Comox Valley Eco-Asset Symposium

# What Happens on the Land Does Matter!

## Moving Towards "Sustainable Watershed Systems, through Asset Management"

March 2017


- Kim A Stephens, M.Eng., P.Eng., Executive Director

the partnership
for water sustainability in bc


Eco-Asset Symposium is a "watershed moment"
in a journey that began with the
2007 Showcasing Innovation Series

At this symposium, we are “convening for action” and these three “big ideas” provide a backdrop for the journey ahead:

- Shifting Baseline Syndrome
- Whole-System,
  Water Balance Approach
- Cathedral Thinking

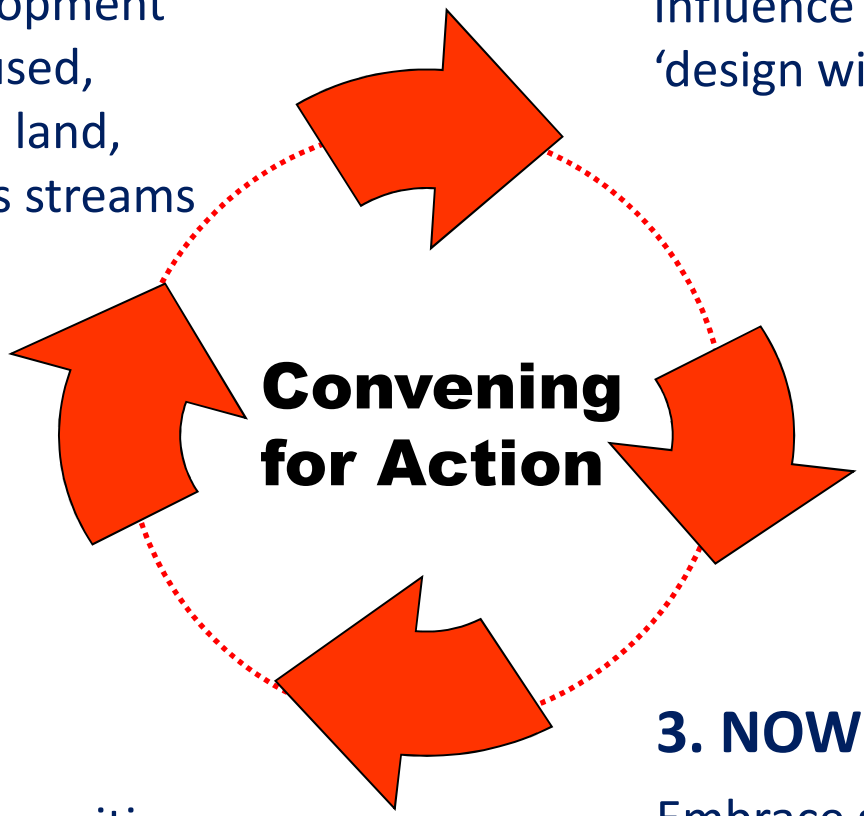
*The "**BC process**" for moving from **Awareness** to **Action** is founded on alignment, collaboration and partnerships*

