. Factors Limiting Stream Health

Ranking	Limiting Factor
1	Changes in hydrology
2	Distrubance and/or loss of integrity of the riparian corridor
2	Degradation and/or loss of aquatic habitat within the stream
4	Deterioration of water quality

Understand the integrated significance of the three flow paths in a watershed (surface runoff, lateral interflow in shallow soils, and deep groundwater), the period of time required for rainwater to reach the stream via each flow path, and the need to protect and maintain the natural distribution of rainwater via each flow path.

Local government is moving along a continuum.
Knowledge is expanding and becoming clearer over time.



'Beyond the Guidebook Series'

Documents progress by local government in applying *science-based* practices to achieve watershed health

Figure 2

Look at a Watershed as a Whole System….

Hydrology-Based Framework for Action

Watershed protection starts with an understanding of how water gets to a stream from individual sites, how long it takes, and whether there are impacts along the way (Figure 3).

The pioneer work of Horner and May provided a reason and a starting point for revisiting urban hydrology in BC. This resulted in development of the Water Balance Methodology to link actions at the site scale with outcomes at a watershed scale.

"So many studies manipulate a single variable out of context with the whole and its many additional variables," states Dr. Richard Horner, now an adjunct professor at the University of Washington. "We, on the other hand, investigated whole systems in place, tying together measures of the landscape, stream habitat and aquatic life."

> *The work of Horner and May is standing the test of time. The reason is that they applied systems thinking and looked at watersheds as a whole.*

Water Balance Methodology

"The need to protect headwater streams in BC has forced us to expand our view from one that looks at the site by itself, to one that considers the site, watershed, stream and aquifer as an integrated system," states Jim Dumont, Engineering Authority for the Partnership for Water Sustainability in BC. "The Water Balance Methodology addresses flow path differences, and provides solutions that would maintain stream health within a developed watershed."

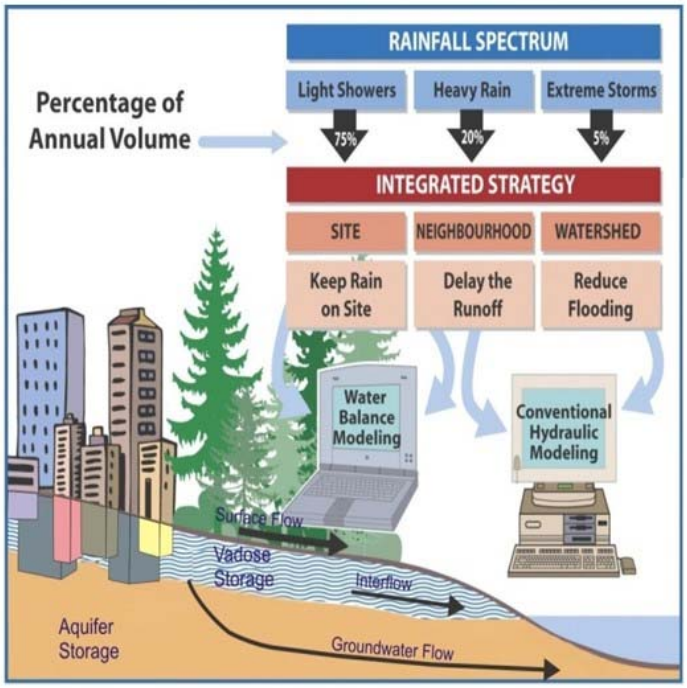
Adaptation to a Changing Climate: The climate in BC is changing: wetter, warmer winters: longer, drier summers. It is necessary to mimic the Water Balance to ensure water supply in dry weather and prevent drainage impacts in wet weather.

- Warmer winters mean more rain, less snow. Thus, there will be less flow to sustain creeks and satisfy water needs during the dry months.
- Intensified land development hardens the land and short-circuits the Water Balance. When it rains, there is more drainage from urban areas.
- More flow results in stream erosion, channel blockages, streams jumping their banks, damage to aquatic habitat and risk to salmon.
- Consequences include expensive fixes at a time when communities are challenged to fund and replace essential infrastructure services.

Now that BC's climate is changing, the 'changes in hydrology' driver for aquatic habitat protection in tributary streams will ultimately benefit people too.

> *Implementing **'design with nature'** standards of practice at the site scale – so that benefits accumulate and mimic the natural Water Balance at a watershed scale – ultimately means that communities will be more resilient during periods when there is either too much or too little rain.*

Watershed protection starts with an understanding of how water gets to a stream, and how long it takes…



Surface runoff
from minutes to hours

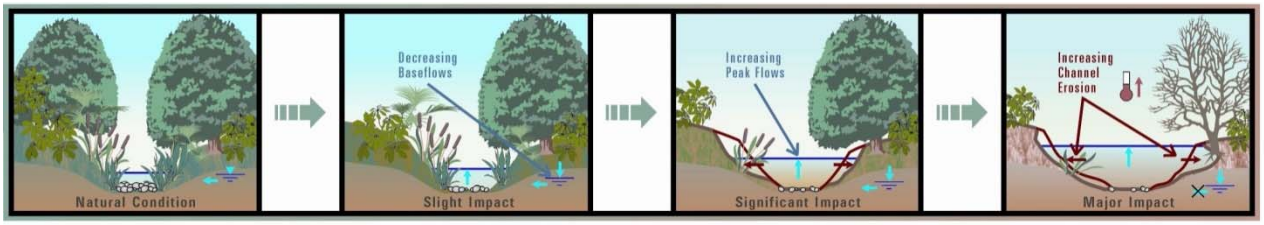
Interflow
from days to seasons

Deep Groundwater
from years to decades or more

Maintain the proportion of rainwater entering the stream via each pathway

Source: *Stormwater Planning: A Guidebook for British Columbia*, 2002

Altering the Water Balance Distribution has Wet-Weather Consequences:



Increasing Surface Volume + Longer Flow Duration = More Stream Erosion + Loss of Stream Habitat

Figure 3

In Summary, the Matrix Connects the Dots:

Learning by Doing

The matrix below illustrates how to integrate the work of Daniel Pauly (left column), Richard Horner and Chris May (top row) to apply science-based understanding and adapt to changing conditions:

- *From top to bottom* - illustrates a watershed's progression through three stages along the Shifting Baseline (before, now and in future).
- *From left to right* - describes the implications for each of the four Limiting Factors at each stage of the progression.

Learn by Doing: Change direction when science-based understanding leads to a better pathway.

Align Efforts: Figure 4 is the primary branding image for 'Beyond the Guidebook 2015'. It illustrates the essence of the three Cascading Objectives introduced and defined on page 1. Alignment of efforts - from high level to ground level - is necessary to achieve the Watershed Health Goal. Simply put, this goal is defined as:

- *Implement standards of practice that mimic the natural Water Balance, are affordable and effective, and achieve the desired outcome, which is – healthy streams and watersheds.*

The goal succinctly describes the matrix below.

Design with nature going forward:

Implement science-based standards of practice for development and infrastructure servicing to protect and restore fish habitat, and to provide community-supporting ecosystem goods and services

	Watershed Hydrology	Riparian Corridor	Within the Stream	Quality of the Water
Nature As It Was Before Settlement	Clean and clear water supported aquatic habitat, fish life-cycles and community uses of streamflow	Intact corridor provided multiple functions related to water quality and beneficial nutrients	Instream gravel supported spawning; large woody debris moderated streamflow and sheltered fish	Beneficial water quality, in particular temperature, supported ecosystem functions and community uses of streamflow
Cumulative Impacts After Development	Changes in water balance distribution resulted in erosion, degrading of habitat, drought and flooding	Habitat removal exposed fish to interventions and resulted in multiple impacts	Streams no longer support fish life-cycles	Toxic liquid wastes destroyed habitat, killed fish and impacted community uses of streamflow
By Designing with Nature	Water balance approach can restore hydrologic integrity & habitat function	Restoration of riparian integrity can restore ecosystem functions	Streams can again support fish life-cycles	Source-controls can prevent toxic liquid wastes from entering streams

Sustainable Watershed Systems, through Asset Management:

TURN THE CLOCK BACK: *Influence the form and function of Built Environment. Replicate a desired watershed condition. Shift the ecological baseline upwards.*

This will take time, commitment and perseverance

Figure 4

This Page Intentionally Left Blank

Table of Contents

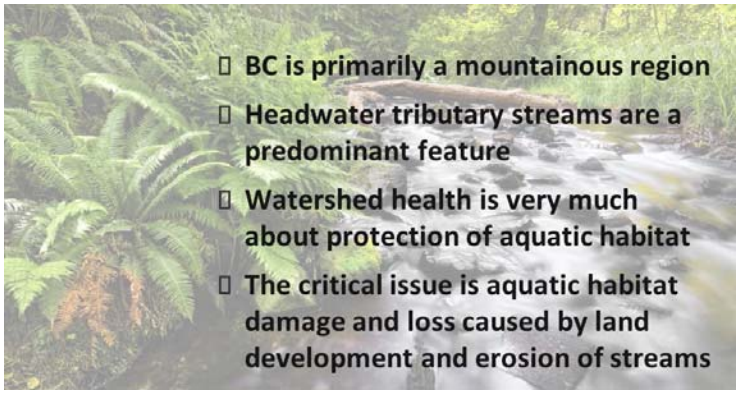
Chapter		*Page No.*
	PART A – Restore Watershed Health in the Built Environment *British Columbia's Watershed Health Goal differs from other regions*	12
1	Focus on Context, Intent & Results	
	PART B – Align with Provincial Policy & Regulatory Framework *Build Greener Communities: Deal with Uncertainty; Manage the Water Balance; Adapt to a Changing Climate*	23
2	What Happens on the Land Matters	
	PART C – Influence the Form and Function of the Built Environment *'Design with Nature' and influence how water is used, runs off the land, and reaches streams*	41
3	Convening for Action in British Columbia	
	PART D – Local Governments are "Convening for Action" in the Georgia Basin *"Through sharing & learning, ensure that where we are going is indeed the right way"*	53
4	Stories of Regional Champions	
5	Comox Valley-CAVI Regional Team	
6	Convening for Action in Cowichan Region	
7	Convening for Action in Nanaimo Region	
8	Convening for Action in Capital Region	
9	Convening for Action in Metro Vancouver	
10	A Look Ahead	

Part A

Restore Watershed Health in the Built Environment:

Focus on Context, Intent & Results

British Columbia's **Watershed Health Goal** differs from other regions because:



Part A – Restore Watershed Health in the Built Environment	
Chapter No. & Title	**Key Messages**
1 **Focus on Context, Intent and Results**	Collaborate to understand what others are doing and what works. Leverage more with the same resources. Create a watershed legacy - implement practices that are affordable, effective and mimic the Water Balance.
a. **Historical Context Provides Perspective**	Look back to look ahead. Accept risk to open the door to creativity and innovation. Develop tools. Design with nature. Establish precedents. Learn by doing. Adapt experience. Constantly improve.
b. **'Sustainable Service Delivery' Introduced**	Integrate financial accountability, infrastructure sustainability and service delivery. Focus on desired outcomes, not prescriptive methodologies. Get plans right at the front-end. Prepare for the future.
c. **'Regional Team Approach' Introduced**	Embrace shared responsibility. Everyone has a role to play to achieve the goal. Agree on expectations and how all the players will work together. Take a leap of faith and apply pragmatic skills to the 'big picture'.

1. Focus on Context, Intent and Results

Watershed Health, Rainwater Management and Sustainable Service Delivery are related priorities for communities on the east coast of Vancouver Island and in the Metro Vancouver region.

Furthermore, local governments are tackling the question of how best to move forward on these priorities, particularly in light of a changing climate and community expectations to provide higher levels-of-service at reduced levels-of-cost.

Inter-Regional Collaboration

In early 2012, Metro Vancouver and the Regional Boards for the Capital Region, Cowichan Region, Nanaimo Region and Comox Valley agreed to collaborate under the umbrella of the *Georgia Basin Inter-Regional Educational Initiative* (IREI).

Previously, all had adopted strategies that were watershed-based and established a vision. Now, emphasis is on 'implementation and integration'. Hence, collaboration helps everyone better deliver on policy goals and regulatory requirements.

> *Inter-regional collaboration helps the champions in each region understand what the other regions are doing, what works and what does not.*

Benefit of Sharing: In his staff report to the Capital Regional District Board in March 2012, Glenn Harris (Senior Manager, Environmental Protection) wrote:

"Board support for the Inter-Regional Education Initiative enables CRD staff participation in a coordinated inter-regional information sharing process. Local governments will benefit from the information sharing between four Vancouver Island regional districts, learn from the experiences of the other regional districts, and be able to participate in workshops delivered locally and elsewhere on Vancouver Island."

'Mind Map' for Collaboration

The IREI program for 'sharing and learning' in the local government setting has transitioned from the successful 'proof of approach' on Vancouver Island in 2012 to full-scale implementation by 2014, including Metro Vancouver. In 2016, IREI program delivery will be in its 5th year.

The implementation spotlight is on what does the **Watershed Health Goal** mean in practice, and how will it be translated it into action on the ground. The definition of the goal is reiterated on Figure 5.

A guiding principle for collaboration is to leverage 'science-based understanding' of the relationship between land use changes and resulting stream health (and also financial liability) consequences – and thereby influence community planning by means of an environmentally adaptive approach.

> *The IREI program will help local government partners leverage more with the same resources.*

Align Local Actions and Provincial Policies: Figure 5 illustrates the scope of the IREI program. It is designed to facilitate and align integration at two scales: provincial and inter-regional. It has been a two decade journey to reach this point. Progress has been an incremental building blocks process. In the chapters that follow, Beyond the Guidebook 2015 elaborates on the elements introduced on Figure 5.

Common Interests: When the Comox Valley Regional Board voted in March 2012 to play a leadership role in launching the IREI, then Chair Edwin Grieve provided this perspective in a news release:

"Inter-regional sharing, collaboration, alignment and consistency will accelerate effective implementation of watershed protection objectives within each regional district. The regions are linked by common interests, but are not dependent on each other."

To achieve the Watershed Health Goal …..

Implement standards of practice that mimic the natural Water Balance, are affordable and effective, and achieve the desired outcome, which is - healthy watersheds and streams.

Region	Watershed-Centric Initiative	Lens
Metro Vancouver	Integrated Liquid Resource & Waste Management Plan	*Watershed Plan Effectiveness*
Capital Region	Integrated Watershed Management Implementation	*Watershed Health Assessment*
Cowichan Region	Regional Integrated Watershed Plans	*Climate Change Adaptation*
Nanaimo Region	Drinking Water & Watershed Protection Plan	*Sustainable Partnerships*
Comox Valley	Guide to Water-Wise Land Development	*Regional Team Approach to Sustainable Service Delivery*

Figure 5

Resilient Rainwater Management: Across Canada Workshop Series

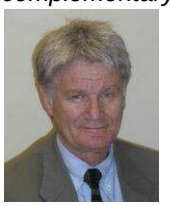
Funded by the Climate Change Adaptation Project at the University of Waterloo in 2014, the *Across Canada Workshop Series on Resilient Rainwater Management: Adapting to a Changing Climate* introduced audiences in Alberta, Ontario, Quebec and the Maritimes to the case study experience of BC local government champions who are leading implementation of 'design with nature' practices.

> *The relevance of the Across Canada Series is two-fold: resulted in the storyline for Part A; and has provided an informed basis for comparing BC's approach with initiatives in other provinces.*

About the Series Title, Focus and Branding: The series was branded as an opportunity for Across Canada audiences to learn about BC's *collaborative and adaptive* approach to protecting and restoring watershed health.

"We had to be sensitive to what worked for each of our Across Canada partners. They had to show that it would be worthwhile for their target audiences to take a day away from work. So, how we messaged the series became crucial. For the title, we chose *resilient* over *sustainable* because it represents the Shifting Baseline vision for restoring watersheds," reports Ted van der Gulik, Partnership President.

Ability for Recovery: *"Sustainable and resilient are complementary terms that draw attention to the future,*



and help focus thought and action. However, use of ***resilient*** *more clearly shines the spotlight on* ***Context, Intent*** *and* ***Results****,"* states Erik Karlsen, former Director of Regional Growth Strategies, BC Ministry of Municipal Affairs. *"Sustainable refers to attaining certain conditions in the context of social, economic and environmental considerations. Resilient in a biological sense is primarily the ability for an ecosystem to recover from an intervention*."

Watershed Health Goal: Focus on What Local Governments Regulate

Viewed from the perspective of local government, a fundamental difference between BC and other provinces is that BC legislation enables 'bottom-up' solutions and action, whereas other jurisdictions prescribe 'top-down' requirements.

> *In BC, the emphasis is on progressing towards a desired outcome. In other regions, the main focus is on compliance with engineering criteria.*

Figure 6 reproduces two Key Messages from presentation slides. These provide context for BC's collaborative, adaptive and still evolving approach.

In 2002, the premise that '*land development and watershed protection can be compatible'* was a major departure from contemporary thinking. The premise drew attention to the application of science-based understanding to a sphere of activity that local government can regulate: that is, 'standards of practice' for land development.

> *The Watershed Health Goal is defined as: implement standards of practice that mimic the natural Water Balance, are affordable and effective, and achieve the desired outcome, which is - healthy watersheds and streams.*

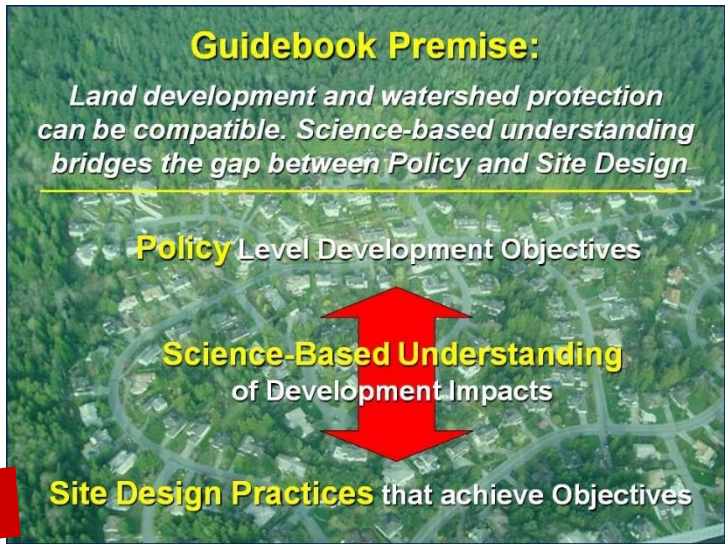
Shared Responsibility: *"Storm Water Management innovation in BC is the result of not being overly regulated,"* observes Hugh Fraser, Deputy Director of Engineering, Delta Municipality. *"Establish sound principles. Apply them. Adapt to the specific site conditions. Do not be too prescriptive, it may take away the opportunity for innovation."*

"Creating a watershed health legacy will ultimately depend on how well we are able to achieve rain water management improvements on both public and private sides of a watershed. There is a huge up-side if the private sector embraces their contribution to shared responsibility."

A Focus on Outcomes: in 2002, the 'Guidebook Premise' signalled a fresh approach to 'Land Development & Watershed Protection'….

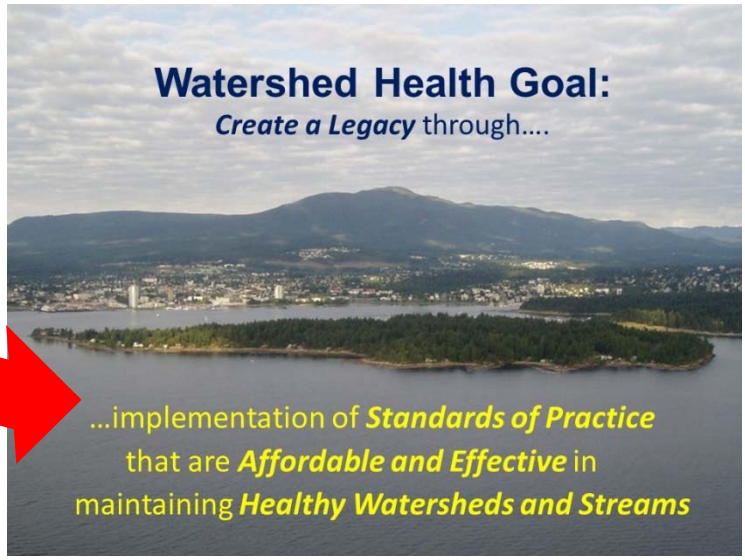
Guidebook Branding:

"Build the Vision, Create a Legacy



Reference: *Stormwater Planning: A Guidebook for British Columbia, 2002*

Science-based understanding has evolved the Guidebook Premise into this definition:



Reference: *Georgia Basin Inter-Regional Education Initiative, 2014*

Figure 6

a. Historical Context Provides Perspective

It was Sir Winston Churchill who said: "The farther back you can look, the farther forward you are likely to see". This insight provides context for Figure 7. The time-line identifies milestones in the building block process, and provides a perspective on BC's long-term commitment to incrementally achieve the **Watershed Health Goal**.

> *Integrate and apply science-based understanding to develop tools and establish precedents. Learn from experience to successfully implement, through collaboration, an environmentally adaptive approach to community design.*

Learning by Doing

The 2002 Guidebook established a North American precedent for application of 'adaptive management' in the local government setting. Adaptive management means 'learn by doing' and changing direction when the science leads to a better way. The goal is to learn from experience and constantly improve standards of practice.

> ***Accept and manage risk*** *to advance accepted practices. Accepting risk opens the door to creativity and results in innovation.*

Water-Centric Focus: *"Part of the reason for the success in BC of our way of thinking is a result of the efforts of various organizations who have managed to successfully engage governments, developers, the community, academia, etc., in water-centric thinking, planning and development activities. In many jurisdictions, water-centric has become a focus and part of our daily conversations*," stated John Finnie.

John Finnie is Past-Chair of the CAVI-Convening for Action on Vancouver Island initiative. He retired from local government as General Manager, Regional and Community Utilities, Regional District of Nanaimo.

Design with Nature

With release of the Water Sustainability Action Plan in 2004, a 'design with nature' philosophy became an integral part of the branding for green infrastructure, rainwater management and water sustainability in BC. The phrase is adapted from the title of the seminal book by Ian McHarg.

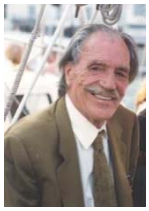
> *Published in 1969,* ***Design with Nature*** *is widely considered one of the most important and influential works of its kind.*

In 2005, the BC Green Infrastructure Partnership translated a 'design with nature' way-of-thinking into a set of action statements that have meaning for practitioners in the local government setting:

'Design with Nature' Means:

- Develop compact, complete communities
- Increase transportation options
- Re-use and recycle water, energy and nutrients from liquid wastes
- Protect and restore urban 'green' space
- Strive for a lighter 'water footprint'
- Achieve higher levels of stream, wetland and marine environment protection

Gradient of Meaning: In the Preface to the 1992 edition, Ian McHarg reflected on the historical context leading up to publication of *Design with Nature*, and also the two decades following publication. He concluded with the following statement:



"So, I commend Design with Nature to your sympathetic consideration. The title contains a gradient of meaning. It can be interpreted as simply descriptive of a planning method, deferential to places and peoples, it can invoke the Grand Design, it can emphasize the conjunction with and, finally it can be read as an imperative. DESIGN WITH NATURE!"

Watershed Health Goal: Time-Line & Milestones

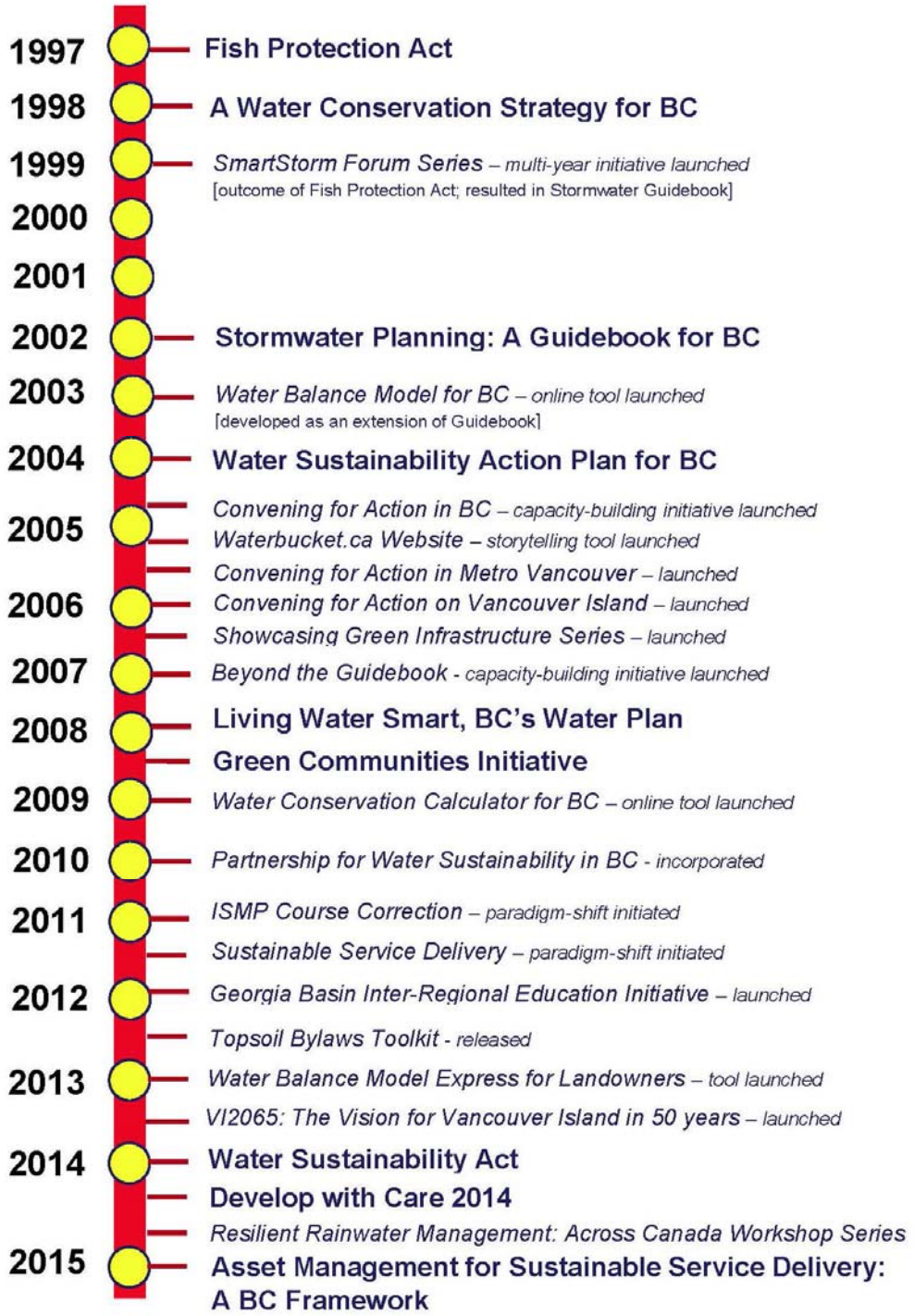


Figure 7

b. 'Sustainable Service Delivery' Introduced

The term *Sustainable Service Delivery* was coined in 2010. It was introduced by the Province to integrate:

- financial accountability,
- infrastructure sustainability and
- service delivery.

The *Worth Every Penny Workshop* hosted by the Regional District of Nanaimo in September 2010 initiated the branding of the concept.

> *Figure 8 reproduces Key Messages from provincial government presentations, starting with a broad definition of Sustainable Service Delivery, followed by what it should mean in practice.*

Prepare for the Future

Released in 2008, *Living Water Smart: BC's Water Plan* is a call to action to prepare communities for change and do business differently. Living Water Smart has 45 actions and targets. Introduction of *Sustainable Service Delivery* achieved this Living Water Smart policy objective.

> *"Governments will develop new protocols for capital planning that will look at the life-cycle costs and benefits of buildings, goods and services." – Reference: p 69, Living Water Smart*

Natural Services: Released in December 2014, ***Asset Management for Sustainable Service Delivery: A BC Framework*** facilitates the new way of doing business. *"It identifies natural services and the use of natural resources – and how they are part of / integrated into the overall services provided at a local government level,"* states Glen Brown, General Manager - Victoria Operations, Union of BC Municipalities (UBCM).

The BC Framework for Action

In May 2014, Canada, BC and UBCM signed the renewed Gas Tax Agreement for a 10-yr term. The Agreement identifies that local governments will be required to meet asset management commitments, as established by the Partnership Committee (the committee that oversees the strategic implementation of the agreement).

These asset management commitments are aligned with the newly developed *Asset Management for Sustainable Service Delivery: A BC Framework;* and support local governments moving towards service, asset and financial sustainability. The Framework provides a circular, continuous pathway to link all components of the asset management process (Figure 8).

While the launch and rollout of the BC Framework is recent, it has already garnered both national and international attention. Other provinces, as well as the Federation of Canadian Municipalities, are integrating the BC Framework into their respective work, and have identified it as a holistic and 'easy to understand' resource.

> *The Framework focusses on desired outcomes – such as the Watershed Health Goal – purposely not prescribing specific methodologies.*

Get It Right at the Front-End: *"The unfunded 'infrastructure liability' is a driver for local governments to consider longevity, focus on what happens after developers hand-off municipal infrastructure,* ***get it right at the front-end****, and prepare for the future. Climate change is part of the liability equation – adaptation has level-of-service implications for infrastructure,"* explains Derek Richmond, Chair of the CAVI-Convening for Action on Vancouver Island initiative, and previously Manager of Engineering with the City of Courtenay.

Between 2010 and 2015, 'Sustainable Service Delivery' evolved from a concept to implementation as the 'BC Framework':

The BC Framework has been developed to recognize the diversity of BC's communities. It also recognizes that asset management, and the best practices that support asset management, must be scalable to community size, character and capacity.

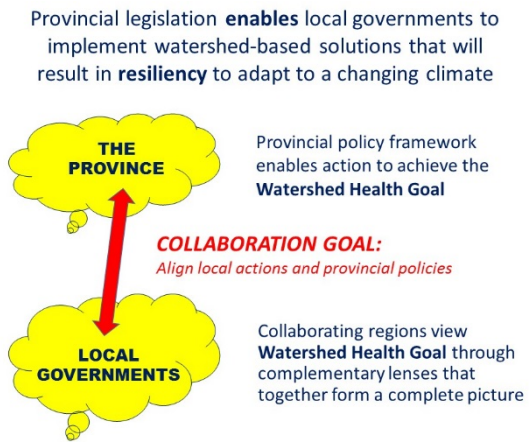
Source: *presentations by Glen Brown, former Executive Director, Local Government Infrastructure & Finance Division, Ministry of Community, Sport & Cultural Development*

Figure 8

c. 'Regional Team Approach' Introduced

The notion of shared responsibility underpins an approach to community sustainability that enables and encourages 'learning by doing'. Furthermore, shared responsibility means that everyone has a role to play in accomplishing a community goal, such as tackling the *Shifting Baseline Syndrome* to restore watershed and stream health.

> *Shared responsibility is a foundation piece for Georgia Basin Inter-Regional Education Initiative.*



A Game Plan: *"Each regional initiative has its own vision and road map. However, a commonality is a desire for a* ***Regional Team Approach*** *founded on partnerships and collaboration,"* observes Tim Pringle, Partnership Past-President and founding Executive Director of the Real Estate Foundation of BC (1988-2008).

"The term 'regional team approach' is resonating. Insertion of the word ***team*** *in 'regional approach' has had a profound impact on how practitioners view their world. Team implies there is personal commitment; it also suggests there is a game plan and a coachable context. The regional team approach is proving to be a powerful motivator."*

Mission Possible

In 2008, Comox Valley and Cowichan Valley local governments embraced 'shared responsibility' and became 'demonstration regions' for rollout of the Living Water Smart and Green Communities initiatives. These two 'convening for action' processes launched the 'regional team approach' and exploration of what could be accomplished through alignment, partnerships and collaboration.

Turn Vision into Action: Refer to Figure 9. The 'regional team approach' is founded on partnerships and collaboration; and seeks to align actions at three scales – provincial, regional and local. A shared vision is that community development will result in cumulative benefits. This can be achieved by 'designing with nature'.

> *Everyone needs to agree on expectations and how all the players will work together, and after that each community can reach its goals in its own way.*

The way to bridge the gap between talk and action is captured by this 1786 church inscription in Suffolk, England: "A vision without a task is but a dream. A task without a vision is but drudgery. A vision with a task is the hope of the world."

Collaboration: *"We need both immediate-term pragmatism and visionary dedication to sustainability if we are to preserve our capacity for positive and permanent regional vitality. Breakthroughs result when we take leaps of faith and apply our pragmatic skills to the 'big picture'. The knack is to demonstrate that the road to both short and long term economic security is through COLLABORATION. This is why I am so impressed by the collaboration that is gathering momentum on Vancouver Island,"* concludes Eva Kras, author of ***'THE BLOCKAGE – Rethinking Organizational Principles for the 21st Century'***.

Essence of the 'Regional Team Approach' is that all players set their sights on the common good and challenge old barriers of jurisdictional interests:

WHAT WE WANT TO ACHIEVE:

"The shared vision is to control our destiny and create a legacy for our children and grand-children. Having a shared vision means that we will visualize what the regions of British Columbia can look like in 50 years, and today we will set in motion actions that will ripple through time to produce that future."

Living Water Smart & Building Greener Communities: Implementing a 'regional team approach' in British Columbia, August 2009

Water Sustainability Action Plan for BC

Collaboration grows from a shared vision about the future and commitment to action:

"Collectively this is what we want to incrementally achieve and, over time, this is how we will work together to get there."

HOW WE WILL GET THERE:

"We are NOT saying that every community must follow the same formula; what we are saying is that everyone needs to agree on expectations and how all the players… regulators, developers, designers, etc….will work together, and after that each community can reach its goals in its own way."

Eric Bonham
Former Director
Ministry of Municipal Affairs
August 2009

Source: *Outreach archives for Water Sustainability Action Plan*

Figure 9

Part B

Align with Provincial Policy & Regulatory Framework:

Enable Action by Decision Makers at Local Level

Build Greener Communities

Deal with Uncertainty
Manage the Water Balance
Adapt to a Changing Climate

Part B – Align with Provincial Policy & Regulatory Framework	
Chapter No. & Title	**Key Messages**
2 **What Happens on the Land Matters**	Milestone years are: ‣ 2003: Climate change is real - a 'teachable year' ‣ 2008: Living Water Smart & Green Communities launched ‣ 2014: Three provincial game-changers enable action Communities are in the best position to develop solutions which meet their unique needs and local conditions.
a. **Water Sustainability Act (Bill 18, 2014)**	Better connecting land and water means providing natural resource decision makers with a strategic water lens and, through planning, tools to better integrate land and water which include opportunities for formal collaboration. Water Sustainability Plans can be combined with other local, regional or provincial planning processes to resolve issues.
b. **Develop with Care 2014**	Local governments have the authority to take action to: ‣ Preserve intact functioning ecosystems as an integral part of the strategy for building green communities. ‣ Implement 'Design with Nature' standards of practice that would restore an ecologically functioning and resilient baseline condition.
c. **Asset Management for Sustainable Service Delivery**	The BC Framework recognizes the life-cycle implications of managing the built and natural environments as integrated components of a healthy watershed. The ultimate vision for Sustainable Service Delivery is that communities would value and manage natural assets in the same way that they manage engineered assets.

2. What Happens on the Land Matters

During the late 1960s, BC began its multi-faceted and ongoing journey towards sustainability. By the 1980s, local governments were given enabling legislation to protect the environment.

By the mid-1990s, local governments were given new legislation for *Regional Growth Strategies* and *Official Community Plans* as well as improved tools for environmental protection, particularly in relation to salmonid ecosystems.

During this period, and in the early 2000s, inter-governmental partnerships were formed to address environmental challenges; and were supported by protocol agreements between the Province and the Union of BC Municipalities.

> *In the post-2000 era, milestone years (from a water / watershed sustainability perspective) are 2003, 2008 and 2014. A unifying theme for the three is 'build greener communities'.*

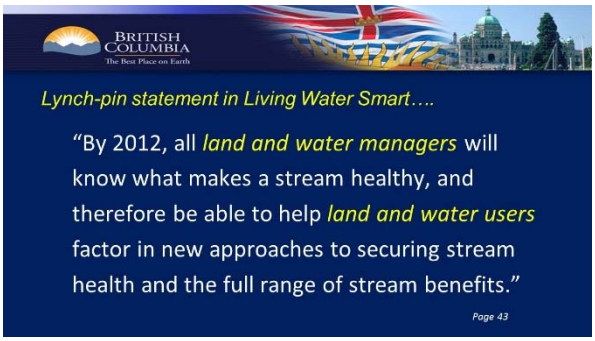
Build Greener Communities

Drought, forest fires and floods in 2003 created a 'teachable year' for change (Figure 10). The year began with destructive wind storms and deadly avalanches, followed by a summer of fire, an autumn of floods and an early winter with more record rains. The province's year of weather misery and misfortune earned it a place at the top of Canada's weather stories for 2003.

Heightened awareness of a changing climate led to the **Water Sustainability Action Plan for BC**, released in February 2004. The main goal was to encourage province-wide implementation of fully integrated water sustainability policies, plans and programs. The Action Plan created a partnership umbrella for aligning actions at three scales – provincial, regional and local. Action Plan success helped to lay the groundwork for the *Living Water Smart* and *Green Communities* initiatives in 2008.

2008 - Call to Action: The 45 actions and targets in **Living Water Smart, BC's Water Plan** establish expectations vis-à-vis how land will be developed (or redeveloped) and how water will be used. The **Green Communities Initiative** complements Living Water Smart and comprises plans, strategies and enabling tools to achieve the land and water stewardship vision. The two initiatives constituted a call to action:

- prepare communities for a changing climate;
- choose to live water smart; and
- strive to build greener communities.



2014 – Game-Changers Enable Action: The 2008 'call to action' resulted in three landmark initiatives. These came to fruition in 2014. Together, they provide a platform for integrated actions that achieve the Watershed Health Goal.

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia, released in March, makes the link between environmental function and resilience as communities grow.

The **Water Sustainability Act**, passed in May 2014, makes the link between land use actions and desired water balance outcomes.

Asset Management for Sustainable Service Delivery: A BC Framework, released in December 2014, makes the link between local government services, the infrastructure that supports the delivery of those services, and watershed health.

In 2003, it was the Kelowna Fire that sparked the discussion…..

Figure 10

Call to Action (2008)

In 2008, work over a 5-year period by a host of champions (inside and outside government) culminated in the Province's *Living Water Smart* and *Green Communities* initiatives. This work built on the foundation that had been laid over previous decades. The resulting policy, program and regulatory framework enables implementation of **collaborative solutions** that would achieve the Watershed Health Goal.

Figure 11 conceptualizes the essence of the two complementary initiatives.

Green Communities Initiative: BC is perhaps the least prescriptive province, and BC local government is among the most autonomous in Canada. The Province enables local government by providing policy and legal tools in response to local government requests.

The enabling approach means the onus is on local government to take the initiative and implement. The Province recognizes that communities are in the best position to develop solutions which meet their own unique needs and local conditions. This is why the *Green Communities Initiative* has four types of building blocks, in particular partnerships.

Being Enabled Means: *"It is exciting to see local governments acting creatively to address the pressing environmental challenges of our time. Good work in planning, service delivery and infrastructure development - that fits the unique context of individual communities - is contributing to making our communities not only more sustainable but also better places to live,"* states Dale Wall, former Deputy Minister, Community and Rural Development.

Living Water Smart – BC's Water Plan: Living Water Smart solutions and commitments go beyond what government does, and are ongoing. Actions and targets are grouped into five themes:

Living Water Smart - Implementation Themes

1. Governance, legislation, regulatory change
2. Efficiency, outreach, public awareness
3. Science, information & learning
4. Watershed planning & restoration
5. Community planning and development

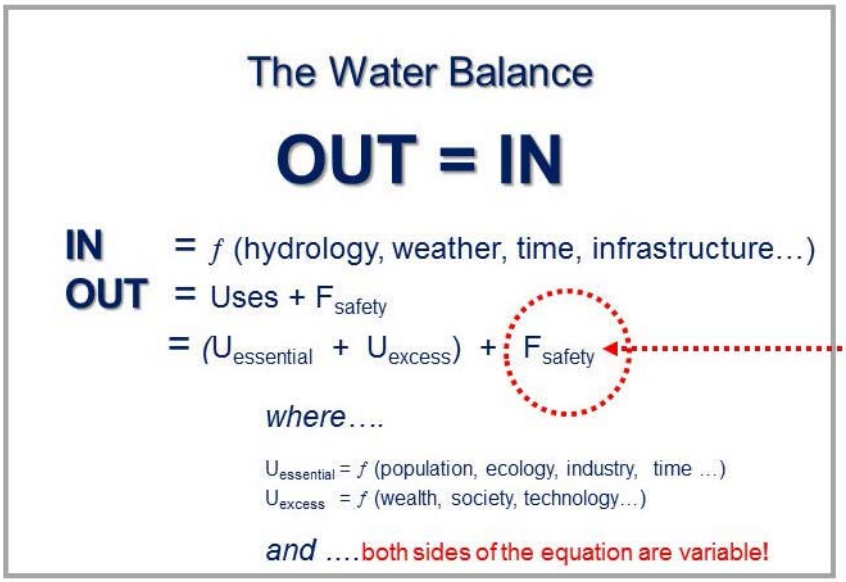
Partnerships: The umbrella provided by the *Water Sustainability Action Plan* has allowed the Province to leverage partnerships to greatly enhance the profile and resulting impact of Living Water Smart. The Partnership for Water Sustainability, a non-profit society, is playing a key delivery role in several theme areas, in particular developing tools for local government and providing training to support an environmentally adaptive approach to community design.

The outreach and education provided by the Partnership for Water Sustainability has been important in helping to realize the goals of Living Water Smart.

Collaboration: *"Living Water Smart acknowledges that what government does is only part of the solution. Living Water Smart challenges all British Columbians – individuals, families, communities, business and industry to step up and be water stewards. Embrace shared responsibility. Create a legacy for those who follow in our footsteps,"* states Lynn Kriwoken, Executive Director in the Ministry of Environment. Her responsibilities encompass Living Water Smart development and implementation.

Living Water Smart, BC's Water Plan

is founded on an understanding of:



HOLISTIC APPROACH:

This deceptively simple equation embodies principles and concepts for dealing with uncertainty and managing risk.

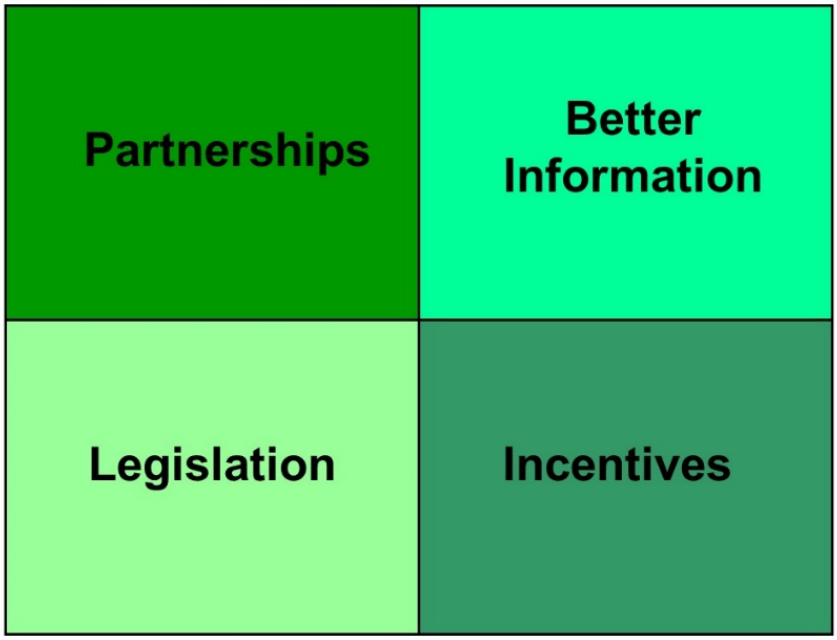
Over time, the safety factor has been decreasing in BC

LIVING WATER SMART ACTION:

"Adapting to climate change and reducing our impact on the environment will be a condition for receiving provincial infrastructure funding." – p. 63

Green Communities Initiative

is comprised of four types of building blocks:



AUTHORITY TO ACT:

The Local Government (Green Communities) Statutes Amendment Act (Bill 27, 2008) removed legislative barriers for local governments. The legislation ensures local governments have the necessary authority to take action to reduce GHG emissions, conserve energy and water and make their communities more socially and environmentally sustainable.

