

Challenge and change brings opportunity!

"The 'Rising to the Challenge' Conference will reach out beyond our core industry practitioners to engage with a broader group of committed and talented people who will all need to work together to develop the solutions of the future."

Andrew Allan
National President
Stormwater Australia
August 2016



The New Normal in British Columbia



Dan Burritt, CBC Vancouver Rewslat% FM

Parallel Journeys to a Water-Resilient Future





Tony Weber Queensland

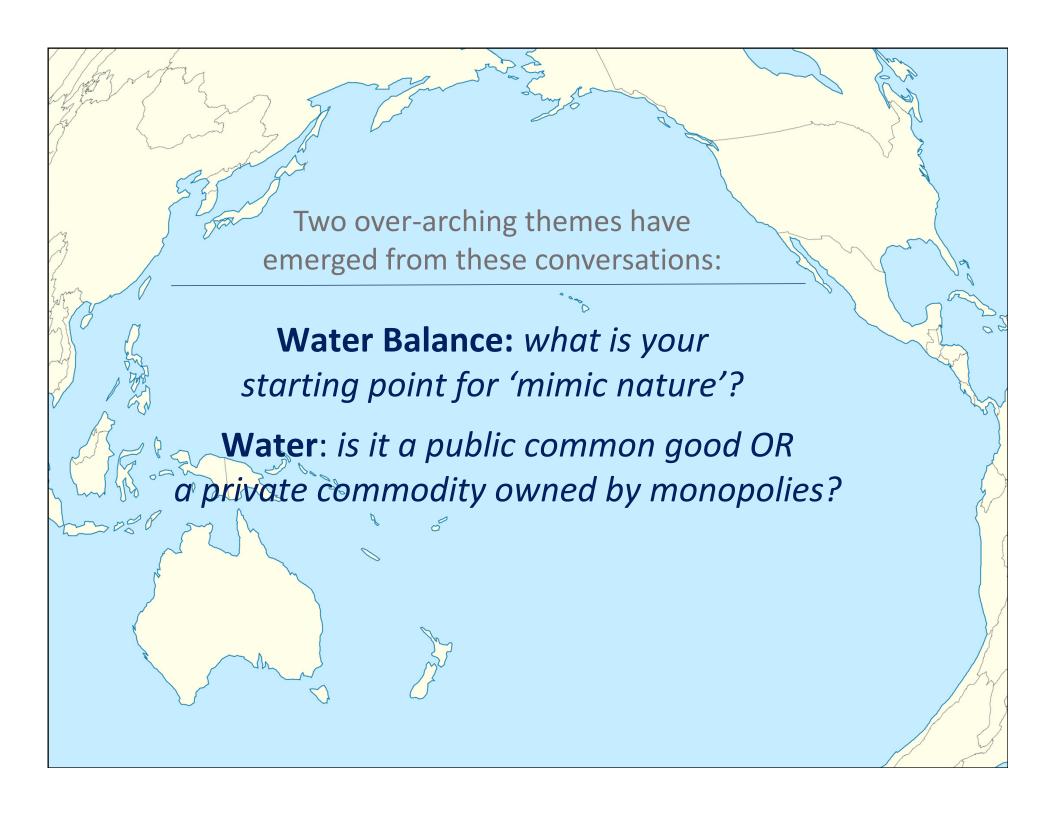


Peter Coombes
New South Wales



John Thwaites
Victoria

Andrew Allan Victoria



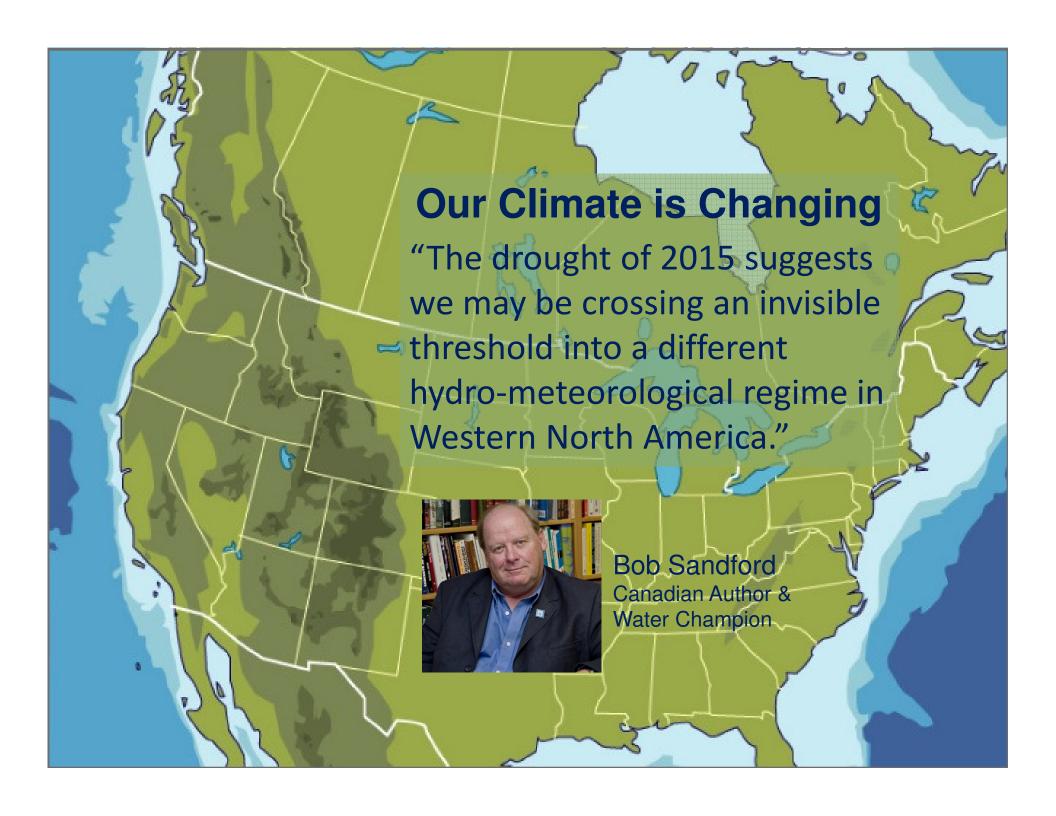
In 1995, Dr. Daniel Pauly coined the phrase "Shifting Baseline Syndrome"

Communities could re-set the "With each new generation, ecological baseline IF they would the expectation of various implement 'standards of practice' that ecological conditions shifts. restore a desired watershed condition. The result is that standards are Some Good Thing = Driver for Action lowered almost imperceptibly." Achieving this would take time, (Aquatic Habitat, Salmon, Clean Water or...) commitment and perseverance. The curve represents a Each generation adjusts its succession of changes. baseline to the new level generation n n + 1n + 2 etc.

Decades or Centuries

Parallel Journeys to a Resilient Future

- The New Normal in BC
- Water Balance 101
- Convening for Action in BC
- Sustainable Watershed Systems



British Columbia Population = 4.6 million

75% live in the southwest corner in the Georgia Basin, including Vancouver Island.