## 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'




## 3. NOW WHAT can we do?

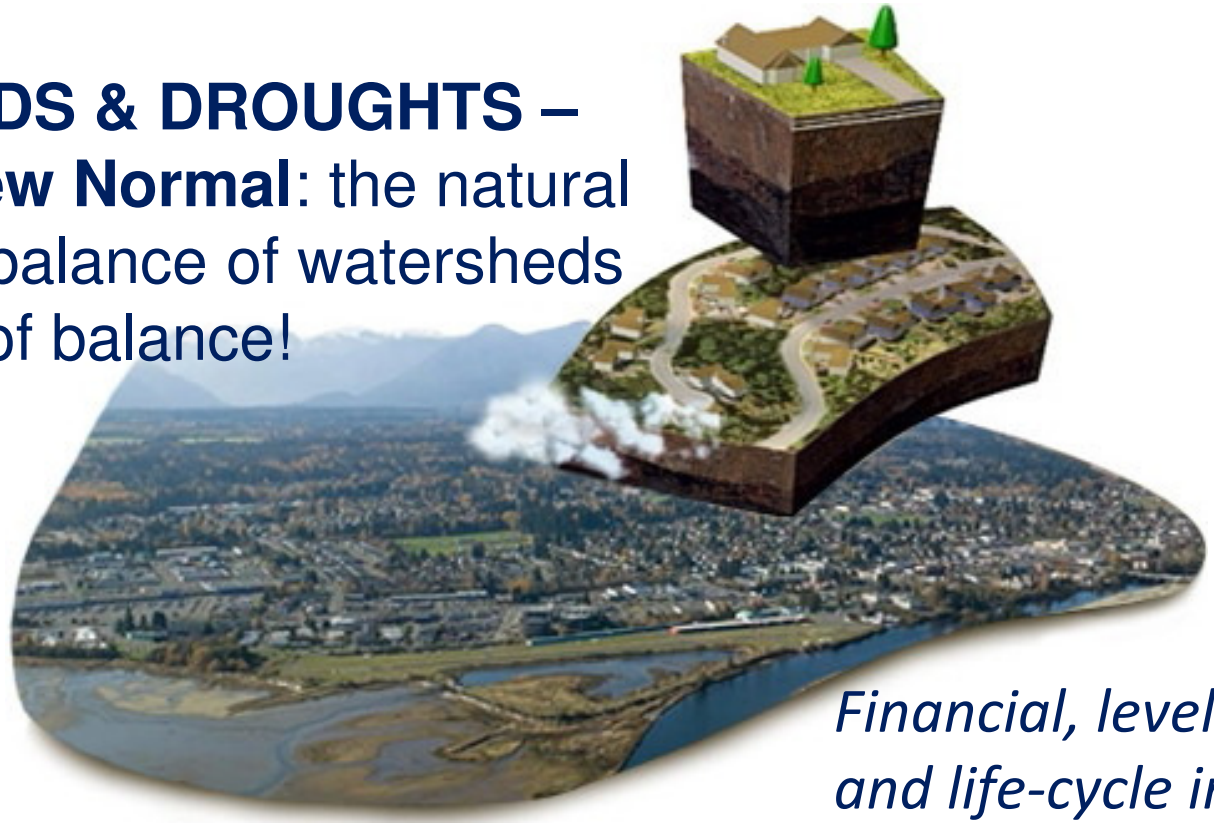
Embrace share responsibility, learn by doing and establish precedents