Figure 11

Game-Changers Enable Action (2014)

Doing business differently and making a difference is a building blocks process. Understanding expands and becomes clearer over time. The foundation for integrated action that connects land and water has been constructed over the past half-century. The three recent milestone years are:

- 2003 – The Teachable Year
- 2008 – Call to Action
- 2014 – Game-Changers Enable Action

Accepted 'standards of practice'- especially those for engineering, planning and finance – influence the form and function of the Built Environment. The goal of shifting to an ecologically functioning and resilient baseline and creating a watershed health legacy will ultimately depend on implementing 'Design with Nature' standards of practice.

Springboard to Implementation: It has taken a decade to move from the 'teachable year' to a point where the policy, regulatory and program framework is in place and enables implementation of watershed-based solutions.

> *As of 2014, three game-changers (Figure 12) provide the springboard for collaborative action to achieve the* ***Watershed Health Goal****. Integration and coordination of the three will maximize their joint effectiveness and the part each can play over time in building Green Communities that are resilient.*

Environmentally Adaptive Approach: A guiding principle for collaboration is to leverage 'science-based understanding' of the relationship between land use changes and resulting stream health (and also financial liability) consequences – and thereby influence community planning by means of an environmentally adaptive approach.

Coordinated & Integrated

Opportunities abound to couple the three game-changers with other elements of the existing policy, regulatory and program framework - such as *Liquid Waste Management Plans* (LWMPs) and the *Climate Leadership Plan* – to achieve the Watershed Health Goal.

Liquid Waste Management Plans: The rainwater component of an LWMP is a potentially powerful regulatory and planning tool. It can influence other local government processes for the better. When fully integrated with land use and (re)development processes, the rainwater component of an LWMP can generate the blueprint for coordinated action at a watershed scale, one property at a time.

Climate Leadership Plan: The process for developing BC's Climate Leadership Plan was announced in April 2015. The anticipated release of the plan is March 2016. The plan will include recommendations on how to further the Province's collaboration with local governments within the context of mutually-beneficial climate actions.

Climate Action: *"Adaptation is local in application. The Province has developed information and tools to support practitioners and decision makers to take action at a local level. Sharing of knowledge and experience through* ***'organic collaboration'*** *is also vital because peer-to-peer learning is what practitioners respect most,"* states Thomas White, Manager, Climate Risk Management, Climate Action Secretariat (Ministry of Environment).

Resilient Communities - What Happens on the Land Matters:

*As of 2014, three provincial **Game-Changers** enable **Collaborative and Integrated Action** to achieve the **Watershed Health Goal:***

WHAT – *The Act connects land and water, and makes the link to desired water balance outcomes*

SO WHAT – *'Develop with Care' makes the link between environmental function and resilience as communities grow*

THEN WHAT – *The Framework makes the link between local government services, the infrastructure that supports the delivery of those services, and watershed health*

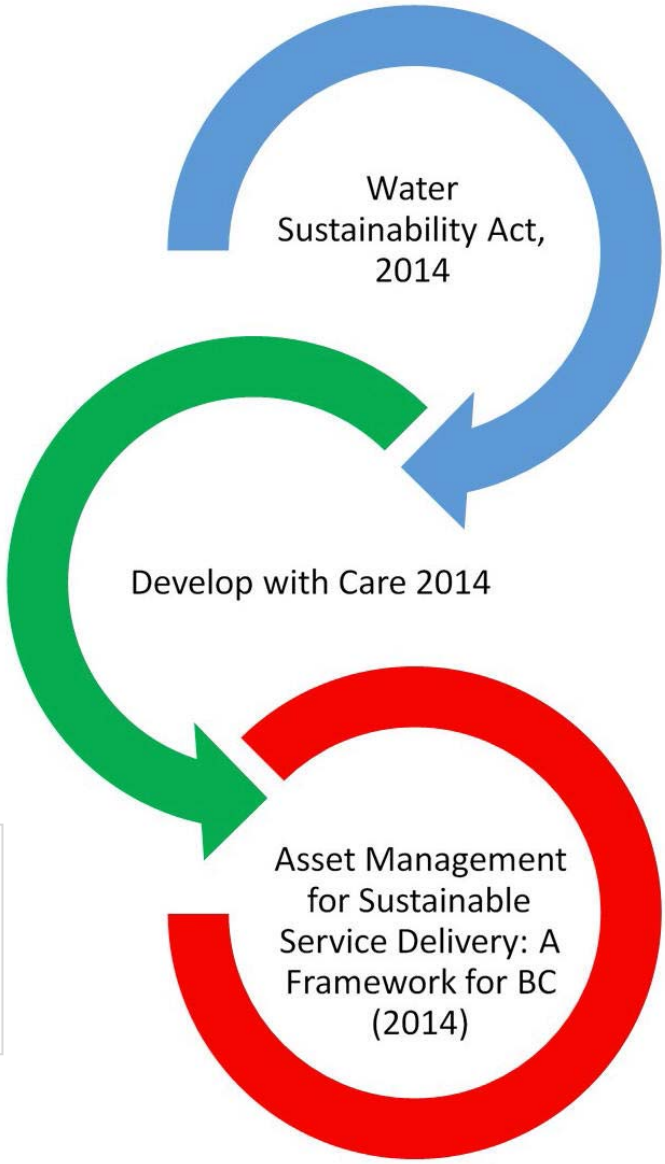


Figure 12

a. Water Sustainability Act (Bill 18, 2014)

A decade in the making, the new Water Sustainability Act is an historic achievement. The Act is the signature piece in a policy and legislative framework that establishes expectations and direction for adapting to a changing climate. The Act recognizes the connection between land use actions and the implications for the both the water cycle and watershed sustainability.

> *The Act will have widespread impacts on how water and land practitioners conduct their work.*

Seven Policy Areas

The Act addresses seven policy areas (Figure 13). These policy areas bring together 19 of the 45 Living Water Smart commitments that are ultimately implemented through the Act, build on the current merits of the Water Act and bring in new policy tools which will help manage BC's water more sustainably into the future.

One policy area - ***consider water in land use decisions*** - helps to address the potential impacts of land use actions on water. To do this, the Water Sustainability Act enables a number of tools which will help decision makers better manage the impacts of land use on water.

> *The development of Water Objectives and Water Sustainability Plans are two tools for managing the impacts of land use on water.*

Connecting Land and Water

Under the *Water Sustainability Act*, Water Objectives promoting protection of water quality, water quantity and aquatic ecosystem health will be established in regulation and further defined in policy.

Strategic Water Lens for Making Decisions: Establishing the Water Objectives will also build on the provincial government's current initiatives related to cumulative effects management and environmental mitigation. Having Water Objectives will help support decision-making across a number of natural resource statutes, and in particular support a more consistent approach for the consideration of the impacts that land-based activities can have on water.

By establishing broad province-wide objectives and an evaluation framework that can be customized by region, decision makers will have a strategic water lens that can be used in decision making so the decisions they make will better *integrate objectives for water quantity, water quality, and aquatic ecosystem health*.

Integration with Local Government Planning: The *Water Sustainability Act* also allows for the development of Water Sustainability Plans. These collaboratively developed plans can integrate water and land use planning and can be combined with other local, regional or provincial planning processes to address water-related issues focused on addressing or preventing conflict, mitigating risk to water quality, water quantity and aquatic ecosystem health or restoring watershed function.

Process for Water Sustainability Action Plans: *"The scale and scope of each plan – and the process used to develop it – would be unique, and would reflect the needs and interests of the watersheds affected. Planning will be an effective tool where the need is great, and where other area-based management tools are not able to address the links between land use and watershed impacts,"* explains Jennifer Vigano, Water Policy, BC Ministry of Environment. Jennifer helped to write the new Act.

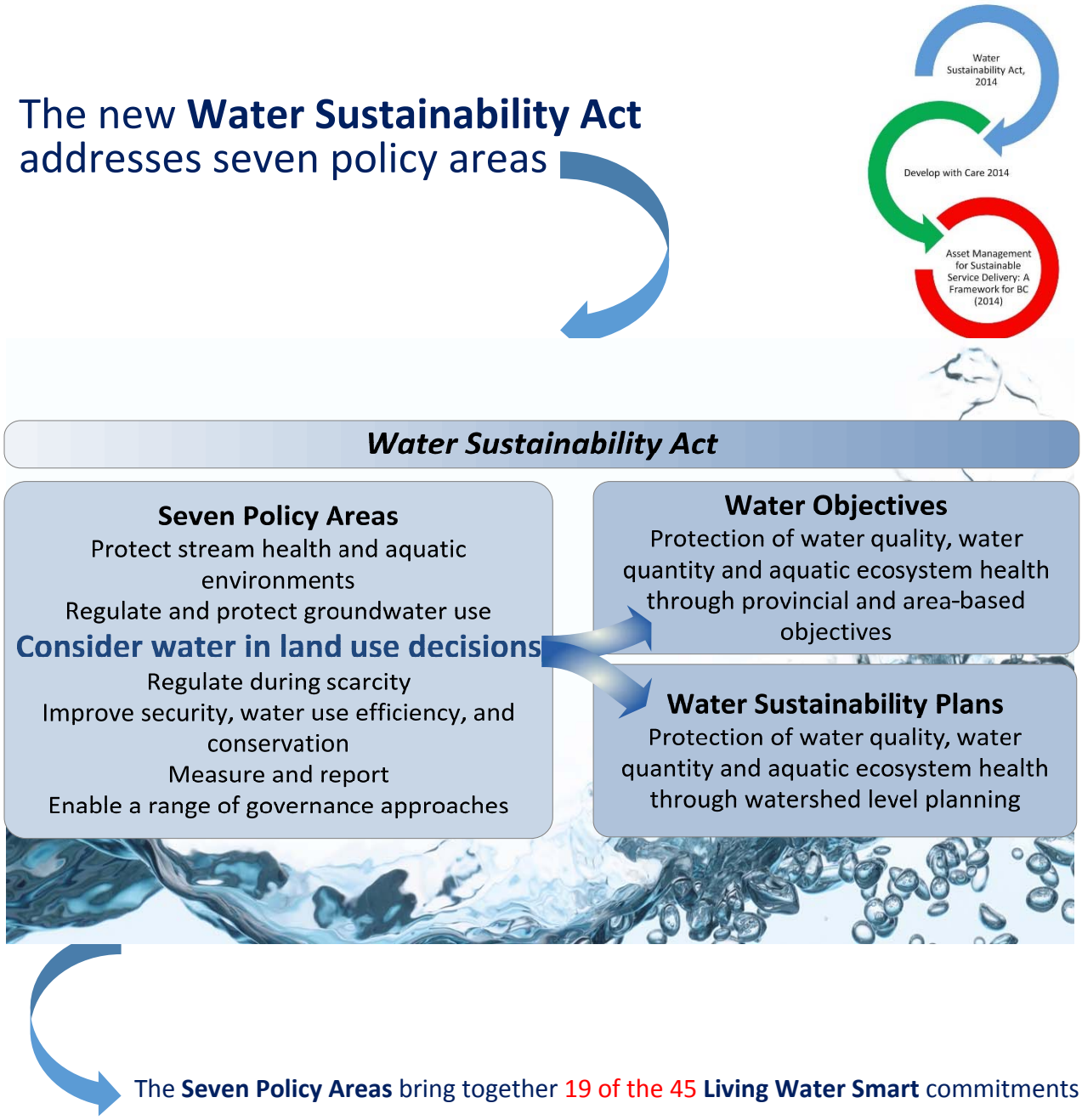

The new **Water Sustainability Act** addresses seven policy areas
Water Sustainability Act, 2014
Develop with Care 2014
Asset Management for Sustainable Service Delivery: A Framework for BC (2014)
Water Sustainability Act
Seven Policy Areas
Protect stream health and aquatic environments
Regulate and protect groundwater use
Consider water in land use decisions
Regulate during scarcity
Improve security, water use efficiency, and conservation
Measure and report
Enable a range of governance approaches
Water Objectives
Protection of water quality, water quantity and aquatic ecosystem health through provincial and area-based objectives
Water Sustainability Plans
Protection of water quality, water quantity and aquatic ecosystem health through watershed level planning
The **Seven Policy Areas** bring together 19 of the 45 **Living Water Smart** commitments

Figure 13

b. Develop with Care 2014

Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia (Figure 14) replaces the 2012 version of this internationally acclaimed document. It provides information and guidance so that local governments, land developers and others involved in land use can use creative approaches to meet the Province's environmental standards.

> *Develop with Care 2014 is part of the Province's results-based approach to land use decisions. It provides supporting details to achieve the objectives of the Living Water Smart and Green Communities initiatives.*

Towards Resilient Communities

Develop with Care 2014 has evolved in the course of five releases, starting in 2001.

- *Environmental Objectives, Best Management Practices and Requirements for Land Developments (2001)*
- *Environmental Best Management Practices for Urban and Rural Land Development in British Columbia (2004)*
- *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia (2006)*
- *Develop with Care 2012*
- *Develop with Care 2014*

The Province has many different programs that provide local governments with guidance to achieve their community goals. Develop with Care 2014 brings together information and guidance from several provincial ministries. The document takes an integrative and collaborative approach so that the information and guidance (to the extent possible) is all in one place.

Alignment of Provincial and Local Government Mandates

The expanded scope of the 2014 edition includes new information on the Province's programs and direction, with emphasis on the environmental protection mandate of the Ministry of Environment.

> *Develop with Care 2014 is a tool to engage with local governments, planners, developers and others involved in land use about the provincial mandate and issues.*

Land Use and Environment: *"Develop with Care 2014 incorporates the integration piece that now makes the direct connection to the Built Environment and the local government mandate. A focus on the Built Environment provides an opportunity to look at environmental protection from perspective of land use, and get out in front of issues. Partnering of provincial policies and mandate with the local government decision process for zoning and development leads to local government being in sync with provincial policies and working together,"* states Helene Roberge, former Unit Head, Clean Communities Section of the Ministry of Environment. She was co-lead for Develop with Care 2014.

A Compilation of Best Practices: *"Develop with Care has evolved and grown from its beginnings in 2006, as a reference to preserve species and ecosystems on Vancouver Island, to becoming the reference of choice to protect ecological values in urban and rural communities across British Columbia, elsewhere in Canada and even overseas. We are delighted to offer this compilation of best practices to landowners, local governments and the development industry,"* summarizes Maggie Henigman, co-lead for creation and evolution of the Develop with Care series. Maggie Henigman is an Ecosystems Biologist with the Ministry of Forests, Land and Natural Resource Operations.

Develop with Care 2014 promotes ways to retain and create environmental function and resilience as communities grow…

Guidance, Not Legislation:

Based on science and experience, and building on leadership that is being shown by many local governments and developers to create resilient communities and developments, Develop with Care 2014 is intended to support and encourage good decision making and to influence sustainable planning. In addition to what is prescribed in mandatory provincial and federal legislation, or to objectives that are set, Develop with Care 2014 provides guidance on how to meet those standards without being prescriptive.

Support for Decision-Making:

Features information on 'green' alternatives to standard urban development practices, riparian protection, climate change, waste management, the protection of Environmentally Valuable Resources, a Terms of Reference for conducting biological inventories, Checklists for streamlining review processes, species and land use based Fact Sheets, and much more.

Figure 14

Adaptive Communities are Resilient Communities

BC communities have already experienced the impacts of a changing climate such as flooding, drought, wildfire and more frequent and intense storms. The extent and costs of these events have been significant.

> *"Successful adaptation does not mean that impacts will not occur, only that they will be less severe than would have been experienced had no adaptation occurred," say D. S. Lemmen, F. J. Warren and J. Lacroix.*

Planning for a Changing Climate: Some communities are already anticipating and adapting to this "new normal", and they are using existing planning legislation and tools. Being able to start with good information about projected future conditions is key to assessing the risks and vulnerabilities of a particular location.

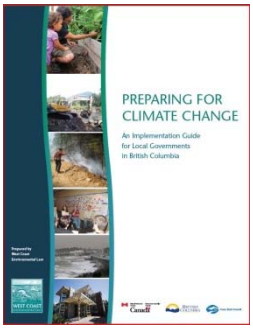
> *Figure 15 identifies seven strategic resources to help achieve the goals for resilient communities, and these are described opposite.*

Each Community is Different: *"We worked in partnership with Pacific Climate Impacts Consortium to make the regional climate science maps and data projections available to communities through the **Plan2Adapt** interactive web tool,"* says Cathy LeBlanc, Intergovernmental Relations and Planning Branch, Ministry of Community, Sport and Cultural Development.

"Communities can use the science projections to figure out what is happening (i.e. climate variables), so what (i.e. impacts) and then what (i.e. affected sectors). Each community is different and by developing its own strategies for mainstreaming adaptation into its decisions and operations, it will become more resilient."

"Collaborating with other communities and partners, using key adaptation resources, and mainstreaming activities, will help to increase community resilience," concludes Cathy LeBlanc.

Preparing for Climate Change: An Implementation Guide for Local Governments in BC (2012) provides over 90 links to examples of planning tools being used for adaptation and it provides three land use scenarios and two checklists.



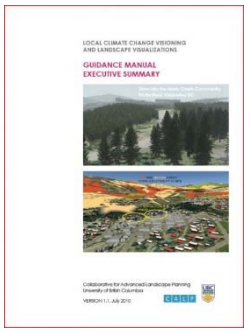
It reinforces the linkages between low impact development, emergency management, asset management, and financial and strategic planning. And it encourages communities to collaborate with their neighbours to assess regional impacts.

A number of other recent partnerships developed key adaptation resources including:

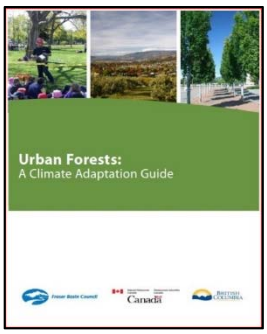
- **Local Climate Change Visioning and Landscape Visualizations Guidance Manual** (2010) - to help communities visualize localized scenarios for flood adaptation, snow pack melt, wildfire, and sea level rise.
- New resources for coastal communities facing flooding, storm surge and sea level rise, such as the **Sea Level Rise Adaptation Primer** (2013).
- **Urban Forests: A Climate Adaptation Guide** (2010) - to help plant the right tree, for the right place and the right time.
- The **Development Permit Areas for Climate Action: A Guide for Energy Conservation, Water Conservation and GHG Emissions Reduction** (2011) – that promotes the use of DPAs individually or in combination to achieve broader rainwater management goals.

Previous partnerships helped to produce the **Water Balance Model** (capturing rainwater on-site and recharging aquifers) and the **Stormwater Planning: A Guidebook for BC** (performance targets).

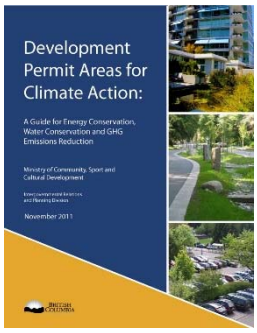
Implement **'Design with Nature'** practices to build **Resilient Communities….**



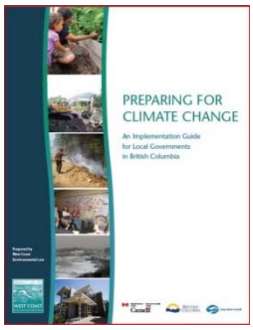
2010 Visioning Guide



2010 Urban Forests Guide



2011 DPA Guide



2012 Implementation Guide

2013 Sea Level Rise Primer

FIVE RESOURCES *that provide local government elected officials and practitioners with high-level guidance on how to make informed decisions*

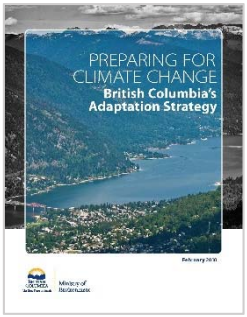
Plan2Adapt:

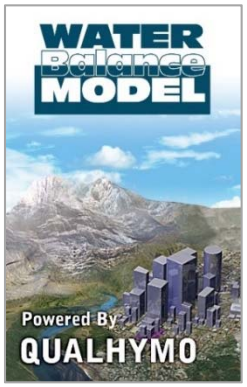
This online tool allows users to generate information (maps, graphs and data tables) to better understand how climate will change in their area, how the region will be impacted and what they can do to prepare.

ONLINE TOOLS *enable scenario comparisons.*

Climate change innovation by the Pacific Climate Impacts Consortium is incorporated in the Climate Change Module within the Water Balance Model.

Launched in 2003, this online scenario modelling and decision support tool is designed to help local government implement green infrastructure that is effective in maintaining the natural Water Balance.





The model supports two provincial initiatives: ***Living Water Smart****; and* ***Preparing for Climate Change: British Columbia's Adaptation Strategy****.*

Figure 15

c. Asset Management for Sustainable Service Delivery

Introduced in Part A, *Asset Management for Sustainable Service Delivery: A Framework for BC* (Figure 16) is a landmark initiative. Several years in the making, the BC Framework is aligned with the asset management requirements for the Province's capital grants programs, and is therefore a game-changer.

Sustainable Service Delivery encompasses water resources and drainage, and hence, will determine the achievability of the Watershed Health Goal.

> *The Province's grants program provides a financial incentive for local governments to demonstrate how they can fulfil 'Design with Nature' objectives and expectations that are both explicit and implicit in the BC Framework.*

Land Servicing and the 'Unfunded Infrastructure Liability'

The unwanted legacy of historical 'stormwater management' is the unfunded liability that is created when land development and infrastructure servicing practices combine to harden the landscape and short-circuit the natural Water Balance (bottom part of Figure 16).

When altering of the land surface short-circuits the Water Balance, consequences include expensive drainage and stream stabilization fixes (in an era when communities are challenged to fund and replace essential infrastructure services).

Implementing 'Design with Nature' development practices at the site scale – so that benefits accumulate and mimic the natural Water Balance at a watershed scale – ultimately means that communities will be more **resilient** during periods when there is either too much or too little rain.

Focus on Desired Outcomes

Over the past 15 years in BC, local government leaders have been applying science-based understanding to develop tools, establish precedents and gain the experience necessary to implement practices that would ultimately achieve the Watershed Health Goal.

The "missing link" in the sharing and learning process has been an opportunity or driver to package the tools, precedents and experience into a comprehensive and integrated application.

The renewed Gas Tax Agreement complete with requirements to implement the BC Framework (in order to meet asset management commitments) now provides a timely driver for such integration.

> *Outcome-oriented, the BC Framework is the catalyst for local governments to integrate natural systems and climate change thinking into Asset Management, and forestall an 'unfunded infrastructure liability'.*

Asset Management Continuum: *"The BC Framework provides a high level overview of what is needed to develop, implement and maintain strong asset management practices for local governments.*

The BC Framework also points the way to integration of natural systems and climate change thinking into asset management. Resilient cities will be the ones that can absorb water and manage the water cycle as a closed loop. We can view asset management as a continuum. Communities will progress along it incrementally as their understanding grows. By accounting for and integrating the services that nature provides, they can achieve the goal of Sustainable Service Delivery for watershed systems," explains Liam Edwards, Executive Director (for Infrastructure and Finance, Local Government Division) in the Ministry of Community, Sport and Cultural Development.

Branding graphic for
Asset Management for Sustainable Service Delivery: A Framework for BC

Figure 16

Asset Management Defined:

Asset Management is an integrated process, bringing together skills, expertise, and activities of **People**; with **Information** about a community's physical **Assets**; and **Finances**; so that informed decisions can be made, supporting Sustainable Service Delivery

When the land surface is hardened,
below-ground flow paths to streams are eliminated ….

With potential financial liability and sustainability consequences

TOO MUCH WATER:

Erosion, instability and movement of gravel and contaminants

TOO LITTLE WATER:

Creeks go dry … (and fish will not survive)

Sustainable Service Delivery for Watershed Systems

The Union of BC Municipalities (UBCM), in partnership with the Province and Asset Management BC, developed the BC Framework. It sets strategic direction for asset management and its implementation in BC.

The BC Framework makes the link between local government services, the infrastructure that supports the delivery of those services, and the health of watershed systems. The focus on outcomes allows local governments to tailor an approach to individual needs and capacities.

Value Natural Services: The BC Framework defines asset management as a continuous process (not a discrete task). The PLAN is only a part of the overall process. The PROCESS deals with all of the components necessary to:

- refocus the business process to properly manage a community's infrastructure within the built environment; and
- understand the life-cycle implications of managing the built and natural environments as integrated components of a healthy watershed.

The BC Framework recognizes that nature, and the ecosystem services that it provides, are a fundamental and integral part of a community's infrastructure system. This recognition reflects an understanding that trees, soil, green spaces, and water contribute a valuable municipal function in maintaining the hydrologic integrity of a healthy watershed.

> *The ultimate vision for fully integrated Sustainable Service Delivery is that communities would protect, preserve, restore, and manage these natural assets in the same way that they manage their engineered assets.*

Get It Right At the Front End: Holistic application of the BC Framework would help local governments reconcile two dilemmas:

- **Engineered assets:** The long-term operating, maintenance and renewal cost of infrastructure assets is usually about 80 percent of the life-cycle cost. Communities bear this cost forever. Often this is not adequately funded through property taxation and utility charges. For this reason, the life-cycle shortfall is characterized as an 'unfunded infrastructure liability.'
- **Natural assets:** Loss of hydrologic integrity is a consequence of historical drainage and 'stormwater management' practices that do not respect the Water Balance. Local governments bear the entire financial burden to stabilize and restore watershed systems impacted by increased runoff volumes after the landscape is transformed by development. This too is an 'unfunded infrastructure liability.'

> *Sustainable Service Delivery for watershed systems, and 'getting it right at the front-end,' would apply to land uses that local governments regulate and/or can influence within settled areas of watersheds (Figure 17).*

Inform and Educate Practitioners: By 2017, an over-arching program goal of the *Georgia Basin Inter-Regional Educational Initiative* (IREI) is that local governments in the partner regions would truly understand ***how*** natural systems support municipal services and would be able to fully **integrate** this understanding and application of the Water Balance Methodology as the technical foundation for programs, planning and funding.

Professional development provided by the IREI program would result in a common understanding among all departments within an organization about how they could align their efforts to achieve *Sustainable Watershed Systems, through Asset Management*.

Sustainable Watershed Systems, through Asset Management applies to land uses that local government regulates and is founded on an understanding of how the **Water Balance Methodology** integrates the **Site** with the **Watershed, Stream** and **Groundwater Aquifer**

The Water Balance Methodology is about managing the whole rainfall spectrum and providing benefits to the stream through the wide range of stream needs - from base flow to managing flooding. The Water Balance Methodology bridges all ranges in rainfall and streamflow events. The Water Balance Methodology incorporates robust and proven calculation techniques and engineering applications to define a watershed and stream as a whole system. In this manner the results can be used to provide a quantitative assessment of both impacts and mitigation effectiveness. It also possible to show benefits that have been long thought as not achievable.

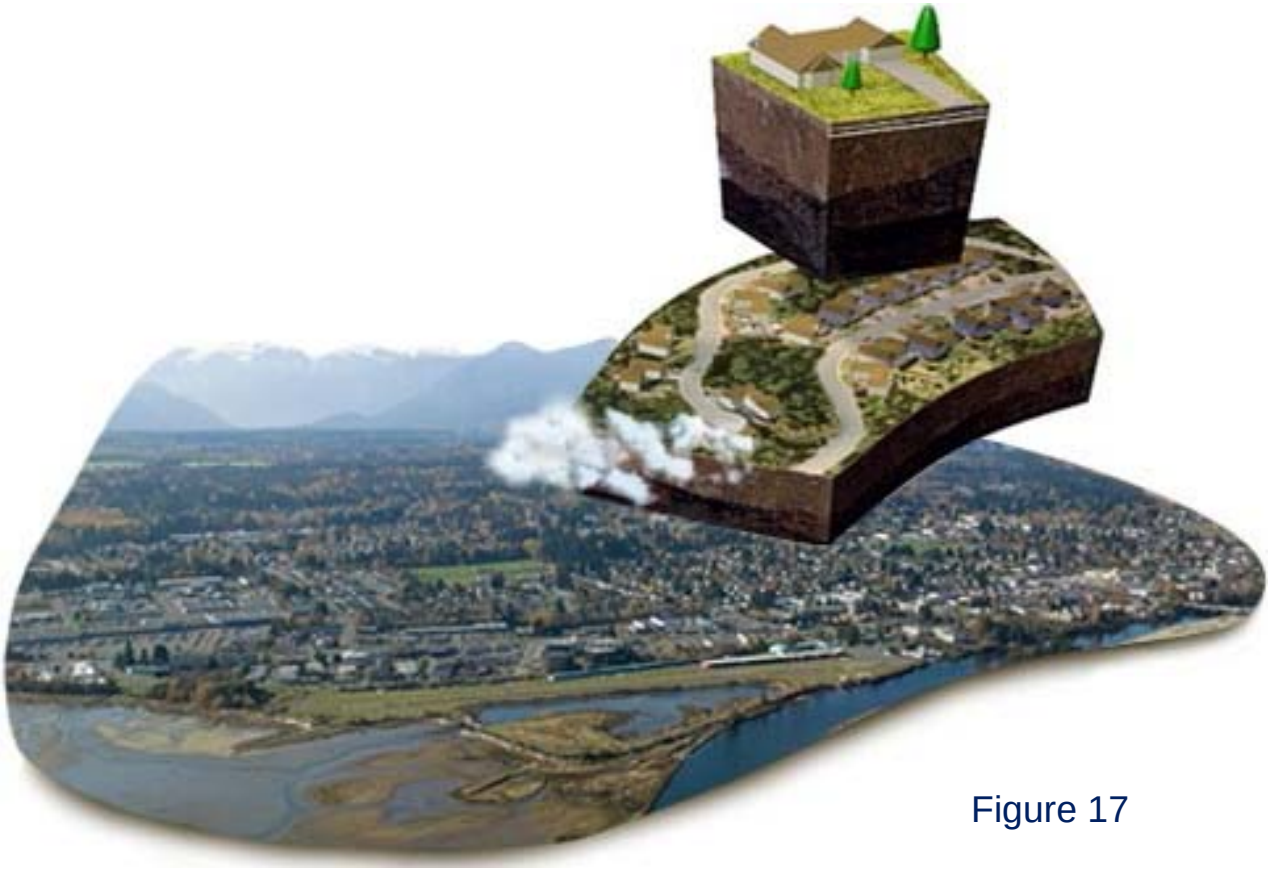


Figure 17

Part C

Influence the Form and Function of the Built Environment:

Develop Tools and Talent, Focus on Outcomes

'Design with Nature' and influence how water is used, runs off the land, and reaches streams:

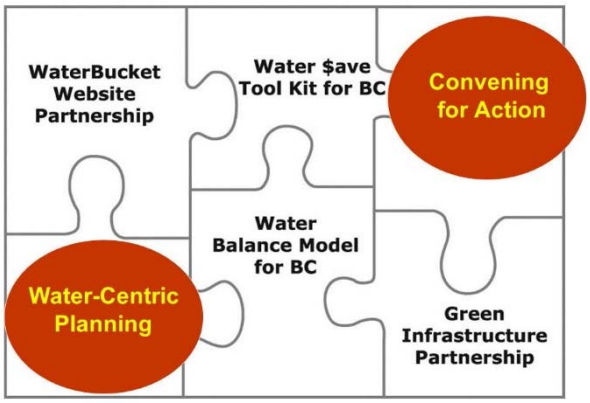
Part C – Influence the Form and Function of the Built Environment	
Chapter No. & Title	**Key Messages**
3 **Convening for Action in British Columbia**	Influence choices. Encourage action. Provide tools. Establish 'design with nature' precedents. Transform *communities of interest* into *communities of practice*.
a. **A Vision for Water-Centric Planning**	Recognize that water is a form maker. Plan with a view to water. Balance settlement, economy and ecology. Integrate missions, mandates and accountabilities
b. **Embrace Shared Responsibility**	Understand and care about the goal. Choose to be enabled. Choose to act. Focus on how people interact. Decide what tools will achieve the goal. Implement.
c. **Design with Nature**	Build the vision, create the legacy. Green communities. Soften the 'water footprint'. Choose designs that mimic the Natural Water Balance.
d. **Develop Tools & Talent**	Bridge the gap between those who decide what to do and those who drive the details. Focus on knowledge leading to action. Deal with uncertainty. Manage risk.
e. **Implement a Regional Team Approach**	Embrace the 4Cs: communicate, cooperate, coordinate and collaborate. Look beyond boundaries. Align efforts at a watershed scale. Move forward as a group.

3. Convening for Action in British Columbia

Released in 2004, the *Water Sustainability Action Plan for British Columbia* (i.e. "the Action Plan") recognizes that the greatest impact on water, land and water resources occurs through our individual values, choices and behaviour.

Inform Provincial Policy

For the past decade, the Action Plan has provided a partnership umbrella for championing processes and projects that inform Provincial policy through the shared responsibility model. The Action Plan products represent a continuum, with policy at one end, and pragmatic applications and tools at the other end. The Action Plan initially comprised six elements, has evolved, and has coined terms that are part of the practitioner vocabulary in BC:



Focus on Outcomes: Part C is written for those who wish to understand how Action Plan initiatives influence land and water practitioners. The storyline that follows is organized in five parts:

- A Vision for Water-Centric Planning
- Embrace Shared Responsibility
- Design with Nature
- Develop Tools and Talent
- Implement a Regional Team Approach

Influence Choices

Land planning and water use practices are intertwined. For this reason, an Action Plan goal is to influence choices and encourage action by individuals and organizations - so that water resource stewardship is an integral part of land use and daily living - at all levels, from the province to the household; and in all sectors, from consumptive to ecosystem support uses.

> *Sustainable and resilient communities are all about choices – choices that become reality very quickly, with lasting consequences. Much depends on getting the choices right.*

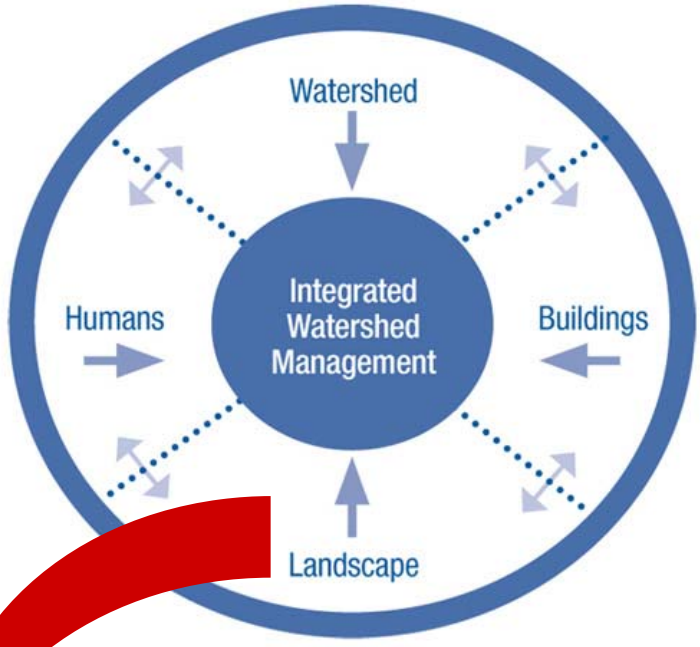
What - So What - Now What - Then What: Figure 18 illustrates the 'BC Process' for leading and implementing change. Launched in February 2005 at a water resource conference in Kelowna, **Convening for Action** is a provincial initiative that supports innovation on-the-ground.

Implementing change is primarily a people matter, not a technical one. Bridging the gap between interest and practice involves motivating practitioners to engage in ways that provide sufficient meaning to inspire them and lead to action.

> *The BC Process transforms 'communities of interest' into 'communities of practice'.*

Move from Talk to Action: In 2007, Ray Fung stated: *"Convening for Action is our mantra. When we gather, it is for a purpose. There must be an action item or an outcome. Our aim is to move from talk to action by developing tools, building capacity, and providing training*." Ray Fung is the Director of Engineering & Transportation, District of West Vancouver. He is a Past-Chair of both the BC Water Sustainability Committee (2003-2008) and BC Green Infrastructure Partnership (2008-2012).

Integrated Watershed Management and Designing with Nature underpin the 'BC Process' for Moving from Awareness to Action



The Water Sustainability Action Plan for BC promotes the watershed as a fundamental planning unit:

"Integrated water management involves consideration of land, water, air and living organisms – including humans – as well as the interactions among them. The Action Plan will use existing and emerging government policies, legislation and programs as fundamental starting points and will build on these."

– extract from Executive Summary

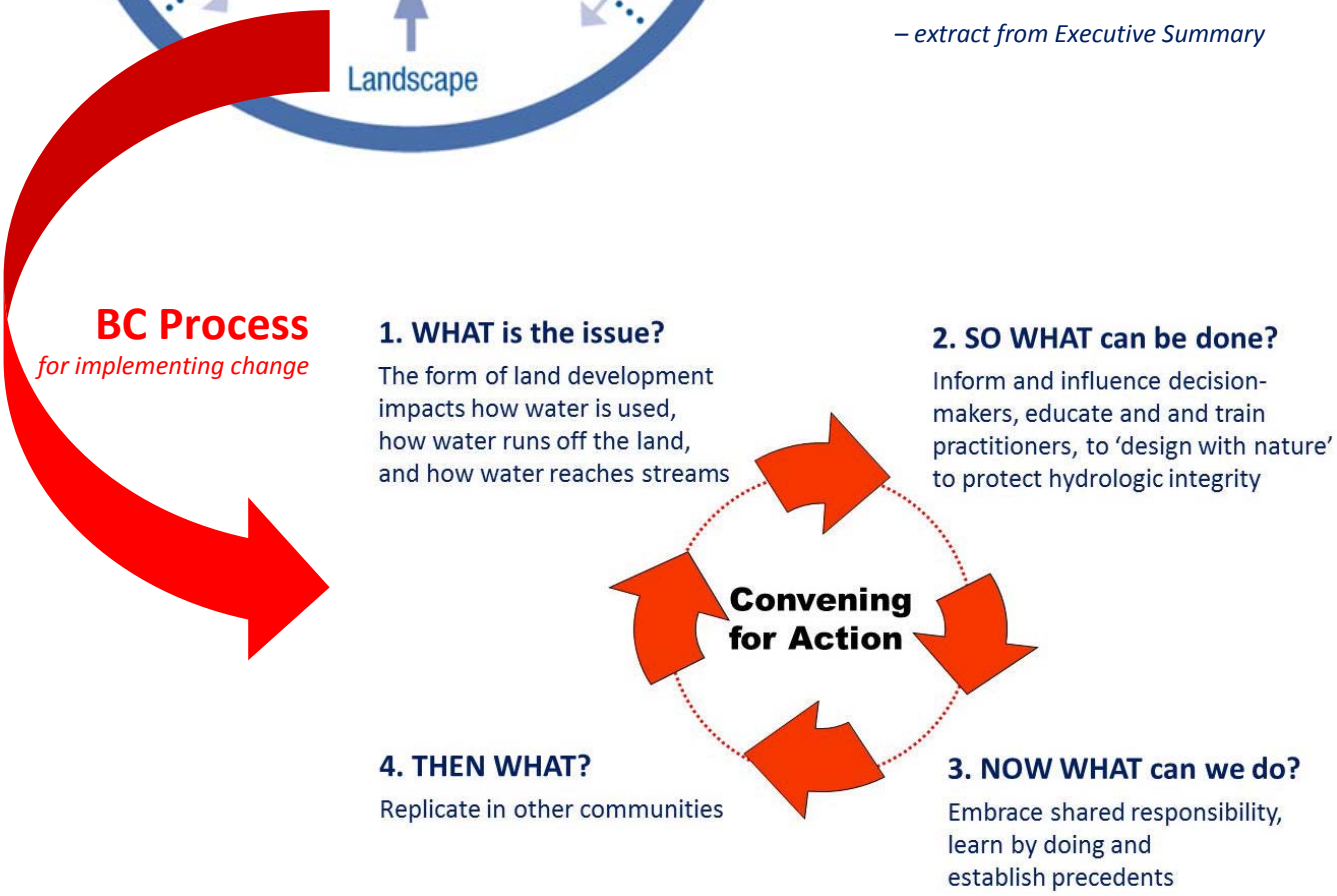


Figure 18

a. A Vision for Water-Centric Planning

Water-centric planning means planning with a view to water – whether for a single site or the entire province. At the core of the approach is a water balance way-of-thinking and acting.

The Genesis

Released by the Greater Vancouver Regional District in March 2002, a *Watershed / Landscape-Based Approach to Community Planning* was incorporated as an element of the Action Plan; and subsequently morphed (in 2005) into what is now known as "water-centric planning"(Figure 19). In its simplest expression this means:

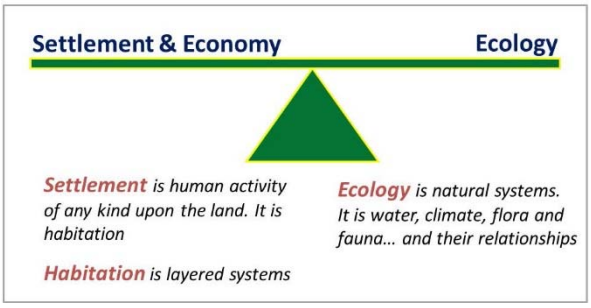
- Protection of people and property from natural hazards.
- Protection and conservation of self-sustaining ecosystems.
- Continuation and growth of resource-based economic activity.
- Provision of an affordable, sustainable and maintainable infrastructure.

> *Make resource, land use and community design decisions with an eye towards their potential impact on the watershed.*

Water Brings People Together: At a workshop hosted by the Partnership in 2014, and titled 'How Managing Water Now…Will Shape the Future', pollster and researcher Angus McAllister reported that: *"Through my polling research, I have learned that people are hardwired to water, at both the functional and emotional levels. It is no accident that we like to gather around water coolers and watering holes. Water brings people together. It is a natural starting point for any conversation about common interests, and by extension, our shared future."* Angus McAllister is the President of McAllister Opinion Research.

Move Towards Settlement, Economy and Ecology in Balance

The long-term wellbeing for a community, watershed or region is about sustainability of what communities allow or prevent happening on the land. Wellbeing is about *balancing settlement activity, economy and ecology*. Since 2006, this has been an Action Plan focus, with an emphasis on how to protect and restore hydrologic integrity.



Water is a Form Maker: Watersheds are defining landscapes that serve the needs of human settlements and provide natural habitats and their integral ecological systems. In numerous ways, the built environment has to adapt to watershed features and water movements to maintain viable settlements.

> *The designing with nature approach to community design is fundamental to achieving watershed sustainability from any perspective.*

Living Water Smart: Several years after release of Living Water Smart in 2008, Lynn Kriwoken stated that: *"Living Water Smart is an idea that people are embracing. It is a plan that is as much about land as water….because only with healthy water can we enjoy all the values that we take for granted. If we can show how to get the water part right, then other parts are more likely to follow."* Lynn Kriwoken is an Executive Director in the BC Ministry of Environment. Her responsibilities encompass the Living Water Smart development and implementation program.

As defined in the Water Sustainability Action Plan, 'Water-Centric Planning' means….