Another ~8% reside in the Okanagan Basin in the southern interior

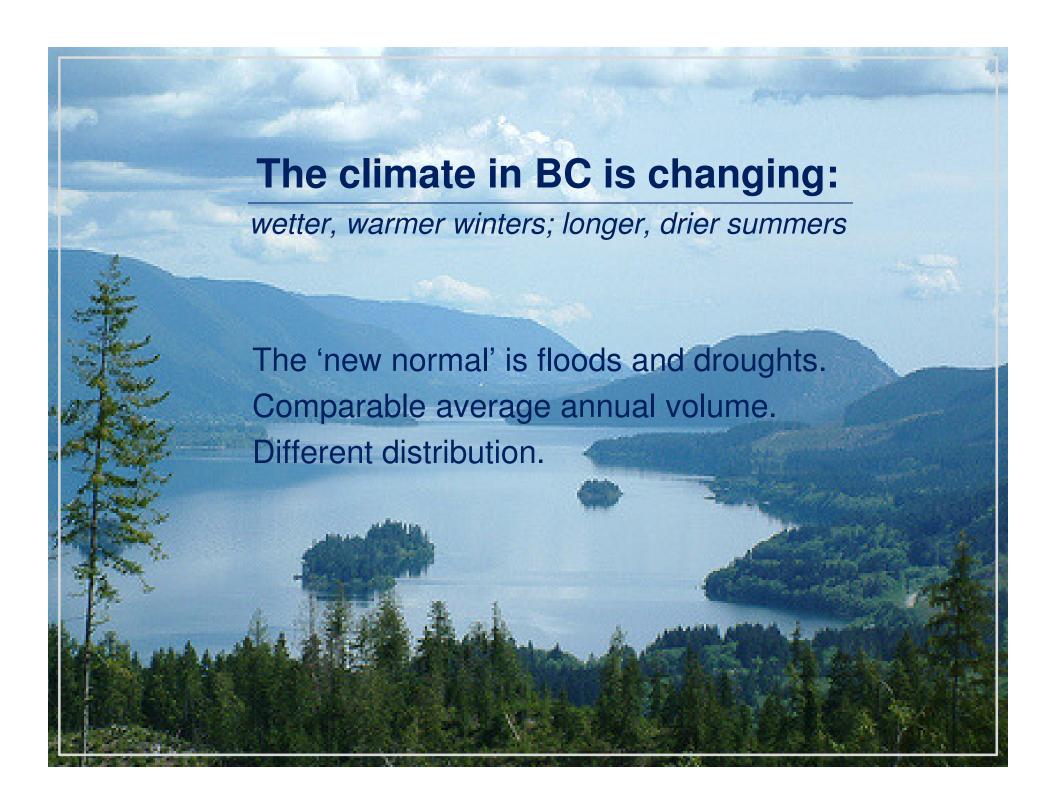
Georgia Basin population = 3.5M

This compares with 3.4M in Southeast Queensland



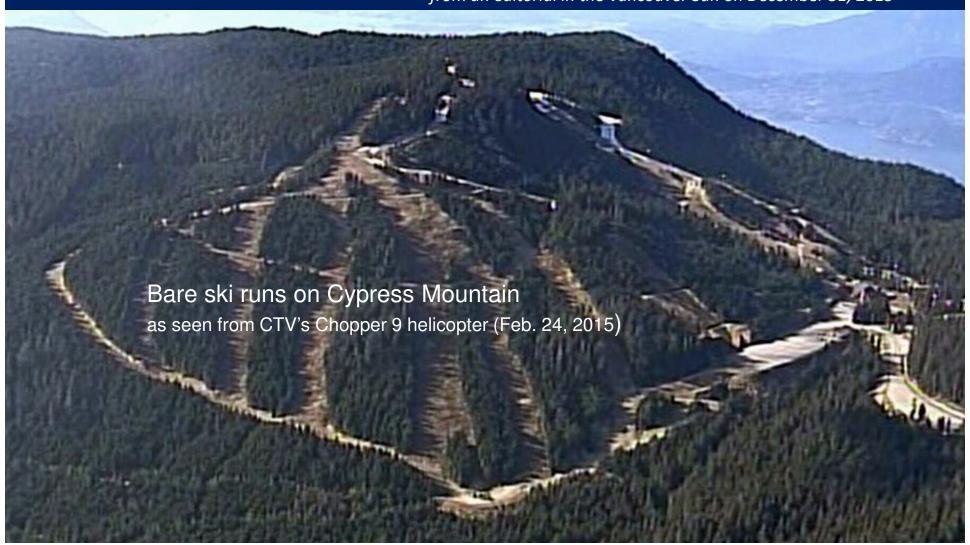
Home to 3½ million people, the Georgia Basin encompasses the east coast of Vancouver Island and the Lower Mainland Region (including Metro Vancouver)





"2015 was the year of the great drought, dwindling snow packs, melting glaciers, beleaguered salmon runs and a costly forest fire season, followed by windstorms and heavy rains."

from an editorial in the Vancouver Sun on December 31, 2015



2015 is a 'teachable year' for change, the first since 2003 when....