## 4. THEN WHAT?

Replicate in other communities

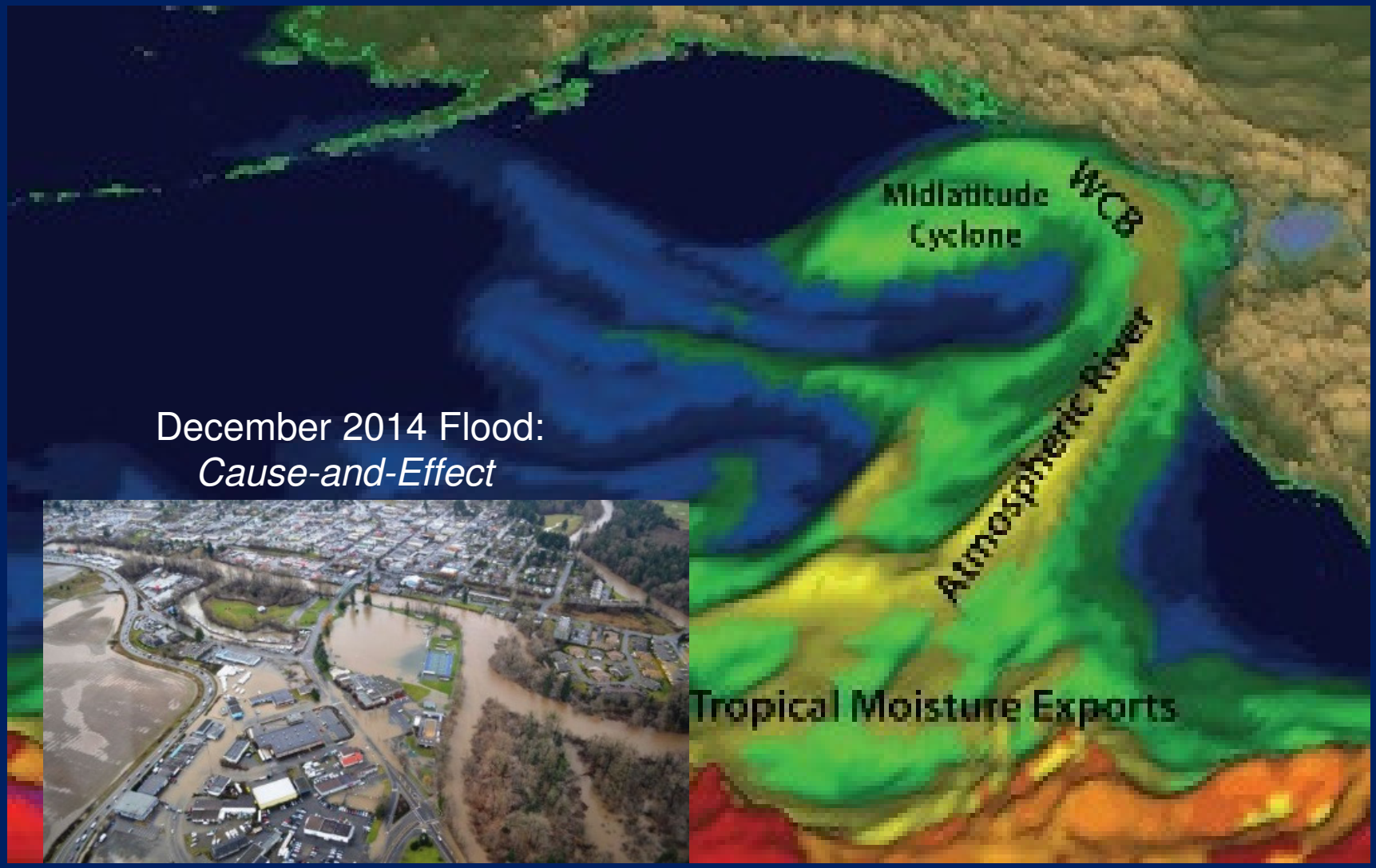
LOOKING BACK: A legacy of past community planning and infrastructure servicing practices is…

**FLOODS & DROUGHTS – the New Normal**: the natural water balance of watersheds is out of balance!



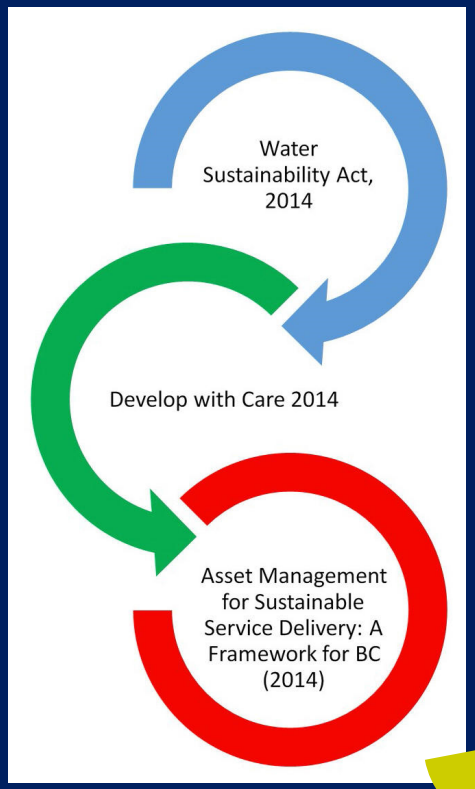
*Financial, level-of-service and life-cycle impacts and implications are drivers for local government action*