Action Plan Vision

Stewardship of a limited and vital resource, water, actively supported by an aware and enlightened citizenry

Goal

Create the Future Together

How to Create the Future

We will plan with a view to water – *whether for a site, a region, or the province*

We will integrate missions, mandates and accountabilities

We will move towards a **water balance** way-of-thinking and acting to deal with risk and manage uncertainty

Source: *Outreach archives for Water Sustainability Action Plan*

DESIRED OUTCOME:

"In an 'integrated landscape', water is the unifying element."

Patrick Lucey
Aquatic Ecologist
January 2005

Figure 19

b. Embrace Shared Responsibility

The Shared Responsibility Matrix (Figure 20) is a decision support tool. During the 2-year period 2007 through 2009, it evolved from a set of generic "what we would like to do" questions that were framed through the eyes of engineering and planning practitioners in local government.

Responsibility Matrix Explained

The Responsibility Matrix is designed to encourage players in a process to share their perspectives on how to advance implementation of Water Balance and Green Infrastructure goals. It is structured in two parts to:

- **Top Half** - focus on the linkages between goal, party and tool – and how people interact and/or collaborate to achieve community development goals.
- **Bottom Half** - illustrate application of the Matrix by providing an example of who needs to do what to achieve a desired outcome.

> *Imagine what tools or procedures would remove barriers and allow parties in the process to fulfil their pieces of the puzzle.*

Talk to Each Other: Susan Rutherford developed the Responsibility Matrix to inform and educate: *"All of us have an impact on land, on water, and on the way things look. Policy and legal tools can help developers, regulators and designers collaborate to implement green infrastructure solutions and ensure responsible outcomes. Each party in the process has a responsibility. There are solutions to be found if all parties simply talk to each other about how they could all work together more effectively,"* stated Susan Rutherford in 2009. At the time, she represented West Coast Environmental Law Foundation on the BC Green Infrastructure Partnership. Currently, Susan is Legal Counsel at Metro Vancouver.

How Government Works in BC

The relationship between the provincial and local levels of government in BC has evolved differently than in other provinces, with a history of recognizing and appreciating local autonomy.

As a result, BC local government is among the most autonomous in Canada, and the BC provincial government is perhaps the least prescriptive province.

Historically, the Province has enabled local government by providing policy and legal tools in response to requests from local government. Local governments can choose to act, or not.

Choose to Act: In general, being enabled means the onus is on local government to take the initiative. Historically, the Province has recognized that communities are in the best position to develop solutions which meet their own unique needs and local conditions. This approach underpins, for example, *Asset Management for Sustainable Service Delivery: A BC Framework*.

> *BC's enabling history, guiding philosophy and culture is a driver for local governments to embrace Shared Responsibility.*

Care About the Goal: When the City of Surrey hosted the '2009 Water Balance Model and Green Infrastructure Forum', Vincent Lalonde stated: *"Once we know what we want our watersheds and neighbourhoods to look like, the next step is to decide what the tools are that will get us there. All of us need to understand and care about the goal if we are to create the future that we all want. So we designed the 2009 Forum to start a dialogue between policy-makers and project implementers about shared responsibility."* Vincent Lalonde is currently the City Manager. At the time, he was General Manager, Engineering.

Shared Responsibility illustrated with an example…

Responsibility Matrix

Goal	Party	Tool
▪ Objectives ▪ Situations ▪ Responsibilities	▪ Regional staff and elected representatives ▪ Municipal staff and elected representatives ▪ Private actors (developers, builders, homeowners, stewardship groups, universities and colleges, etc.)	▪ Law ▪ Bylaw ▪ Policy ▪ Procedure ▪ Incentive ▪ Penalty ▪ Security ▪ Budget
Desired or Required Outcomes	**Relevant Staff or Other Actors**	**Instruments for Action**

Application of Responsibility Matrix

Desired Outcome	Relevant Actors	Instruments for Action
Onsite Rainwater Management	1. Regional Government 2. Municipal Government 3. Developer 4. Builder	1. Living Water Smart policy direction; Regional liquid resource management plan 2. Regional targets translated to site level action using Water Balance Mode tool and Land Use Planning, site standards; linkage made between watershed plan and development practices/neighbourhood plan; Official Community Plan direction; visible political leadership on issue 3. Bylaws require a) onsite rainwater management facilities b) security for performance c) regular inspection and reporting re: maintenance (e.g. on business license renewal); departments charged and funded to inspect 4. Communication, contractual provisions, occupancy permit

Source: *Beyond the Guidebook 2010: Implementing a New Culture for Urban Watershed Protection and Restoration in British Columbia*

IMAGINE:

Each party in the process has a responsibility. Focus on the linkages between goal, party and tool to determine who needs to do what to achieve a desired outcome.

"If someone says something is not working – that barriers prevent success - then our challenge for them is: Think about what would make it work, and what are you going to do to make that alignment of goals happen? Our theme is 'imagine'."

"What we have in mind when we say 'imagine' is that players would imagine a legal tool or procedure that would ensure that barriers are removed or other parties in the process more effectively fulfil their piece of the sustainable development puzzle."

"Imagine what we could each do differently. There are solutions to be found. Our actions influence whether others will succeed, and our own achievement of goals is influenced by how we are supported. We are all working at this together and we all have a role to play."

Susan Rutherford
from 'Shared Responsibility Underpins a Regional Team Approach to Creating Our Future in British Columbia', December 2009, Water Sustainability Action Plan for BC

Figure 20

c. Design with Nature

Chapter 1 introduced 'designing with nature' as a guiding philosophy for water-centric design. This section elaborates on how this holistic approach to community development is communicated.

Build the Vision, Create a Legacy

Figure 21 presents the educational backdrop that has guided implementation of the Action Plan. Commencing with release of the Stormwater Guidebook in 2002, the mantra has been: *Build the Vision, Create a Legacy*. Initially (2002), building blocks for leading and managing change were defined as:

- **Achievable and Affordable Goals:** Apply a science-based approach to create a shared vision for protecting or improving the health of individual watersheds over time.
- **Participatory Decision Process:** Build stakeholder consensus and support for implementing change; and agree on expectations and performance targets.
- **Commitment from Everyone:** Take action to holistically integrate water management with land development practices.

> *In 2004, the design with nature 'mind-map' was created to conceptualize how to connect the dots (bottom image in Figure 21).*

Guidance for Aligning Local Actions: *"If one goes back 10 years, there was a void of policy and*

legislation. There is now clear guidance for aligning local actions with provincial and regional goals to 'design with nature' so that British Columbians can create greener communities, live water smart and prepare for climate change," stated Glen Brown in 2010.

Hierarchy of Green Vocabulary

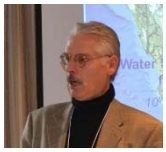
In 2007, the Action Plan introduced the following hierarchy of 'green' vocabulary. This informed a common understanding plus initiated a change in thinking about servicing of land development:

- **Green Value** means land use strategies that accommodate settlement needs in practical ways while protecting the ecological resources upon which communities depend.
- **Design with Nature** is an approach to achieve *Green Value*, and is supportive of community goals that relate to building social capacity.
- **Green Infrastructure** is the on-the-ground application of *Design with Nature* policies and practices for development and servicing.
- **Water Sustainability** is achieved through *Green Infrastructure* practices that reflect a full understanding of the relationship between land and water, and how water reaches streams.

Green Infrastructure - Differentiate Engineered from Natural: Green infrastructure design takes a 'design with nature' approach, to both mitigate the potential impacts of existing and future development and to provide valuable services.

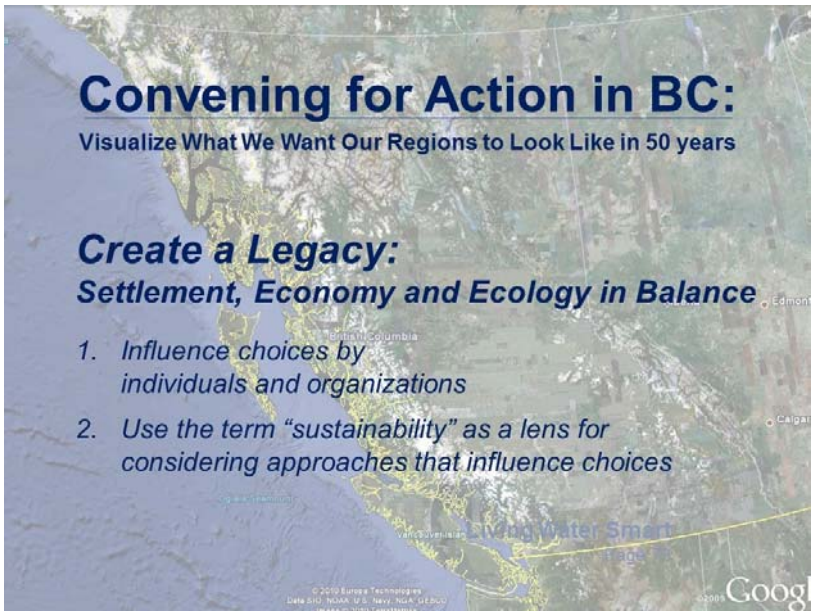
> *Implement engineered designs that mimic the Natural Water Balance and thereby soften the Water Footprint of development.*

Strive for a Balance: *"Designing with nature is efficient. It amounts to using income from natural capital rather than drawing down the resource. Human settlement should be in relative balance with the ecology that supports it. This condition is prerequisite for designing with nature and it supports better control*



of the life-cycle costs of providing infrastructure for the built environment," wrote Tim Pringle in 2011. He developed the above hierarchy of Green Vocabulary.

Build the Vision, Create a Legacy means……



Source: *Outreach archives for Water Sustainability Action Plan*

BUILD THE VISION:

"Fundamental change in the scope of rainwater / 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. The ability of consumers and the development community to adapt will then set the pace of change."

Erik Karlsen,
Province of BC
co-author, The Tenth Paradigm,
an article published in 2002

CREATE A LEGACY:

"A shared long-term vision is needed to focus the effort that will create a legacy. The shared vision provides a context for all planning, data collection, sensitivity analyses, capital expenditures, and regulatory changes. prioritizing goals and actions (ideally through consensus) provides a road map for moving towards a target condition."

Robert Hicks
Metro Vancouver
co-author, The Tenth Paradigm,
an article published in 2002

Figure 21

d. Develop Tools & Talent

The Action Plan mission is to develop tools and talent, and focus practitioners on outcomes. Tools include calculation, communication and education.

Web-Based Tools

Calculators that support Living Water Smart targets and actions include the Water Balance Model, Water Balance Model Express, Water Conservation Calculator, Agricultural Water Demand Model, Landscape Irrigation Calculator and Agricultural Irrigation Calculator.

> *Web-based calculators support water-centric planning and water balance thinking.*

Water OUT = Water IN

Unveiled in 2005, Figure 22 is a communication tool. Deceptively simple, the 'OUT = IN' equation embodies basic principles and concepts for dealing with uncertainty and managing risk.

A key message is that vulnerability on the IN side of the equation results in a need to build resiliency on the OUT side. In turn, this reinforces the value of 'design with nature' practices that would yield cumulative benefits in a community over time.

Go Back to the Basics: Robert Hicks, a Senior Engineer with Metro Vancouver, co-created the 'OUT = IN' equation. In 2005, he stated that: *"A core message is that the OUT = IN equation is variable on both sides. Something to think about is that in mathematics one cannot solve for two variables with a single equation. In other words, it is time for practitioners to go back to the basics and re-think how we approach water resource analysis and planning."*

Outreach & Continuing Education

The pyramid diagram on Figure 22 has guided Action Plan implementation of a layered approach to communicating with a range of audiences. A goal of ongoing outreach and continuing education is to 'bridge the gap' between those who decide what to do and those who drive the details.

What Outcome-Oriented Means: The 'convening for action' experience has demonstrated that four ingredients will be in the mix when practitioners in a local government setting undertake to focus on and achieve a desired outcome (such as balance 'OUT = IN'). They will have to collaborate to:

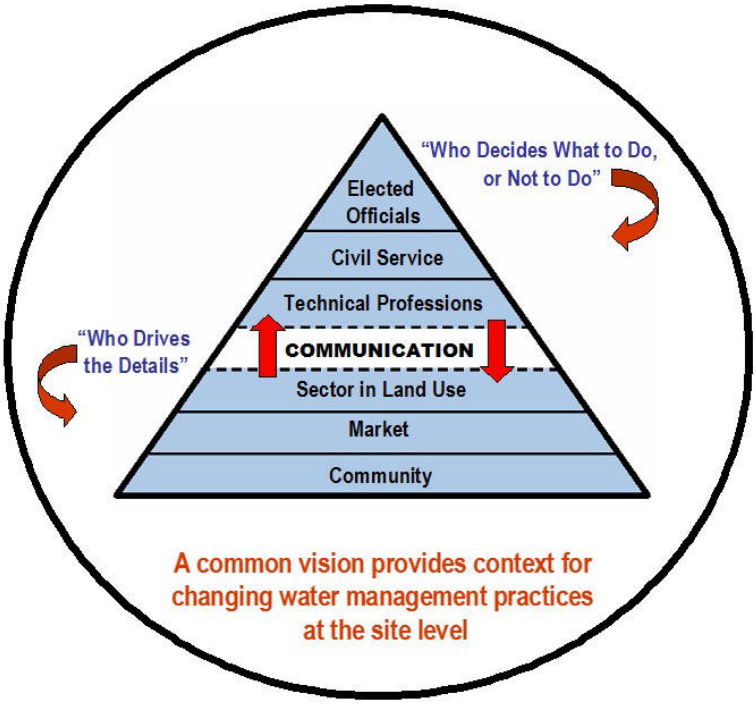
1. Define the problem
2. Declare the community's values
3. Select and apply the right tools
4. Wrestle with the solutions

It is about hard work and applying common sense. Mutual support and the shared process are also critical. Focus on values and actions. Keep it simple. Find a starting point that is intuitive to everyone. Ensure actions are practical and easy to implement.

> *A focus on knowledge leading to action, and on sharing, is building capacity and support for meeting BC's water sustainability challenges.*

Function as a Team: Tim Pringle observes that: *"Outcome-oriented planning is a problem-solving PROCESS. It is not a procedure. It is not a matter of applying a regulation or a checklist. Going through a process becomes 'talent development'. Participants have to be committed to the outcome. To get there, they have to function as a team. It is the talent development process that enables development of outcome-oriented plans. It is very definitely a grounded approach."*

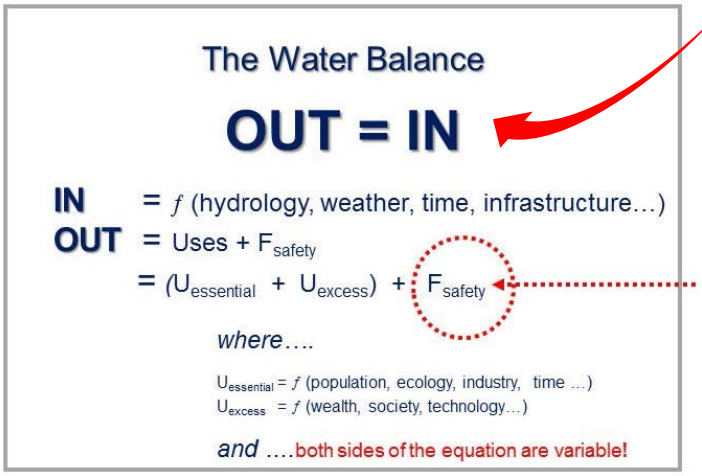
'Mimic the Water Balance' to deal with uncertainty and manage risk means…..



CONSISTENT MESSAGING, CONSISTENT UNDERSTANDING:

An Action Plan goal is to influence what the Built Environment will look like. Through a tiered approach to outreach and continuing education:

An Action Plan objective is to inform and influence decision-makers and community, and educate and train practitioners, about 'designing with nature' to achieve a balance for 'Water OUT = Water IN'



Source: *Report on Penticton 'Water OUT = Water IN' Workshop, Water Sustainability Action Plan, April 2005*

BUILD RESILIENCY:

This deceptively simple equation embodies principles and concepts for dealing with uncertainty, managing risk, and implementing a holistic approach to land and water management. Over time, the safety factor has been decreasing in BC.

"Climate change is aggravating an existing vulnerability. When we are vulnerable on the IN side of the equation, ewe then have to build in resiliency on the OUT side. But where will we do that, recognizing that everything is in flux? The answer is that we look for the little things that will yield cumulative benefits.

Kim Stephens
Fraser Basin Council Workshop
November 2007

Figure 22

e. Implement a Regional Team Approach

Part A introduced the Regional Team Approach as a way to align efforts, learn from each other, and demonstrate what Shared Responsibility looks like in practice. This section provides a bridge to the five regional stories in Part D.

Collaboration Continuum

Figure 23 illustrates the Collaboration Continuum and provides context for articulating goals and desired outcomes for inter-regional collaboration.

In 2013, the five partnering regions formed an IREI Inter-Regional Leadership Team. In 2014, they delivered an Inter-Regional Collaboration Series, which is on the cusp of **Cooperate** / **Coordinate**.

> *As of 2015, the five regions are poised to **collaborate** on how to integrate natural systems thinking into asset management.*

Appreciate the Nuances: At the IREI inter-regional collaboration session hosted by the Comox Valley in June 2014, Nancy Gothard (Environmental Planner, City of Courtenay) explained the continuum: *"There are distinctions along the continuum. Competing is at one end and is the opposite of collaboration!*

Integration of work plans and resources is at the other end. This tells us that we should be clear as to what is our goal on the continuum. Some people think that talking to each other is collaboration, but does that mean they are collaborating on action? Not necessarily. And then there are those who get their backs up at the mention of collaboration. In other words, there are many nuances in the continuum and it is important to appreciate those nuances."

Communicate, Cooperate, Coordinate, Collaborate – The 4Cs

In 2008, Vancouver Island was selected as the provincial demonstration region for a Regional Team Approach that would showcase how to achieve this Living Water Smart target:

> *By 2012, all land and water managers will know what makes a stream healthy, and therefore be able to help land and water users factor in new approaches to securing stream health and the full range of stream benefits –* reference p 43, Living Water Smart

Local Governments are Convening for Action: Part D presents synopses of five regional stories about local governments that are moving forward with water-centric planning. Some key messages:

- inter-regional deliverables benefit all
- a focus on action creates value
- yields insights into different pathways
- facilitates cross-pollinating of ideas
- can talk to peers in other regions
- brainstorming leads to understanding
- learning from other partners is time-saving
- moving forward as a group

> *Collaboration is leading to shared language and a unified message.*

The 4Cs: *"To recap: WHY we are going down this pathway – it is about obtaining added value and a reduction in the Water Footprint. This leads to a balance between economy and ecology. And as for the HOW aspect: if we are going to align efforts on a watershed scale, then getting it right at the front-end means looking beyond our boundaries to envision the bigger picture…..in other words, global thinking for local action. It means we are **communicating** and **cooperating** with others to ensure that our **collaborative** results are **coordinated** in a timely manner,"* stated Derek Richmond in 2009.

The Collaboration Continuum: *Build the Vision, Create a Legacy*

Different Points of Entry; Different Scales of Interaction

COLLABORATE TO ACHIEVE THIS LIVING WATER SMART ACTION:

"All land and water managers will understand what makes a stream healthy, and therefore be able to help land and water users factor in new approaches to securing stream health and the full range of stream benefits." – p. 43

DESIRED OUTCOME:

Integration of Natural Systems Thinking Into Asset Management

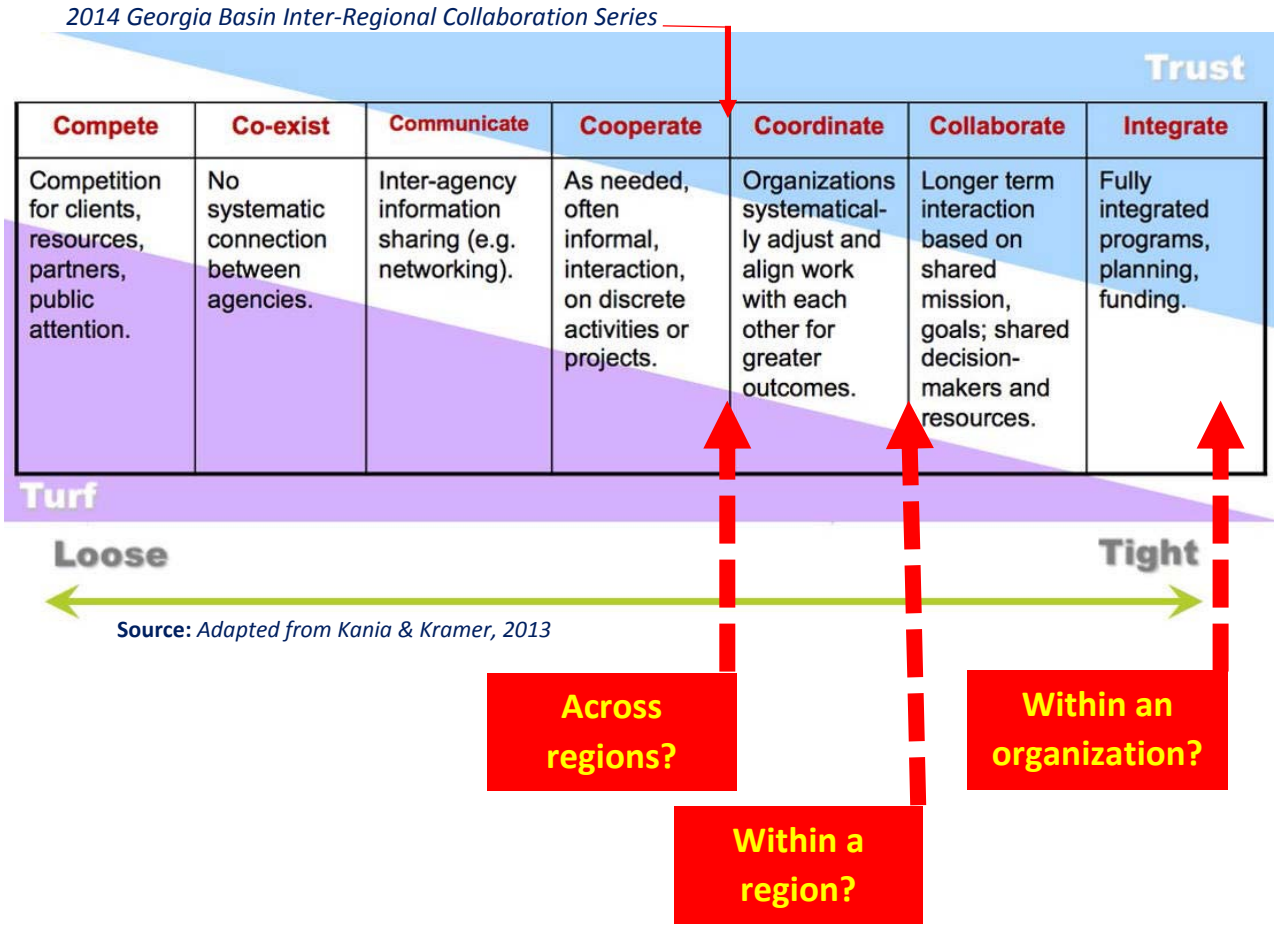


Figure 23

Part D

Local Governments are "Convening for Action" in the Georgia Basin:

Build a Vision, Create a Legacy

"**Through sharing & learning**, ensure that where we are going is indeed the right way"

Part D – Local Governments are "Convening for Action" in the Georgia Basin	
Chapter No. & Title	**Key Messages**
4 **Stories of Regional Champions**	Everyone learns from stories and the most compelling ones are those of the champions who are leading changes in practice.
5 **Comox Valley-CAVI Regional Team**	Regional restructuring in 2008 was the catalyst for collaboration. The region was an early champion of 'Sustainable Service Delivery'. The challenge is how to bridge the 'implementation & integration gap'.
6 **Convening for Action in Cowichan Region**	Alternating floods and droughts are the 'new normal'. Hence, the region was an early champion of a 'Water Balance' way-of-thinking and acting. This is leading to changes in how water-centric decisions are made.
7 **Convening for Action in Nanaimo Region**	Under the Drinking Water & Watershed Protection Program, the approach to land and water use is holistic. The formula for an effective regional team is *Base Funding + Partnerships = Successful Program.*
8 **Convening for Action in Capital Region**	Water quality program has moved beyond stormwater management to *Integrated Watershed Management*. The Bowker Creek Blueprint has established an urban benchmark for restoration of watershed function.
9 **Convening for Action in Metro Vancouver**	The *Integrated Liquid Waste & Resource Management Plan* established the framework for moving the region beyond regulatory compliance to transitioning to an approach that achieves the Sustainable Region Vision.
10 **A Look Ahead**	The concluding chapter is a capsule summary and enlightens how the IREI will facilitate *Sustainable Watershed Systems, through Asset Management*.

4. Stories of Regional Champions

Everyone learns from stories and the most compelling ones are based on the experience of those who are leading in their communities. Part D presents the stories of the five regional districts (within the 'Georgia Basin watershed') that are partners under the IREI umbrella.

> *The members of the IREI Leadership Team are champions. They are collaborating across regions and leading the move from awareness to action to implement watershed-based solutions.*

Part D is written for land use, water resource and infrastructure professionals who are interested in and wish to understand the work of local government champions, both organizations and individuals.

Each of the five regional stories is stand-alone, yet they are linked. Over the past decade, there has been cross-pollinating of ideas and approaches. The ongoing process of ***sharing and learning*** has influenced initiatives and outcomes within the five regional districts.

Looking Back

The foundation for 'convening for action' was laid a decade ago. Figure 24 identifies the regional leaders whose pioneering efforts resulted in the initial breakthroughs that, in turn, established early credibility for the 'regional team approach' and demonstrated how benefits can flow from inter-regional collaboration.

Figure 24 represents the tip of the iceberg. There are layers of participation by a host of champions.

The purpose of Figure 24 is to recognize and honour those who led the first wave. A decade later, most of these local government leaders continue to play a role in 'convening for action'.

Right People, Right Places, Right Time: The Water Sustainability Action Plan is the umbrella for 'convening for action' in the Georgia Basin -

- **Raymond Fung** – Steered implementation of the Action Plan during the first five years. A stabilizing force, he provided thoughtful leadership.
- **John Finnie** – In the eyes of local government, his island-wide integrity brought instant legitimacy to *Convening for Action on Vancouver Island*.
- **Paul Ham** – His influence and impact paralleled that of John Finnie. He guided the launch of *Convening for Action in Metro Vancouver*.
- **Kate Miller** – A visionary, she was ahead of her time in anticipating what needed to be done to prepare her region for the *New Normal*.
- **Jody Watson** – Her unflagging determination and passion made possible the provincially significant *Bowker Creek Blueprint*.
- **Kevin Lagan & Derek Richmond** – Quickly seeing where peer-based learning would lead, they brought together Comox Valley local governments to be the pilot region.
- **Richard Boase** – The local government 'face' of the *Water Balance Model*, he is tireless in his commitment to create a watershed health legacy.

Being Enabled Means: *"The 'convening for action' initiative is the best example of peer driven innovation that I have ever seen. It has led to nothing less than a quiet revolution in how we approach the design and construction of human settlements in British Columbia. When I see an urban stream coming back to life or an innovative approach being taken to new infrastructure, I think of the networks of innovative professionals that not only stand behind this work but also continue to create positive change. I firmly believe that this ability to creatively innovate in support of sustainable practices will enable us to meet a host of future challenges,"* states Dale Wall, former Deputy Minister, Community and Rural Development. Also a 'convening for action' champion in his own right, Dale Wall was the guiding force behind the Province's Green Communities Initiative (2008). He was a founding member of the Green Infrastructure Partnership (an original element of the Water Sustainability Action Plan).

Local Government Champions for *"Convening for Action in the Georgia Basin"*

Richard Boase
(District of North Vancouver)
Co-Chair (2003-date),
Water Balance Model for BC

Nanaimo Region

John Finnie
(Regional District of Nanaimo - retired)
Chair (2006-2011)
Past Chair (2011-to date),
CAVI-Convening for Action
on Vancouver Island

Cowichan Region

Kate Miller
(Cowichan Valley Regional District)
Chair (2007-to date)
Cowichan-CAVI Regional Team

Raymond Fung
(District of West Vancouver)
Chair (2003-2008), Steering Committee
Water Sustainability Action Plan

Capital Region

Jody Watson
(Capital Regional District)
Chair (2004-to date), Bowker Creek
Urban Watershed Renewal Initiative

Comox Valley

Kevin Lagan & Derek Richmond
(City of Courtenay - retired)
Chairs (2007-2010),
Comox Valley-CAVI Regional Team

Metro Vancouver

Paul Ham
(City of Surrey - retired)
Chair (2005-2008), Steering Committee
Green Infrastructure Partnership

Figure 24

Implementing Change

The *Metro Vancouver Green Infrastructure Consultation Workshop* hosted by the City of Surrey in May 2005 resulted in a 'watershed moment'.

"Going into the workshop, the vision of the Green Infrastructure Partnership was to develop a Model Subdivision Bylaw and green infrastructure standards," recalls Raymond Fung.

"As we went around the table, the stories came out as to what Metro Vancouver municipalities were doing. A common refrain was: '*We didn't know you were doing that!'* The energy in the room just kept building and building."

"At the end of the day, we literally tore up our work plan. It was clear that practitioners did not need another guidance document that would go on a shelf. Rather, they needed to network and learn from each other. The 'convening for action' program emphasis shifted from *'informing and educating'* to *'showcasing and sharing'*."

From Genesis to Mainstream: By 2005, green infrastructure in BC had moved from 'creating change' to 'leading change' (Figure 25). The 'early adopters' trail-blazed in the early 2000s with the East Clayton (City of Surrey) and UniverCity (at Simon Fraser University) sustainable communities and sustainable subdivisions in the Chilliwack and Victoria regions. Circa 2005, the 'fast followers' were emerging.

The 2005 Consultation Workshop resulted in an educational approach that is continually evolving and has guided implementation of the 'convening for action' program on both sides of the Georgia Basin for the past decade.

Success Will Follow When…

Five years later, at the 2010 Annual Convention of the Union of BC Municipalities, Raymond Fung and Glen Brown (representing local government and the Province, respectively) reported out to elected representatives on lessons learned and experience gained from the 'convening for action' program.

Guiding Principles for Creating a Legacy: "The Province has provided a 'design with nature' policy framework that enables local governments to build and/or rebuild communities in balance with ecology" they reported. "Desired outcomes are: create liveable communities; protect stream health. Our experience shows that achieving these inter-connected outcomes depends upon a local government capacity-building process that is founded on ten guiding principles."

1. Choose to be enabled.
2. Establish high expectations.
3. Embrace a shared vision.
4. Collaborate as a 'regional team'.
5. Align and integrate efforts.
6. Celebrate innovation.
7. Connect with community advocates.
8. Develop local government talent.
9. Promote shared responsibility.
10. Change the land ethic for the better.

"It takes time to change the local government culture. British Columbia communities now have the tools and the case study experience to 'design with nature'," they concluded.

CHANGE - Progression from Genesis to Mainstream:

The Number of Success Stories is Growing:

"The rate of progress in changing standard practices generally depends on the willingness of individual champions to push the envelope in applying new approaches."

"The number of champions throughout the Metro Vancouver region is increasing."

The Green Infrastructure Partnership: Convening for Action in British Columbia, July 2005 Progress Report

In May 2005, the Green Infrastructure Partnership convened a Consultation Workshop that resulted in 'Celebrating Green Infrastructure Innovation'

Because it is lonely being a champion, and everyone in local government is so busy, participants expressed a strong desire to pool resources and convene on-the-ground to share 'how to do it' experiences

Creating Change	Leading Change	Implementing Change
✓ **Genesis**	✓ Innovators	✓ Early Majority
✓ Idea	✓ Early Adopters	✓ Late Majority
✓ Invention	✓ Fast Followers	✓ Mainstream
	✓ Performance Tuners	✓ Laggards

Derived from Senge (1991); Gladwell (2000) and Oracle Corporation (2005)

Source: *"Change: Challenges & Strategies" – a presentation by Erik Karlsen, May 2005, at the Green Infrastructure Partnership's Consultation Workshop hosted by the City of Surrey*

The clear message (2005) was to make outreach and practitioner education the #1 priority:

A workshop outcome was the decision by the Green Infrastructure Partnership to focus attention on the early champions and celebrate their successes, provide practitioners with the tools and experience to 'design with nature', and move green infrastructure beyond pilot projects to mainstream.

This classic graphic illustrates the adoption or acceptance of a new idea or innovation, according to the demographic and psychological characteristics of defined adopter groups. The process of adoption over time is typically illustrated as a classical normal distribution or "bell curve."

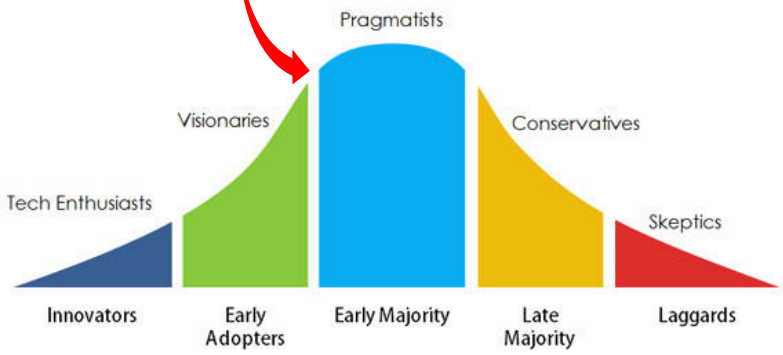


Figure 25

Georgia Basin Inter-Regional Educational Initiative

The IREI provides local governments with a mechanism to share outcomes and cross-pollinate experience with each other.

During the March-April 2015 period, the Boards of five partner Regional Districts passed Resolutions that reaffirmed their commitment to collaboration and to participation in the next phase of IREI program implementation through 2017.

By 2017, an over-arching IREI program goal is that local governments in the five regions would truly understand ***how*** natural systems support municipal services and would be able to fully **integrate** this understanding and associated methodologies into programs, planning and funding (Figure 26).

Capital Region: *"As a program lead tasked with developing an integrated watershed protection strategy on a regional scale, I have found that collaboration and sharing with staff at other regional districts through the IREI gives me new ideas and new perspectives for goals, strategies, and ways to evaluate progress. There are a lot of watershed protection resources available but there is no substitute for face-to-face interaction with others that are doing the same work,"* states Dale Green, CRD Program Manager.

Comox Valley: *"The IREI is closely linked to CAVI – Convening for Action on Vancouver Island. The Comox Valley-CAVI team facilitates collaboration at the regional level, and IREI connects the regions for inter-regional collaboration and cross-pollination of ideas, policies and approaches for rainwater management and more recently, asset management,"* states Kris La Rose, Manager of Liquid Waste Planning, Comox Valley Regional District.

Metro Vancouver Region: *"A number of tools, such as the Water Balance Model initiated by Metro Vancouver, have been further developed by the province and others and are now well known and utilized by municipalities across British Columbia and beyond. Another example is the* ***Monitoring and Adaptive Management Framework for Stormwater****, developed by Metro Vancouver, its member municipalities and the Province, and approved by the Ministry of Environment in December 2014. This partnership arrangement of sharing information related to rainwater management and watershed health provides the collaboration needed to further the work and education across multiple sectors leading to positive and continuous improvement*," states Simon So, General Manager for Liquid Waste Services, Metro Vancouver.

Nanaimo Region: *"The conservation and protection of water and watersheds is a priority in the RDN and the inter-regional education initiative provides another opportunity to assist local governments to better understand the relationships between watershed and stream and site development. The region's Strategic Plan recognizes the need to look for innovative ways to manage our water resource. By increasing our knowledge and understanding and by building efficient infrastructure we will reduce potential impacts and adapt successfully to new conditions,"* states Mike Donnelly, Manager for Water & Utility Services, Regional District of Nanaimo.

Cowichan Region: *"The IREI is a unique format for Georgia Basin local governments to learn from each other by sharing approaches and successes in managing our water resources,"* concludes Brian Carruthers, Chief Administrative Officer, Cowichan Valley Regional District.

Because local governments are at different points of understanding along the "Watershed Health Continuum"….

Inter-regional 'sharing & learning' will help everyone go farther, more efficiently and effectively, to:

- *design with nature*
- *implement green infrastructure*
- *mimic the water balance*

So that local governments can:

- *reduce risk*
- *restore stream / watershed health*
- *comply with regulatory objectives*

Collaboration grows from a shared vision about the future and commitment to action:

"Collectively this is what we want to incrementally achieve and, over time, this is how we will work together to get there."

Process for Implementing Changes in Practice Revolves Around Four Basic Ingredients:

1. *Start with a unifying concept that makes sense ('design with nature' goal)*
2. *Develop a science-based and pragmatic methodology for technical analyses (Water Balance Methodology)*
3. *Create web-based calculation tools that have user-friendly interfaces and are accessible to anyone*
4. *Implement a multi-audience outreach and professional development program that is defined by consistent messaging*

Sustainable Service Delivery for Watershed Systems:

The IREI is connecting the cascading objectives for watershed health, resilient rainwater management and sustainable service delivery.

By 2017, local governments would understand how natural systems support municipal services and how to fully integrate this understanding into programs, planning and funding.

Figure 26

Convening for Action in the Comox Valley

Storyline Overview

Chapter No. & Title	Key Messages
5 **Comox Valley-CAVI Regional Team**	In 2008, Comox Valley local governments embarked on a journey to demonstrate intra-regional collaboration. The parties understood that their commitment would be multi-year, and progress would be incremental.
a. **Comox Valley-CAVI Timeline / Milestones**	Between 2008 and 2011, focus of the CAVI team was on 'sharing & learning' for professional development. Since 2011, the program has explored what integration and implementation of regional policies look like in practice.
b. **Early Champions for 'Sustainable Service Delivery'**	The 2011 State of Vancouver Island Economic Summit showcased the Comox Valley approach to getting things right at the front-end of the development process so that everyone will save time and money.
c. **Guide to Water-Wise Land Development**	The Inter-Regional Education Initiative (IREI) involved a proof-of-approach in Year One (2012). The Comox Valley deliverable was a Guide that establishes expectations for consistent application of outcome-oriented actions.
d. **Moving Towards Sustainable Service Delivery (June 2014)**	The IREI session hosted by the Comox Valley introduced the notion of progressing along the 'asset management continuum' to connect land use planning, life-cycle costing and watershed-based solutions.
e. **Reflections on the Regional Team Approach & Success**	The 'regional team approach' is relationship-based. Collaboration leads to results when five conditions are in play: shared vision, alignment of efforts, plan of action, trust and 'backbone support' (from an entity).

5. Comox Valley-CAVI Regional Team

In September 2006, the *CAVI-Convening for Action on Vancouver Island* initiative was launched. Co-funded by the Province and the Real Estate Foundation, the launch of CAVI set the stage for convening for action in the Comox Valley. The CAVI initiative challenged local governments to tackle this question: *"What will Vancouver Island look like in 50 years?"*

Provincial Demonstration Region

In June 2008, Comox Valley local governments volunteered to be a 'demonstration application' for exploration of a regional team approach that would be guided by the Living Water Smart target for watershed health (introduced in Chapter 5). And so the *CAVI-Comox Valley Regional Team* was formed and embarked on a journey together. Team members are shown in Figure 27.

> *From the beginning, it was understood by all parties that both the process and progress would be incremental, and hence would require a multi-year commitment by all.*

Role Within a Bigger Picture: *"The Comox Valley-CAVI team includes representation from all four local governments, the Ministry of Transportation and Infrastructure, the Partnership for Water Sustainability in BC, the environmental stewardship sector, and the forestry sector," states Kris La Rose, Manager of Liquid Waste Planning, Comox Valley Regional District, and Chair of the Comox Valley-CAVI team.*

"Rainwater management is a board strategic priority, and asset management is an important component of the financial plan for every group in the CVRD engineering services branch. Both topics are key elements of the IREI and continued participation and collaboration with other regional districts will help us to achieve our goals in these areas."

Regional Restructuring Created the Opportunity for Collaboration

The vision for a 'regional team approach' had its origins in the *2008 Comox Valley Learning Lunch Seminar Series*, hosted by the City of Courtenay. The driver for action resulted from provincial intervention in Comox Valley governance.

Three Defining Moments Initiated the Process: In 2008, the Province completed the restructuring process that divided the former Comox-Strathcona Regional District into two new jurisdictions, one being the new Comox Valley Regional District (CVRD). At the same time, the Province mandated development of a Comox Valley Regional Growth Strategy and a Regional Water Supply Plan.

In June 2008, the CVRD and its three member municipalities (City of Courtenay, Town of Comox and Village of Cumberland) agreed to a regional-based approach to conservation planning. In a Joint Resolution, all four formally endorsed *Nature Without Borders: Comox Valley Regional Conservation Strategy*, released in July 2008.

At the concluding seminar in the inaugural Learning Lunch Seminar Series (November 2008), Mayors and CAOs representing all four local governments publicly declared their collective endorsement of regional collaboration.

Provincial Intervention: *"The Ministry is moving forward with projects that offer custom solutions to specific regional district circumstances. While these projects are being designed to respond to specific circumstances, they may also serve as useful 'pilot projects' with application to other areas of British Columbia. The Regional Growth Strategy will have a very strong environmental focus and deal with urban intensification," wrote Ida Chong, Minister of Community Services, in her July 2007 notice of intervention that defined the restructuring.*

Comox Valley–CAVI Regional Team:

From left to right: Glenn Westendorp (Town of Comox), Larry Park (Ministry of Transportation & Infrastructure), Judy Walker (Village of Cumberland) Chris Cole (TimberWest), Kris La Rose, Chair (Comox Valley Regional District), Nancy Gothard (City of Courtenay), Jack Minard (Comox Valley Land Trust)

Kim Stephens
PWSBC

Marc Rutten
CVRD

Derek Richmond
CAVI Chair

Other Current Members (2015)

Domenico Iannidinardo
TimberWest

Kevin Lagan
Courtenay

Kevin Lorette
CVRD

Michael Zbarsky
CVRD

Shelley Ashfield
Comox

Past Members of the Regional Team (during the period 2008 – 2013)

Figure 27

a. Comox Valley-CAVI Timeline / Milestones

Figure 28 provides context for understanding how the 'regional team approach' has evolved over the past decade in the Comox Valley. The timeline identifies provincial and regional milestones in blue and red, respectively. It also identifies annual elements (black) in the ongoing program for professional development in the Comox Valley.

2011 – A Turning Point Year

The CAVI Forum within the *2011 State of the Island Summit* (organized by the Vancouver Island Economic Alliance - VIEA) was a turning point for the Comox Valley Regional Team because:

- During the period 2008-2011, the program of annual seminars was open to all local governments and others on Vancouver Island. The focus was primarily on 'sharing & learning' for the purpose of professional development.
- After the 2011 Summit, the program changed to internal working sessions. The purpose was to explore what integration and implementation of regional policies would look like in practice.

The 2011 Summit showcased how the four local governments, the Comox Valley Land Trust and TimberWest were striving to work across boundaries, align efforts, and apply the '4Cs' – that is, *communicate, cooperate, coordinate* and *collaborate*.

Regional Strategies Provide Direction for Alignment of Efforts

Three regional strategies provide both a policy framework and a backdrop for inter-governmental collaboration in the Comox Valley:

- Nature Without Borders (2008)
- Regional Growth Strategy (2010)
- Regional Sustainability Strategy (2010)

Adoption of the regional strategies has resulted in much for municipal staffs to absorb and digest about doing business differently, while at the same time they are tasked with keeping the wheels of government rolling to meet ongoing commitments.

Water is the Unifying Element: An ever-present challenge for Comox Valley local government practitioners is to both work around and with boundaries. Since 2009, a desired outcome of collaboration is to shift the operational paradigm from *boundaries* to *areas of commonality*.