Drought

Forest Fires

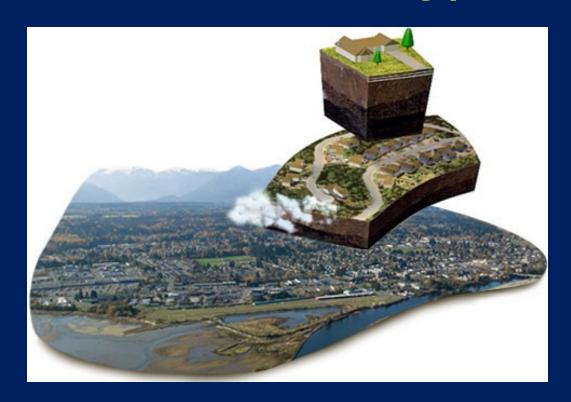
Floods

Pine Beetle



Satellite imagery of forest fires in the Okanagan Basin

A legacy of past community planning and infrastructure servicing practices is...



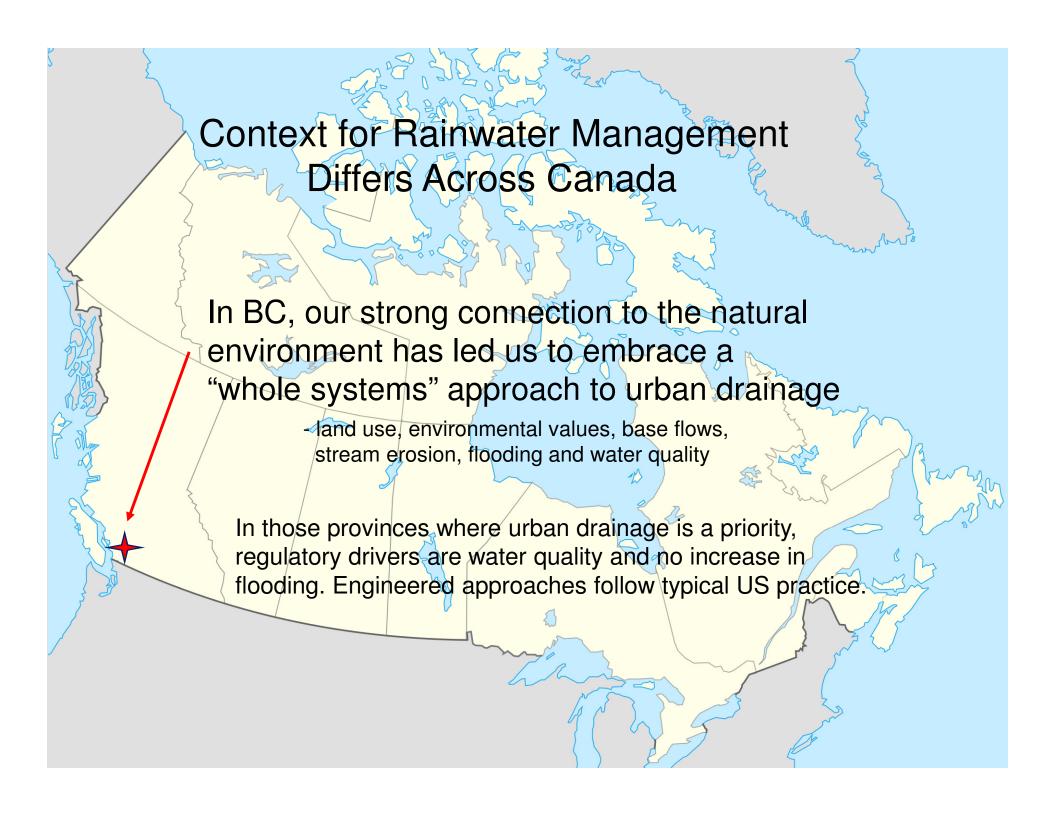
The natural water balance of watersheds is out of balance!