# LOOKING AHEAD: **We face a moment of truth due to a changing climate**




December 2014 Flood:
*Cause-and-Effect*

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

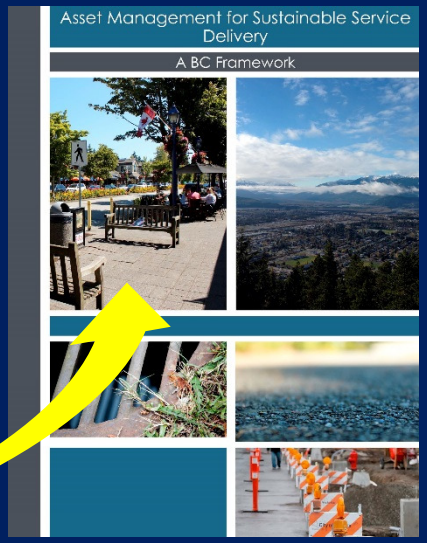



Three game-changers in 2014.

The **BC Framework** is the lynch-pin.

It provides the reason to view infrastructure differently.

The next step is to integrate 'watershed systems thinking' into asset management.



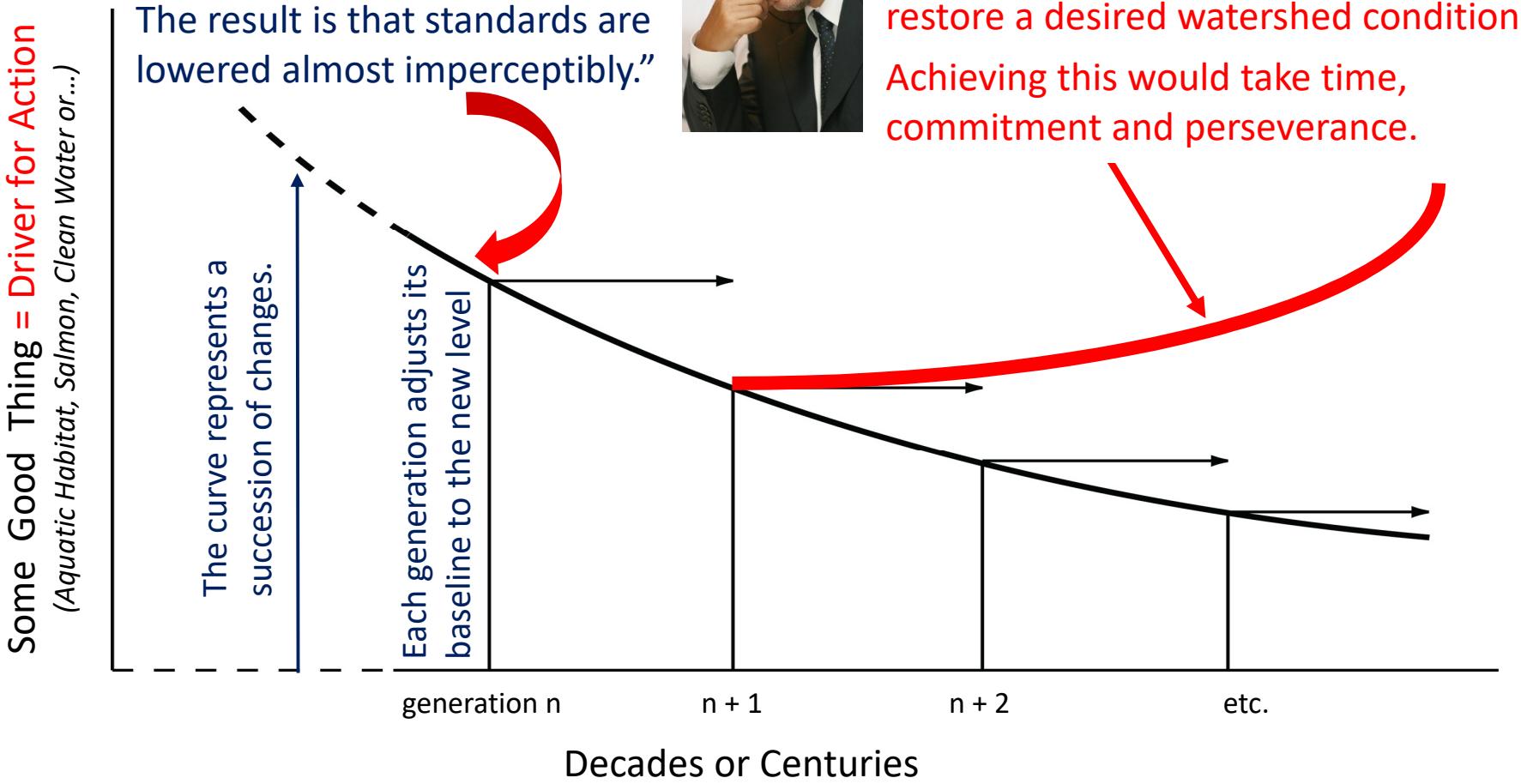
In 1995, Dr. Daniel Pauly coined the phrase