Because water sustainability is achieved through implementation of green infrastructure practices, the Comox Valley-CAVI Regional Team convenes for action around this paradigm:

> *"Water is the finite resource; however, management of development is the control".*

Springboard to Integration: *"The Series theme, **Getting Ahead of the Wave**, defines what needs to be accomplished by the 2009 Series," stated Kevin*

*Lagan, former Director of Operational Services for the City of Courtenay. "As we look ahead to where we want to be in 2010, we envision that the 2009 Series will provide us with the springboard to achieve **integration** of current Comox Valley regional initiatives in subsequent phases of collaboration. To build momentum for what we need to accomplish in 2010, the unifying theme as we evolve the regional team approach can be succinctly expressed as: **what all the plans will achieve**."*

Comox Valley-CAVI Regional Team: Time-Line & Milestones

COLOUR CODE:
Blue = provincial milestone
Red = Comox Valley milestone
Black = Comox Valley – CAVI milestone
Green = sharing at inter-regional event

Figure 28

b. Early Champions for 'Sustainable Service Delivery'

The Comox Valley-CAVI Regional Team was an early adopter of the vision for integrating natural systems thinking and adaptation to a changing climate into asset management. The team recognized the need for local governments to progress along the 'asset management continuum' to achieve the goal of Sustainable Service Delivery.

> *This way of thinking was introduced at the Comox Valley Developers Dialogue (December 2010), underpinned the 2011 Learning Lunch Series (April-May-June 2011), and was showcased at the Vancouver Island Summit (November 2011).*

2010 Developers Dialogue

Designed as a bridging event between the 2009 and 2011 Learning Lunch Seminar Series, the purpose of the 2010 Developers Dialogue was to initiate a conversation with the development community on this theme: *'do things right at the front end and everyone will save time and money'*.

This 'convening for action' event was conducted as a town-hall session. Six objectives established expectations for 'sharing & learning'.

It Starts With a Conversation: Participants stated that the format was excellent for 'stirring the pot' as it allowed for a variety of ideas, questions and comments to flow easily and freely.

The non-formal setting made everyone comfortable in sharing comments, whether positive or negative. The fact that many of the staff and administration from the local municipalities were present, and participated, was viewed by the development community as a testament to the positive strides being made in the Comox Valley.

2011 Learning Lunch Series

Figure 29 shows the program at a glance for the 2011 Seminar Series, hosted by the Town of Comox. This was then showcased at the Summit.

At the first seminar in the 2011 Series, the Province introduced the Vancouver Island audience to new expectations for Sustainable Service Delivery, and foreshadowed the future requirement to view watersheds and watershed health through an asset management lens. The unifying theme for the 2011 Series was this:

> *Water sustainability is more likely to be achieved when land use planning and climate change adaptation are integrated with infrastructure asset management.*

2011 Vancouver Island Summit

The CAVI Forum within the Summit connected the dots to the *Linking Island Leaders Project*. Initiated by the Vancouver Island Economic Alliance in 2009, the Link Project findings and recommendations were unveiled at the 2010 Summit. The Link Team found that a groundswell is building up and down Vancouver Island for regional collaboration.

The Forum comprised two parts. First, the Comox Valley-CAVI Regional Team told their story and shared their experience. This set the scene for a town-hall sharing and learning segment where participants explored how their communities and regions could learn from and adapt the Comox Valley experience.

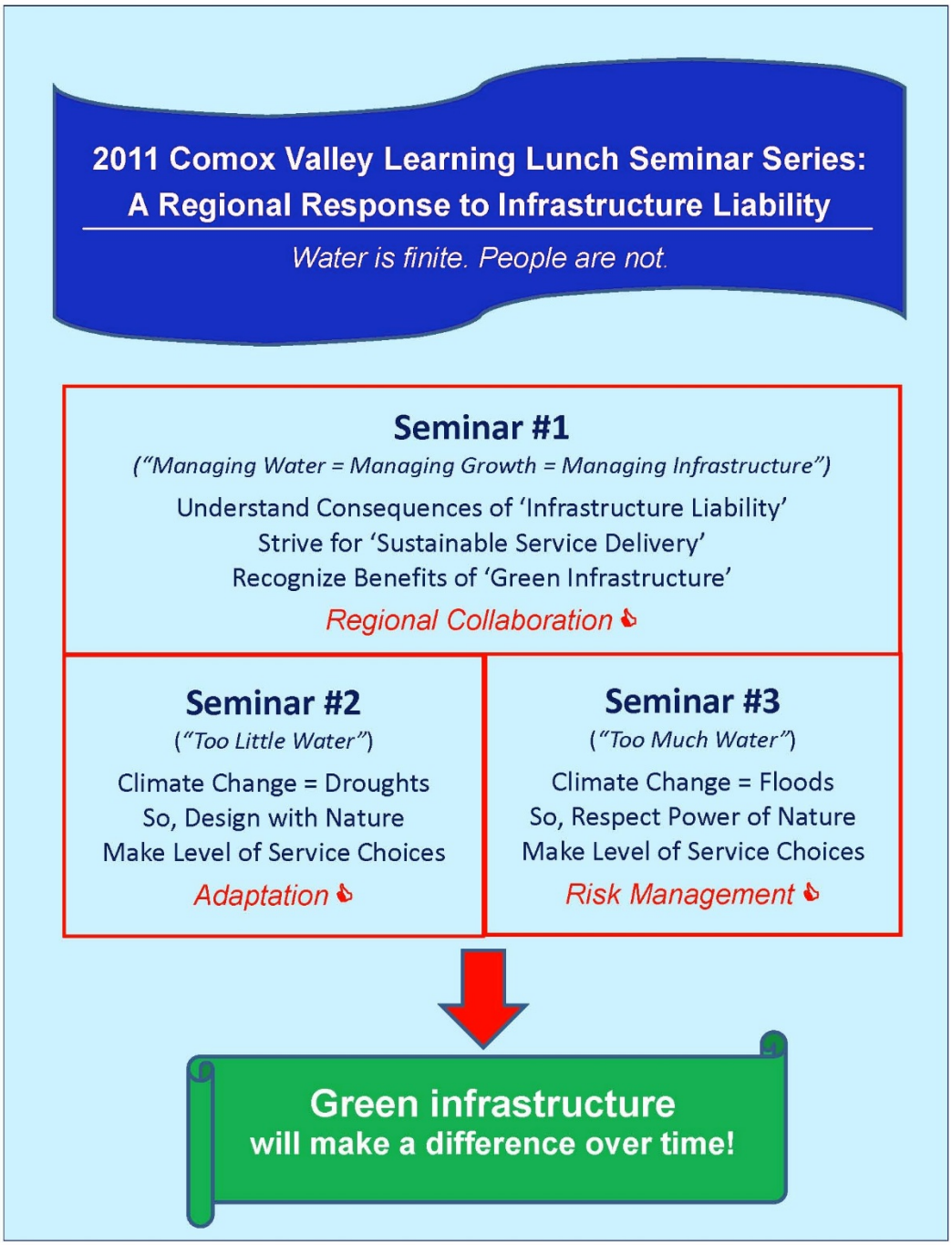

2011 Comox Valley Learning Lunch Seminar Series:
A Regional Response to Infrastructure Liability
Water is finite. People are not.
Seminar #1
("Managing Water = Managing Growth = Managing Infrastructure")
Understand Consequences of 'Infrastructure Liability'
Strive for 'Sustainable Service Delivery'
Recognize Benefits of 'Green Infrastructure'
Regional Collaboration
Seminar #2
("Too Little Water")
Climate Change = Droughts
So, Design with Nature
Make Level of Service Choices
Adaptation
Seminar #3
("Too Much Water")
Climate Change = Floods
So, Respect Power of Nature
Make Level of Service Choices
Risk Management
Green infrastructure
will make a difference over time!

Figure 29

c. Guide to Water-Wise Land Development

In 2012, the first phase of IREI implementation involved a 'proof of approach' to demonstrate how to make inter-regional collaboration tangible to all partners. The other partner regional districts hosted a 'sharing & learning' event, open to all.

In the Comox Valley, however, the 'proof of approach' was built around an internal workshop series. Emphasis was on how to bridge the 'implementation and integration gap' (and move from talk to action).

Bridge the Implementation Gap

The workshop series was guided by the 'mind-map' below. The series deliverable was the first iteration of *A Guide to Water-Wise Land Development in the Comox Valley* (refer to Figure 30), presented at a **Peer Dialogue Session** held in June 2012.

Program Theme: The focus of the Inter-Regional Education Initiative is on actions related to land use and watershed health on Vancouver Island. In 2012, the common theme for education-based events in the four Vancouver Island regions was: ***Sustainable Rainwater Management: What Does It Look Like?***

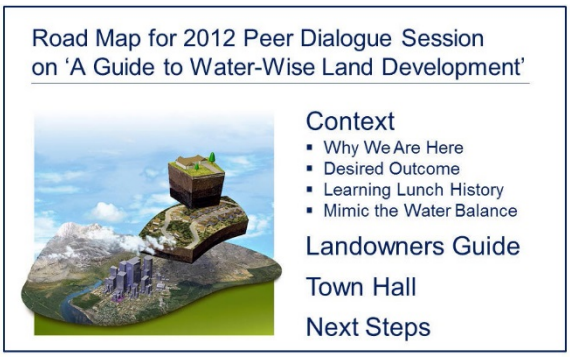
Series Goal: Create a picture of what a *Comox Valley Integrated Rainwater Management Plan* would look like.

Guiding Philosophy: "Our shared responsibility is to look after the land, the goal is to protect watershed and stream health, and the outcome will be reduced 'flashiness' in watersheds."

Desired Outcome: "The 2012 Series will inform a consistent Comox Valley regional approach to 'integrated rainwater management' that results in Watershed Blueprints; and it will lead to a consistent process complete with common tools for review of development applications that have inter-jurisdictional implications and/or impacts."

Peer Dialogue Session in 2012: Attended by inter-departmental representatives from all four Comox Valley local governments, the purpose of the session was to inform, educate and build support for rainwater management that protects watershed health. Technical and inspection staff from building, planning, engineering and public works departments attended.

The regional team first presented the Guide and elaborated on current and proposed initiatives that would add depth to the Guide over time. Participants then contributed their ideas on how to implement and communicate those initiatives.



Soft Launch in June 2014: Over the next 2-year period, the Comox Valley regional team worked on improving the Guide content and layout. At the same time, initiatives identified in the Guide continued to progress. When the Comox Valley hosted the fourth of 5 sessions in the *2014 Inter-Regional Workshop Series*, this provided the opportunity to showcase the final iteration of the Guide (in anticipation of a formal rollout in 2015).

Watershed Blueprints: The team benefitted from inter-regional collaboration in 2013. The Capital Regional District and District of North Vancouver shared their experiences on **how** to implement a Watershed Blueprint approach that is action-oriented and provides planning staff with the level of detail they need to ensure that development applications protect the hydrologic integrity and natural functions of a watershed.

A Guide to

WATER WISE LAND DEVELOPMENT

in the Comox Valley

It does not matter how far away you live or build from a creek, lake, bog or the ocean - you are in a watershed. The Comox Valley consists of 26 watersheds and several unnamed drainages. Another word for watershed is "catchment area" - a way to describe how rain and snow falling onto the land makes its way downhill into a watercourse, or flows underground, and eventually to the sea.

Each of us has a role to play to ensure these watersheds remain healthy for generations to come.

IN THIS GUIDE: Understand the Comox Valley's watershed management goals and learn about the range of initiatives that help get watershed health "right at the front end" including high level policy direction, specific development tools and tips on preparing a successful development application.

AT THE 2012 PEER DIALOGUE SESSION, *the regional team first presented the Guide and elaborated on current and proposed initiatives that would add depth to the Guide over time. Participants then contributed their ideas on how to implement and communicate those initiatives.*

Figure 30

d. Moving Towards Sustainable Service Delivery (June 2014)

The Inter-Regional Collaboration Session held in the Comox Valley in June 2014 achieved two outcomes:

- It provided the Comox Valley-CAVI Regional Team with a driver and a milestone for showcasing progress while also raising local awareness of the benefits of collaboration.
- In addition, the June 2014 event has legacy value because it bridged and provided a springboard to 2015 and beyond, for both the IREI team and the Comox Valley-CAVI team.

The Comox Valley-CAVI team chose *Moving Towards Sustainable Service Delivery* for the session theme. This allowed the team to reflect on their journey since 2011. It also articulated the destination (outcome resulting from collaboration across jurisdictional boundaries):

> *Sustainable Service Delivery connects land use planning, life-cycle costing and watershed-based solutions. It ensures that infrastructure services are sustainable over time, both fiscally and ecologically. It reduces unfunded 'infrastructure liability'.*

Think like a Watershed to Reduce Infrastructure Liability

The session introduced the notion of progressing along the 'asset management continuum' to achieve the goal of Sustainable Service Delivery. Two local government CAOs, both of whom are asset management champions in BC, provided a picture of what can be. They articulated the vision for integration of natural systems thinking and adaptation to a changing climate into asset management.

Asset Management is Systems Thinking: David Allen, City of Courtenay CAO, introduced the strategic context as laid out on Figure 31. Also, he is the Co-Chair of Asset Management BC. He introduced the audience to the **Umvelt** concept (German word for 'environment' or 'surroundings').

"Although the surrounding environment is common to all, each organism experiences the environment in a different way. Applied to asset management, this means that the Umvelt is larger in scope than the triple bottom line," stated David Allen.

*"We cannot look at individual municipal services in isolation. Asset management is about a much bigger Umvelt (refer to Figure 30). Climate change, for example, correlates with the impacts of what has typically been called stormwater management. The shift to the term **rainwater management** is great because it reflects a 'systems thinking' approach."*

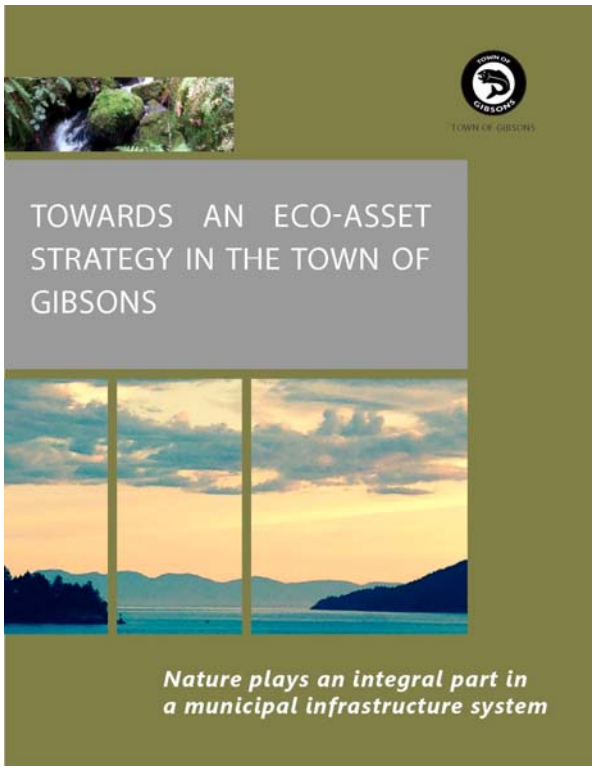
"Asset management is a 'systems thinking' method applied to organization-wide problem solving."

Nature is Our Most Valuable Infrastructure Asset: Emanuel Machado, CAO, introduced the Town of Gibsons **Eco-Asset Strategy** (Figure 31).

"The Town has recognized, formally and in practice, that nature, and the ecosystems services that it provides, are a fundamental and integral part of the Town's infrastructure system. The Town's financial statement includes an auditor's note that establishes an accounting precedent," stated Emanuel Machado.

"Our plan is to develop a model to manage our natural assets the same way that we manage our engineered assets. We believe there are many things that we can do right away."

"We are not suggesting that all ecosystem services provide a municipal function. Trees, soil, green spaces and water provide all the services that we are talking about. As I tell my Council, this is not about habitat. This is about municipal infrastructure."



Umvelt –
'the world as it is experienced by a particular organism'

The Umvelt of Asset Management - *'more than triple bottom line theory, but the entire external environment or surroundings within which it is practiced'*

David Allen, CAO
City of Courtenay
June 2014

Figure 31

e. Reflections on the Regional Team Approach & Success

Collaboration leads to meaningful results when five conditions are in play. Defined as 'collective impact', the concept was first articulated in a magazine article written by John Kania and Mark Kramer in 2011. The 'five conditions' help to explain the relationship-based nature and effectiveness of the 'regional team approach':

The Five Conditions of Collaboration	
1. Common Agenda	- shared vision
2. Shared Measurement	- align efforts
3. Mutually Reinforcing Activities	- plan of action
4. Continuous Communication	- build trust
5. Backbone Support	- "The Partnership"

Comox Valley-CAVI Experience

The experience of the Comox Valley team is that patience, perseverance and time complement the 'five conditions'. Between 2008 and 2011, the CAVI forum provided a setting for conversations that otherwise would not have taken place.

> *Over the years, conversations led to dialogue and then to consensus on how to achieve the Watershed Health Goal in the Comox Valley.*

Learn by Doing: *"To get to the right outcome, we are moving away from regulation. As a landscape architect by training, my experience is…get the soil right and the plants will be okay. Just keep making things better and don't worry about getting them perfect," states Judy Walker, Senior Planner, Village of Cumberland. "Take action. Doing* ***something*** *imperfectly is better than doing* ***nothing*** *flawlessly."*

Shared Responsibility Involves Everyone: The stewardship sector has been at the Comox Valley-CAVI table since inception in 2008.

"As volunteer Stewards of our precious and rare fresh water resources we have the ability and passion to speak for the intrinsic values," states Jack Minard, Executive Director, Comox Valley Land Trust. "There is a shared responsibility for every level of government, every consultant and every landowner to understand those values. Water is life before it is a commodity."

A Tale of Two Watersheds: The Town of Comox has case study experience that demonstrates the benefits of a Sustainable Service Delivery approach.

"When the CAVI team started to talk about asset management in 2011, everyone quickly grasped the need to incorporate ecological values," states Glenn Westendorp, Public Works Superintendent. "This awareness has influenced how the Town looks at development. For example, we calculate the revenue that it will generate over time because we understand the implications of the 20/80 principle - the initial gift of a development only covers the initial 20% of the total infrastructure cost. The other 80% is a deficit, including the cost to fix drainage impacts."

Nature is the Golden Goose: TimberWest manages both public and private forest lands and joined the Comox Valley-CAVI table in 2011.

"Nature is our Golden Goose. If we are good stewards of our watersheds, the natural result is not only the economic wealth (golden eggs) generated in perpetuity by growing and harvesting trees, but all the other watershed and community values our Golden Goose will provide. I look forward to the day when watershed planning includes lower urbanized portions of the watersheds. The protection of our Golden Goose is relevant and transferrable to regional and localized community governments."

A Perspective on the Role of Champions in Leading Change in the Georgia Basin

Nancy Gothard
Environmental Planner, City of Courtenay
Courtenay Representative, Comox Valley-CAVI Regional Team
July 2014

"The approach to watershed-based planning and water sustainability is happening through champions because, apart from some high-level enabling legislation, there is no strong top-down mandate 'requiring' that we do these things. I think in most organizations it is not a top-down priority."

"Where it has surfaced as a top-down priority, it has been because individual champions have ensured that it was considered at those higher levels. At the June 2014 Inter-Collaboration Session hosted by Comox Valley-CAVI, I noticed that each participating organization had different champions, from different parts of the organization. In some communities it was the engineering department, or planning or environmental services, etc."

"But each organization was where we in the Comox Valley were also at – how to get the other departments on board. The fact that we are all at the same point on the trajectory in terms of infiltrating these ideas into our organizations suggests that we are indeed on the right path. We each have come to the conclusion that collaboration is critical."

"That so many people earnestly working on this have reached the same point suggests that we are on the tipping point of a breakthrough in collaboration. We will now be eager, I expect, to share just how we permeated these concepts into our own organizations. This is organizational transformation that we are discussing here, not just Water Balance any longer."

"I also thought – wow, we are all really supporting each other. Once we know that we can just get to the work of 'doing the work'. We are now all on the same page. I don't have to explain to my other counterparts in other areas what it is I'm trying to do, or where we're at in the process."

"Everyone who has gone through the IREI it seems has been 'seasoned' to be nimble and open-minded in how they approach this transformation to water sustainability, and how to genuinely be of assistance to others."

"They have learned to recognize the opportunities for building strengths within process and where weak links in the chain can occur. I was just so encouraged to see that we in the Comox Valley are not alone and that we now have others who are eager to help. This relationship building is key to accelerating the sharing and learning further and the Georgia Basin approach to water sustainability."

Convening for Action in the Cowichan Region

Participants in the pilot Living Water Smart Learning Lunch Seminar Series – June 2008

Storyline Overview

Chapter No. & Title	Key Messages
6. **Convening for Action in Cowichan Valley**	In 2007, the Cowichan Region embarked on a journey as a provincial demonstration region for looking at rainfall differently, testing applications of the Water Balance Methodology, and implementing green infrastructure.
a. **Genesis for Regional Team Approach**	In 2008, the Cowichan Region was the pilot for the initial Living Water Smart Seminar Series. The original concept for inter-departmental alignment expanded into an inter-governmental concept for 'sharing and learning'.
b. **Hosting of Water Balance Forums**	The Cowichan Region is an incubator for approaches that are being replicated elsewhere in the Georgia Basin. The *Georgia Basin Inter-Regional Educational Initiative* (IREI) was launched at the 2012 Water Balance Forum.
c. **Restore the 'Water Balance' in Urbanizing Areas**	Local government regulates how land is drained and serviced. It has the authority to require that land owners comply with volume-based performance targets that restore the seasonal Water Balance distribution.
d. **Adapting to a Changing Climate**	A pattern of alternating droughts and floods has prompted regional action to manage risks. The Cowichan Region views the 'Watershed Health Goal' through the lens of *Climate Change Adaptation*.
e. **Communicating the 'New Normal'**	A changing environment is the 'new normal'. Communities can build tools and technical backstops at a professional and technical level, but at the end of the day everybody needs to be at the table.

6. Convening for Action in Cowichan Region

The Cowichan Valley Regional District (CVRD) was an early champion of the CAVI initiative, and this has resulted in a continuing commitment for almost a decade. In July 2007, for example, the Regional Board endorsed region-wide participation in the CAVI program, mainly because CAVI program elements aligned with the *Cowichan Basin Water Management Plan*, a provincially significant and precedent-setting plan completed in March 2007.

> *The commitment by elected representatives has been reaffirmed a number of times over the years.*

Provincial Demonstration Applications: From 2007 to the present day, the Cowichan Region has served as a provincial demonstration region for looking at rainfall differently and applying the Water Balance Methodology. Approaches tested in the Cowichan Region have been replicated elsewhere.

Along with the Comox Valley, the Cowichan Region is a demonstration application for the 'regional team approach'. An understanding of Cowichan and Comox Valley experience yields helpful insights into trust-building and the benefits that accrue over time.

Timeline / Milestones

Figure 32 provides context for understanding how Cowichan region leadership has informed evolution of a 'mimic the Water Balance' approach to implementing green infrastructure and capturing rain, where it falls. The colour coding means:

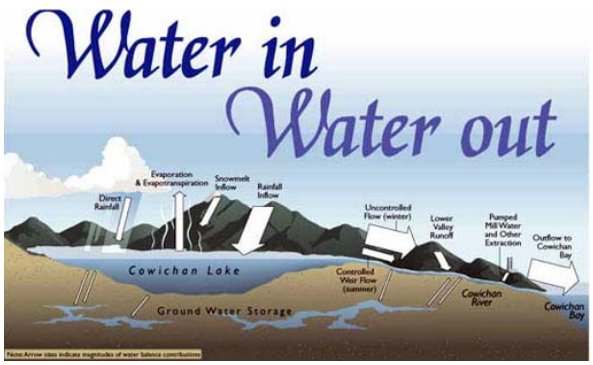
- **Blue** – provincial milestones;
- **Black** – Cowichan milestones in the ongoing evolution, testing and validation of a Water Balance approach to Resilient Rainwater Management; and
- **Green** – sharing of Cowichan case study findings at inter-regional events.

2007 Creating Our Future Workshop: After the launch of the CAVI initiative in 2006, the first CAVI 'sharing & learning' event was the **Creating Our Future Workshop.** This flagship event was by invitation, with the audience drawn from 19 communities up and down the east coast of Vancouver Island. The event was an adjunct to the *2007 Gaining Ground Summit* held in Victoria.

The workshop celebrated Vancouver Island success stories. The program centrepiece was the Cowichan Basin Water Management Plan, with its **'Water IN = Water OUT'** guiding philosophy. The workshop provided a platform for announcing the plan for the *2007 Vancouver Island Showcasing Green Infrastructure Innovation Series* in parallel with the Metro Vancouver Showcasing Series.

Cowichan Basin Water Management Plan: In 2007, when the former General Manager, Planning Division (Tom Anderson) recommended that CVRD partner with CAVI, he informed Board members that:

"The Basin Management Plan was developed through a uniquely inclusive consultative process; and provides an umbrella for aligning community development practices policies with emerging practices. The CAVI program can help the Cowichan Valley Regional District and member municipalities add depth to three areas of the Water Management Plan: demand management; protect aquatic ecosystems; and research, education, public outreach."



Convening for Action in Cowichan Region: Time-Line & Milestones

COLOUR CODE:
Blue = provincial milestone
Black = Cowichan Region milestone
Green = sharing at inter-regional event

Figure 32

a. Genesis for 'Regional Team Approach'

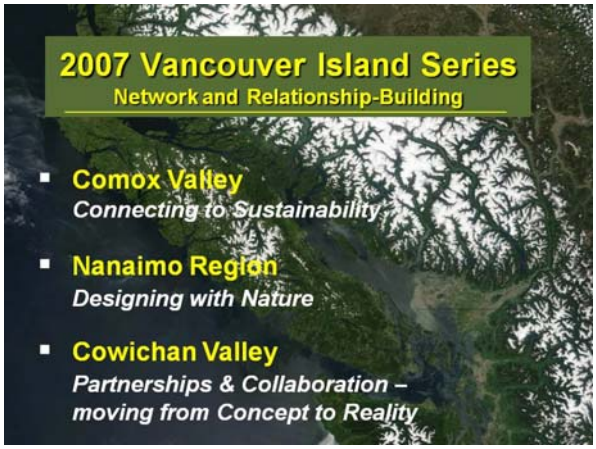
The historical significance and importance of the 2007 Showcasing Innovation Series is two-fold. First, it demonstrated what could be accomplished through inter-regional collaboration, and therefore is the genesis for the *Georgia Basin Inter-Regional Education Initiative* (IREI), launched in 2012. Secondly, it was the catalyst for relationship-building within the Cowichan Region that then led to the precedent for a 'regional team approach'.

> *In 2008, the Cowichan Region was the pilot for the Living Water Smart Learning Lunch Seminar Series. The Comox Valley Series then built on and adapted the Cowichan experience.*

2007 Showcasing Green Infrastructure Innovation Series

Practitioners in local government want to learn from those who are innovating, and they want to visit projects that are precedent-setting. The 2007 series enabled host local governments to tell their stories in a way that no other forum provided.

Each of the three regional districts north of the Malahat divide partnered with its largest municipal member to co-host a 'showcasing day'. Support from the Cowichan Region was the lynch-pin that brought the showcasing concept to fruition.



2008 Living Water Smart Learning Lunch Seminar Series

The Learning Lunch approach to aligning inter-departmental efforts within local government was an outcome of the *2007 Green Infrastructure Leadership Forum*. The idea resonated and the original inter-department concept quickly expanded into an inter-governmental concept.

Release of *Living Water Smart* in June 2008 provided a reason for bringing together engineers, planners, building inspectors and bylaw enforcement officers. The focus was on aligning efforts to implement effective green infrastructure.

> *Six provincial resource documents formed the curriculum backbone:* ***Stormwater Planning: A Guidebook for British Columbia (2002), A Guide to the Guidebook, Beyond the Guidebook 2007,*** *the* ***Green Infrastructure Guide (2007), Develop with Care (2006),*** *and* ***A Guide to Green Choices (2008).***

The series spread the curriculum over three sessions (Figure 33). This enabled participants to take in new information, reflect on it, blend it with their own experience, test it, and eventually apply it in making decisions.

Consistency at Front Counters: In 2008, during the planning of the series, Peter Nilsen (former Deputy Engineer, District of North Cowichan) observed that: *"Within the Cowichan Valley Regional District, there are five local government jurisdictions; and the same group of developers and development consultants have projects in all or most of those jurisdictions. It therefore becomes essential that developers and their consultants hear a consistent message regarding rainwater management and green infrastructure expectations when doing business at the front counters in each of those jurisdictions."*

2008 Living Water Smart Learning Lunch Seminar Series

Curriculum for 'Beyond the Guidebook: The New Business As Usual'

Session	Theme	Scope
1	Today's Expectations are Tomorrow's Standards **EVOLUTION** (*What*)	Session #1 traced the evolution of rainwater and stormwater management policies and practices over the past two decades. This provided a frame-of-reference and a common understanding for subsequent sessions. The *2002 Stormwater Guidebook* and the *Water Balance Model* were introduced so that participants would have an understanding of the purpose and application of performance targets. A desired outcome was that participants would understand **WHY** drainage practice comprises a continuum of paradigms, and communities progress at different rates along the continuum.
2	Legal and Policy Strategies to Support Green Infrastructure **TOOLS** (*So What*)	Session #2 introduced the extensive and very specific tools available under the Local Government Act so that they can proactively manage the complete spectrum of rainfall events: from light showers to heavy rain to extreme storms. The *Green Infrastructure Guide* was explained so that participants would know how to use it effectively as a resource. A desired outcome was that participants would understand **WHAT** bylaw and policy tools enable incorporation and retrofitting of engineered green infrastructure into development plans.
3	Nature Knows No Boundaries **TARGETS** (*Now What*)	Session #3 elaborated on a performance target approach to land development that makes sense, meets multiple objectives, is affordable, and results in net environmental benefits at a watershed and/or regional scale. A framework for 'bringing it all together' was introduced so that participants could explore a regional team approach that ensures a common understanding and consistency at the front counter. A desired outcome was that participants would understand **HOW** a Design with Nature approach to rainwater management (i.e. using infiltration and trees) will influence the greening of the built environment and protect stream health.

Figure 33

b. Hosting of Water Balance Forums

Over the past decade, the Cowichan Region has experienced a number of floods and droughts. These teachable moments have heightened local awareness of the need to look at rainfall differently and **'design with nature'** – that is, if communities are to adapt to a changing climate (wetter, warmer winters; longer, drier summers).

The Cowichan Region has been an incubator for approaches that are being replicated elsewhere in the Georgia Basin. The CVRD has hosted three Water Balance Forums - in 2008, 2012 and 2014.

2008 Forum

The first forum (October 2008) was an outcome of the *Living Water Smart Learning Lunch Seminar Series*. Willing development proponents and their consultants (planning & design) collaborated with the Water Balance Model team to develop three case study applications at three different scales.

Results, lessons learned and insights were shared at the Forum; and provided the technical foundation for roundtable exploration about how to implement green infrastructure effectively.

> *The 2008 Forum provided the template for the first Metro Vancouver Water Balance Forum, hosted by the City of Surrey in March 2009.*

Manage Rain Where It Falls: At the conclusion of the Forum, Rob Conway (Manager, Development Services) stated that: *"We are increasingly advising development applicants that they need to manage rainwater runoff where it falls. Until now we have not had an appropriate way to assess their proposed solutions. The Water Balance Model is a great way to do this."*

2012 Forum

The second forum (March 2012) was the launch event for the *Georgia Basin Inter-Regional Education Initiative*. The members of the Cowichan Valley regional team reported out on how each has progressed since 2008 (Figure 34).

> *The 2012 Forum emphasis was on 'targets and criteria', lessons learned, and practices necessary to protect stream health.*

Alignment of Efforts: Nagi Rizk, Municipal Engineer with the Town of Cowichan Lake, delivered the closing remarks: *"It is a great honor for me to be part of the Cowichan Valley team. Our goal is to ensure a consistent approach to rainwater management on Vancouver Island, one that mimics the water balance. By working together we can make a difference. I am excited to think about the future and the great progress we can achieve together in the coming years."*

2014 Forum

The third forum (February 2014) was the venue for release of the *Primer on the Water Balance Methodology for Protecting Watershed Health* and unveiling of the **Water Balance Model Express**.

> *The WBM Express is an online and interactive tool that quantifies how well properties capture, sink and spread rainwater runoff.*

WBM Express: At the April 2014 Board Meeting, Ladysmith Mayor Rob Hutchins moved the motion that: *"the Water Balance Web Tool and supporting documents be shared with the CVRD and partner municipal planning staff; and further, that planning staff consider integrating the tool into the planning framework to support watershed management objectives at the Official Community Plan level and Development Permit level."*

*Held at the Cowichan campus of Vancouver Island University, the **2012 Water Balance Forum** attracted representatives from 29 organizations (including the City of Calgary) for the launch of the Georgia Basin Inter-Regional Education Initiative.*

The 2012 Cowichan Valley forum team comprised representatives of Cowichan Tribes, five local governments - Lake Cowichan, Duncan, North Cowichan, Ladysmith and Cowichan Valley Regional District - and the Cowichan Watershed Board.

Representatives of the Ministry of Environment (John Deniseger), Department of Fisheries & Oceans (Wilf Luedke) and Ministry of Transportation and Infrastructure (Bob Wylie, Approving Officer) elaborated on regulatory requirements that provide a driver for local governments to protect and/or restore watershed health over time.

Figure 34

c. Restoring the 'Water Balance' in Urbanizing Areas

Land development alters the three pathways by which rainfall reaches streams. This changes the proportions of annual Water Balance volumes for surface runoff, groundwater and interflow (lateral flow in shallow soils). Warmer, wetter winters (with less snowpack and more rainfall) and drier, longer summers exacerbate changes in seasonal Water Balance distribution and volumes.

> *Local government regulates how land is developed, drained and serviced. It has the authority and ability to require that land owners comply with watershed-based volume targets that will restore the Water Balance distribution after land is urbanized.*

The Cowichan Region is a provincial leader in demonstrating how to apply science-based understanding and strategies to develop criteria and tools for use in areas where local government action can influence Water Balance outcomes.

Water Balance Methodology

In 2013, CVRD and the Partnership for Water Sustainability jointly funded a case study to develop a logical and straightforward way to assess potential impacts resulting from urban development; and analytically demonstrate how to restore the hydrologic function of a watershed.

The Cowichan case study is part of the technical foundation for the **Primer on the Water Balance Methodology for Protecting Watershed Health**.

An integrated design for land development, rainwater management and groundwater recharge would replicate the shallow soil storage and interflow conveyance system in order to mimic the hydrologic performance of a natural watershed.

Performance Targets: The Primer presents the basic science and a basic knowledge needed to create an understanding of watershed hydrology and the natural processes that affect the flow of rainwater from cloud to stream.

Figure 35 illustrates the application of three Water Balance performance targets to size and design the components of a standard rain garden installation. Targets are watershed-based.

Water Balance Model Express

The key to rainwater management is to connect each property's hard surfaces with well-designed absorbent or porous surfaces. The *Water Balance Model Express for Landowners* has pre-set values for the three Water Balance parameters (retention volume, base flow release, and infiltration area). These are established by the local government at a watershed-scale.

> *The Express guides the property owner through a simple and visually oriented set of sizing options for rain gardens, cisterns, infiltration swales and landscaping.*
> www.cvrd.waterbalance-express.ca

Rainwater Brochure

The CVRD has developed a 'rainwater brochure' (Figure 34) to inform and educate the community about core Water Balance concepts, and to support use of the WBM Express.

Act Like a Watershed: *"Our community is deeply committed to watershed management and stewardship. However, often they are missing the specific tools and information to transform that commitment to concrete actions they can take in their own lives. This often means simple changes to how they develop or care for their properties,"* states Kate Miller, Manager, Environmental Services.

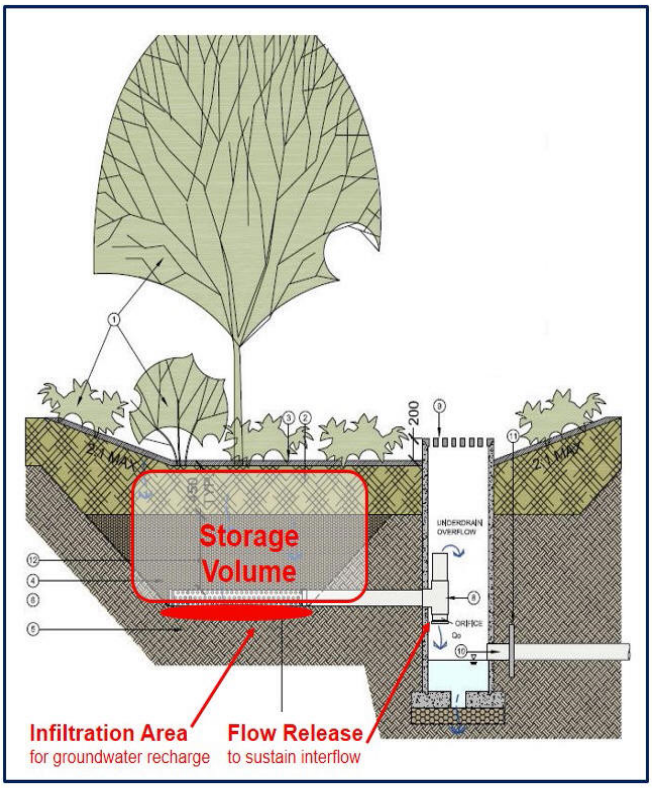


Image Source: *Stormwater Source Control Design Guidelines 2012 (Final Report), Metro Vancouver*

How Performance Targets for Storage, Infiltration and Flow Release are incorporated in a Rain Garden Design

Watershed-Specific Performance Targets			
Target Parameter	**Water Balance Function**	**Units of Measurement**	**Example Target Values***
Base Flow Release Rate	Interflow Replicator Rate	litres per second per hectare of drainage area	0.5
Storage Volume	Interflow Storage Replicator	cubic metres per hectare of hardened land surface	300
Infiltration Area	Groundwater Storage Recharge	percentage of project site area in contact with native ground	3%

**represents expected order-of-magnitude of target value*

Reference: http://waterbucket.ca/wp-content/uploads/2012/05/Primer-on-Water-Balance-Methodology-for-Protecting-Watershed-Health_February-2014.pdf

Figure 35

d. Adapting to a Changing Climate

Under the IREI umbrella, each of the five partner regional districts is spearheading a different part of the Watershed Health Legacy puzzle picture. The lens for the Cowichan Region is *Climate Change Adaptation* because a pattern of alternating droughts and floods is already a reality (Figure 36).

Restoring the absorbency of the urban landscape would stretch the seasonal population-support capacities of water storage reservoirs (by reducing demand for landscape irrigation water) and sustain environmental flows during droughts. It would also reduce stream erosion in wet weather.

> *"If mitigation is about CARBON, then adaptation is about WATER"*
>
>
>
> Jim Mattison,
> Assistant Deputy Minister
> Water Stewardship Division
> Ministry of Environment
> April 2008

Managing Risks in the Face of Climate Change

When the CVRD hosted the Inter-Regional Collaboration Session held in May 2014, the Cowichan Region team chose *Adapt to a Changing Climate – Manage the Water Balance* for the session theme.

The team shared their insights flowing from the processes and products they have under development to manage risks to water resource infrastructure, water supply and water quality in the face of climate change.

> *The Cowichan Region is well advanced in advancing processes and developing products that can eventually be packaged as elements of an over-arching* ***Water Sustainability Plan.***

Changing How We Make Decisions

Recurring region-wide consequences of water-related challenges prompted regional action to develop governance structures and processes to make the connections between high-level decision making and actions on the ground.

Regional Water Authority: In February 2015, the *Regional Surface and Ground Water Management and Governance Study* was presented in draft to the CVRD Board. The study made four primary recommendations. Establishing a Regional Water Authority is #1. Co-governance with First Nations is identified as a primary condition for success in managing water resources. The Authority's mandate, as currently proposed, would be to provide regional coordination for stewardship of surface and ground water resources, and regulation of environmental standards in high-risk watersheds.

> *The feedback from the Board was to hear from First Nations on their recommendations for Regional Governance before taking further steps.*

Create a Watershed Health Legacy: *"It is envisioned that we would apply whole watershed thinking and follow a risk-based approach to decision-making and management across the region. Currently, over 60 distinct organizations – including First Nations, improvement districts,*

government agencies, NGOs, and industry – play a role in the governance, management, and stewardship of water resources in the Cowichan. Coordination between these organizations is key as we face the pressures of climate change and population growth on our water resources," says Keith Lawrence, Senior Environmental Analyst, CVRD Engineering and Environmental Services Department.

What the Water Balance problem in the Cowichan looks like….

Fall 2006 – *too much water!*

Summer 2006 – *too little water!*

Skutz Falls on the Cowichan River

Exploring solutions…….

At the Inter-Regional Collaboration Session hosted by CVRD in May 2014, the 'town-hall' format encouraged interactive sharing and learning about what 'water sustainability planning' looks like in the Cowichan Region.

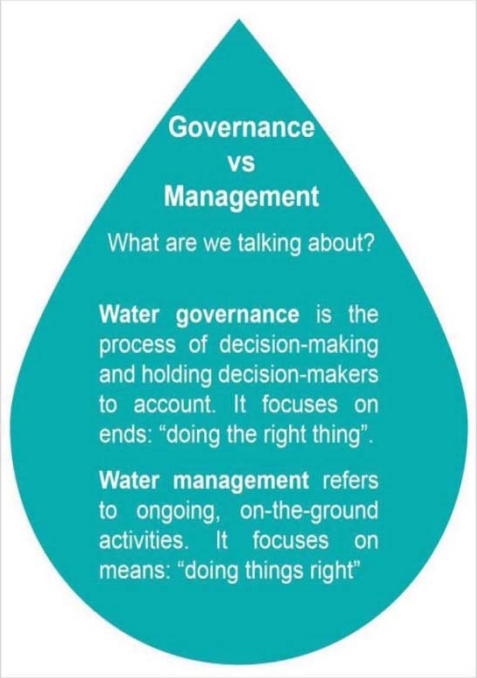


Figure 36

e. Communicating the 'New Normal'

Summer drought and winter flooding are the 'new normal' in the Cowichan region, and are putting water supply and the regional ecosystem under extreme stress. To foster long-term, strategic water preparedness the CVRD has launched a website that is intended to provide the community with easy, clear information and tools that make adapting to the 'new normal' easier.

Water Balance Actions

The CVRD's *New Normal* initiative illustrates what putting 'water balance thinking' into action looks like from a communications perspective. The branding for the New Normal uses images and words that inform and educate, with a focus on practical actions that emphasize what is possible: Drought Smart, Flood Smart and Smart Tools.

Regional Climate Adaptation Initiative: The amount of water entering and exiting the region each year is not changing; instead what is changing is how and when water arrives.

NewNormalCowichan is a regional adaptation initiative led by CVRD in partnership with the communities that comprise the Cowichan Region.

Living the new normal means using only as much water as needed to minimize the impacts of drought, and getting better at storing water (including in the ground) so that the region has enough to support the ecosystem and economy year round. And it means being aware of the risks and being prepared for flooding.

> *Smart tools, such as the Water Balance Model Express for Landowners and the Agricultural Water Demand Tool, make adapting to the new normal easier for homeowners, business owners and farmers.*

Moving Towards a Water Balance Culture: *"The summer dry season has extended on both ends and*

we can no longer count on a predictable snowpack and reliable rain to keep our watersheds healthy," states Jon Lefebure, CVRD Board Chair and Mayor, District of North Cowichan. *"Our region and each of us individually needs to adopt new 'water smart' management practices. NewNormalCowichan.ca's main message is that we all have a part to play in establishing a culture of water conservation."*

Our 'Regional Team Approach' - why it is different but perfect for us

Kate Miller, Manager, Environmental Services
Engineering & Environmental Services Department
Cowichan Valley Regional District
June 2015

"In nature, form and function are key to how things develop. In the Cowichan Valley Regional District our regional landscape outside the established towns is dramatically different than those of our CAVI partners - we do not own or control our watersheds, we do not have urbanized areas with attendant funding resources or regulatory frameworks. Nor have we had mandated development of unified watershed plans. But we do have a dominance of electoral areas with proudly distinct communities, capable and engaged municipal partners, and a leadership that is characterized by true independence and internal reliance."