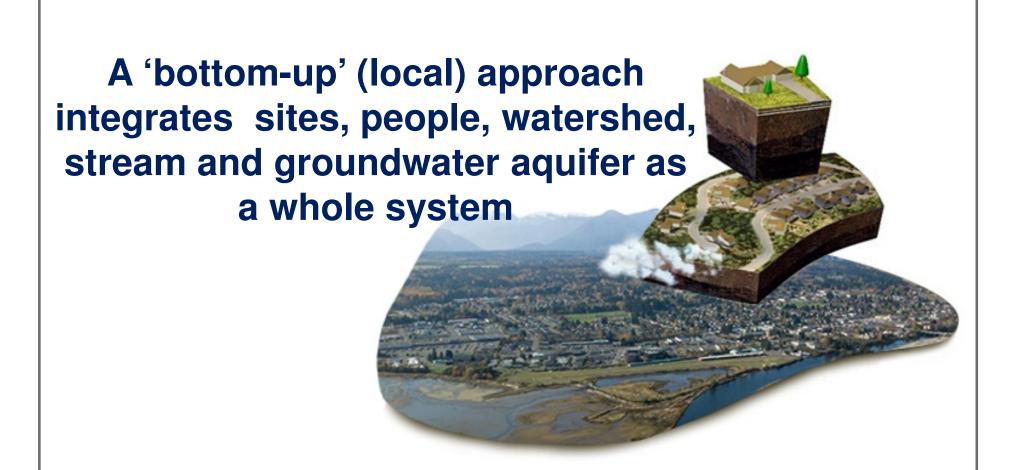
This has financial, level-of-service and lifecycle impacts and implications that are drivers for local government action



Parallel Journeys to a Resilient Future

- The New Normal in BC
- Water Balance 101
- Convening for Action in BC
- Sustainable Watershed Systems





Mimic the WATER BALANCE to Reduce Risk, Improve Watershed Health and Comply with Regulatory Requirements

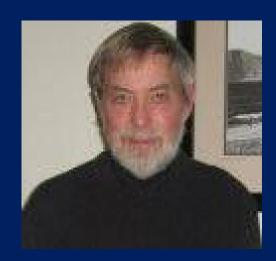
Key Message:

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

BC is primarily a mountainous region Headwater tributary streams are a predominant feature Watershed health is very much about protection of aquatic habitat ☐ The critical issue is aquatic habitat damage and loss caused by land development and erosion of streams

In 1996, Washington State research established the "primacy of hydrology"

"Get the hydrology right and water quality typically follows along"



Richard Horner, PhD
Professor Emeritus
University of Washington
Seattle



Chris May, PhD
Division Director, Surface & Stormwater
Kitsap County
Washington State

Linking Rainfall, the Landscape, Streamflow, Groundwater and Sustainable Service Delivery has been a building blocks process

2002 – How to reduce runoff volume

2007 – How to mimic flow-duration

2012 – How to sustain deep infiltration

2013 – How to integrate performance targets

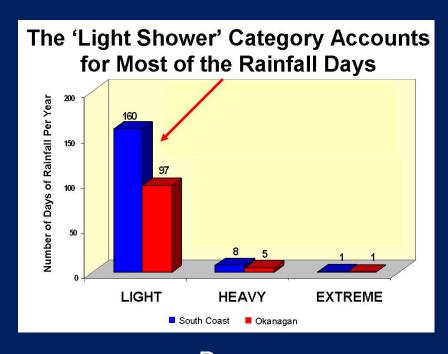
2014 – How to downscale targets to a site level

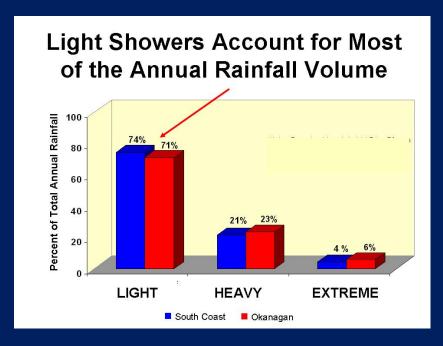
2015 – How to view water balance pathways as infrastructure assets providing services

Science-based understanding becomes clearer over time

In 2000, inspired by Horner & May we went back to basics in BC and developed the concept of a Rainfall Spectrum.

We demonstrated the achievability of "rainfall capture". This helped overcome fear and doubt.