# "Shifting Baseline Syndrome"

"With each new generation, the expectation of various ecological conditions shifts. The result is that standards are lowered almost imperceptibly."

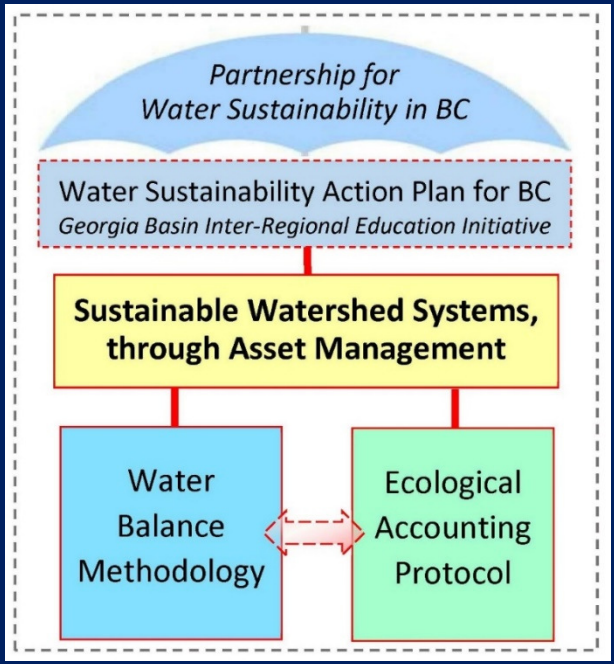
Communities could re-set the ecological baseline IF they would implement 'standards of practice' that restore a desired watershed condition.

Achieving this would take time, commitment and perseverance.



LOOK AT DEVELOPMENT DIFFERENTLY:

To protect watershed health, engineered infrastructure ought to fit into natural systems, rather than the other way around