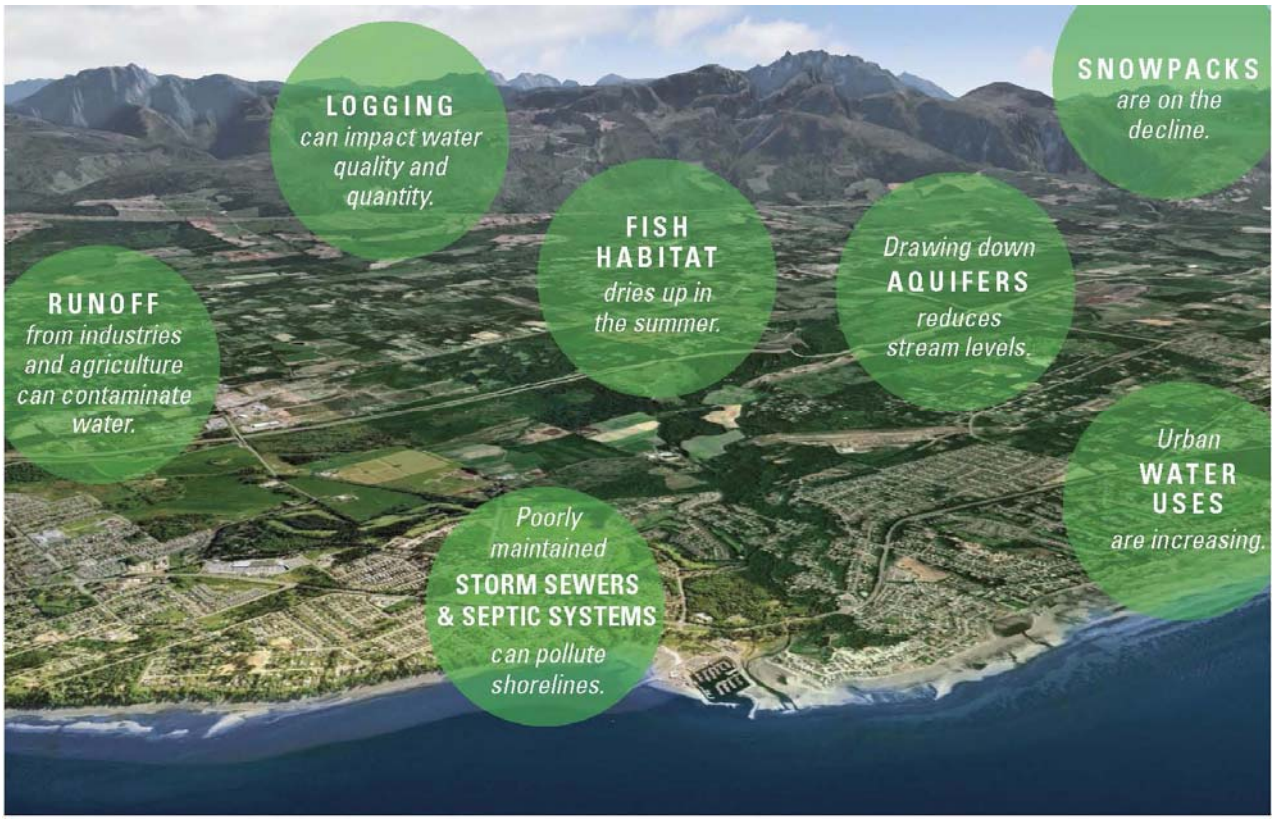
"The outcome is a unified perspective on the issues across our region and a deeper understanding of the distinctive local and organizational frameworks in which we work. We are partners, but have distinctly different ways of applying the underlying issues and philosophies of a 'design with nature' approach – one that respects the broad range of our communities and political and organizational imperatives we live and work with."

"This has resulted in a rich tapestry of watershed planning across our region. There is no one model. Rather, we have a range of applications that are sensitive to the environment in which it was formulated and to the core drivers and champions that brought it forward. The range of participants is truly astounding and brings richness to the regional approach. This cannot be developed in a linear manner. No amount of funding or imposed organizational structure can create a sense of the genuine unless it has come from the heart, and in our region it has. Each plan and initiative is distinct, place-based, and respectful of its community of interest and of others. Each makes room for the circle to be continually enlarged by sharing of learning and resources."

"We truly have a rich basis in which to begin the process of stepping back, learning and reflecting on our next steps. It started with the foundational Cowichan Stewardship Roundtable's collaborative and participatory model under Cowichan Tribes leadership that brought the first community together. It continued with the CAVI partnership for technical and professional support which brought the full range of local government players to the table. It encompasses the evolving panoply of local plans as each community stepped forward (Cowichan, Somenos, Quamichan, Shawnigan, Bonsal, Yellow Point) and put the various visions into action."

"As we look out into the future in a changing environment – our new normal - this richness and the depth of community participation can only help our region's future resiliency. While we can build the tools and the technical backstops at a professional and technical level, at the end of the day we need to have everybody at the table."

Convening for Action in the Nanaimo Region



Reference Source: *"Action for Water" referendum brochure, 2008*

Storyline Overview

Chapter No. & Title	Key Messages
7 **Convening for Action in Nanaimo Region**	In 2003, the Nanaimo Region recognized the signs of trouble on the horizon for water and watershed health, and initiated development of a strategy – "*Action for Water*" – for better management and increased security of the ground and surface water resources that sustain the region.
a. **Drinking Water & Watershed Protection Program**	Funded through a parcel tax, the *Drinking Water and Watershed Protection* service is a region-wide watershed function. Collaboration is an intrinsic part of the program. The program strength comes from working partnerships. Collaboration is a magnet that attracts champions.
b. **Showcasing Green Infrastructure Innovation**	In 2007, the Nanaimo Region hosted the inaugural event that formally initiated inter-regional collaboration on Vancouver Island. City of Nanaimo case study experience became a signature piece of 'sharing & learning' sessions, had ripple effects and influenced other governments.
c. **Regional Strategy for Resilient Rainwater Management**	The Nanaimo Region's *Liquid Waste Management Plan Amendment* charts a path forward for the next 20 years and beyond. Viewing watershed health through an asset management lens provides a driver to require that development practices maintain Water Balance integrity.
d. **Sustainable Partnerships**	Partnerships are a long-term investment, and a partnership is more than a project. First Nations in the Nanaimo Region can help local government understand what 'healthy watershed' means and bring their long-term understanding to integrated watershed management.

7. Convening for Action in Nanaimo Region

The Regional District of Nanaimo (RDN) was the first regional district to embrace a leadership role within the CAVI initiative. The RDN's John Finnie, General Manager of Regional and Community Utilities, was the first CAVI Chair (2006-2011). Annual updates to the Board about CAVI activities and accomplishments enabled the Board to reaffirm commitment to inter-regional collaboration.

The RDN's contribution to inter-regional "sharing and learning" is the experience it has gained over the past decade in first developing and then implementing the precedent-setting *Drinking Water & Watershed Protection Program*.

Action for Water: *"In 2008, and as the outcome of a successful referendum, the RDN became the first regional government to create a drinking water and watershed protection service area with taxation authority in an electoral area. This was the culmination of a 6-year effort. In 2012, the service area was expanded to include the municipalities within the regional district and they became active participants in the watershed function,"* reports John Finnie.

Timeline / Milestones

The timeline shown on Figure 37 identifies milestones in the evolution of the Nanaimo Region's watershed-based approach. The colour coding means:

- **Blue** – provincial milestones;
- **Black** – Nanaimo region milestones; and
- **Green** – sharing of Nanaimo region case study findings at inter-regional events.

Source of Authority for Watershed Approach: In February 2003, a staff report to the Board crystallized the *Action for Water* vision. The 2003 report is a valuable historical document. Not only did it consolidate various directives, it identified a strategy (and associated implications) for moving forward incrementally with the regional service area. Findings of relevance to other regions are:

- The primary source of authority for a regional district to undertake studies in relation to watershed protection is found in section 800.1(2)(b) of the Local Government Act.
- This section provides for coordination, research and analytical services related to the development of the regional district.
- The regional district's powers to regulate and control development through zoning bylaws enable a regional function and service area for Drinking Water & Watershed Protection.

Action for Water Video: In 2008, the RDN produced a video that drew attention to water resource impacts and explained the need for action through the local government mandates of land use planning and development standards. "The *Action for Water* video was a critical communication tool during the public consultation process leading up to the referendum in November 2008," recalls John Finnie.

Provincial Demonstration Applications: The Nanaimo Region is a provincial demonstration region for a water balance approach to watershed protection, starting with two chapters in the 2002 Guidebook: *Policies for Integration of Land Use Planning and Stormwater Management*; and *Setting Priorities for Early Action*.

RDN case study experience showcased what could be accomplished by bringing together the right people with the right knowledge at the right time to collaborate on solutions. As a result, the RDN lens for describing the value of the 'regional team approach' is **sustainable partnerships**.

Convening for Action in Nanaimo Region: Time-Line & Milestones

COLOUR CODE:
Blue = provincial milestone
Black = Nanaimo region milestone
Green = sharing at inter-regional event

Figure 37

a. Drinking Water & Watershed Protection Program

The RDN established a provincial precedent when it started the *Drinking Water & Watershed Protection* service. The program is funded through a parcel tax. The stable revenue source enables strong long-term continuity of the program.

Holistic Approach to Land and Water Use: *"A growing population combined with known negative impacts created the need to tackle issues of groundwater depletion, stream degradation, surface water contamination and the changes climate change will bring. Land use planning and development standards cannot be effectively modified without a clear understanding of our water resources, where they are changing and why,"* states Mike Donnelly, RDN Manager of Water Services.

Water Budget Study Demonstrates Leadership

Completed in March 2013, the region-wide Water Budget Study is the foundation piece for a better understanding of regional water resources (Figure 38). The assessments provide an understanding of the current water demands, availability, use, the stresses placed on rivers/creeks and aquifers by human activities, and long-term impacts of changing climate conditions on fresh water resources in the region.

> *By taking the lead with this baseline inventory of regional water resources, the RDN can now prioritize more detailed assessments that will enable the development of watershed management plans.*

Working Partnerships Promote Collaboration

Collaboration is an intrinsic part of the *Drinking Water & Watershed Protection* program. The strength of the program comes from the working partnerships between the RDN and the four municipalities in the region – City of Nanaimo, District of Lantzville, City of Parksville and Town of Qualicum Beach. The five co-fund the service. The on-the-ground education and outreach component is known as **Team WaterSmart**.

Towards a Responsible Water Culture: *"We always come back to the Drinking Water & Watershed Protection Action Plan vision. It is over-arching, outcome-oriented and lays out what we need to do to understand and manage water in our region. The program is a 'one-stop' source for local government initiatives on water stewardship. Cooperation with the four municipalities results in consistent messaging, efficient use of resources and a concerted effort to establish strong water-awareness and cultivate a responsible water culture in the Nanaimo region,"* states Julie Pisani, RDN Program Coordinator.

Shared Responsibility: Working partnerships with provincial government ministries, local stewardship groups, academic institutions and other regional governments further strengthen the program. Notable successes (Figure 39 include:

- Community Watershed Monitoring Network
- Groundwater Observation Well Network
- Water Use Reporting Centre (an initiative of the Okanagan Basin Water Board)

"The RDN embraces shared responsibility. Because we have base funding, we said we would fill gaps. This changed the RDN's relationship with the Province," explains Mike Donnelly. "Now, we pool resources to undertake work that otherwise would not get done. We are amazed by how much energy results from a collegial approach to solving problems. Collaboration is a magnet that attracts champions who want to make a difference."

Base Funding + Partnerships = Successful Program

Keys to Success in the Nanaimo Region:

Outcome-oriented, the DWWP Action Plan is over-arching and provides guidance for partnerships that make a difference over time.

- There is no 'how you do it' plan.
- There is no need for a 'grand plan' to tell the region what to do.
- Start at the project level to get started on bringing the vision to fruition.
- Link the project to the higher level vision.

Water Budget Project is foundation for better understanding regional water resources:

Where various elements of the hydrologic cycle are located.

How much water they hold.

How water moves between them.

Where water is being taken or used.

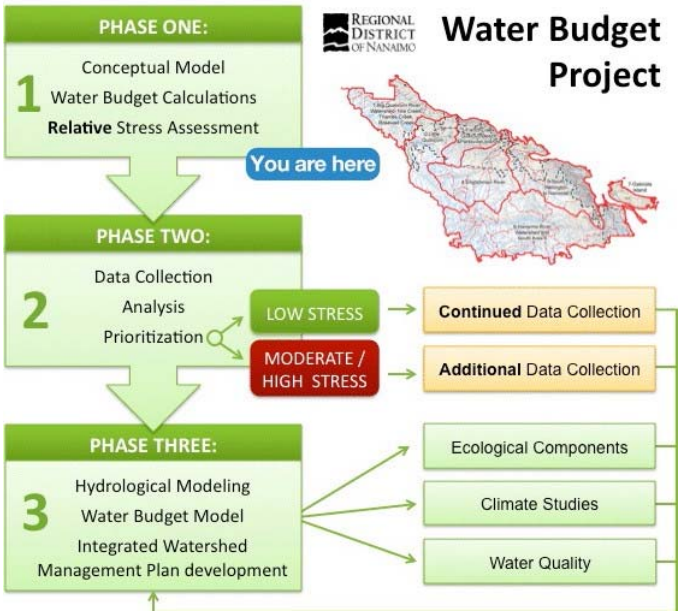


Figure 38

Community Watershed Water Quality Monitoring Network

In 2011, the Drinking Water and Watershed Protection program partnered with the Ministry of Environment and 10 steward groups to implement the Community Watershed Monitoring Network. The Ministry trains the volunteers and analyzes/ stores the water quality data. The RDN provides and maintains the equipment used by volunteers.

Do More With the Same Resources: *"This partnership has allowed the Ministry to study watersheds over a greater geographic range and in more eco-regions across Vancouver Island, has resulted in strong relationships with local government and interest groups, has provided valuable input and local support, and, ultimately, has resulted in a more effective monitoring program,"* states Rosie Barlak, the Ministry's Environmental Impact Assessment Biologist.

Provincial Groundwater Observation Well Network

Also in 2011, the Drinking Water and Watershed Protection program partnered with the Province and the Geological Survey of Canada to more than double the number of wells in the Observation Well Network (from 17 to 31) in the Nanaimo region.

Improve the Understanding of Groundwater: *"Usually the province is responsible for drilling and maintaining observation wells, but we saw this as an opportunity to create a partnership to achieve our goals under the Drinking Water and Watershed Protection program, to gather more data and fill gaps in the current groundwater data for our region. Pat Lapcevic, Section Head (Ministry of Forests, Lands, and Natural Resources Operations) is the provincial government champion who embraced the shared vision and is a key partner in our regional groundwater monitoring efforts,"* explains Julie Pisani.

BC Water Use Reporting Centre

In 2011, the Okanagan Basin Water Board launched the web-based BC Water Use Reporting Centre (WURC) in partnership with the Province and Environment Canada. Within a year, RDN partnered with the OBWB and WURC is now used by almost all water utilities in the Nanaimo region.

Make Informed Decisions: *"In general, reporting of licensed water use in B.C. is collected ineffectively if at all. However, the water use reporting software developed by the OBWB and now used in the Okanagan and Nanaimo, would allow information on major groundwater and surface water extractions to be gathered efficiently from all over B.C. The software also allows utilities and others involved in water management to use the data for planning and managing the resource,"* explains Nelson Jatel, OBWB Stewardship Director.

Rainwater Harvesting Incentive Program & Guidebook

Introduced in 2012, the *Rainwater Harvesting Incentive Program* is the first-of-its-kind in BC. It provides grants of up to $750 for homeowners. Also in 2012, the RDN published the *Rainwater Harvesting Best Practices Guidebook*.

Achieve Multiple Beneficial Outcomes: *"We stepped back from a prescriptive 'how-to-do-it' approach and adopted a guidelines approach. The Guidebook was developed through an inter-departmental collaboration process that involved staff from long-term planning, water, building inspection and sustainability. We are promoting rainwater harvesting to reduce the volume of groundwater drawn from aquifers during dry summer months. This will sustain critical baseflow in streams, prevent saltwater intrusion, and increase self-sufficiency,"* states Chris Midgley, RDN Manager of Energy and Sustainability.

Collaboration is an intrinsic part of the Drinking Water & Watershed Protection Program:

Groundwater Observation Well Network

Friends of French Creek - Water Quality Monitoring

Development Permit Areas for Water Conservation

The 'Green Communities' Amendments Act (2008) provides local government with the regulatory authority to require rainwater harvesting in a Development Permit Area

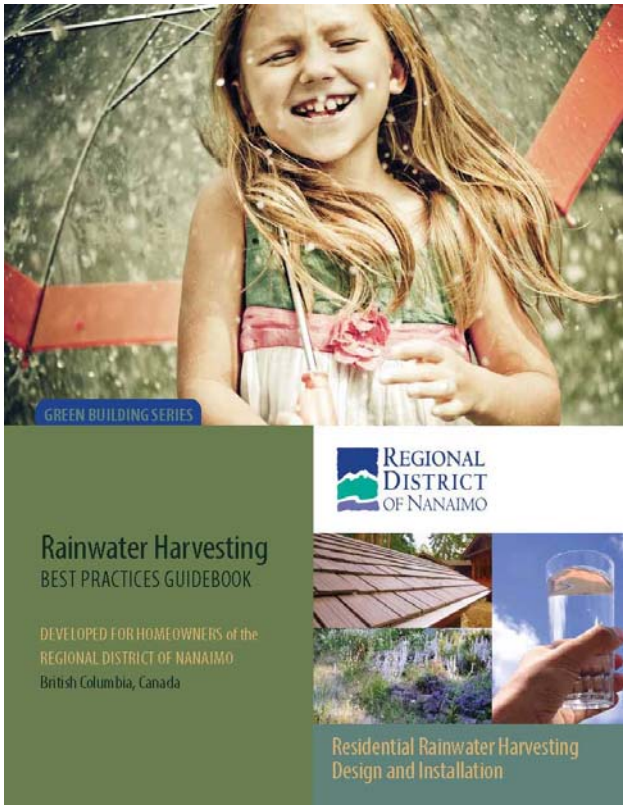


Figure 39

b. Showcasing Green Infrastructure Innovation

In 2007, the RDN partnered with the City of Nanaimo to co-host the inaugural event in the *Showcasing Green Infrastructure Innovation on Vancouver Island Series*. This CAVI event formally initiated the inter-regional collaboration process.

Share and Learn

'Showcasing goals' were to promote networking, build local government capacity to implement green infrastructure policies and practices, and facilitate sharing of approaches, experiences, tools and lessons learned. In the years a "Showcasing Innovation in the Nanaimo Region", City of Nanaimo experience was a feature of other inter-regional 'sharing and learning' seminars.

Ingredients for Success: *"Our participation was a catalyst for the City to evaluate our progress, and reflect on lessons learned from our experience in*

piloting innovation. It is about people, and most of all, it is about involving the right people at the start. The ingredients for success include passion and the willingness to take a vision and make it happen," stated Rob Lawrance, the City's Environmental Planner.

Establish Expectations

The story of the Inland Kenworth truck and heavy equipment facility in the City of Nanaimo became a signature piece of the inter-regional program, especially the *2008 Vancouver Island Learning Lunch Seminar Series*. From a City perspective, this was a milestone project. It had a ripple effect in the City. It influenced other local governments.

Dare to Be Different: The Inland Kenworth success story showcased what a collaborative approach to development site planning can accomplish. City staff challenged the design team to "dare to be different" rather than be satisfied with another routine application of unimaginative site planning practices. The proponent embraced the challenge to "design with nature" (Figure 40).

Design with Nature: *"One of the early keys to success was the time that City staff, the owner's representative and the design team spent walking*

the site. As we collectively began to understand both the constraints and opportunities, the design team became animated and energized. We could not help but notice the major change in attitude as the group of design professionals began to gel as a design team," recalled Gary Noble, Development Approval Planner.

Turning the Tide in Nanaimo: *"We view this project as the one that changed the thinking of the consulting community in Nanaimo, particularly on*

redevelopment projects. Even in traditional, hard-piped urban areas where it would be easy to connect to storm sewers that discharge to the ocean, project proponents are telling us that they want to be innovative when redeveloping their properties. We are turning the tide because development and redevelopment projects are now incorporating features for rainwater runoff capture," stated Dean Mousseau, Manager of Development Engineering, whenever he told the Inland Kenworth story at 'sharing and learning' sessions.

Inland Kenworth is located at the intersection of the Nanaimo Parkway and Northfield Road, and is close to a residential area. The site is immediately adjacent to the Northfield Marsh and is ultimately tributary to the Millstone River.

Inland Kenworth Site

DID YOU KNOW THAT *working relationships developed as a result of the Inland Kenworth project led to a unique four-way partnership for green roof research at four locations on Vancouver Island, with a research focus on the potential for offsetting carbon emissions that originate from building operations. This type of research had not previously been attempted.*

One of the research locations is the LEED Gold head office building of Greg Constable, who was the owner's representative for design and construction of the Inland Kenworth project.

The research partners are Vancouver Island University, Island West Coast Development (Greg Constable), Regional District of Nanaimo and City of Nanaimo.

To represent and reflect the coal mining heritage of the surrounding area, roof drainage is conveyed to a sluice box structure that discharges onto a rock garden. The water then flows via a man-made streambed that has been excavated through a rock outcrop to connect with the Northfield Road drainage system which outlets into a natural wetland. The dry streambed is filled with rock and is a distinctive and highly visible feature of the development. There is no catch basin on the site. Drainage runoff is infiltrated along the perimeter of the property.

"This is the first project that I have built without a catch basin," stated Greg Constable in 2007.

Figure 40

c. Regional Strategy for Resilient Rainwater Management

Approved by the Minister of Environment in October 2014, the Nanaimo Region's *Liquid Waste Management Plan (LWMP) Amendment* was developed through a 5-year collaborative process. It charts a path forward for the next 20 years and beyond.

> *The RDN will develop a regional strategy on rainwater management in coordination with member municipalities.*

Rainwater management activities will then be implemented under the umbrella of the *Drinking Water & Watershed Protection Action Plan*.

'2012 Water Balance Forum' Informed Regional Initiatives

In March 2012, the RDN Board endorsed participation in the *Georgia Basin Inter-Regional Education Initiative (IREI).* Next, in June 2012, the RDN hosted a Water Balance Forum. This was a notable event for local government professional development in the Nanaimo Region because:

- it was a 'proof-of-concept' event for the IREI and had an inter-regional audience (Figure 41);
- it has informed aspects of the *Drinking Water & Watershed Protection* program; and
- it has also informed the rainwater component of the region's LWMP process.

Recognition of the relationship between land development practices and watershed health is common to all three of the above. The Forum was about how to apply the **Water Balance Methodology** to lighten the 'water footprint', adapt to climate change, and protect stream and watershed health. Hence, the relevance.

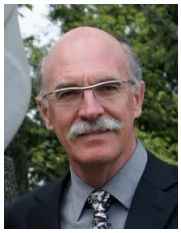
'Parksville Primer' Looked At Groundwater Differently

It is envisioned that the *Beyond the Guidebook Primer Series* of guidance documents would provide an educational foundation for the regional strategy. The third in the series is particularly relevant. Released in 2012 by the Partnership for Water Sustainability and Living Rivers, the *Primer on Integrated Rainwater and Groundwater Management for Lands on Vancouver Island and Beyond* was developed through collaboration with the City of Parksville. The Primer informed the educational process for the Parksville Official Community Plan Review.

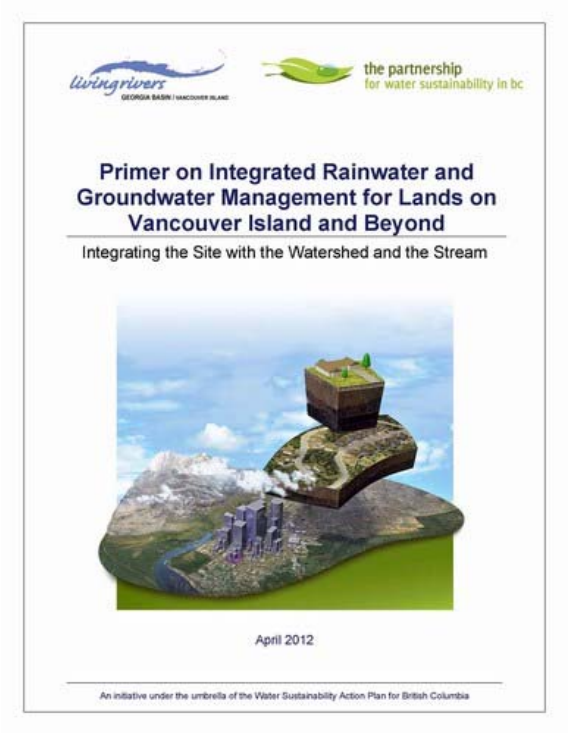
Groundwater and Land - They ARE Connected: The Primer synthesized the pioneer work of Dr. Gilles Wendling. He looked at groundwater differently in the Englishman River. His findings have informed evolution of the **Water Balance Methodology**. His work has helped to establish a performance target for sustaining the movement of water through the ground, after land is urbanized.

Dr. Wendling emphasizes that time is a critically important dimension in maintaining the water balance. Also, that water is always moving. "These are fundamental concepts, yet are not always well understood," he says.

Involve the Community: *"Characterizing aquifers is a complex and costly exercise because you need wells in order to reach aquifers and to monitor the depth and fluctuation of the level of the water table. The approach that we took was to involve the community. By getting them involved in its study, the community connects to its watershed, its complexity and how it works. Community members will then be able to more willingly modify their behaviour and management of the land,"* states Dr. Gilles Wendling.



2012 Nanaimo Water Balance Forum. *Planning, engineering and other local government staff - including managers and supervisors - gained an understanding and appreciation of the speed and power of the Water Balance Model (scenario modelling and decision support tool) in generating useful answers in minutes rather than in hours or days.*



living rivers GEORGIA BASIN | VANCOUVER ISLAND

the partnership for water sustainability in bc

Primer on Integrated Rainwater and Groundwater Management for Lands on Vancouver Island and Beyond

Integrating the Site with the Watershed and the Stream

April 2012

An initiative under the umbrella of the Water Sustainability Action Plan for British Columbia

Groundwater and Land: They ARE Connected!

DID YOU KNOW THAT these elements - rainfall, the ability of the landscape to absorb rainfall, movement of water through the ground, and the resulting flow in streams – are part of a system that we call the Water Balance. Land development short-circuits this system when the land surface is hardened and below-ground flow paths to streams are eliminated.

TIME is a critically important dimension in maintaining the Water Balance. An aquifer is NOT an underground lake. This fact is not necessarily understood by everyone. The water is always moving.

Figure 41

Sustainable Service Delivery for Watershed Systems

The 'Parksville Primer' drew attention to the 'unfunded infrastructure liability' associated with drainage practices that do not respect the Water Balance. Also, it foreshadowed application of a life-cycle approach to achieve *Sustainable Service Delivery for Watershed Systems* (ref. Chapter 8).

> *Viewing the watershed through an asset management lens provides local governments with a driver to require that development practices maintain Water Balance integrity.*

Think Like a Watershed: By early 2012, the linkages between the natural Water Balance, watershed and stream health, and infrastructure liability had emerged as important pieces in ensuring 'resilient rainwater management', both fiscally and ecologically.

Apply the Whole Systems Approach: *"We need to understand the sub-systems that are in play between the time that rainfall is received at the top of the tree canopy and the time that it actually gets to the stream. That's the key to the whole systems approach,"* states Will Marsh, author of ***Landscape Planning: Environmental Applications,*** a classic textbook. He retired to the Comox Valley from the University of Michigan-Flint where he was Chairman of the Department of Earth and Resource Sciences and a Director of the Laboratory for Land and Water Management.

"We too often jump too quickly to the engineering computations about this method or that method....when what we really need is a basic understanding of the land and its functions. In other words, think like a watershed," Will Marsh emphasizes.

'Worth Every Penny Workshop' Stimulated a National Dialogue

The Worth Every Penny Workshop, hosted by the RDN and held in Parksville in September 2010, provided the Province with a forum to initiate branding of the concept for 'sustainable service delivery' (reference: Chapter 3).

Part of the rollout to stimulate a national dialogue on sustainable water management, the workshop was described as the first of its kind in Canada. The workshop program was a unique blend of research and practice, and was the launch event for *Worth Every Penny: A Primer on Conservation-Oriented Water Pricing* (Figure 42).

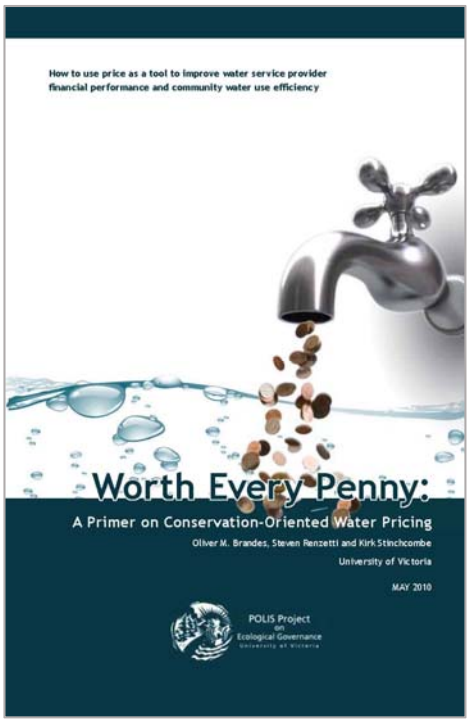
> *The Worth Every Penny Workshop connected the dots between water pricing, sustainable service delivery and 'Beyond the Guidebook 2010'.*

Conservation-Oriented Water Pricing: With little financial incentive to conserve, overconsumption threatens water supplies, community water security and the sustainability of water service infrastructure.

Move to a 'Level-of-Service' Approach: *"We talk about water pricing, but we are not actually talking about the price of water. We are talking about the services to provide the water. Water pricing is a hot issue in communities across the country. Yet it remains an almost totally untapped option for helping ensure our water service infrastructure is well maintained and up to date,"* emphasized Kirk Stinchcombe, co-author of Worth Every Penny.

Reduce Water Footprint & Protect Watersheds: *"Effective conservation-oriented water pricing can help reconcile growing communities with the health of local watersheds and engage individuals and businesses to change their behaviour and begin reducing their water footprints,"* added Oliver Brandes, co-author and Co-Director of the Polis Project at the University of Victoria.

DID YOU KNOW THAT *provincial grant programs provide local governments with incentives for implementation of new ways of doing business. Those who are proactive and show leadership are the ones who are being rewarded.*
(2010 Worth Every Penny Workshop hosted by the Regional District of Nanaimo)



Oliver Brandes (L) and Kirk Stinchcombe (R), co-authors of "Worth Every Penny", released in May 2010

Figure 42

d. Sustainable Partnerships

The RDN has been effective over an extended period of time in working with champions from other organizations and groups. Together they have formed 'working partnerships' that add substance to the 'regional team approach'.

Make Real the 'Regional Team Approach': *"The success of our working partnerships goes back to the guidance that staff received from the Board Chair*

(Joe Stanhope) a decade ago. He emphasized that RDN staff could only make the Drinking Water & Watershed Protection program happen with community help. Joe said work with others, understand their needs and take the long-term view. We have phenomenal partnerships. The program is successful because ***'it is about community'****. The champions in those other organizations live here,"* reflects Mike Donnelly.

First Nations – Those Who Connect to the Land

Viewed through the RDN lens for watershed health, partnerships are a long-term investment, and more than a project. In September 2014, the RDN reached out to local First Nations to co-host the 5th in the Inter-Regional Collaboration Session, and initiated a relationship-building process.

Progress from 'Working' to 'Sustainable': *"The most important thing when you are creating working partnerships is to understand the perspectives of the other partners. Listen to them. Spend time with them.*

Get to know them. Perspective is very important. Building an effective partnership is not about figuring out how the other person can help you get what you want done. It is about how you can figure out how you can help that person. That is how you build a ***sustainable partnership****. Understand what their needs are to help them move forward,"* stated Randy Alexander (General Manager for Regional and Community Utilities) in his opening remarks.

"Perhaps we do not have regulatory authority in various areas. But we can bring together scientists, government agencies, First Nations and others. We are good at measuring, analyzing and planning. But we do not really understand much about what makes a watershed healthy, whether over 100 or 1000 years. As we move forward with integrated watershed management in the Nanaimo Region, our hope is that we can work with the three First Nations communities in our region. They can help us understand what 'healthy watershed' means and bring their long-term understanding to our work."

Englishman River walkabout with First Nations elders – September 2014

Our 'Regional Team Approach' is founded on 'Sustainable Partnerships'

Julie Pisani
Program Coordinator, Drinking Water & Watershed Protection (DWWP)
Regional District of Nanaimo
July 2015

"Voters have equipped us with the ability to provide a dedicated service to understand and protect our drinking water and watersheds, funded by a parcel tax of $8 per property per year. This sustainable funding source is obtained from, and applied back to the urban municipalities and the rural electoral areas alike. Foundationally, the program looks at understanding and managing water on a regional, watershed scale. Partnerships between the municipalities and the rural areas are a crucial part of this."

"Through the DWWP program, we are able to raise awareness and public involvement across the region, collect data and monitor our water resources, and in turn use this public awareness and scientific data to inform policy and planning decisions that protect water."

"We receive guidance from our Technical Advisory Committee, with representation from forestry companies, stewardship groups, provincial ministries, local water purveyors, academic institutions and the public-at-large. This results in a collective intelligence that steers the program, making us more nimble and able to have a well-rounded perspective on the key issues and courses of action. The connectivity across organizations that has been built through the co-participation in the DWWP program has opened doors to collaboration to achieve shared goals and pool resources."

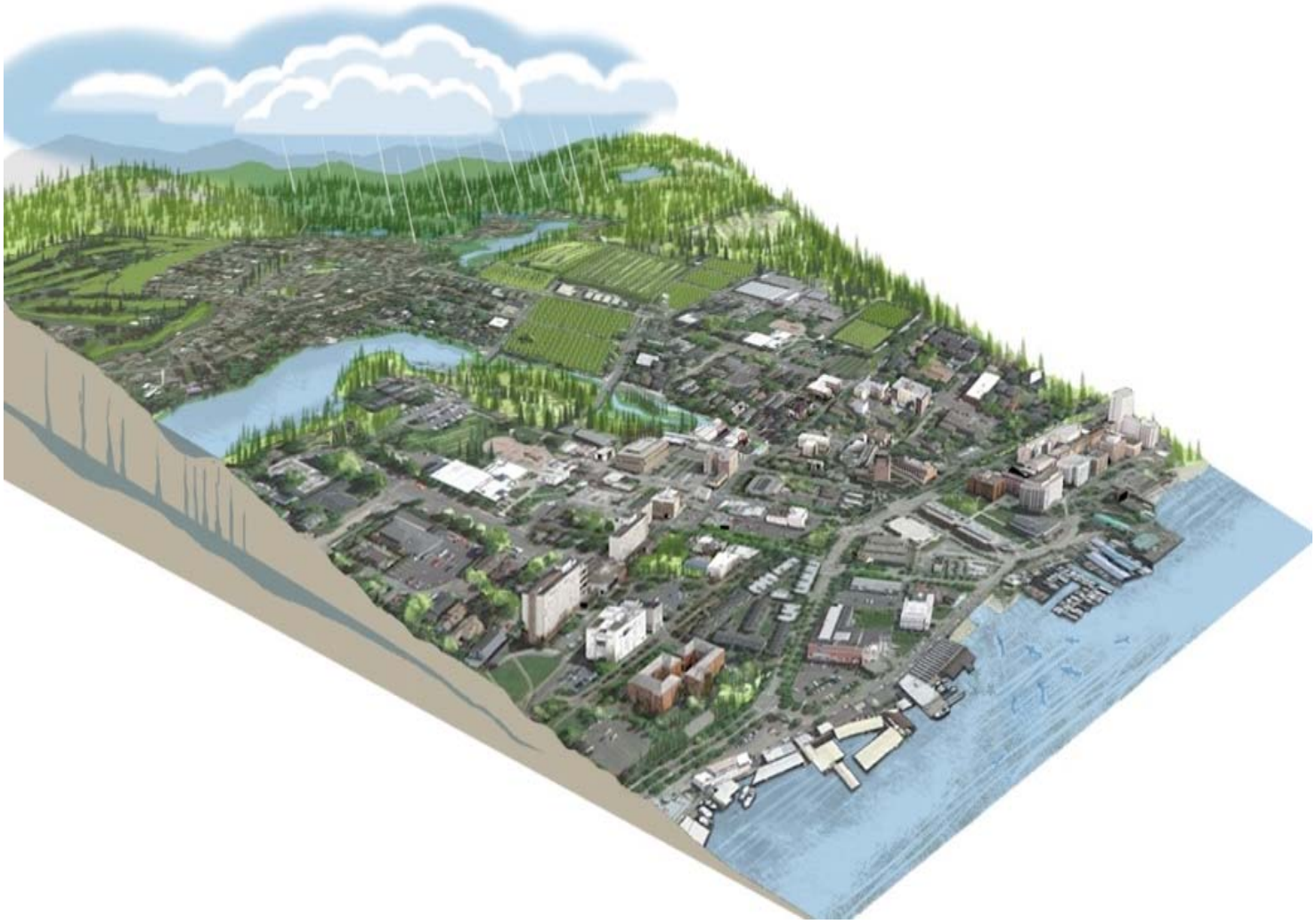
"As we continue to focus on public education as well as science and data collection, we become better equipped to protect our water through sound planning and policy. There are questions that drive us: How much groundwater do we have? How is it recharged? How can we adapt to a changing climate? What is the current water demand? How can we improve water conservation efforts in our communities? What is the health of our creeks and streams? Can we do a better job of managing rainwater and stormwater? How do our land use decisions impact our water availability and water quality? What are better ways of developing our land while minimizing impact on water?"

"These questions are far reaching and are not something the RDN can answer alone, hence our reliance on partnerships, sustained over the long-term, to truly get to the heart of these matters. It's one thing to ask the right questions, yet another thing to respond in an effective way. We need a diversity of tools, perspectives and approaches if we are to be water resilient in our region."

"Among the many partners it takes to tackle these issues, the First Nations in our region are likely the most important. The traditional knowledge and indigenous value of the land and the water is a realm of knowing that our scientific method does not touch. Water is a resource, but it is much more that that too. It is a life force; a spiritual force. If we are to ultimately succeed in our region in managing our actions on the land so that we may protect and preserve our water, we must sustain partnerships that collectively make us much more effective together than in isolation."

"We have started building relationships in an effort to foster trust and collaboration, and it always starts with stories. Conversations about what we care about, stories about the past which help us understand the present, and dialogue about the future and positive vision about what that may look like."

Convening for Action in the Capital Region



Storyline Overview

Section No. & Title	Key Messages
8 **Convening for Action in the Capital Region**	The water quality monitoring program in the Capital Region has evolved from 'stormwater-based thinking' to 'watershed-based thinking'. The genesis for the current *Integrated Watershed Management Program* is the Core Area Liquid Waste Management Plan.
a. **Integrated Watershed Management Strategy (IWM)**	The Inter-Municipal 'IWM' Committee developed the implementation strategy to move the region forward with IWM. The vision is to deal with watershed stressors near the source rather than at the municipal infrastructure or receiving environment level.
b. **2008 Showcasing Green Infrastructure Innovation Series**	Success helped reinforce early support for the IWM vision. The series drew attention to community-scale projects in the Capital Region that demonstrated how to **design with nature** to manage the urban landscape and maintain watershed function.
c. **Bowker Creek Blueprint / Forum**	A 'design with nature' ethic and 100-Yr Action Plan are driving watershed restoration. The Blueprint has established a benchmark for IWM. The Oak Bay High School and creek channel restoration project is a true 'watershed moment' for the creek and community.
d. **Towards a Watershed Health Legacy**	Authority for IWM work in the Capital Region presently flows from the Core Area Liquid Waste Management Plan. This work is the 'first step' to a regional service. Experience gained to date would ultimately inform the implementation of a full regional IWM service.

8. Convening for Action in Capital Region

CRD has been involved since inception of the 'convening for action' vision. Together with local governments from north of the Malahat divide, the Capital Regional District (CRD) was represented at the September 2006 launch of the *CAVI-Convening for Action on Vancouver Island* initiative in Victoria.

The occasion in 2006 was the CAVI consultation workshop held as an adjunct to the Water in the City Conference. This unique conference placed water 'front and centre' in community decision-making. The theme for the CAVI launch was *Towards Water Sustainability on Vancouver Island*.

Vision for Water-Centric Land Development: The conference and 2006 consultation workshop both inspired and seeded ideas that subsequently influenced and/or are now embodied in Capital Region initiatives, in particular the Integrated Watershed Management Implementation Strategy and the pilot Bowker Creek Blueprint.

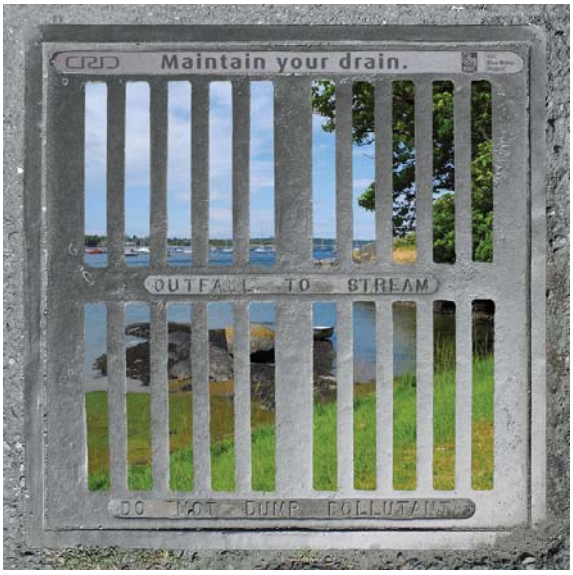
> *The 2006 workshop introduced this vision --"land development done on a sustainable water-centric basis which balances how humans manage the full water cycle in harmony with nature."*

Timeline / Milestones

The timeline shown on Figure 43 provides context and identifies some milestones in the evolution of the Capital Region's watershed-based approach. The CRD's contribution to inter-regional "sharing and learning" is the watershed-based experience that CRD staff has gained over the past decade.

Historical Perspective: *"The program began in 1983 as an engineering response to high levels of fecal coliform on local beaches. In 1993 the program focus turned to chemical contaminants in sediment. A year later (1994), the program added sampling of creeks and streams at municipal borders to determine contaminant contributions. In 2000, the CRD initiated the Core Area Liquid Waste Management Plan (for 7 municipalities). Two chapters (stormwater quality and harbours environmental action) were the genesis for the current IWM program,"* explains Dale Green, CRD Program Manager for Integrated Watershed Management (IWM).

Moving Beyond Stormwater: CRD has undergone a transition, from 'stormwater-based thinking' that is narrowly focussed, to 'watershed-based thinking' that is holistic in approach. The broadening of scope is reflected in the re-naming of the Stormwater, Harbours and Watersheds Program (SHWP). In 2012, the program became the Integrated Watershed Management Program (IWMP). The storyline that follows discusses some of the changes and key initiatives.