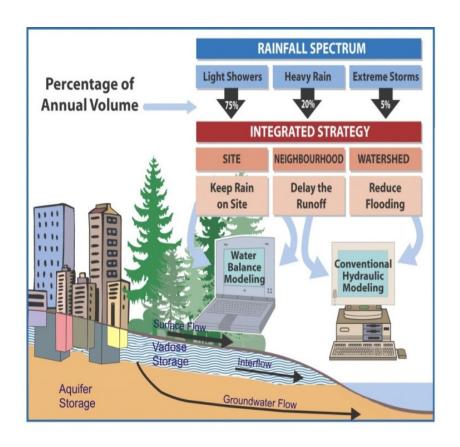




Days Volume

Guiding Principle #1 – Manage all the rainfall-days in the year

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

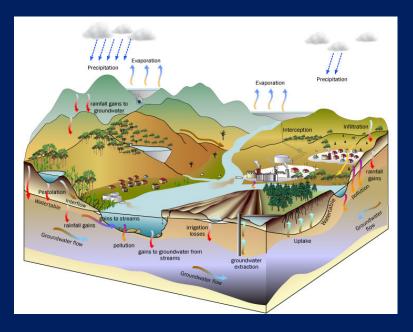
Deep Groundwater from years to decades or more

GUIDING PRINCIPLE #2:

Maintain the proportion of rainwater entering the stream via each pathway!

Water Balance in a West Coast Watershed

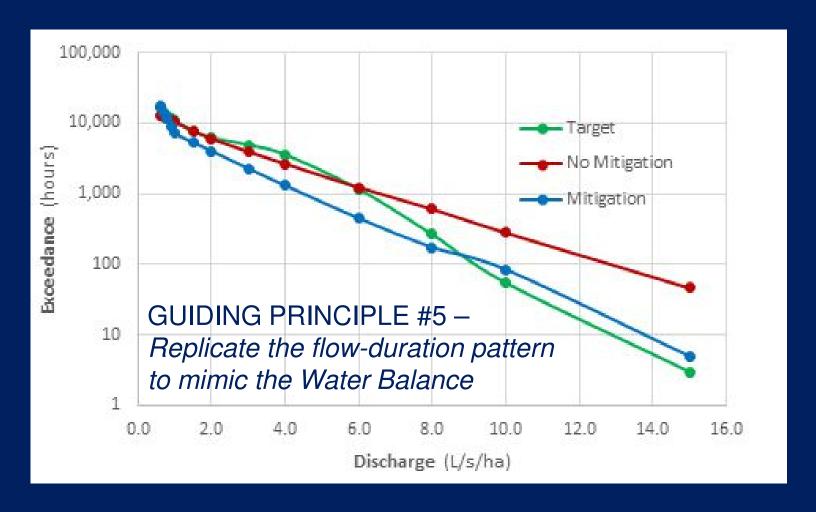
Guiding Principle #3 : Understand where the water goes naturally and reproduce those conditions



PRECIPITATION = 100%		
LOSSES = 20%		
	Surface Evaporation	= ~10%
	Loss to Deep Groundwater	= ~ 5%
	Plant Transpiration	= ~ 5%
STREAMFLOW = 80%		
Water Balance Pathways	Direct Runoff	= ~10%
	Groundwater from Aquifers	= ~15%
	Interflow	= ~55%

Guiding Principle #4: Restore interflow to maintain hydrologic integrity

If the desired outcome is to limit stream erosion, prevent flooding and improve water quality, then.....

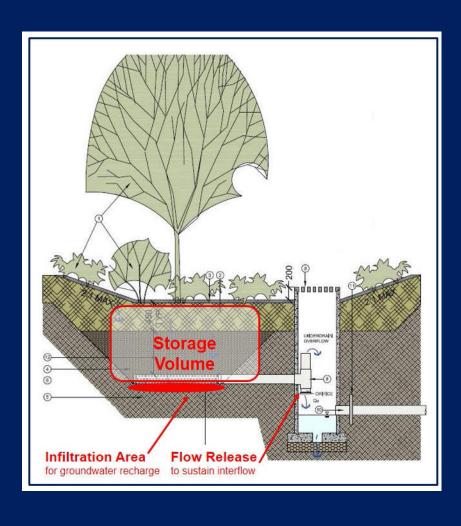


Results are from a <u>lumped</u> and <u>calibrated</u> continuous simulation computer model of pre-development conditions

A journey to a water-resilient future starts with the first rain garden.....



A journey to a water-resilient future starts with the first rain garden.....



Visualize the design elements of a Rain Garden:

- Volume for Interflow Storage
- Release to Sustain Duration of Interflow (Shallow Groundwater)
- Area to Allow for Deep Groundwater Recharge

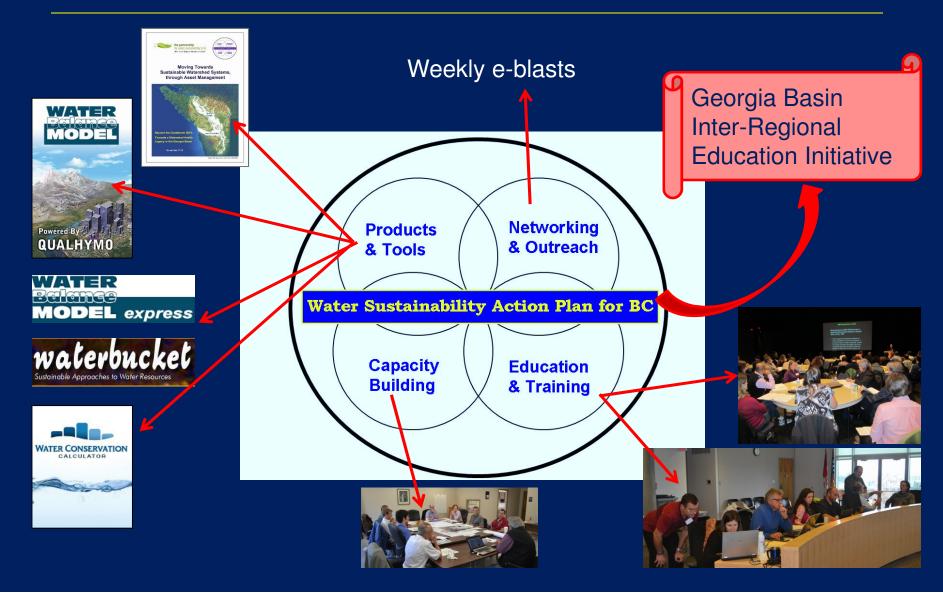
Parallel Journeys to a Resilient Future

- The New Normal in BC
- Water Balance 101
- Convening for Action in BC
- Sustainable Watershed Systems

OUR MISSION:



Develop Tools. Develop Talent. Focus on Outcomes



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 'regional team approach' is founded on partnerships and collaboration; and seeks to align actions at three scales provincial, regional and local."

Glen Brown, Executive Director BC Ministry of Community, Sport & Cultural Development October 2011

This is the "BC process" for moving from Awareness to Action

1. WHAT is the issue?

The form of land development impacts how water is used, how water runs off the land, and how water reaches streams

2. SO WHAT can be done?

Influence practitioners to 'design with nature'

Convening for Action

4. THEN WHAT?

Replicate in other communities

3. NOW WHAT can we do?

Embrace shared responsibility, learn by doing and establish precedents





The Partnership is responsible for delivering the Georgia Basin Inter-Regional Educational Initiative (IREI)



Launched in 2012 with support from five regional districts that represent 75% of BC's population

In 2016, the five Regional Boards recommitted through 2021 to work as a team

'Convening for Action' experience shows that success will follow when local governments.....

- 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.



Key Message:

Local governments learn from each other and progress through sharing of case study experience



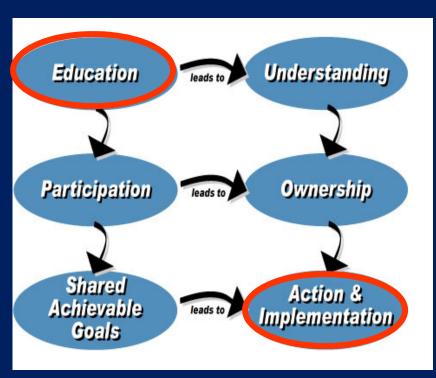
By telling the stories of those who are spearheading changes in practice, this helps other local governments eliminate the