Convening for Action in Capital Region: Time-Line & Milestones

1983
- Capital Regional District (CRD) established stormwater quality monitoring program for fecal coliforms

1993-4
- CRD began monitoring environmental contaminants in stormwater and added creek and nearshore marine monitoring to program

1995
- CRD Model Stormwater bylaw established

1997
- Developed watershed management plans for 3 priority watersheds: Craigflower, Millstream, and Goldstream creeks

2000
- Developed Core Area Liquid Waste Management Program (CA LWMP), which included requirements for stormwater monitoring and the development of integrated watershed management plans

2002
- CRD embarked on development of community-driven watershed management plan (WMP) for Bowker Creek
- Stormwater Planning: A Guidebook for BC

2003
- CRD Core Area LWMP approved by the Province
- British Columbia Green Infrastructure Partnership

2004
- Bowker Creek WMP adopted by CRD, Victoria, Saanich, and Oak Bay.
- Bowker Creek Urban Watershed Renewal Initiative (BCI) Steering committee established and part-time BCI coordinator hired to facilitate implementation of the Bowker Creek WMP
- Water Sustainability Action Plan for BC

2005
- Waterbucket.ca Website

2006
- CAVI – Convening for Action on Vancouver Island
- LWMP Blue Ribbon Panel review conducted by Society of Environmental Toxicity and Chemistry – identified need to prioritize environmental stressors related to harbour and stormwater runoff, change current sampling methodology to better evaluate ecological effects, and conduct time series sampling for quality and quantity
- CRD Environment Committee requested staff investigate the feasibility of Integrated Watershed Management (IWM)

2007
- CAVI Creating Our Future Workshop
- Green Infrastructure Innovation: Celebrating Successes on Both Sides of the Georgia Basin
- Bowker Creek Initiative (BCI) completes Master Drainage Plan
- CAVI Green Infrastructure Leadership Forum

2008
- Living Water Smart, BC's Water Plan
- CRD established Inter-municipal Integrated Watershed Management committee
- CRD hosts Showcasing Green Infrastructure Innovation in the Capital Region series
- Green Communities Initiative

2009
- CRD Strategic Plan identified the environmental protection as a priority. Desired outcome was multi-use watershed protection to ensure quality water and a healthy ecosystem.
- CRD Staff directed to develop an integrated watershed management plan for multi-jurisdictional watersheds

2010
- BCI completed the Bowker Creek Blueprint: A 100-Year Action Plan to Restore the Bowker Creek Watershed
- CRD developed IWM strategy, adopted by CALWMP, staff directed to implement in core area only
- Bowker Creek Forum – Launched Topsoil Law & Policy/Technical Primer Set
- Beyond the Guidebook 2010: Implementing a New Culture for Urban Watershed Protection

2011
- Developed IWM implementation strategy for the Core Area in partnership with member municipalities
- Completed review of Stormwater Quality Monitoring Program
- Bowker Creek Blueprint endorsed by City of Victoria and District of Saanich
- Course on the ISMP Course Correction – Bowker Creek Blueprint lessons learned
- Initiated sampling for Harbour Water Quality Objectives (using 5-in-30 methodology) in partnership with MOE
- Bowker Creek Restoration at Oak Bay High School – grant announcement

2012
- Georgia Basin Inter-Regional Education Initiative
- CRD Strategic Plan included a goal to "increase protection of marine and freshwater habitat" and focused actions to develop watershed and receiving environment health indicators, improve knowledge and protection of watersheds, and enhance monitoring
- BCI created A Developer's Guide to Water-wise Development (template for CRD and CVRD Developer's Guide)
- Bowker Creek Blueprint endorsed by District of Oak Bay
- Capital Region Water Balance Forum: *Sustainable Rainwater Management What Does It Look Like?*
- CAVI Forum within the Vancouver Island Summit – Bowker Creek Blueprint highlighted
- CRD began enhanced stream monitoring using 5-in-30 methodology
- Renamed Stormwater Harbours and Watershed program to Integrated Watershed Management Program (IWMP)

2013
- Water Balance Model Express for Landowners
- Inter-regional Collaboration Series – formation of IREI Leadership Team
- RBC Blue Water Grant – Community Action on Watershed Health

2014
- Water Sustainability Act
- Develop with Care 2014
- Session #2 in the IREI Collaboration Series: "Moving Beyond Stormwater in the Capital Region"

2015
- Asset Management for Sustainable Service Delivery: A BC Framework
- BCI completed the Bowker Creek Restoration project at Oak Bay High School
- Enhanced nearshore marine monitoring including winter beach sampling for public health

COLOUR CODE:

Blue = provincial milestone

Black = Capital Regional District Milestone

Green = sharing at inter-regional event

Orange = BCI milestone

Figure 43

a. Integrated Watershed Management Strategy

Figure 44 illustrates the conceptual framework that has been adopted for integrated watershed management in the CRD. Supporting language in the IWM documentation mirrors the **Cascading Objectives** that were introduced in the Preface.

Political will as a driver for IWM coincided with the 2006 Water in the City Conference. This resulted in direction that enabled CRD staff to partner with member municipalities and community groups, with the objective of initiating IWM. By 2008, a consensus process had resulted in a working definition of IWM, which is unique to the CRD (Figure 44) and the development of a regional watershed vision.

> ***Regional Watershed Vision:*** *Multi-use watersheds support healthy, livable and vibrant communities. These properly functioning watersheds perform ecological services and ensure healthy terrestrial, aquatic and marine ecosystems while providing improved resiliency to a changing climate.*

The information presented in the elements that comprise Figure 44 shows that the approach to IWM in the CRD has moved well beyond 'stormwater-based thinking'.

Environmental Implications: *"Moving to a watershed-focused program allows the CRD to support the core area municipalities with new strategies for environmental protection, including an increased focus on dealing with watershed stressors near the source rather than at the municipal infrastructure or receiving environment level. Additionally, the strategy supports municipal efforts in watersheds that cross municipal boundaries and provides guidance towards measuring watershed and receiving environment health to better assess program actions and municipal efforts,"* wrote Glenn Harris, Senior Manager (Environmental Protection Division), in the February 2011 report that led to adoption of the IWM Implementation Strategy.

Approach to Implementation

CRD looked at the experience of other regions and countries. "One of the key things that we learned is that you need to have a whole lot of people involved because nobody has the overall authority or jurisdiction for watersheds. We would never be able to do this alone. We needed to bring our key stakeholders together and work together to move IWM forward," recalls Jody Watson, Harbours & Watersheds Coordinator.

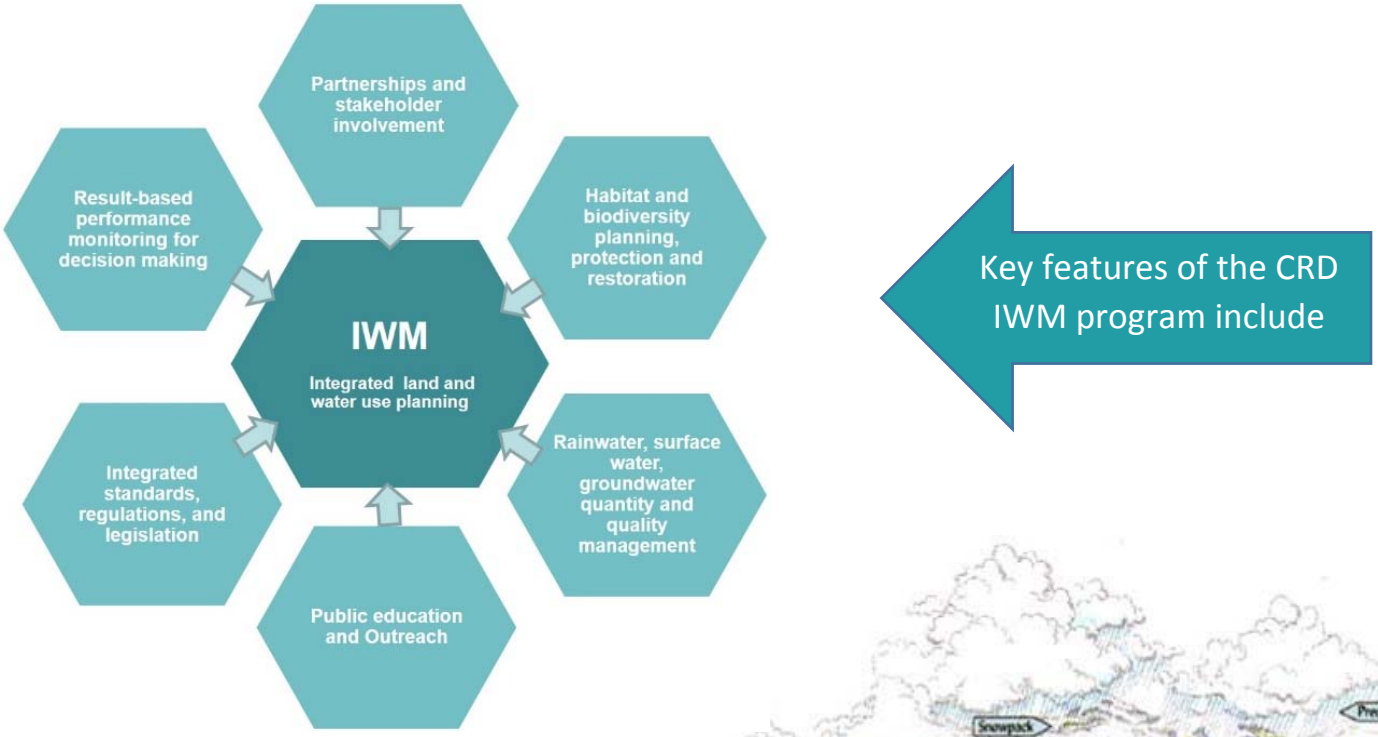
Initial Focus on the Core Area: *"In 2008, CRD established working committees that would help guide the direction of the IWM process. A key committee is the inter-municipal group which has representation from many of the members. In 2011, CRD staff worked with the* ***Inter-Municipal IWM Committee*** *to develop an implementation strategy to move the region forward with IWM. In 2012, primary implementation commenced in the Core Area. If there are opportunities for non-Core municipalities to do some implementation as part of their everyday business, then they are up to speed as to what we are trying to do across the region,"* explains Jody Watson.

Inter-Municipal Sharing & Learning: The Inter-Municipal IWM Committee provides a regional forum for collaboration and integration, particularly among the smaller municipalities that have limited resources. Through participation in this group, the members are able to develop resources together, and then each municipality can choose whether to adopt or not. This form of collaboration and sharing of information and expertise is seen as critical for the Capital Region to move forward with IWM implementation.

Staff champions, who work to promote IWM within their agencies, play a key role in successful IWM implementation and their importance to a successful process cannot be understated.

In the Capital Region, Integrated Watershed Management is

the coordinated, sustainable management of land and water resources within a watershed to ensure the sustainability of vital ecosystems; where local governments and stakeholders work together to control and conserve hydrology, ensure biodiversity, minimize land degrading activities and maximize economic, social and environmental objectives.



***OR MORE SIMPLY PUT**.....IWM is collaboratively managing the landscape to maintain watershed function and create sustainable communities.*

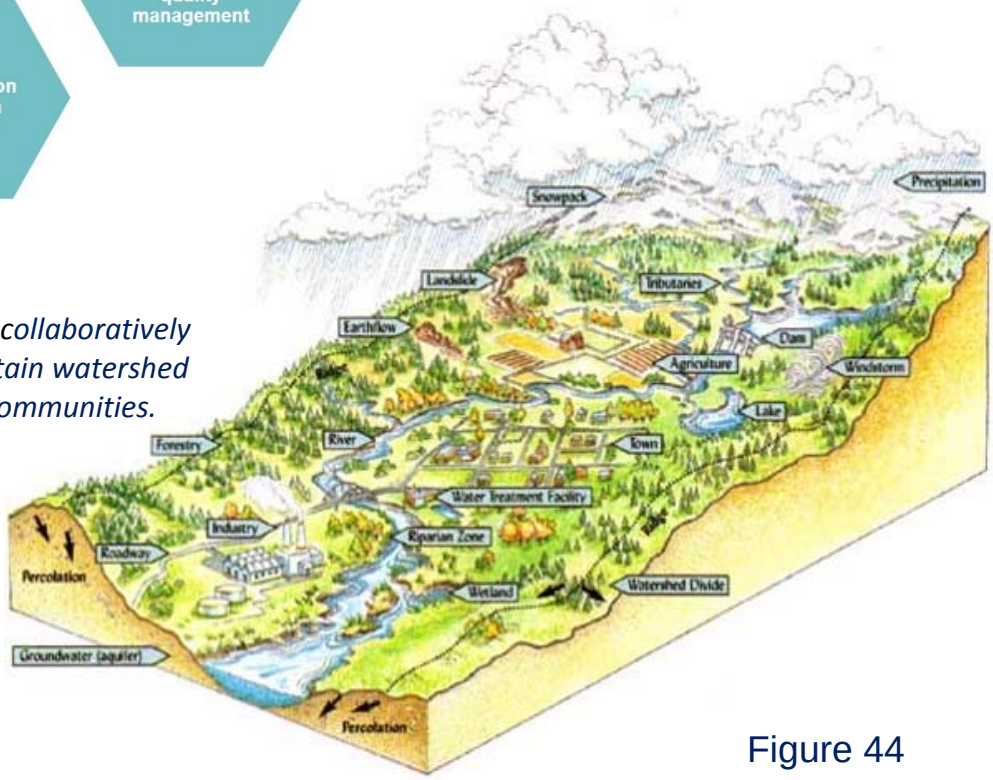


Figure 44

Regional IWM Strategy

The CRD IWM Strategy has 4 goals, which are addressed by 12 strategies and numerous supporting actions for the Capital Region, member municipalities and electoral areas (Figure 45). The supporting actions are linked and reinforce each other; their implementation requires collaboration and integration to ensure they are not undertaken in isolation.

Guiding Principles: The IWM program is guided by four key principles:

- **Collaborative approach**: Work collaboratively with local government, senior government agencies, First Nations, communities and public stakeholders
- **Ecosystems based**: Acknowledge and foster the interconnectedness and interdependence of watershed ecosystems in the region
- **Forward thinking**: Promote innovative technologies and approaches and reflect a shift in focus to green infrastructure
- **Climate Adaptation**: Recognize that climate change will impact watershed ecosystems and aim to reduce environmental, social and economic vulnerabilities

Stakeholder Input - *To be successful, IWM requires collaboration and involvement of a wide variety of community interests and water users including First Nations, municipalities, businesses, residents, agencies and landowners. They decide on the priority issues that need to be addressed, help to set goals, decide on what actions to take and implement locally.*

During implementation, it is anticipated that there will be collaboration between the CRD, member municipalities and other partners to ensure an informed and coordinated process.

Implementation - Monitoring

A key component of the Capital Region's IWM Program is monitoring watersheds and receiving environments. The program's monitoring and assessment activities were updated to include many improvements such as:

- creation of maps for key watersheds using available land use data for future work to compare against water quality issues
- intensively monitor a few streams each year then return to those streams in a 3-5 years to evaluate change
- working with the Provincial Government on development of Water Quality Objectives and undertaking the subsequent attainment monitoring on a 5-year cycle
- where appropriate, shifting from single samples to a five sample in 30 days scheme to properly understand average conditions and variability
- mapping of watershed boundaries was updated with new information and LIDAR and municipal GIS were used to improve upon boundaries from air photo interpretation
- installation of several real-time water monitoring stations (flow, temperature and pH) to gather baseline watershed runoff and contaminant loading data and monitor for change over time
- working closely with the CRD's Climate Action Program as changes in climate affect runoff and flow
- evaluation of new contaminant indicators such as caffeine
- more attention to first flush type events
- beginning to monitor lakes
- periodically self-assess the program's effectiveness

Regional Watershed Vision

Multi-use watersheds support healthy, livable and vibrant communities. These properly functioning watersheds perform ecological services and ensure healthy terrestrial, aquatic and marine ecosystems while providing improved resiliency to a changing climate.

Goal 1. Protect clean water and effectively manage flows

- Strategies include:
  - Use existing and innovative approaches and technologies that mimic natural hydrology and geology to reduce contamination of rainwater and to ensure that there is no net increase in flows entering watercourses and stormwater systems
  - Effectively monitor water quality and quantity and assess impacts on the recieving environment

Goal 2. Protect and enhance terrestrial, aquatic and nearshore marine habitats

- Strategies include:
  - Encourage retention of the natural services and functions of the landscape
  - Support coordinated efforts to plan for, and protect, the region's urban forests and envronmentally sensitive and significant areas
  - Minimize the impact of invasive species
  - Protect coastal and riparian processes

Goal 3. Improve the resiliency and adaptive capacity of watersheds to a changing climate

- Strategies include:
  - Encourage the preservation and protection of natural systems that improve the adaptive capacity of the natural environment
  - Coordinate a vulnerability assessment of regional watershed and shorelines and deliver tools to assist muncipalities in planning for and adapting to a changing climate
  - Develop integrated watershed management strateigies and program to address projected changes in precipitation and sea level rise

Goal 4. Pursue effective and collaborative watershed management and stewardship

- Strategies include:
  - Work collaboratively to address regional watershed priorities, issues and coordinated management
  - Engage and establish partnerships with local First Nations around common watershed goals
  - Develop and deliver coordinated IWM outreach programs and activities

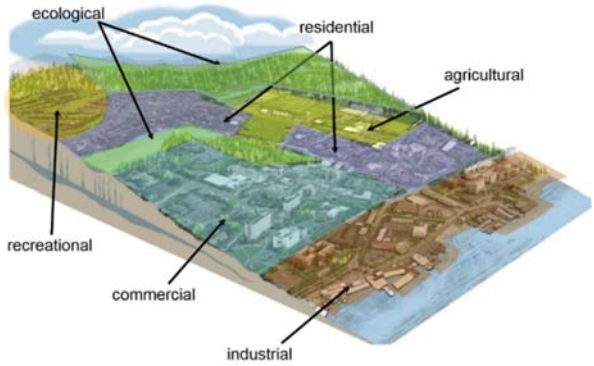
Figure 45

Implementation - Outreach

Part of the shift in the IWM Program involved how the CRD perform its outreach strategy.

RBC Blue Water Project: In 2013, the Integrated Watershed Management Program received a $75,000 RBC Blue Water grant for watershed education. According to Dale Green, staff applied for this grant because the IWM Program was undertaking watershed-scale messaging and additional funds would enable the program to do more in a shorter time in order to educate, inform, engage, inspire and build capacity of residents, business and local governments with a range of region-specific educational programming, tools and resources for watershed stewardship. The project included programming for residents, youth and businesses.

Examples of environmental benefits under this work are ***Land Cover Watershed Maps and Flow Diagram*** (image below).



These tools are widely used by all levels of government and watershed community groups. Applications of the new tools include the Ministry of Environment's draft Water Quality Objectives for the Core Area Harbours. Both the CRD and municipalities have improved existing watershed and catchment area mapping, some of which had never been mapped before.

Watershed Education and Outreach: According to Jody Watson, having a sense of connection to our natural environment is key to taking action and understanding where we as individuals, business or government can best focus our limited resources and have the biggest positive impact of our cumulative efforts.

She adds that the CRD's new array of watershed education tools has opened new entry points to increase public understanding of the issues, opportunities for engagement and an array of actions diverse stakeholders can take. For example, schools located in City of Victoria may earn Education Credits for City of Victoria's new Stormwater Utility.

Green Infrastructure Initiatives: Urban and rural rain and stormwater management are vital to addressing the current and future well-being of regional watersheds. Green Infrastructure focuses on infiltrating rain and stormwater to decrease the burden of volume in the municipal storm drain systems, while improving in ground water for landscape vegetation (i.e., urban trees) and to clean stormwater, thus protecting local waterways and the marine environment. The CRD **Green Infrastructure Common Design Guidelines** (scheduled for completion in early 2016) will assist municipalities to move forward with promoting the construction of Green Infrastructure that is specific to the region's rainfall and climate change forecasts with consistency throughout the region.

b. 2008 Showcasing Green Infrastructure Innovation Series

In 2008, the Capital Region hosted the second in the *Vancouver Island Showcasing Green Infrastructure Innovation Series*. The series was a prelude to the Bowker Creek Forum in February 2010. It helped build support for the IWM vision.

> *The historical relevance is that the series drew attention to projects in the Capital Region that demonstrated how to achieve **design with nature** outcomes at a community scale.*

Design with Nature Outcomes

The 2008 Showcasing Series featured a 'Design with Nature' strategy for land use planning at a community scale, with the objective of transforming the built environment.

"The vision was that the series would play an integrating role to cut across disciplines and ultimately serve as a catalyst to create neighbourhoods that integrate both good planning and innovative engineering designs, for overall greater sustainability," recalls Dale Wall, former Deputy Minister and CAVI champion.

Celebration of Innovation

The Town of View Royal, City of Langford and University of Victoria showcased community-scale initiatives and/or projects that achieved all six elements of a Design with Nature strategy. The series was a progression, starting with a roadway in View Royal and ending with the mini-municipality that is the University of Victoria.

Town of View Royal: The *Transportation Master Plan* was featured because the implementation strategy for reconstruction and enhancement of the old Island Highway set a provincial benchmark for other municipalities to measure themselves against when applying for senior government funding. The strategy integrated transportation, drainage and water quality objectives in order to restore water quality in Portage Inlet, often described as the jewel of Victoria.

City of Langford: The spotlight was on the Westhills Green Community, one of the first Canadian pilots for *LEED Neighbourhood Development*. The project integrated the principles of smart growth, new urbanism and green buildings into a system for neighbourhood design.

University of Victoria (UVic): A community of more than 25,000 people, the campus is a case study for green buildings and compact growth. Leadership, collaboration and partnerships enabled UVic to transition (within a 5-year period) from an incremental to integrated approach to planning and resource management.

c. Bowker Creek Blueprint / Forum

The Bowker Creek watershed area encompasses much of the urban core of the Capital Region. Collective indifference for more than a century had resulted in a degraded watershed. Now, a 'design with nature' ethic is driving watershed restoration by means of a 100-Year Action Plan.

> *The **Bowker Creek Blueprint** has established a benchmark for IWM. It is an inspirational story of champions in government and community, and the power of collaboration and outreach.*

"Why did we choose Bowker Creek when it is a rather degraded watershed," Jody Watson asked rhetorically at the 2010 Bowker Creek Forum. "The answer is that we saw it as an opportunity. If we could make it right in Bowker Creek, we could make it right anywhere."

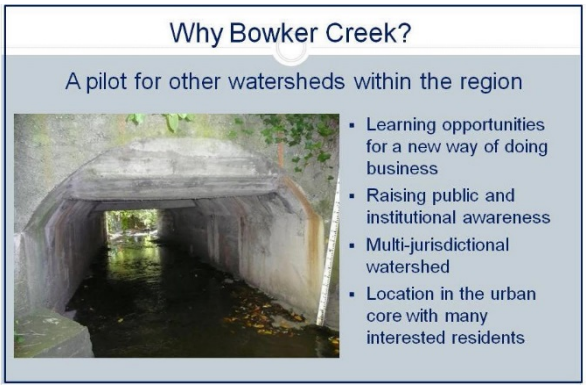
Everyone Lives in a Watershed: *"The Bowker Blueprint is helping the community understand that we all live in a watershed, all water ends up in the*

same place when it runs off the land, and everyone must commit to actions that improve watershed health. As we improve the way we deal with water runoff, our world will be a better place," states Steve Fifield, retired Manager of Underground Utilities with the City of Victoria.

> *The **'Story of the Bowker Creek Blueprint'** is told in a set of five documents released by the Water Sustainability Action Plan for BC in January-March 2010*
>
> *http://waterbucket.ca/viw/category/convening-for-action-in-2010/2010-bowker-creek-forum/*

The Story of the Blueprint

The Bowker Creek Blueprint is a 'game-changer'. In a series of four conversational-style documents released in the build-up to the *2010 Bowker Creek Forum*, the inspirational story of how the Blueprint and Action Plan came to fruition is recounted from the perspectives of those who made it happen. A fifth document was released after the Forum to complete the series.



The 100-Year Vision: The branding graphic (Figure 46) for the Bowker Blueprint personifies the outcome-oriented vision for restoring 'islands of nature' throughout the watershed. The plan elements literally jump off the page. A ribbon of blue runs the length of the watershed; this represents the daylighted creek. The greening of the watershed is portrayed by a green grid: green streets and greenways.

Outreach is a Powerful Tool: Community groups and individuals have taken ownership and

responsibility for 'telling the story' of the Bowker Creek Blueprint. *"People eagerly embrace the opportunities for engagement and education. They really want to share their thoughts and experiences. Residents have a stake in restoring watershed health. There is so much experience that we can mine. We who live in the watershed are the experts,"* says Soren Henrich, Bowker Creek Steering Committee.

What is the Bowker Creek Blueprint?

The Bowker Creek Blueprint was developed by the Bowker Creek Initiative (BCI) to provide a long-term vision and action plan that brings Bowker Creek back into our community as an integrated social, economic, and environmental asset. The Blueprint outlines specific principles and actions for improving the health of the watershed and the creek corridor.

Why a Hundred Years?

The Blueprint recognizes municipal infrastructure upgrades and redevelopment take place incrementally. When opportunities arise, the Blueprint provides information and guidance to member municipalities, the Capital Regional District, the community, and other land stewards to manage and restore the watershed and creek corridor over the long term.

Bowker Creek Blueprint – Provincially Significant & Precedent-Setting for Integrated Watershed Management

existing

future vision

Figure 46

Bowker Creek Forum

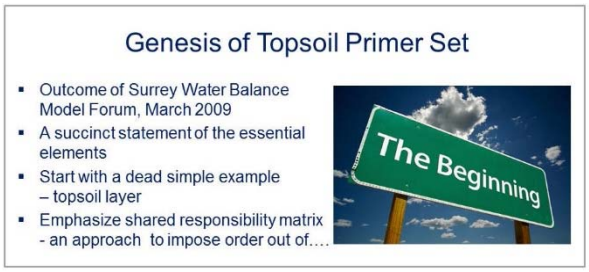
In February 2010, the Bowker Creek Forum brought together champions from Vancouver Island and Metro Vancouver to celebrate the Bowker Creek Blueprint and share their stories.

"In local government, we have seen what works and what doesn't. Agree on the vision. Set the targets. Provide municipal staff with the detail necessary to guide site level decisions as opportunities arise. Then implement," stated Jody Watson, speaking as Bowker Creek Chair.

> *The Bowker Creek Forum was one of two high-profile initiatives that drew the attention of local governments to the need for the '**ISMP Course Correction'** (discussed in Chapter 9).*

How to Design with Nature: The Forum provided the venue for announcing the release of two important documents: the *Topsoil Primer Set* (Law & Policy; Technical) and *Re-Inventing Rainwater Management: A Strategy to Protect Health and Restore Nature in the Capital Region*.

Look at Watersheds as Whole Systems: *"Traditional stormwater management broke the natural water cycle. In contrast, modern rainwater management looks at the dynamics of the entire watershed to restore the function of trees, soil and open space,"* said Calvin Sandborn, Legal Director of the Environmental Law Clinic at the University of Victoria (and lead author, Re-Inventing Rainwater Management).



Why 100 Years?

It took 100 years to put Bowker Creek in pipes and concrete channels…it may take another 100 years to daylight and bring life back to the Creek, says Jody Watson. She notes that the Blueprint is intended to be implemented over a period of decades, because it recognizes that change can be slow in the urban environment. Acknowledging the 100-year timeframe in the title of the Action Plan gave the partner municipalities' comfort and reassurance that they do not have to act immediately on everything in the Blueprint. Staff are able to incorporate actions and recommendations into operational work plans as priorities and resources permit.

Sustainable Planning for Infrastructure: *"The District of Saanich and our partners have all started to internalize the watershed management mandate. Within Saanich this means that the Planning, Engineering, and Parks and Recreation Departments have been directed to consider the principles and actions for watershed management, the 10-key actions for short-term implementation, and stream reach actions laid out in the Bowker Creek Blueprint when developing Departmental work plans and budgets,"* wrote Colin Doyle, former Director of Engineering, in an article published by the American Public Works Association in 2012.

A Plan of Opportunity

The Bowker Creek Blueprint is a first-of-its-kind, opportunistic plan that lays out many principles of integrated watershed management. It offers ways to deal with flooding, water pollution and habitat loss that the creek has suffered and provides recommendations for greenways and pockets of nature within an urbanized watershed. Having a plan in place will ensure that positive changes can happen incrementally, and that opportunities for major improvement can be achieved as they arise.

9 Key Principles Drive Plan Implementation: The Bowker Creek Blueprint includes many watershed-wide and reach-specific actions. To simplify the implementation, nine key principles were developed, that, if considered in all development, land use and operational decision making, will lead to improved watershed health.

Principles for a Healthy Watershed

- Use creek-friendly management approaches wherever possible
- Adopt requirements to reduce effective impervious areas
- Construct water infiltration and retention features in boulevards
- Incorporate Bowker Creek goals into municipal plans
- Maintain effective communication of the Bowker Creek vision, goals and actions
- Plant trees and shrubs and protect existing trees
- Purchase and protect key land in the watershed
- Incorporate proposed greenways into land use planning
- Include climate change adaptation and mitigation in all activities

Short Term Priority Actions

The Blueprint contains extensive detail about actions to be taken over varying timeframes and in different locations, reports Jody Watson. To ensure Blueprint "operationalization" within the municipalities and to create positive momentum for implementation, the BCI steering committee highlighted 10 priority areas for implementation within the first 5 years of Blueprint adoption.

Watershed Moment: A flagship project makes a visionary plan real to the community and spurs plan implementation. Reconstruction of Oak Bay High School (Figure 47) resulted in a flagship opportunity to demonstrate how to mimic a natural system.

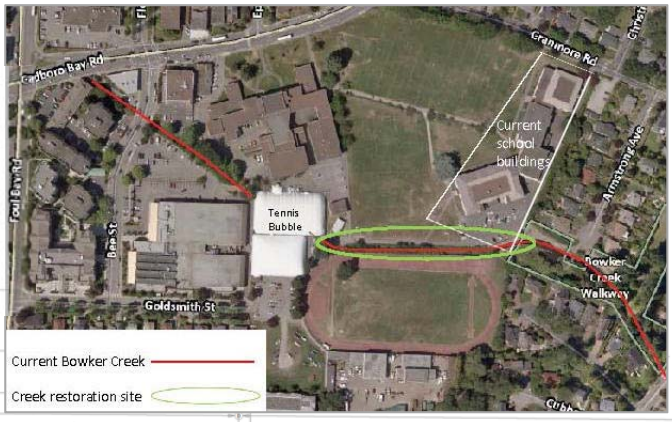
"Moving forward with the Oak Bay High School project is a true 'watershed moment' for the creek and the community. It will be a wonderful example of how a long term coordinated plan to restore function to a degraded watershed can happen, piece by piece, and when opportunities arise, when we work together towards a common vision," observes Jody Watson.

This is the first major restoration project along the creek and is a joint project of the BCI, District of Oak Bay, School District 61 and Oak Bay High School. Funding was provided as part of the federal Gas Tax Innovations Fund. Restoration will improve flow conveyance, create habitat, improve water quality, provide a community-accessible outdoor classroom space and refurbish a greenway along the creek.

Before restoration, Bowker Creek through Oak Bay High School was channelized, overgrown with invasive trees and shrubs and inaccessible to the community.

This Page Intentionally Left Blank

Flagship Project Through Oak Bay School Lands Demonstrates Commitment to Restoring Watershed Function:



The decision to reconstruct Oak Bay High School created the opportunity for restoration of the school lands section of Bowker Creek into a healthier riparian environment and a community-accessible greenspace. In 2014, the project partners, students and community members participated in a design charrette to identify the desired restoration and community objectives for this section of Bowker Creek. This input guided the detailed design of the restored creek and the associated community amenities as shown above. Constructed in summer of 2015, the project demonstrates collaboration, partnerships, long-term visionary thinking and development of innovative green rainwater infrastructure.

Completed in fall 2015, the newly restored section of Bowker Creek features an outdoor classroom among the native trees and shrubs in the newly planted riparian area.

Oak Bay Secondary staff and students were involved in many aspects of creek design and restoration including the design charrette, development of curriculum and planting the riparian streambank.

Figure 47

d. Towards a Watershed Health Legacy

Under the IREI umbrella, each of the five regional districts is spearheading a different part of the Watershed Health Legacy puzzle picture. The lens for the Capital Region is *Watershed Health Assessment*. When the CRD hosted the second session in the 2014 Inter-Regional Collaboration Series, the 'sharing and learning' covered the **past, present** and **future** of watershed health monitoring and assessment in the Capital Region.

> *Guiding principles for inter-regional sharing and learning include: 1) achieve more with the same resources; and 2) through sharing and learning, ensure that where everyone is going is indeed the right way.*

Watershed Assessment in Future

Watersheds are complex: evaluating their health can be challenging and require significant staff and financial resources. These are drivers for an evaluation methodology that would enable a coarse assessment of watershed health to assist in prioritizing watersheds for action and guide a wise investment of effort.

Development of an Evaluation Tool: The 2014 IREI session initiated a discussion about how to measure the health of watersheds at different scales and different levels of effort.

"With over 300 watersheds in the Region, we just do not have the money to do a massive characterization of each watershed," notes Jody Watson. "So how can we use data that are readily accessible to do a coarse level screening or prioritization of watersheds? How, for example, could we utilize the roads information that is in GIS databases to tell us something about a watershed and how it is functioning? If we think creatively, the door opens to all kinds of analytical possibilities."

Application of Tools: A rough level watershed characterization can be achieved using landscape level data that will help to prioritize watersheds requiring further action or more detailed assessment. CRD staff want to utilize landscape level GIS data that characterizes watershed functions and/or watershed stressors to conduct a rapid, albeit, coarse evaluation of watershed health. Figure 48 depicts the type of data being used to conduct coarse landscape level watershed assessments.

Stressor	Data Layer/Source	Possible Metrics
Human Use	Road layer	• # Km of roads • # vehicles/road type
Altered Hydrology	• Volume / Flow data • Proper Functioning Condition (PFC) Assessments • Municipal ISMPs • Infrastructure: - Trunk sewers - Stormwater infrastructure and Catchments - Inflow & Infiltration data • SHIM data	• Identify areas of erosion • # km above ground • # km piped/buries • Riparian habitat
Land Use	• BC Assessment Data • Municipal Zoning	• % watershed area by land use classification
Habitat Loss **Fragmentation** **Impervious Surfaces**	• Urban Forest Inventory: - land cover - tree cover - impervious cover	• % watershed area by land cover type • % impervious cover by class • % tree cover by density class • Change over time

Next Steps Towards Integration: Issues of watershed and receiving environment are regional by definition. Developed in 2010, the IWM Strategy described what could be done to protect and enhance watersheds and receiving environment. Full implementation was deemed beyond the scope of existing authority, resources and staffing levels. Therefore, components of the IWM plan are being undertaken in the Core Area.

Authority for IWM work in the Capital Region presently flows from the Core Area LWMP. This was described as a 'first step' to a regional service in the *July 2010 Progress Report to Core Area LWMP Committee*. Experience gained to date would ultimately inform the implementation of a full regional IWMP service.

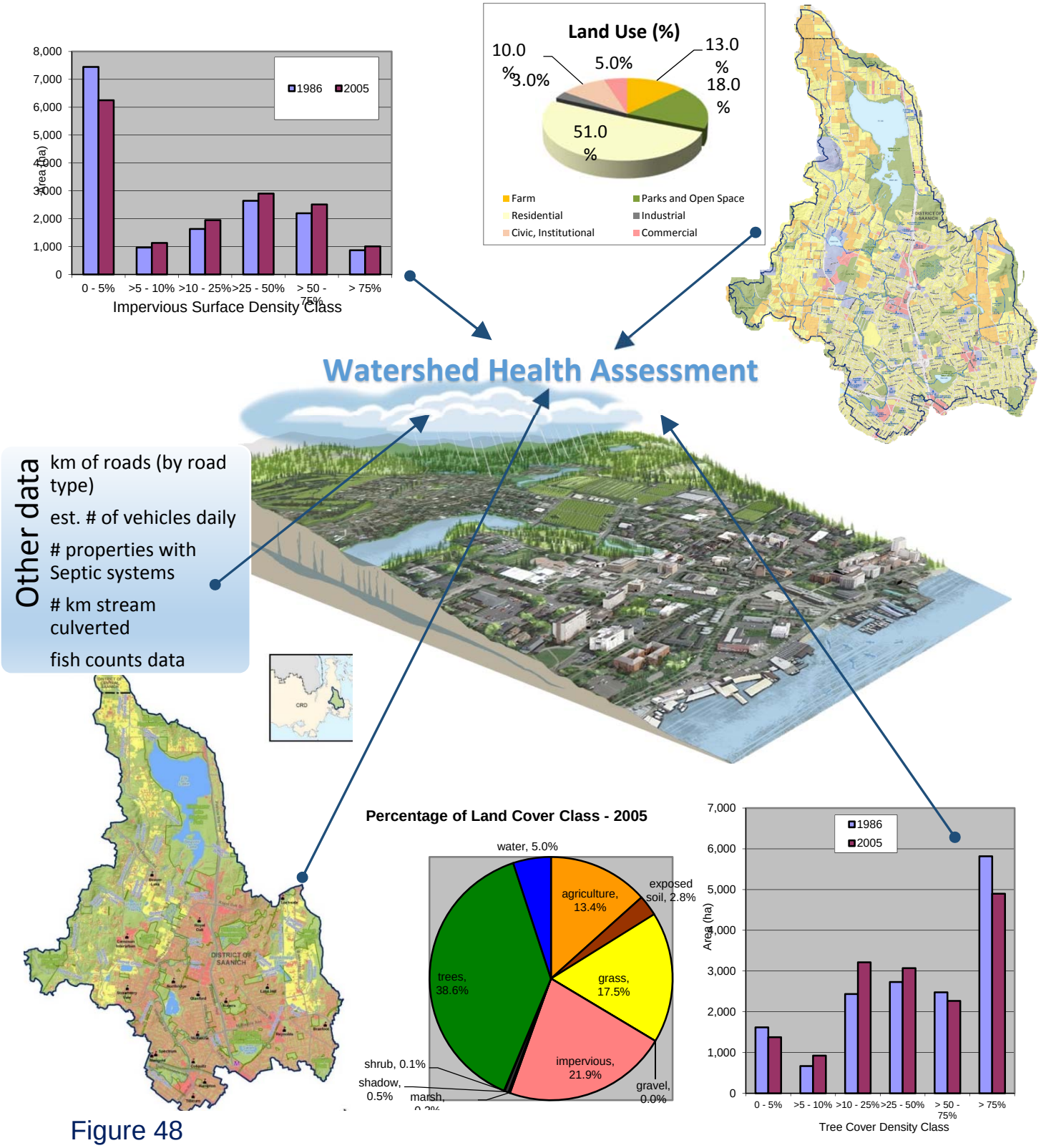

8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Area (ha)
1986
2005
0 - 5%
>5 - 10%
>10 - 25%
>25 - 50%
> 50 - 75%
> 75%
Impervious Surface Density Class
Land Use (%)
10.0 %
3.0%
5.0%
13.0 %
18.0 %
51.0 %
Farm
Parks and Open Space
Residential
Industrial
Civic, Institutional
Commercial
Watershed Health Assessment
Other data
km of roads (by road type)
est. # of vehicles daily
properties with Septic systems
km stream culverted
fish counts data
CRD
Percentage of Land Cover Class - 2005
water, 5.0%
agriculture, 13.4%
exposed soil, 2.8%
grass, 17.5%
impervious, 21.9%
gravel, 0.0%
trees, 38.6%
shrub, 0.1%
shadow, 0.5%
marsh,
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Area (ha)
1986
2005
0 - 5%
>5 - 10%
>10 - 25%
>25 - 50%
> 50 - 75%
> 75%
Tree Cover Density Class

Figure 48

'Regional Team Approach' - Looking Ahead

Dale Green
Program Supervisor
Integrated Watershed Management Program
Capital Regional District
October 2015

"The evolution of IWM at the CRD mirrors somewhat my own career. Like the program, before coming to the CRD I started as an analyst, looking at what's in water but not thinking as much about where that water came from or where it was going. The program and I simultaneously evolved to consider watersheds as units containing multiple interacting factors and that the water quality issues we were measuring were the indicator of undesirable changes in the watershed. Along the way it was quickly understood that regional government, local governments and stakeholders cannot work on watershed condition and function in isolation nor can they leave it to each other to handle. A combined effort is essential for success."

There are no passengers on spaceship earth. We are all crew – *Marshall McLuhan*

"From this chapter, the reader should have a sense of the rapid realignment of our program's focus and the work still to be done. This took the effort and contribution of the entire program team, as well as our municipal champions and community stewards. Significant effort was put into creating a vision of the program future and at the same time ensuring that the service we deliver to protect watersheds, biodiversity and ecosystem health is effective in terms of benefits as well as cost."

"We see through our work, the incredible efforts put into watershed protection by community stewards. These seemingly tireless volunteers often are the kick-starters of new initiatives by identifying the need for action before staff are aware. Those walking the trails and using the waterways and ocean are often the first to know of changing conditions and effects on the environment. These are also the people that maintain the knowledge and make requests for change as staff and politicians' transition in and out of their positions over time and things are forgotten in old reports and filing cabinets."

"**Cooperation is key**. The CRD is composed of 13 municipalities and 3 electoral areas. Watershed boundaries are not political boundaries or even neighbourhood boundaries. We are lucky to live in a region of such significant environmental values. When local government champions come to the table to work with regional staff and each other, great things happen. The IWM program is about to re-engage with regular meetings with community groups and is also taking steps to enhance existing relationships and build new connections to First Nations. We continue to look forward and enhance cooperative efforts to make us all stronger and better able to protect and enhance our watersheds."

Creating a new 'Land Ethic' through IWM

Jody Watson
Harbours & Watersheds Coordinator
Chair, Bowker Creek Initiative
Capital Regional District
October 2015

"A land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such."

Aldo Leopold, Land Ethic, Sand County Almanac, 1949

"Many people living in an urban environment, especially young people, have no idea what a natural, properly functioning creek should look like. Their 'norm' is often a channelized creek with hardened walls and bottom, with few trees, if any, along the banks. Or worse, they don't even know a creek exists because it has been put underground. Some had never played in a creek, which was unfathomable to me as a free-range kid from the prairies."

"Our collective 'baseline' or memory of what a healthy creek should look like has shifted significantly. Within the urban environs, this baseline had shifted even more through generations of development and decades of engineering practices designed to get the water off the land as quickly as possible. This approach to land development has resulted in a loss of hydrological and ecological function in many areas."

"Published in 1949, Aldo Leopold's 'Land Ethic' suggested that humans exist within an integrated community of life that also includes other animals, plants, rocks, soils and waters, collectively: the land. A land ethic, he postulates, 'cannot prevent the alteration, management and use of these resources'. He argued that the health of the land is linked to the ways a community functions ecologically; to its capacity, under human use, to remain fertile and productive over the long term. Leopold heralded:

"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

"A similar ethic is often echoed in conversations with First Nation colleagues in the Region. They have generously shared their land principles and helped me to understand their deep spiritual connection to the land and the resources it provides. Theirs is an age-old land ethic that is reinforced through customs and ceremonies, feasts and dance, and through stories of First Nations way of knowing and being. The teachings include that of interconnectivity which is critical to the health of our communities. A strong desire to return to traditional food harvesting practices requires actions closely aligned with improving watershed health and creates opportunities to forge a new relationship with our First Nations neighbours, with whom we share this land. "

"A land ethic, Leopold proposed 'reflects a conviction of individual responsibility for the health of the land'. The multi-jurisdictional nature of our watersheds requires the collective commitment of local and senior government agencies, First Nations, and communities to improve the health of our watersheds. Through IWM, utilizing a 'Design with Nature' approach, we are changing the way we develop our land by attempting to re-engineer the hydrological function back into our urban landscape and restore ecologically functioning pockets of nature. We are, in some ways, cultivating a new land ethic."

"I remain hopeful that by gathering together change-makers from First Nations, local governments and our communities to work towards a collective vision for healthy watersheds that we will emerge with a strong new land ethic here in the Capital Region. And over time, we will shift the baseline of a healthy creek closer to one which I held as a young girl."