"disconnect between information and implementation"

that may otherwise hold them back

waterbucket.ca website

This is what needs to happen to achieve integration that leads to action



Source:

Stormwater Planning: A Guidebook for British Columbia, 2002

Critical Success Factors:

- Commitment to take action & deliver
- Champions to provide energy & drive
- Accountability to deliver at all levels
- Resources to get the job done

Inform, Educate & Inspire

It has taken more than a decade to implement a policy, program and regulatory framework that makes possible 'Water-Resilient Communities

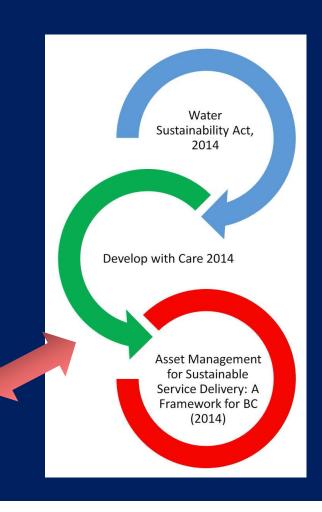
AN OVER-ARCHING THEME:

What happens on the land matters!

2003 – The Teachable Year

2008 - Call to Action

2014 – Game-Changers Enable Action



Parallel Journeys to a Resilient Future

- The New Normal in BC
- Water Balance 101
- Convening for Action in BC
- Sustainable Watershed Systems

BC is moving from asset management to "Sustainable Service Delivery"



Wes Shoemaker
Deputy Minister
BC Ministry of Environment

"Moving beyond traditional engineered infrastructure asset management to also account for nature's services will help influence 'standards of practice' and represent a leading-edge evolution in how infrastructure is planned, financed, implemented and maintained in BC."

February 2016

INTRODUCING THE NEW PARADIGM — "Watersheds as Infrastructure Assets"



A watershed is an integrated system.

The three pathways by which rainfall reaches streams are 'infrastructure assets'.

The three pathways provide 'water balance services'.

BC has a provincial policy, program and regulatory framework that <u>enables</u> local governments to move from UNDERSTANDING to IMPLEMENTATION of a "whole systems" approach keyed to the **primacy of hydrology**.

Policy, Program and Regulatory Framework

Science-Based
Understanding of
'Changes in Hydrology'
& Development Impacts

In 2002, the breakthrough was: Science-based understanding bridged the gap between "policy" and "practice"

Infrastructure & Site Servicing Practices



"Watersheds are
Infrastructure Assets
and provide
Water Balance Services"

Policy, Program and Regulatory Framework

Science-Based

Methodologies & Tools

to Mitigate

Development Impacts

In 2016, the challenge is to:
Bridge the disconnect between
"understanding" and
"implementation"

Infrastructure & Site Servicing Practices

2002

2016

"The role of local government is to deliver services. Achieving sustainable service delivery is the end goal of asset management."



David Allen, Co-Chair Asset Management BC

Asset Management Continuum *for* **Sustainable Service Delivery**



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

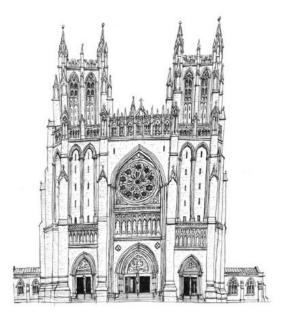
GROUND ZERO: In the beginning, there was no Asset Management Plan and a consequence is the 'unfunded infrastructure liability'

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

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

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

"Cathedral Thinking" aptly describes the vision for Sustainable Watershed Systems



In embarking on this journey to a water-resilient future, we can learn from our ancestors.

The builders of great cathedrals in medieval times thought in terms of multiple generations carrying out their work, to complete a dream that would not be realised until long after the originator's death.

The foundation for Cathedral Thinking:

a far-reaching vision, a well thought-out blueprint, and a shared commitment to long-term implementation

To learn more about "the BC experience", visit www.waterbucket.ca

To add your name to the database for our weekly eNewsletter, email the Partnership for Water Sustainability in BC at

outreach@waterbucket.ca