Convening for Action in Metro Vancouver Region

Storyline Overview

Chapter No. & Title	Key Messages
9 **Convening for Action in Metro Vancouver Region**	For almost three decades, the LWMP process has been a regulatory driver for watershed-based action. Ongoing high-level support by the Metro Vancouver Board has sustained and enabled incremental progress in aligning rainwater management efforts across the region.
a. **Water Balance Model for British Columbia**	The web-based Water Balance Model began as an initiative of the Metro Vancouver *Stormwater Interagency Liaison Group* (SILG). Translating high expectations for 'green' development into practical design guidelines required looking at rainfall differently.
b. **Green Infrastructure Partnership**	The Partnership helped local government practitioners by creating forums for them to share their experiences and lessons learned. This created a ripple effect that spurred even more innovation and moved the state-of-the-art to a more mainstream level.
c. **ISMP Course Correction**	Two years in the making (2008-2010), the *Integrated Liquid Waste & Resource Management Plan* established the framework for moving the region beyond regulatory compliance to transitioning Metro Vancouver to an approach that achieves the Sustainable Region Vision.
d. **Watershed Case Profile Series**	By telling the stories of those who are spearheading changes in practice, this helps other local governments eliminate the "disconnect between information and implementation" that may otherwise hold them back. The Case Profiles will facilitate inter-regional sharing.
e. **Adaptive Management Framework**	Developed by an inter-governmental working group, the AMF is a universal, consistent yet flexible, monitoring framework that may be implemented across municipalities of different sizes, drainage patterns and budgets. The intent is that it be a 'living document'.

9. Convening for Action in Metro Vancouver Region

The genesis for inter-regional collaboration among 'convening for action' champions from Metro Vancouver and the east coast of Vancouver Island is found in three successive initiatives, dating back to 1990, that advanced an ecosystems approach:

- *Canada's Green Plan for a Healthy Environment* (1990 - 1995)
- *Georgia Basin Ecosystem Initiative* (1998 - 2003)
- *Georgia Basin Action Plan* (2003 - 2009)

In 2000, Canada and the United States signed a *Joint Statement of Cooperation on the Georgia Basin and Puget Sound Ecosystem* - to maintain sustainable ecosystems and communities in the face of continuing population and economic growth. It outlined common goals and objectives, reinforced the benefits of 'decades of collaborative activity', and recognized contributions then being made by the Metro Vancouver region.

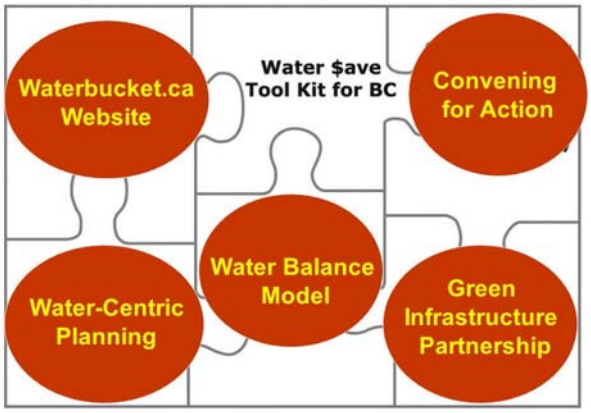
> *This long history provides context for, and insights into, understanding the origins of the ecosystem-based approach that underpins the current Georgia Basin IREI.*

Timeline & Milestones

The timeline included as Figure 49 identifies milestones through the 'convening for action' lens. Spread over almost two decades, the milestones represent a cumulative building blocks process.

Water Sustainability Action Plan: Experience gained in the Metro Vancouver region during the period 1997-2003 informed and influenced the *Water Sustainability Action Plan* (2004), notably five of the six original plan elements.

The centrepiece of the Action Plan, the Water Balance Model (WBM), began as an initiative of the Metro Vancouver Stormwater Interagency Liaison Group (SILG). As an early demonstration of the value of the 'regional team approach', the WBM established credibility for related initiatives.



Inter-Regional Sharing and Learning: The *Convening for Action in Metro Vancouver* initiative was launched through the Green Infrastructure Partnership, with endorsement by regional elected representatives and Regional Engineers Advisory Committee, in 2005. Metro Vancouver experience then informed implementation of the Vancouver Island program (commencing in 2007). For the past decade, cross-pollination of ideas and approaches has been ongoing among local government leaders. Vancouver Island champions are proving out concepts initially identified by 'convening for action' in Metro Vancouver.

Convening for Action in Metro Vancouver Region: Time-Line & Milestones

COLOUR CODE:

Blue = provincial milestone

Black = Metro Vancouver regional milestone

Green = SILG milestone

Brown = SILG in collaboration with *Water Sustainability Action Plan*

Figure 49

Metro Vancouver Storyline

A communications strategy built around the two images on Figure 50 helped to create 'political will' in the Metro Vancouver region during the period 1998 through 2003. In the years since, ongoing high-level support by the Metro Vancouver Board has sustained and enabled incremental progress in aligning efforts across the region.

Liquid Waste Management Planning (LWMP): For almost three decades, the LWMP process has been a regulatory driver for action. Briefly:

- Stage 1 of the first Plan was completed in 1989.
- Stage 2 was completed in 1999 and approved by the Minister of Environment in 2001.
- Stage 2 included a *Stormwater Management Plan* for the region.
- Between 2008 and 2010, an updating process revamped the LWMP as the *Integrated Liquid Waste & Resource Management Plan*.
- It was approved by the Minister in May 2011.

> ***Stormwater Interagency Liaison Group*** - *The 2001 LWMP created SILG to build on the solutions (for integrated watershed planning) developed during the Stage 2 LWMP process, facilitate the ongoing exchange of information among the member municipalities, and provide technical advice.*

Application of Science-Based Understanding: In 1998, the concept of 20-yr and 50-yr visions (Figure 50) helped the Councils for the cities of Coquitlam, Burnaby, Port Moody, Surrey and North Vancouver visualize and make policy choices for watershed protection. This then shifted the focus from WHY DO IT to HOW. By 2001, development of the *Water Balance Methodology* (and the WB Model) informed the HOW answer.

Political Will and Support: Informing regional elected representatives about 'water balance' restoration is a guiding principle for the *Convening for Action in Metro Vancouver* initiative:

- The process started in 2003 at the UBCM Annual Convention. The Urban Forum coupled the formal launch of the WBM with celebration of **A Sustainable Urban System: the Long-Term Plan for Greater Vancouver**, Canada's award-winning entry in the 2003 Sustainable Urban Systems Design Competition.
- The informing / educating process accelerated in conjunction with two regional initiatives: *Sustainable Region Initiative* (2006-2007); and *LWMP Reference Panel* process (2008-2010).
- Since 2011, update presentations have been made by the Partnership to Metro Vancouver's Utilities Committee in Spring and/or Fall.

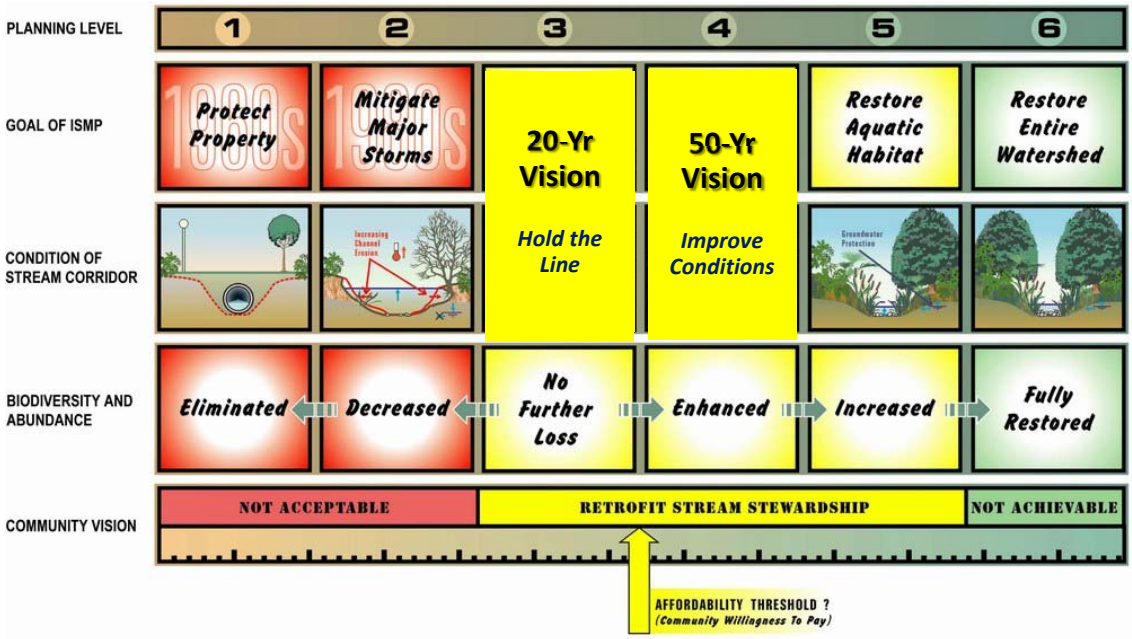
The Partnership has also implemented a process to recognize individuals Councils as Champion Supporters of the Water Sustainability Action Plan.

Watershed Moments: The Metro Vancouver storyline that follows is organized in five parts:

a. Water Balance Model for British Columbia
b. Green Infrastructure Partnership
c. ISMP Course Correction
d. Watershed Case Profile Series
e. Adaptive Management Framework

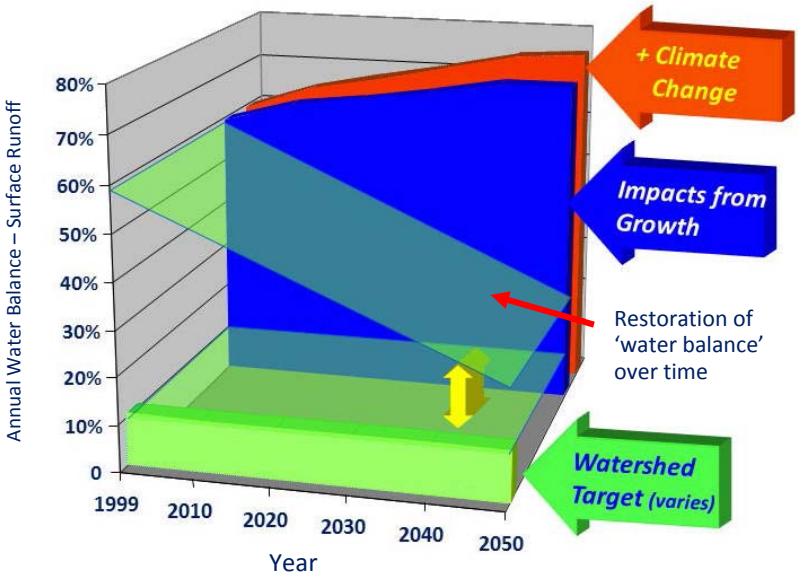
> *This series of 'watershed moments' is viewed primarily through the 'convening for action' lens, and secondarily through the SILG lens.*

Communication Tools that 'Translate the Science' Inform Decision Processes:



What was viewed as 'not possible' in 1998 is the legacy goal in 2015:

In 1998, the image above captured the evolution of drainage planning philosophy over the previous half-century. The image translated the Horner and May scientific findings (on the impact of land use change) into a decision support tool for green infrastructure goals and objectives. Because it illustrated the consequences for stream corridor ecology of various attitudes towards rainwater management, it provided stakeholders with clear visual choices regarding desired outcomes for ***Integrated Stormwater Management Plans*** *(ISMPs).*



Genesis for the Water Balance Model (circa 2001):

To secure high-level political support to explore HOW to implement changes in rainwater management practices at the individual property scale, it was first necessary to demonstrate that:

- *the consequences of inaction would be more surface runoff volume due to densification plus a changing climate; and*
- *the restoration of a watershed's 'water balance' could be achieved over a 50-yr timeframe (or one building cycle), one property at a time, in conjunction with land redevelopment.*

These were drivers for development of the Water Balance Methodology.

Figure 50

a. Water Balance Model for British Columbia

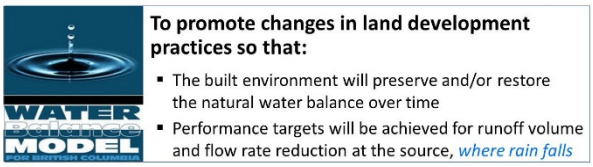
Figure 51 encapsulates the history of the WBM – from WB methodology to WB model. Translating high expectations for "green" development into practical design guidelines required looking at rainfall differently. In 2001, SILG recognized the value of the water balance approach and funded development of the original spreadsheet tool.

> *The web-based WBM bridges engineering and planning, is a scenario comparison and decision support tool, and is an initiative of government.*

Encourage a 'Design with Nature' Stewardship Ethic

In July 2002, a core group of champions on SILG formed the Inter-Governmental Partnership (IGP) to develop the WBM as a web-based tool, the first of its kind in the world. The IGP quickly expanded membership to four regions to become a provincial initiative co-chaired by the Province of BC and Environment Canada. The WBM was included as an element of the Georgia Basin Action Plan.

Inter-Governmental Partnership: Vision (in 2002)



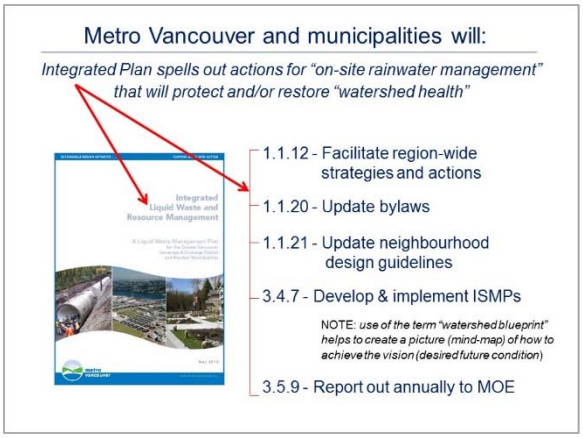
Outreach & Continuing Education Program: In 2004, the IGP began a capacity-building and talent development program which continues to this day. The City of Surrey, North Vancouver District and City of Coquitlam have ongoing leadership roles in this program. These municipalities are pioneering and implementing 'water balance' solutions that demonstrate how urban development can achieve 'design with nature' outcomes.

Slow, Sink and Spread Rainwater Runoff

Political support for the 'water balance' approach is real - for example: The Metro Vancouver Board amended the 2012 Budget to add a line item to co-fund the Water Balance Model Express. This triggered a matching grant from the BC-Canada Regional Adaptation Collaboratives project.

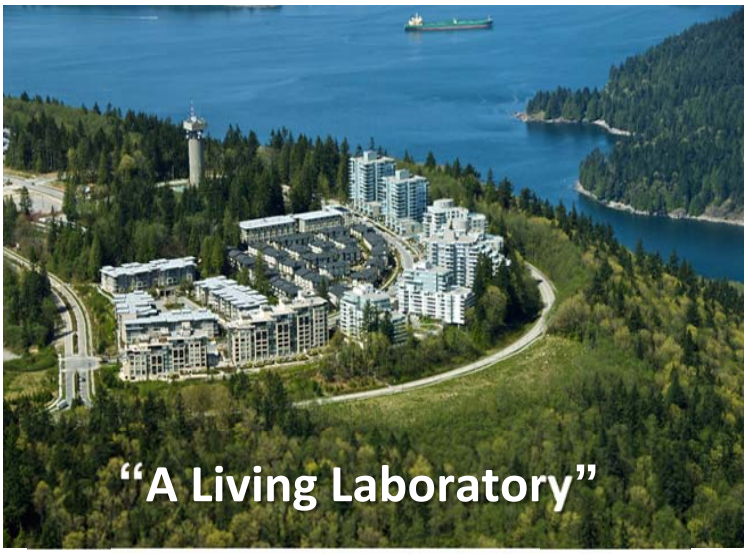
Interfaced with Google Maps/Earth, the Express is an online tool that helps property owners quantify how well their properties capture, sink and spread rainwater runoff and do their share to meet pre-set watershed targets for volume, infiltration and flow.

The first three to be implemented are Surrey, North Van District and Coquitlam.



Commitment to Protecting Watershed Health: *"Metro Vancouver contributed $50,000 because widespread use of this decision tool will help Metro Vancouver and members fulfil our regulatory commitments. The region and members have committed to protecting stream and watershed health. This will be accomplished by managing rain where it falls. Use of the Water Balance Model can help municipalities to define achievable and affordable performance targets at the watershed, neighbourhood and site scales,"* stated Metro Vancouver Chair Greg Moore in 2012 when he announced the grant.

Looking At Rainfall Differently Led to the 'Water Balance Methodology'



Looking at rainfall differently started with the UniverCity Sustainable Community on Burnaby Mountain (2000):

Simon Fraser University is situated at the top of the Stoney Creek drainage system in the Brunette Watershed. The Stoney Creek ISMP was the pilot for Integrated Stormwater Management Plans in the Metro Vancouver region

Linking Rainfall, the Landscape, Streamflow, Interflow and Groundwater has been a Building Block Process:

How to Reduce Runoff Volume (2000)

How to Mimic Flow-Duration (2007)

How to Sustain Deep Infiltration (2012)

How to Integrate Performance Targets (2013)

Year	Milestone in Evolution of Water Balance Methodology
1973	Thomas Hammer publishes research on relationship between land use changes and stream erosion
1996	Breakthroughs by a number of pioneers lead to a roadmap for integrated watershed management
2000	Protecting stream health within Brunette River tributaries in Metro Vancouver results in "Water Balance Methodology"
2002	Province releases *Stormwater Planning: A Guidebook for British Columbia*
2007	Province initiates *Beyond the Guidebook* initiative to link site, watershed & stream
2013	Water Balance Express integrates watershed-specific targets at site scale

Year	From Methodology to Model – The Timeline
2000	Water Balance Methodology developed
2001	prototype WBM implemented on spreadsheet platform
2001	Water Balance Methodology incorporated in Guidebook
2002	Stormwater Guidebook released by Province
2003	web-based WBM launched at UBCM Annual Convention
2004	outreach program rolled out in multiple regions
2007	interface integrated with QUALHYMO engine
2008	"Version 1.0" rolled out with "Living Water Smart"
2009	received "Premier's Award for Innovation & Excellence"
2009	"The Plan for the Future" released
2010	federal / provincial RAC program funded 4 new modules
2011	"Version 2.1" rebuilt on Linux / Wordpress platform
2014	"WBM Express for Landowners" operationalized

Figure 51

b. Green Infrastructure Partnership

Everything is connected. British Columbia's Green Infrastructure Partnership (GIP) was an outcome of the WBM launch at the 2003 UBCM Convention.

During the period 2003 through 2010, the GIP played a prominent role in leading change and assisting with implementation of the Water Sustainability Action Plan, primarily in the Metro Vancouver region, and also on Vancouver Island.

Reflections of a Past-Chair

Paul Ham, at the time the General Manager of Engineering with the City of Surrey, served as GIP Chair from 2005 until his retirement in 2008. He continued as Past-Chair until 2010.

"Shortly after becoming GIP Chair, I met with my peers on the Metro Vancouver Regional Engineers Advisory Committee (REAC), and asked them to support and participate in the Green Infrastructure Consultation Workshop that the City of Surrey hosted in May 2005," recalls Paul Ham.

"The so-called 'REAC Workshop' proved to be a transformational event. The 'Convening for Action' initiative was well and truly launched."

"In looking back, I see my years of chairing the Green Infrastructure Partnership as helping to get the ball rolling and ideas disseminated, on green infrastructure, all of which has subsequently been taken up by others to a much greater degree of implementation and success."

"Green infrastructure practices have moved from pilot project to neighbourhood and watershed scale approaches. I believe that, in some substantive way, our GIP efforts a decade ago advanced the cause of sustainable development and moved the state of-the-art of green infrastructure to a more mainstream level," concludes Paul Ham.

Metro Vancouver Milestones

In 2010, GIP responsibilities were merged with those of the Partnership for Water Sustainability, which is now the "keeper of the GIP legacy", defined by successes such as (Figure 52):

2005 Consultation Workshop: "The REAC workshop proved to be a revelation for all those who participated," recalls Raymond Fung (GIP Chair, 2008-2012), Director of Engineering & Transportation with the District of West Vancouver.

"We witnessed the motivational power of celebrating successes. We also recognized the need to get the story out about the leadership being shown by local government. This influenced everything that followed, including the work on Vancouver Island."

2006 Showcasing Green Innovation Series: The workshop led to the 2006 pilot which then led to series in Metro Vancouver and on Vancouver Island in 2007. "These three series helped local government practitioners immeasurably by creating forums for them to share their experiences and lessons learned. This created a ripple effect that spurred even more innovation," states Raymond Fung.

2007 Beyond the Guidebook Seminar: At this launch event, Surrey organized a charrette exercise based on the Fergus Creek prototype watershed plan. Later, the Ministry of Community Development issued a circular to all local governments in BC.

> *"We wanted regional and municipal governments to be informed that the 'Beyond the Guidebook' approach to rainwater management is endorsed by the Province and reflects a 'design with nature' approach to climate change adaptation," recalls Glen Brown. He is now UBCM's General Manager.*

2009 Surrey Water Balance Forum: The goal was to move beyond pilot projects to a watershed-based approach to achieving performance targets. The program framed the *HOW question* as it pertains to green infrastructure: HOW will Surrey get it built right; and HOW will a consistent regional approach be achieved in Metro Vancouver?

Moving Beyond Pilot Projects to Watershed-Based Approach Began a Decade Ago:

GIP branding for 'Convening for Action in Metro Vancouver'

*"We are using the slogan **The New Business As Usual** to convey the message that, for change to really occur, practices that until now have been viewed as the exception must become the norm moving forward. We have to build regulatory models and develop models of practice and expertise to support The New Business As Usual", stated Dale Wall, former Deputy Minister (when he announced the launch of the WBM Version 1.0) at the Gaining Ground Summit in May 2008.*

Dale Wall was a founding member of GIP Steering Committee

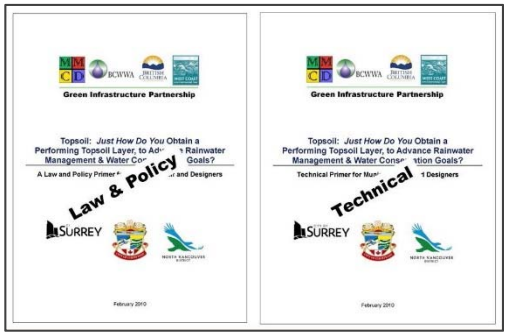
The 2007 Beyond the Guidebook Seminar engaged practitioners in the practical aspects of implementing changes in development practices.

Today's Expectations are Tomorrow's Standards

At the '2007 Beyond the Guidebook Seminar', the Ministry of Community Development unveiled its road map for leveraging change to protect stream health (Green Communities Initiative and criteria for grants).

DFO announced that 'Beyond the Guidebook' is part of the move from guidelines to tools, and explained why the stream health objective is broader than how much water one can infiltrate on a particular development.

2009 Surrey Forum led to collaboration among local governments in three regions



Topsoil Primer Set (2010)

Experience shared at the 2009 Surrey Forum was the inspiration for the Topsoil Primer Set, released in 2010 at the Bowker Creek Forum. This synthesized the pioneering experience of Surrey, North Vancouver District and Courtenay (Vancouver Island). Subsequently, the Province funded and the Okanagan Basin Water Board led, the initiative to transform the Primer Set into a Bylaws Toolkit in 2012.

Topsoil Bylaws Toolkit (2012)

Figure 52

c. ISMP Course Correction

Two years in the making (2008-2010), Metro Vancouver's *Integrated Liquid Waste & Resource Management Plan* established the framework for moving the region beyond regulatory compliance to transitioning Metro Vancouver to an approach that achieves the Sustainable Region Vision.

> *The companion report by the advisory LWMP Reference Panel included a recommendation for an "**ISMP Course Correction**".*

Liquid Waste Management Plan Reference Panel

As part of its consultation and bridge-building process, the Reference Panel met with REAC to discuss the 'elephant in the room' (Figure 53). Subsequently, the panel recommended that municipalities re-focus ISMPS on watershed targets and outcomes. This recommendation flowed from concerns of municipalities over the 'unintended consequences' resulting from ISMPs completed to that point.

> *The Reference Panel also recommended an expanded mandate for a renamed and **'new SILG'** to lead a 'regional team approach'.*

A Better Plan: *"The Integrated Plan has been influenced for the better by the contributions of the 10-person advisory Reference Panel. The Reference*

Panel reported directly to the regional politicians. Through reporting out and ongoing interaction with Metro Vancouver's Waste Management and Finance committees, the Reference Panel made an observable difference in stimulating informed discussion about liquid waste/resource and rainwater management issues," stated Johnny Carline, Metro Vancouver CAO, in June 2010.

ISMP Course Correction Series

Released in November-December 2010, the 5-part series was designed to inform local governments and others about what they could do to ensure outcome-oriented ISMPs. The series was followed by a Summary Report in February 2011. The series presented a road map for action.

After a decade of ISMP experience in the Metro Vancouver region, key issues were **'cost'** and **'cost versus value'**. The money issue revolved around the long-term dilemma of how to pay for infrastructure and watershed improvements if there is no source of dedicated funding.

As an outcome of the series, the Partnership for Water Sustainability and Asset Management BC aligned efforts to achieve a shared goal to:

> *Connect the dots between land use planning, watershed health AND infrastructure asset management.*

This alignment is the genesis for *Sustainble Watershed Systems, through Asset Management* (2015).

Course on ISMP Course Correction

Designed for an interdisciplinary audience and peer-based, the 2-day course guided practitioners through the stages and steps in developing a **Watershed Blueprint** that is balanced, landscape-based and financially sustainable. The teaching team comprised leaders from the City of Surrey, Capital Regional District, District of North Vancouver and District of West Vancouver.

Beyond the Guidebook Primer Series: The first two guidance documents in the Primer Series were released by the Partnership in conjunction with the 2-day course. The Primers provided the technical foundation for the course curriculum. The series adds depth to the 2002 Guidebook. The goal is to help all local governments go farther, more efficiently and effectively.

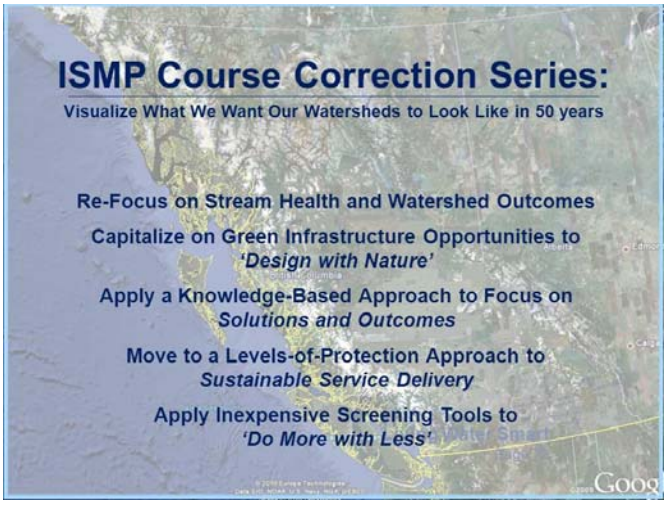
ISMP Course Correction is the Genesis for 'Sustainable Watershed Systems, through Asset Management'

The "elephant in the room" was unfunded municipal liabilities resulting from unintended outcomes of ISMPs

WHY A COURSE CORRECTION:

"Unfortunately, ISMPs completed to date have tended to be engineering-centric, and in general can be described as 'glorified' master drainage plans. ISMPs that do not integrate land use and drainage planning are resulting in unaffordable multi-million dollar infrastructure budget items that become municipal liabilities, without providing offsetting stream health benefits."

Metro Vancouver Reference Panel
Final Report, July 2009



Series Brought Together Two Streams of Thinking: Watershed-Based Planning & Infrastructure Asset Management:

The series drew attention to successful approaches and wisdom gained by local government leaders.

The series purpose was to assist local governments in moving beyond pipe-and-convey 'stormwater' to a 'design with nature' approach to community design – one that integrates 'rainwater management' with land use planning, climate change adaptation and infrastructure asset management.

Each document in the series explored a theme area (listed opposite).

The "Course on the ISMP Course Correction" (November 2011) is the genesis for the Georgia Basin Inter-Regional Education Initiative (IREI). Representatives from 4 of the 5 IREI partner regions attended.

Course on the ISMP Course Correction:

Hosted by Surrey, themes for the 2-day course were: Build the Vision (Day#1) / Create the Legacy (Day #2). The course elaborated on methodologies and tools that will help local governments: 1) get the watershed vision right; 2) establish achievable performance targets; 3) create an affordable watershed blueprint; and 4) integrate with other processes and/or plans to incrementally implement the watershed blueprint over decades.

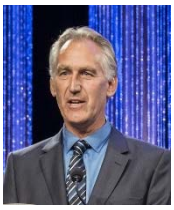
Figure 53

d. Watershed Case Profile Series

The Water Case Profile Series is an undertaking (by the Partnership for Water Sustainability) and a deliverable under the IREI umbrella. The series purpose is to inform and accelerate inter-regional sharing within the Georgia Basin.

> *By telling the stories of those who are spearheading changes in practice, this helps other local governments eliminate the "disconnect between information and implementation" that may otherwise hold them back.*

Eliminate the Disconnect: *"The Watershed Case Profile Series was an action item that resulted from the Partnership's update presentation to the Metro Vancouver Utilities Committee in October 2012. At that meeting, we invited Metro Vancouver to collaborate with Vancouver Island regional districts pursuant to Strategy #3.2 in the* ***Integrated Liquid Waste & Resource Management Plan****. The Partnership volunteered to meet individually with municipal Councils to inform them about the benefits of collaboration and how it would help them to better deliver on regulatory compliance,"* explains Ted van der Gulik, Partnership President, and formerly the Senior Engineer with the BC Ministry of Agriculture.



Champion Supporters

The Champion Supporter designation provides the Partnership with the reason to meet with Councils (Figure 54). The designation is an effective way to recognize municipal champions who are making exceptional contributions, and are establishing precedents that inform implementation of proven watershed-based approaches. Extracts from the Case Profiles for five Metro Vancouver municipal leaders are presented in the pages that follow:

City of Surrey: Now in its fifth decade of continuous implementation of watershed-based planning and engineering, the City has more 'ISMP experience' than any other jurisdiction in BC. The City continues to evolve and adapt an approach that incorporates lessons learned in getting green infrastructure built right. When it revisits all ISMPs in the upcoming update cycle, the City will be overlaying a climate change lens.

City of Coquitlam: In 2003, Council amended the Official Community Plan (OCP) to require that watershed planning precede Neighbourhood Plans, and that land use plans take into account watershed conditions and needs. The City has arrived at a good place, but the journey was not easy. There was a dark period, yet that is what makes the Coquitlam story authentic.

District of North Vancouver: The 2011 OCP embedded the vision for restoration of the urban watershed landscape. Then development of implementation plans for five Town Centres showed that the pathway to an ISMP is through an integrated project that brings together the right people with the right knowledge to fit the pieces together and build integrated solutions.

Corporation of Delta: The three urban areas within an agricultural sea are built out. This means Delta is effectively limited to retrofitting of rain gardens within road corridors. Because road rights-of-way account for one-third of urban land area, Delta's rain garden program has the potential to make a material difference over time.

City of North Vancouver: The City-wide rain garden program has raised community awareness of the connection between catch basins and stream health, and the need to capture rain where it falls. Rain garden benefits are cumulative. Now that the City has success stories to share, it is poised for the next leap forward.

Watershed Case Profile Series Showcases Local Government Leaders:

Metro Vancouver Utilities Committee

Recognition of City of Surrey

Recognition of Metro Vancouver

Convening for Action in Metro Vancouver

"Clearly, this program is resonating with local government. No other forum provides us with the same kind of opportunity to 'tell our stories'. It is evident that there are many champions in local government; and it is important that we recognize and celebrate what they are doing. This is all part of creating our future. And when we ask 'what will this community look like in 50 years', we can point to the green infrastructure examples and then we will know what it will look like in 50 years."

Delta Mayor Lois Jackson
Metro Vancouver Chair (2006-2011)
September 2007

Recognition of North Vancouver City

Recognition of City of Coquitlam

Recognition of North Vancouver District

Figure 54

City of Surrey

Surrey is one of two municipalities that have played defining roles in all *Convening for Action in Metro Vancouver* milestones since inception. The District of North Vancouver is the other. Both have undertaken original and science-based research, developed demonstration applications, and hosted 'sharing & learning' forums. These contributions date back to the content for the 2002 Guidebook.

Surrey Biodiversity Conservation Strategy is Over-Arching: The City of Surrey is believed to have established a Canadian first when it adopted a *Biodiversity Conservation Strategy* in July 2014. The Executive Summary includes a lynch-pin statement, one that provides guidance for watershed-based planning and actions that would ultimately create a Watershed Health Legacy:

> *This Biodiversity Conservation Strategy recognizes Surrey's biodiversity as a key foundation of a healthy, livable and sustainable community. Preserving nature provides many benefits (including reduced infrastructure).*

A Collaborative Culture: "The guiding philosophy behind the Biodiversity Strategy is to do what is good for the long-term health and livability of Surrey, and makes sense to the community. A watershed-based approach is more than drainage. To be truly integrated, it must be about overlapping layers. It is about what each department can do to support the strategies of other departments," explains Carrie Baron, Drainage Manager.

"We can do this because Surrey has an embedded team-building culture. Collaboration is the way we do business. It is just natural. The departments sit together on internal groups. This is why everyone understands what others are doing."

Integration of Natural Systems Thinking and Adaptation to a Changing Climate: "The City has been building on its Master Drainage Plan foundation since the 1970s. The operative word is **evolution**. Surrey's approach to drainage has been evolving over the decades through an adaptive (learn by doing) process. As of 2015, the City has completed ISMPs for all its watersheds. Now we are preparing for the next evolution," reports David Hislop, Drainage Upland Engineer.

"We are striving for a science-based approach to watershed health. In 2016, we will look at all our ISMPs, good and bad, for lessons learned so far," continues Carrie Baron. "This assessment is the first step to moving forward with the next cycle. Looking ahead, we will be adding climate change and further advancing integration of natural systems thinking into the City's watershed plans. This aligns with the program direction for the IREI."

Restoration of Already Urbanized Watersheds: "Greenfield development is comparatively easy. The real challenge is in restoration of watershed health. Retrofits are tougher to implement. Shifting the ecological baseline to replicate a healthy watershed requires boldness. If local government doesn't do it, then nobody will," adds Carrie Baron.

"When a community has a long-term and realistic vision of what is needed, then it is all about seizing opportunities as they arise, such as the Robson Park Revitalization (Figure 55). But keep in mind that progress towards the vision will be incremental. Avoid steps that are too big."

"All City projects have interdepartmental steering committees. So, internal conversations lead to integrated outcomes, complete with policies and regulations that support implementation. We are trying to integrate as best we can, and meet the needs of many in the process. At the end of the day, this is what makes for a better community."

Robson Park Revitalization in North Surrey demonstrates how to incrementally restore the health of an already urbanized watershed:

The 5 hectare project successfully merged the need for stormwater management with the need to revitalize a dated park facility. Completed in 2011, creek daylighting resulted in a new park with educational water features.

Transformation of Robson Park: *"We are really excited about the impact that Robson Creek day-lighting has had in mobilizing the community in this North Surrey neighbourhood," states Carrie Baron, Surrey Drainage Manager.*

"Park transformation started with Engineering and Parks collaborating on a joint project. We then involved the neighbourhood, streamkeepers and local school to create a shared vision."

"The locals say they have never seen so many people use the revitalized Robson Park. This success story shows that things don't have to stay the same; over time we can bring value back into a neighbourhood."

Engineering Objectives:

Minimize stream erosion velocities

Provide detention for frequent runoff events

Provide water quality treatment of storm inflows

Provide some spawning and rearing habitat

Increase oxygen in the system

Figure 55

City of Coquitlam

Over the past decade, Coquitlam has been evolving an effective and adaptable approach to development and implementation of Integrated Watershed Management Plans (IWMP's). The City is now recognized as a leader in this field.

IWMPs: OCP amendments in May 2003 addressed a Provincial requirement to complete watershed planning. The new City policies prioritized watershed studies before Neighbourhood Plans so that land use plans could take into account each watershed's conditions and needs. This move provided staff with the mandate to include IWMPs in the City's Financial Plan and funding to complete all eleven watershed plans by the 2016 legislative deadline.

Linking the IWMP and neighbourhood planning processes gave the City's Planning, Parks, Environmental Services and other departments a vested interest in the outcome of watershed plans and a reason to actively participate in the process. The OCP policies also supported new approaches for mitigating land development impacts which laid the foundation for the city-wide *Rainwater Management Design Requirements and Guidelines* used today.

Council later endorsed a 'systems' approach philosophy which aims to offset impacts in one area of a watershed with gains in another for a 'net environmental benefit'

Rainwater Management Requirements: The approach to rainwater management features practical, performance-based requirements. These apply to subdivision and building permit applications in all areas with a watershed plan. The rainfall capture criteria are tailored to each watershed and specified within each IWMP.

The requirements remove the burden of formal permitting, security or inspection for single family building permits. Larger developments are required to have professionals undertake and oversee the requirements with drainage works being regulated within the existing subdivision approval process.

Recognizing the limitations of source control application on single family lots required that watershed plans deliver a strategy to augment rainfall capture shortfalls with works in other areas.

Building Better: The Building Better program was developed to point out where sustainable features are located in Coquitlam and provide information on how they work. Building better in Coquitlam means using sustainable building approaches and purpose-built features to mimic nature or promote a healthy environment. Some examples are: absorbent topsoil, infiltration trenches, water quality ponds, pervious pavement, street trees and rain gardens. (*To see other applications, visit the City of Coquitlam's Building Better webpage at:* http://www.coquitlam.ca/city-services/environment/building-better.aspx)

The *Building Better Green Star* helps the public to identify which projects incorporate sustainable building features and recognizes the developers, builders and businesses in Coquitlam who are "building better".

Monitoring and Adaptive Management: In 2013, Coquitlam piloted the regional *Monitoring and Adaptive Management Framework* being developed by Metro Vancouver and member municipalities. The framework is used to monitor watershed health and ISMP effectiveness and will help the City to prioritize adaptive management actions. The City is now in its second year of AMF implementation with plans to continue the program by monitoring three watersheds per year.

Studies: In 2011, the City tested the performance of on-site infiltration trenches to address concerns about their performance in sloped areas with poor draining soils, and high rainfall. Despite overflow conditions in the winter months, the test results revealed the benefit of the facility and its overall performance on an annual basis, which exceeded both design criteria and expectations.

The City also conducted a performance study in 2012 on a bioswale median with engineered soil and special filter media designed to remove pollutants from the road runoff. The test results showed an 80-90% reduction in contaminants such as nitrate, zinc, copper and total suspended solids.

The City has initiated another study to consider further options for single family rainwater management. The study will compare the use of the City's current large treatment facilities for single family home runoff to treatment options at the site level.

Water Balance Express: In 2015, Coquitlam has teamed up with the Partnership for Water Sustainability BC to implement the Water Balance Express decision support tool for landowners. The City plans to use the tool to augment its existing rainwater management requirements. The WBM provides outreach and support for a single family homeowner who wants to do more than the existing requirement for additional topsoil.

Ten Principles for Watershed Planning and Rainwater Management in the City of Coquitlam

1. Take action. Doing *something* imperfectly is better than doing *nothing* flawlessly.
2. Use Council direction to endorse an overarching objective which requires inter-departmental collaboration, guides policy development, and gets watershed management into municipal processes.
3. Develop a city-wide strategy which defines concrete goals, how you plan to achieve them, and who you need to do it.
4. Appoint and support a champion within your organization to lead the movement.
5. Start small. Build on successes as you go. Incremental improvement is easier to implement.
6. Stay practical. Strive to turn idealistic, ambitious ideas into actions that are achievable.
7. Expect and prepare for opposition. It is important to advance good policy regardless of resistance to change.
8. Be flexible and acknowledge when you need to adjust course. Mistakes are lessons for moving forward.
9. Take a holistic approach to watershed management which offsets impacts in some areas with meaningful gains in others.
10. Balance environmental, economic and social considerations.

    Be sure you are developing a plan which considers a variety of sectors, rather than advancing the agenda of one group.

Source:
Watershed Planning and Rainwater Management: Creating the Future in the City of Coquitlam, January 2014, Partnership for Water Sustainability in British Columbia

District of North Vancouver

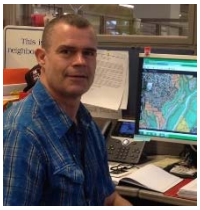
The Lynn Valley Town Centre project provided the demonstration application for development of two web-based tools, namely: the *Drainage Infrastructure Screening Tool*; and the *Water Balance Model Express for Landowners*. These tools were foundation pieces for the *Hastings Creek Watershed Blueprint* process (Figure 56).

> *The Hasting Creek Watershed Blueprint process has demonstrated HOW local governments can implement the 'ISMP Course Correction' and how they can accomplish more with the same investment.*

Hastings Creek Watershed Blueprint: "Integrated community planning is very much about a *sense of place* and, in the case of Lynn Valley Town Centre, weaving nature into the urban fabric. The Hastings Blueprint is enabling us to develop principles. These will be transferable to integrated planning for other town centres," stated Susan Haid, former Manager of Sustainable Community Development, in 2013.

The Lynn Valley Town Centre planning process has been guided by this principle: *How will the Town Centre Implementation Plan do its part to improve the overall health of the entire Hastings Creek watershed system?*

"We look for ways to do a better job, apply technology effectively and efficiently, and save the District money. This is the philosophy that we have brought to the Hastings Creek Blueprint," states Richard Boase, Blueprint champion. We recognize the value of a life-cycle cost way of managing assets. The financial burden of stabilizing streams is a motivator for the District to do business differently: *view the watershed through an asset management lens*."



Drainage Infrastructure Screening Tool: Developed in response to a need identified by Metro Vancouver municipalities, the tool is an intermediary step in the drainage assessment process that also happens to include the opportunity to provide a look at how climate change will affect piped drainage systems. It is about looking for simpler methods to determine if there is a problem that needs detailed analysis.

> *The Lynn Valley Town Centre demonstrated the immediate payback in using the screening tool to apply a Level-of-Service Methodology.*

DESIRED OUTCOME: provide an equal Level-of-Service for all properties

What is the existing level of drainage service within the community?

What will be the effect of climate change?

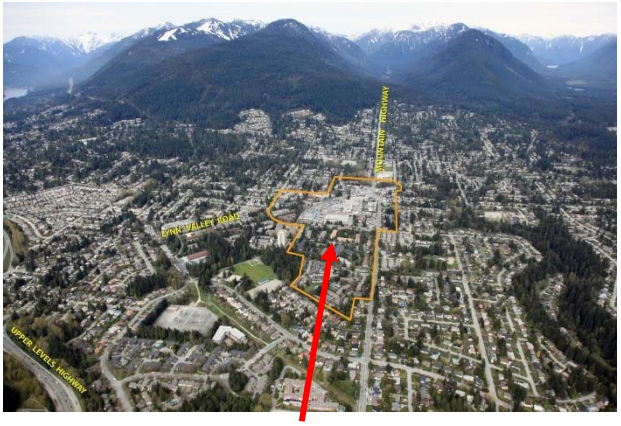
What will be the effect of redevelopment?

What will be the effect of climate change on redevelopment?

From Policies to Action on the Ground: "The Blueprint work has resulted in a balance of science-based understanding and practicality at the watershed scale. Next, engineering and planning will drill down to the individual site scale to implement changes in land development and infrastructure servicing practices," states Gavin Joyce, the District's General Manager for Engineering, Parks and Facilities.

"Integration of the Lynn Valley Town Centre and Watershed Blueprint processes yielded invaluable understanding. We now have the opportunity to put in place the right tools to restore watershed health. The process starts with good policies that cascade down in order to produce action on the ground. We have a plan; there is agreement about the goals; we are developing tools for use by staff, developers and homeowners; and we have a schedule of opportunities. Everything that we need is in play."

A 'Watershed Blueprint' is a Truly Integrated Plan to Restore Watershed Function over Decades



Aerial view of Lynn Valley Centre & Hastings Creek Watershed

QUOTABLE QUOTE #1: *"The work-in-progress Hastings Creek Watershed Blueprint is much more than a report. It will be an online decision support tool: map-based; and interdepartmental in application. We are building on what we learned from the Bowker Creek precedent and taking what they did to another level," explains Richard Boase.*

"The Drainage Infrastructure Screening Tool has facilitated the Opportunities Assessment. It enabled staff to focus on what is important and most relevant. This has resulted in an effective deployment of resources, both human and financial, and a better return on investment."

QUOTABLE QUOTE #2: *"We have demonstrated the payback in collaborating with the stewardship community," states Richard Boase. "We know what to look for and we have a clear picture of where ecological values can be restored. Also, the Opportunities Assessment has been the catalyst for inter-municipal collaboration with North Van City on common watersheds. We have a standard methodology for assessment. Each of us can follow-up in our own way."*

"Opportunities Assessment" - a driver for first three stages

Agree on the vision.

Set targets to populate WBM Express.

Provide planners with the detail necessary to guide site-level decisions as opportunities for restoration arise.

Then implement.

Source: "A Watershed Blueprint for Hastings Creek: Creating the Future in the District of North Vancouver", May 2013, Partnership for Water Sustainability in BC

Figure 56

Corporation of Delta

Delta has some 500 kilometres of roadways. The corporate vision is to enhance community liveability by beautifying streets, one block at a time. In 2005, the municipality embarked upon a long-term initiative to incrementally improve the urban landscape though a streetscape program (Figure 57).

Delta hosted the first of three events in the **Showcasing Green Infrastructure Innovation in Metro Vancouver: The 2007 Series**. This was a 'defining moment' for Delta. The key message was: *"sustainability on-the-ground is achieved incrementally through small steps*".

Beyond Pilot Projects: "Delta is making 'green infrastructure' a standard practice in our community. These are no longer just 'pilot projects'. When we re-build roads in Delta, streetscape enhancement is part of the capital budget. In addition, each year we invest in two or three community rain gardens," states Hugh Fraser, Delta's Deputy Director of Engineering. He is a rain garden champion; and his commitment has been critical to the success of the initiative.

Shared responsibility is a foundation piece for Delta's rain garden program. "Everyone in the process, students, designers, managers and constructors, must understand and care about the big-picture goal. This requires an ongoing educational process that instils an ethic," emphasizes Hugh Fraser.

"Creating a watershed health legacy will ultimately depend on how well we are able to achieve a balance between the public and private sides of rainwater management. There is a huge up-side if the private sector embraces their contribution to shared responsibility," concludes Hugh Fraser.

The Story Behind the Story: Community leader Deborah Jones, the volunteer Rain Gardens Coordinator, is a driving force behind the "top-down and bottom-up" approach that defines Delta's rain garden program. "The program came about through a fortunate confluence of personalities, interests and skills – it is not something that a community can necessarily just decide to do, and presto, it happens," says Deborah Jones.

"Remove any one of the individuals or organizations who played roles in the process, and North Delta's school and community rain gardens either would not have happened at all, or would have been much less successful. Absolutely ZERO would have happened without Hugh Fraser and his support for infiltration drainage projects."

Learn by Doing, Adapt and Improve: "Delta has implemented a rain garden construction program in partnership with local elementary schools. The ultimate objective is to improve fish habitat in Delta's waterways," reports Dr. Sarah Howie, Delta's urban environmental designer for streetscapes and natural projects.

"A curriculum-based 'Rain Gardeners' program for Grades 4 and 5 students has educated a generation of students about watersheds, how they work, and why rain gardens can help improve aquatic habitat. Students experience caring for nature by maintaining rain gardens."

"After almost a decade of designing and building rain gardens in North Delta, we are still experimenting. On every project, we try something different. Each time we learn something new from experience, and the next time we apply that experience. In short, Delta's design process is one of continuous improvement. The combination of Council support, designers willing to be innovative, and the delivery team working together has been absolutely crucial to building commitment."

QUOTABLE QUOTE: *"This garden really illustrates Hugh Fraser's comments about fitting infiltration drainage into an aesthetic streetscape/roadway. People love this touch-of-BC-landscape right on a busy street surrounding a bus stop!" – Deborah Jones, November 2014*

Heath School Rain Garden, North Delta

Photo Credits: *Cougar Creek Streamkeepers*

Figure 57

City of North Vancouver

Compact and fully urbanized, the City of North Vancouver is undergoing redevelopment to higher density land use. This creates opportunities to build a greener community, live water smart and adapt to a changing climate. The City's rain garden program embodies those three objectives.

Why the City Has a Rain Garden Program: "About a decade ago, Tony Barber brought forward the vision for building rain gardens and enhancing the City's streetscapes (Figure 58). He

was the staff champion whose passion and commitment made the rain garden program a reality. This is part of his personal and professional legacy," states Mayor Darrell Mussatto.

"It had taken decades of urbanization to cause the progressive decline of the City's creeks. Restoring stream health requires a long-term commitment over decades by the community, successive Councils and City staff.

"Rain gardens have ecological importance, and are a standard requirement for all developments in the City of North Vancouver. In addition, all of our major transportation projects incorporate rain gardens. We know that a single rain garden will not make a material difference to conditions in our creeks. But 1000 rain gardens would be a different story. All those rain gardens would add up."

"Before the City's mindset was out of sight, out of mind. Now we celebrate rain. We have success stories to share, and we are ready to engage the community in a broader conversation about rainwater management and where future rain gardens would be located. We would like neighbourhoods to get involved in the design of their rain gardens," emphasizes Mayor Darrell Mussatto.

Design with Nature to Create an Interface: "Rain gardens are a form of urban

green infrastructure," states Doug Pope, City Engineer. "In this context, the City's vision is that we can enhance and elaborate the interface between urban and natural states. For more than a decade, the City has been demonstrating how to do this."

"In doing this work, we are not re-creating pristine natural conditions. Rather, by designing with nature we are creating an informed and intentionally designed urban landscape," adds Douglas Pope, City Engineer.

"The City is prepared to take a chance in doing business differently. Yes, there will be growing pains and sometimes there will be mistakes. Yet, this is what leads to innovation and efficiencies."

"A guiding principle is to achieve a balance between rainwater management on public and private lands," concludes Doug Pope.

What the City Has Learned: "Once you get started with any new process, you get feedback

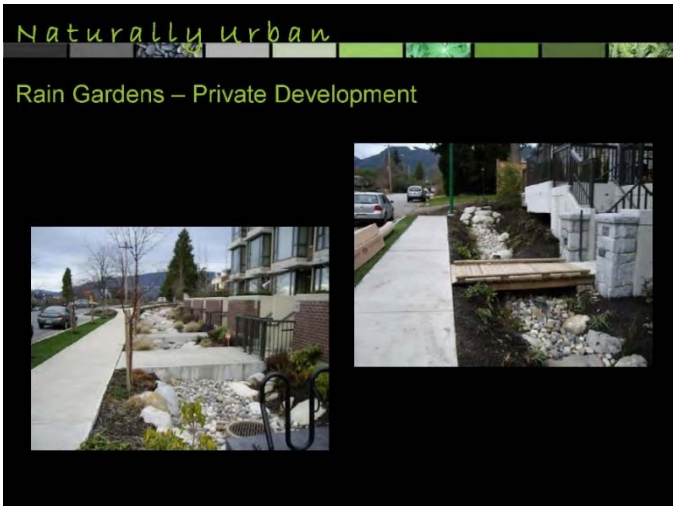
that generates 'collisions of ideas'. The processes get better and the products become stronger. And that is what we are seeing in the City," explains Peter Navratil, Deputy City Engineer.

"Push-back from developers declined once they saw what a rain garden looked like for the first time. From all perspectives, it gets easier and easier with each successive installation."

"Simply put, an enhanced streetscape is a requirement for re-development. Rain gardens installed within bumpouts are a standard requirement of all developments. The benefits go well beyond rainwater management, addressing safer pedestrian movements and aesthetically pleasing streets," concludes Peter Navratil.

Hardening of the urban landscape impacts stream health:

Restoring stream health starts with capturing rain where it falls:



Source: Presentation by Tony Barber at 2010 FCM Sustainable Communities Conference

Figure 58

e. Adaptive Management Framework

In 2010, the BC Minister of Environment placed a condition on approval of the regional *Integrated Liquid Waste and Resource Management Plan*. The condition required that member municipalities work with Metro Vancouver to develop a program which would monitor stormwater and assess the effectiveness of Integrated Stormwater Management Plans (ISMP's).

A Collaborative Interagency Approach: *"There are 21 municipalities in the Metro Vancouver area. The challenge was to develop a program which would be cost-effective, consistent and fair for municipalities with very different drainage systems and budgets," says Melony Burton (City of Coquitlam), Chair of the Stormwater Interagency Liaison Group (SILG).*

To address this challenge, Metro Vancouver formed a technical group with members of SILG, the regional Environmental Monitoring Committee (EMC) and the Ministry of Environment. The group collaboratively developed the Monitoring and Adaptive Management Framework (AMF), which provides an approach for (Figure 59):

- tracking ISMP implementation;
- monitoring watershed health in a cost-effective, consistent, and meaningful way;
- using monitoring results to identify impacts
- analyzing and prioritizing those impacts to select the most effective adaptive management practices to bring about improvements; and
- reporting out to Ministry of Environment on all the components above.

Goal is to Improve Watershed Health: The AMF document covers five major areas: (1) the monitoring framework; (2) data collection methodology; (3) assessing and reporting results; (4) adaptive management actions; and (5) supporting information on supplemental monitoring and cost savings.

The framework focuses on adaptive management to stimulate continuous improvements in watershed health. As a management tool, the AMF provides key information to help identify whether adaptive management is needed and to help prioritize where to focus limited resources to gain the most benefit for aquatic health if impacts are detected.

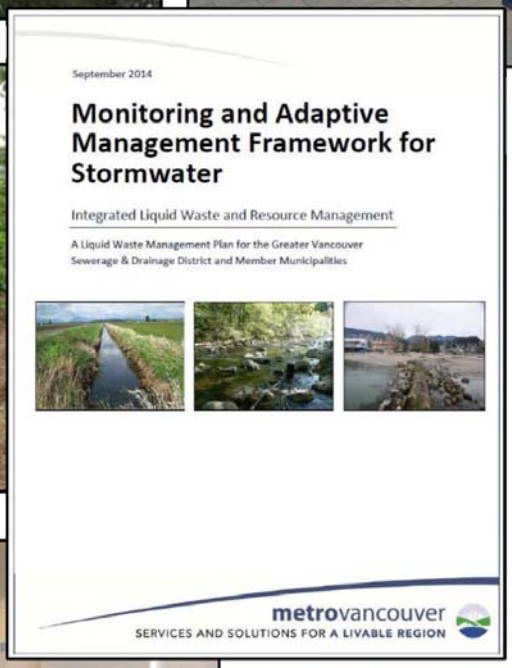
Protecting the region's waterways and aquatic life from the pressures of development is a challenge: *"The AMF provides an opportunity for municipal actions to fit together into a regional approach for watershed protection. It allows for more consistency, efficiency, and cooperation in efforts to protect the region's valuable resources. Application of the standardized approach would build on the accumulated experience of stakeholders in the ISMP process, produce meaningful results and save time and resources for both the municipalities and the Ministry of Environment,"* notes Andjela Knezevic-Stevanovic, Director, Environmental Management & Quality Control, Metro Vancouver.

"I commend Metro Vancouver and the Stormwater Interagency Liaison Group for collaborating to develop a program that measures ISMP effectiveness, reports on stream health, and prioritizes adaptive management actions. Our Ministry looks forward to continuing to work with Metro Vancouver and member municipalities to protect this region's waterways and aquatic life," adds A.J Downie, Regional Director, Coast Regional Operations, Ministry of Environment.

AMF enables municipalities to report out on the effectiveness of watershed-based planning initiatives and health of their watersheds….

Water Quality Sample Collection

Members of the Adaptive Management Framework Technical Working Group



September 2014

Monitoring and Adaptive Management Framework for Stormwater

Integrated Liquid Waste and Resource Management

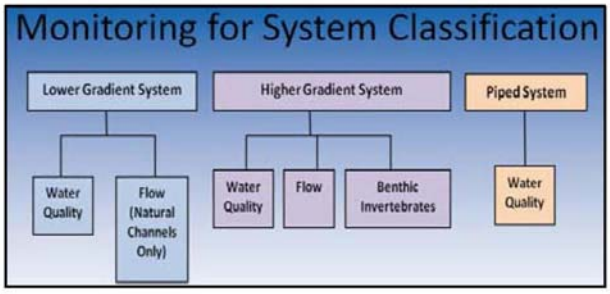
A Liquid Waste Management Plan for the Greater Vancouver Sewerage & Drainage District and Member Municipalities

metrovancouver

SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Monitoring Results Report Sheet

In November 2013, Metro Vancouver hosted an information session to inform a broader audience and garner additional feedback before finalizing the AMF



Components of the standard AMF monitoring program for each of three system types

Figure 59

'Regional Team Approach' - Tackling Big Goals Together

Melony Burton
Chair, Metro Vancouver Stormwater Interagency Liaison Group
Supervisor, Infrastructure Management
City of Coquitlam
September 2015

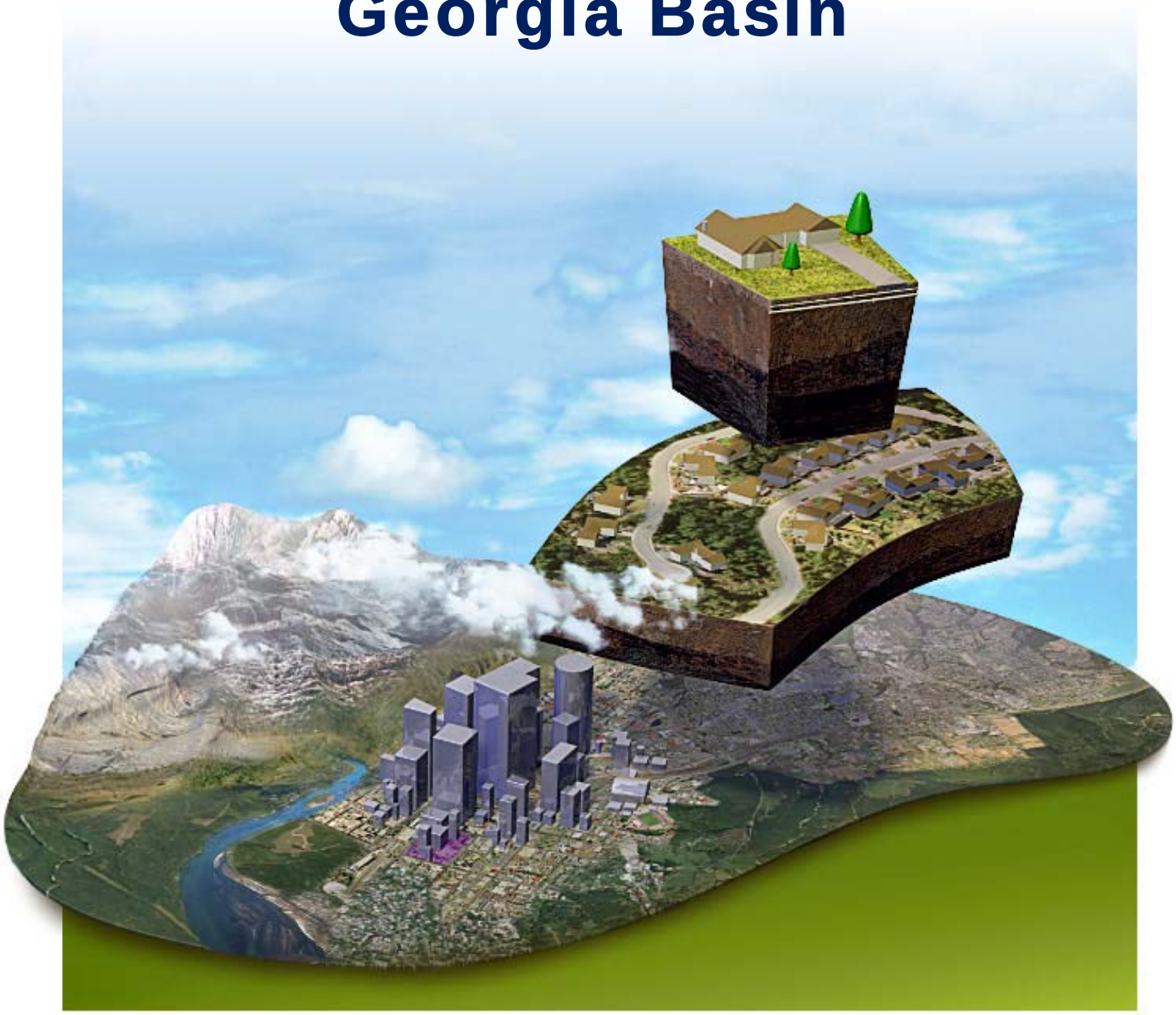
"The Stormwater Interagency Liaison Group (SILG) is made up of engineers from 21 Metro Vancouver municipalities, one treaty, and one electoral area. The committee meets every second month to discuss stormwater issues and share practical experience. They also work closely with Metro Vancouver to meet regulatory obligations."

"Over the years, this group has commissioned several useful documents such as the ISMP Template, Stormwater Source Control Design Guidelines, ISMP Lessons Learned and the Monitoring and Adaptive Management Framework (AMF). The committee is now working to develop a region-wide approach for single family rainwater management."

"SILG members take turns making presentations about projects in their municipalities while guest speakers keep the committee tapped into related initiatives in different fields or regions. These show and tell sessions expose members to creative approaches while offering up insights on processes and challenges. Trading ideas and materials also prevents the duplication of efforts."

"At SILG, we respectfully challenge each other's ideas to come up with solutions that are far more robust than any one of us could develop in isolation. There are big, audacious visions and goals for reform in watershed health and stormwater management. These have birthed daunting objectives that often progress at a painfully incremental pace. But it is important to acknowledge that many of these problems are complicated and have no quick fix. If they did, individual municipalities would have already addressed them. Collectively, we bring a wealth of knowledge, experience, ideas and organizational resources to the table to tackle big goals together. This is how the hard stuff gets done."

Towards A Watershed Health Legacy in the Georgia Basin



This Page Intentionally Left Blank

10. A Look Ahead

The 'new normal' in British Columbia is floods and droughts. The summer dry season has extended on both ends and we can no longer count on a predictable snowpack and reliable rain to maintain a healthy water balance in our watersheds. Annual volumes of water entering and exiting our regions are not necessarily changing; instead, what is changing is how and when water arrives – it is ***feast AND famine.***

The drought of 2015 that extended east from Vancouver Island to Manitoba and north from Mexico to the Yukon suggests we may be crossing an invisible threshold into a different hydro-meteorological regime in Western North America.

If a region is in a 6-month drought and then gets the normal 6-month rainfall in a week, for example, average precipitation remains the same – but the effects are very different. Regime changes matter far more than many thought.

Sustainable Watershed Systems, through Asset Management: This chapter summarizes why the three provincial game-changers (introduced in Part B) are drivers for *Sustainable Watershed Systems, through Asset Management*.

It then elaborates on the 'Water OUT= Water IN' mind-map for looking at the Water Balance differently.

Finally, it enlightens how the *Georgia Basin Inter-Regional Educational Initiative* (IREI) would facilitate integration of watershed systems and natural capital thinking, as well as adaptation to a changing climate, into asset management.

> *Over the next two years, the IREI program would progressively inform and educate an expanding network of practitioners, inside and outside local government.*

Watershed Systems as Infrastructure Assets: A watershed is an integrated system, is infrastructure, and must therefore be viewed as an asset that provides municipal services. Watershed systems thinking covers the continuum from water supply to drainage, and encompasses human and/or ecosystem needs.

Where a local government regulates land use, a watershed is an integral part of the drainage infrastructure assets of the local government. More specifically, the three pathways (surface, interflow, groundwater) by which rainfall reaches streams are infrastructure assets. They provide 'water balance services'. As such, protection and maintenance of the three pathways has financial, level-of-service and life-cycle implications for asset management.

> ***Asset Management for Sustainable Service Delivery: A Framework for BC*** *makes the link between local government services, the infrastructure that supports the delivery of those services, and watershed health.*

What Happens on the Land Matters!

A systems approach to watershed health and protection recognizes that actions on the land have consequences for the three pathways to streams and hence the water balance of the watershed. Those consequences are felt in both dry weather and wet weather – too little or too much water, respectively.

Local governments regulate how land is developed, drained and serviced. This means local governments have the authority and ability to determine and implement **watershed-based volume targets** that would help to prevent drainage impacts in wet weather and also maintain an adequate water supply in dry weather for human and/or ecosystem needs.

Call to Action: A 'teachable year' heightens awareness, leads to a sense of urgency, and engenders political will to implement necessary changes in how communities service land and respect water.

Drought, forest fires, floods and pine beetle in 2003 created a teachable year for change in BC. It truly was a 'watershed moment' and led directly to the *Water Sustainability Action Plan for BC*, released in 2004. The subsequent response by provincial, regional and local government champions to a 'call to action' by former Premier Gordon Campbell gave BC a head-start on many other regions to include water supply sources, streams and aquifers as infrastructure assets.

> *The outcome? A decade later, provincial 'game-changers' are now in place that would enable protection and/or restoration of 'water balance' assets in the built environment. A key objective (desired outcome) for integration of watershed systems thinking into asset management is protection of hydrologic integrity.*

Get It Right & Avoid Expensive Fixes: 2015 is yet another 'teachable year'. The impact of the 2015 drought on public awareness has created a timely window of opportunity. The stage is set for BC to take a quantum step towards implementing a full-scale Water Balance approach.

This would go beyond traditional drainage infrastructure to encompass services that nature provides. It would connect land and water. We define this holistic approach as *Sustainable Watershed Systems, through Asset Management*. Benefits would accumulate over time and would include lower life-cycle costs for infrastructure assets. Also, communities would be more resilient during periods when there is either too much or too little rain.

What happens on the land does matter – for example, hardening the land surface short-circuits the water cycle (balance). The result: either too little or too much flow in watercourses. Consequences include avoidable and expensive fixes in an era when communities are challenged to fund and replace essential infrastructure services.

The 2015 drought could potentially be the catalyst for widespread implementation of tools and experience gained by local government leaders over the past decade. Apply an understanding of watershed systems as infrastructure assets to turn the clock back, restore watershed health and build water-resilient communities.

Game-Changers Enable Action

The Province has long recognized that communities are in the best position to develop solutions which meet their own unique needs and local conditions. Viewed through a local government lens, a fundamental difference between BC and other provinces is that BC legislation enables 'bottom-up' solutions and action, whereas other jurisdictions prescribe 'top-down' requirements.

Furthermore, the emphasis in BC is on progressing towards a desired outcome. By comparison, the main focus in other regions of Canada is on compliance with engineering criteria. This is a fundamental difference in approaches. It helps explain why integration of watershed systems thinking into asset management goes beyond engineering criteria.

In 2014, the *Across Canada Workshop Series on Resilient Rainwater Management: Adapting to a Changing Climate* introduced audiences in Alberta, Ontario, Quebec and the Maritimes to BC's collaborative and adaptive approach. The series provided an informed basis for comparing BC's 'top-down & bottom-up' approach with initiatives in other provinces.

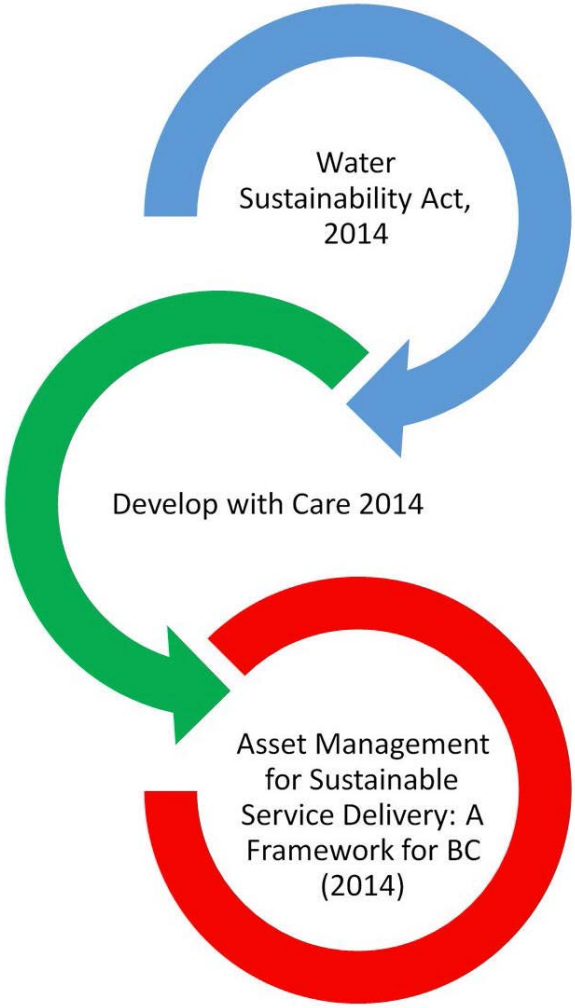
Protect Hydrologic Integrity and Watershed Health: Three landmark initiatives came to fruition in 2014. All embody the enabling philosophy. Together they provide a platform for integrated and coordinated actions that would enable local governments to achieve *Sustainable Watershed Systems, through Asset Management*.

- **WHAT** – The 'Water Sustainability Act' connects land and water, and makes the link to desired water balance outcomes (that would be achieved by integrating watershed systems thinking into asset management).
- **SO WHAT** – 'Develop with Care 2014' makes the link between environmental function and resilience as communities grow.
- **THEN WHAT** – 'Asset Management for Sustainable Service Delivery: A Framework for BC' makes the link between local government services, the infrastructure that supports the delivery of those services, and watershed health.

A Focus on Outcomes: The *BC Framework* is strategically aligned with asset management requirements under senior government funding programs. This provides additional incentive for implementing holistic asset management practices, including integration of watershed systems thinking and natural capital into asset management. Of the three drivers, this means the *BC Framework* is the lynch-pin for local governments to protect (restore) hydrologic integrity and watershed health. Resilient communities will be the ones that can affordably manage the urban water cycle as a closed loop.

The *BC Framework* focusses on desired outcomes, purposefully not prescribing specific solutions. This allows local governments to develop and implement an approach that can be incremental and measured, tailored to the individual needs and capacity of each local government. This encompasses all aspects of the local government domain, including infrastructure and assets that relate to water.

These Game-Changers Enable Action:



The BC Framework is the lynch-pin for integration of watershed systems thinking and natural capital into asset management.

Build Resiliency to Achieve a Balance: 'Water OUT = Water IN'

Introduced in Part B, the image below is a communication tool. Deceptively simple, the 'OUT=IN' equation embodies basic principles and concepts for dealing with uncertainty, managing risk, and implementing an integrated approach to land and water management.

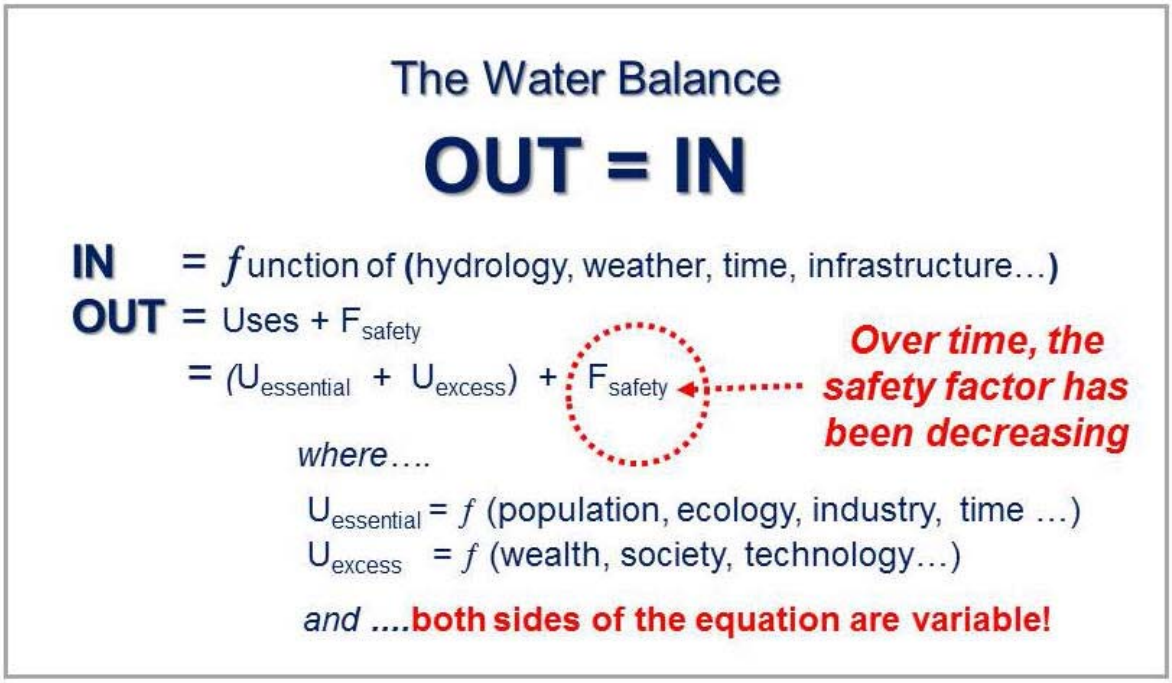
Adapt to a Changing Climate: The equation is variable on both sides, and over time the safety factor has been decreasing in BC, in large part due to population growth. The 2015 drought shows that BC may be at a tipping point. One needs to think about and act in relation to newly experienced extremes in anticipation of these becoming potentially future norms.

Population-support capacity and ecosystem needs are two of many variables. When water needs are small relative to the water resource, variability on the OUT side is not that noticeable and the safety factor is large. But when needs are large relative to the available water, a small variation on the IN side magnifies the perception of impact. The safety factor may be marginal or non-existent. In many cases, BC communities are operating on narrow margins.

Climate change is exacerbating an existing vulnerability (a seasonal water imbalance). When we are vulnerable on the IN side of the equation, we then have to build in resiliency on the OUT side. But where will we do that, recognizing that everything is in flux?

The answer is that we look for the little things that will yield cumulative benefits in the built environment. This is key to being able to mimic the seasonal Water Balance distribution and volumes.

> *Start with soil, vegetation and trees - protect and preserve the absorbency of the landscape in the built environment. Sustain the three pathways by which rainfall reaches streams – maintain the natural proportions of annual Water Balance volumes for surface runoff, groundwater and interflow (lateral flow in shallow soils).*



Look at a Watershed as a Whole System: Protection of watershed health starts with an understanding of how water gets to a stream from individual sites, how long it takes, and whether there are impacts along the way.

Apply the **Water Balance Methodology**, adopted by the Province in 2002, to mimic the hydrologic performance of a watershed. Establish targets that maintain the Water Balance distribution, both by season and pathway. Urban hydrology is a compromise between accuracy and data availability. Avoid the pitfalls of Voodoo Hydrology. Include streams as assets that need protection from land servicing consequences.

Andy Reese, prominent American water resources engineer and author, coined the term Voodoo Hydrology in 2006 to describe the pseudo-science that characterizes drainage engineering and stormwater management practice. He cautioned:

> *"We must understand that urban hydrology is an inexact science where we are simply trying to get close to the right answer. We are dealing with probabilities and risk, a changing land-use environment, and many real-world factors that can alter the answer. The applications we may encounter can vary radically. Therefore, it behooves us to better understand the inner workings of the black boxes we commonly use."*

> *The need to protect headwater streams and groundwater resources in BC means communities must expand their view from one that looks at the site by itself, to one that considers the site, watershed, stream and aquifer as an integrated system.*

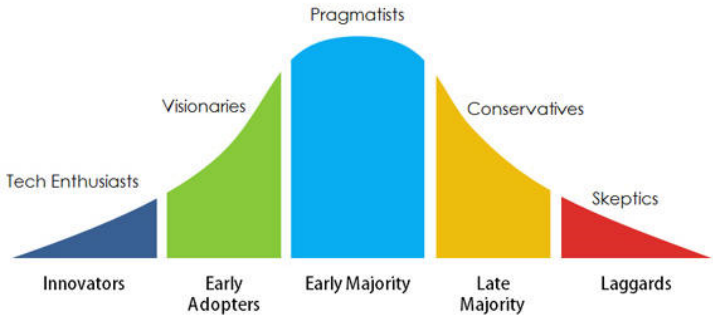
Integrate Watershed Systems Thinking Into Asset Management

Launched in 2012, the Georgia Basin Inter-Regional Educational Initiative (IREI) is endorsed by five Regional Boards representing 75% of the population of BC. In April 2015, all five – Capital Region, Metro Vancouver, Nanaimo Region, Cowichan Region and Comox Valley – recommitted through 2017. Program delivery is led by the Partnership for Water Sustainability in BC, which serves as the secretariat for the IREI.

By 2017, a program goal is that all local governments would understand how to achieve Sustainable Watershed Systems, through Asset Management (supply source, stream, aquifer).

> *The goal is a modest one. It is achievable because it recognizes how an idea or innovation is adopted or accepted. Progress in leading and implementing change is incremental.*

Implementing Change – from Genesis to Mainstream: Introduced in Chapter 4, the image below illustrates the process of adoption of a new idea or innovation over time. This understanding has guided implementation of the Water Sustainability Action Plan (including the IREI program) for the past decade. Everyone learns from stories and the most compelling ones are based on the experience of the champions who are leading implementation of watershed-based solutions.



Over the past decade, the Water Sustainability Action Plan has facilitated cross-pollinating of ideas and approaches in the local government setting. The ongoing process of sharing and learning has influenced initiatives and outcomes within the five partner regional districts. Through 2017, IREI program objectives are four-fold:

1. **Build** on the existing IREI technical and educational foundation to further integrate the asset management lens.
2. **Develop** additional content and how to implement a *Sustainable Service Delivery Methodology* through a 'demonstration application' (with the Cowichan Valley Regional District taking the lead and the IREI Leadership Team serving as a sounding board).
3. **Communicate** the story of the content development process, outcomes and deliverables.
4. **Conduct** training to apply the *Sustainable Service Delivery Methodology* to water resources.

> *By 2017, it is envisioned that professional development provided by the IREI program would result in a common understanding among all departments within an organization about how they could align their efforts to achieve* ***Sustainable Watershed Systems, through Asset Management****.*

Road Map for Water & Watershed Sustainability

Going forward, the IREI program will be guided by the road map presented as Figure 60. This conceptualizes the multiple land and water processes that can be in play in a region, the potential interactions between processes, as well as the interactions among IREI partners. It also illustrates how a Regional Water Sustainability Plan could ultimately be the integrator of those processes.

Regional Water Sustainability Plans: The Water Sustainability Act allows for the integration of regional water and land use planning in conjunction with other local, regional or planning processes. As reported in Part B, the scale and scope of this form of integrated plan – and the process used to develop it - would be unique, and would reflect the needs and interests of the communities and watersheds affected. In situations where other area-based management tools are not able to address the *links between land use and watershed impacts*, a Regional Water Sustainability Plan would be an effective tool for local government to employ.

Ecological Accounting Protocol: The IREI focus is on making *Sustainable Watershed Systems* real to local government practitioners and decision-makers. The twin technical pillars of the IREI program are the Water Balance Methodology (existing) and Ecological Accounting Protocol (to be developed).

The best blend of engineered assets (infrastructure) and natural assets (that provide ecological goods and services) would support a robust long-term asset management plan and the required financial commitments.

To be undertaken by the Partnership for Water Sustainability in 2016-2017 as a parallel initiative, the Ecological Accounting Protocol project will address the challenge of determining financial values for goods and services drawn from natural systems.

Road Map for Water & Watershed Sustainability:

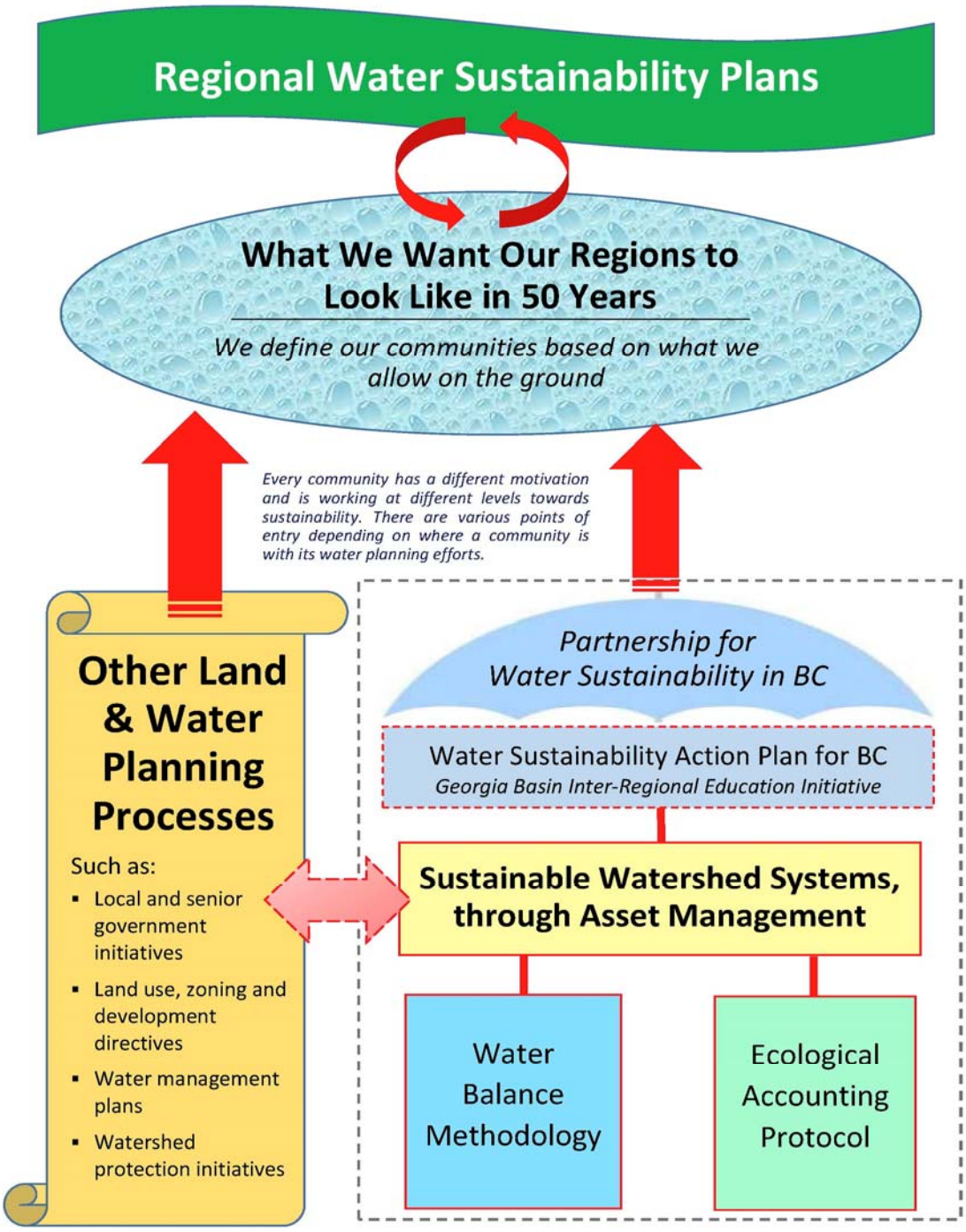


Figure 60

Concluding Remarks

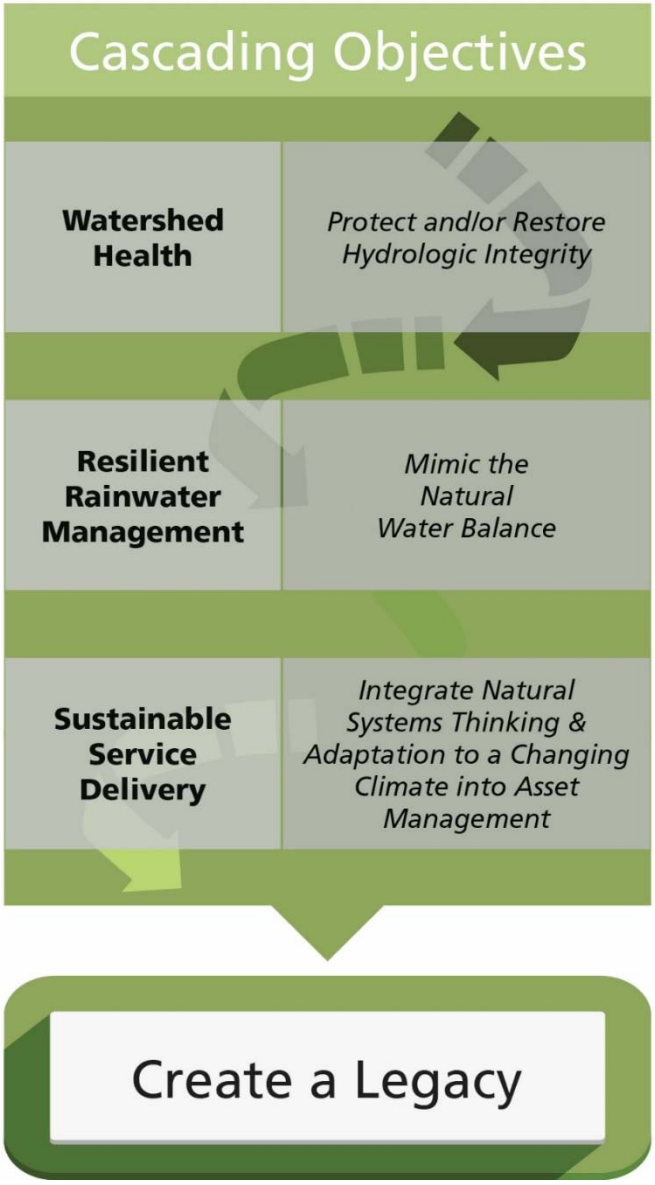
The rate of progress in implementing new ideas or standards of practice generally depends on the willingness of individual champions in local government to push the envelope in applying new approaches. The number of water sustainability champions throughout British Columbia is growing, and they are collaborating.

Asset Management for Sustainable Service Delivery: A BC Framework is a game-changer. It signifies the dawn of a new era for local governments in terms of how communities service urbanizing and redeveloping areas, and define how infrastructure is planned, financed, implemented and maintained. Watershed systems are infrastructure assets.

British Columbia local governments are sharing and learning from each other. The province is at a tipping point. Water balance tools and case study experience are in place. It is within the grasp of local governments to move beyond traditional infrastructure asset management. They can account for nature's services by implementing *Sustainable Watershed Systems, through Asset Management*.

Over the next two years, the IREI program would progressively inform and educate an expanding network of practitioners (inside and outside local government) on how to integrate watershed systems thinking and climate change adaptation into asset management (to achieve hydrologic integrity and hence avoid expensive fixes).

> ***Sustainable Watershed Systems, through Asset Management****, and getting it right at the front-end, would apply to land uses that local governments regulate and/or can influence within settled areas of watersheds.*



TURN THE CLOCK BACK: *Influence the form and function of Built Environment. Replicate a desired watershed condition. Shift the ecological baseline upwards.*

This will take time, commitment and perseverance

Sustainable Watershed Systems, through Asset Management applies to land uses that local government regulates and is founded on an understanding of how the **Water Balance Methodology** integrates the **Site** with the **Watershed, Stream** and **Groundwater Aquifer**

The Water Balance Methodology is about managing the whole rainfall spectrum and providing benefits to the stream through the wide range of stream needs - from base flow to managing flooding. The Water Balance Methodology bridges all ranges in rainfall and streamflow events. The Water Balance Methodology incorporates robust and proven calculation techniques and engineering applications to define a watershed and stream as a whole system. In this manner the results can be used to provide a quantitative assessment of both impacts and mitigation effectiveness. It also possible to show benefits that have been long thought as not achievable.

This Page Intentionally Left Blank