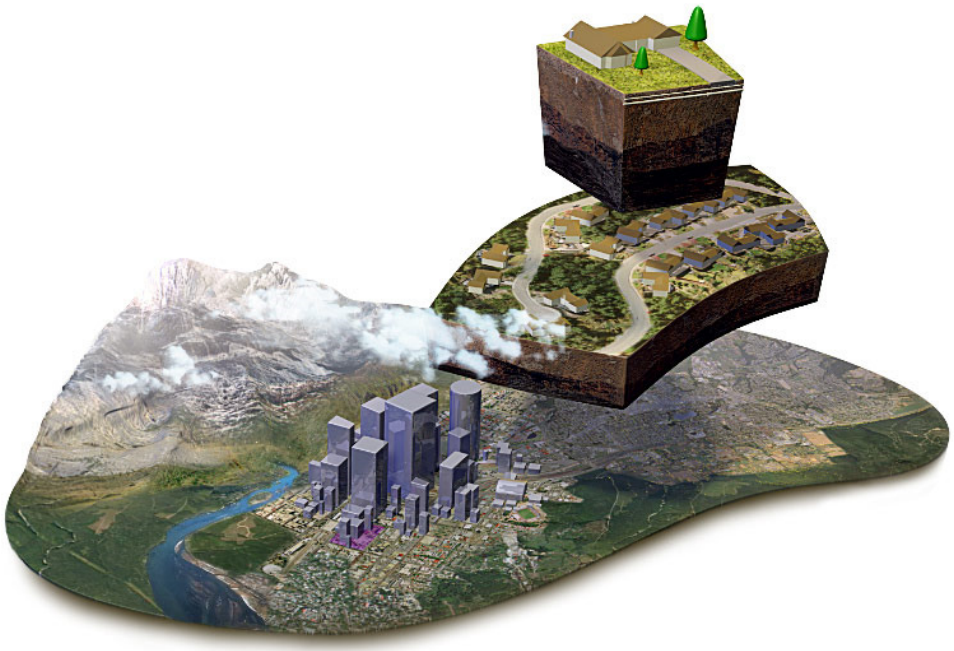



## THE TWIN PILLARS

In 2002, the Province adopted the **Water Balance Methodology**

Now, the Partnership is developing EAP as a tool to calculate the **opportunity-cost** of drainage infrastructure

# INTRODUCING THE NEW PARADIGM –
## *"Watersheds as Infrastructure Assets"*



A watershed is an **integrated system**.

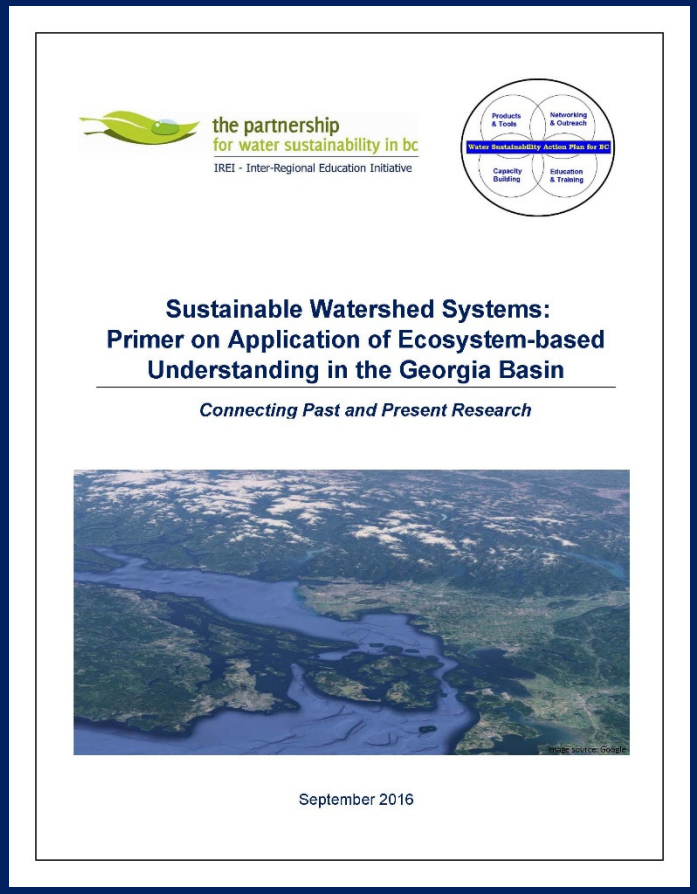
The **three pathways** by which rainfall reaches streams are 'infrastructure assets'.

The three pathways provide **'water balance services'**.

**The 3 pathways are:**

- *over the land surface*
- *shallow horizontal (interflow)*
- *deep vertical to groundwater*

# Everyone learns about the Water Cycle in elementary school ……..



the partnership
for water sustainability in bc
IREI - Inter-Regional Education Initiative

Products & Tools
Networking & Outreach
Water Sustainability Action Plan for BC
Capacity Building
Education & Training

**Sustainable Watershed Systems: Primer on Application of Ecosystem-based Understanding in the Georgia Basin**

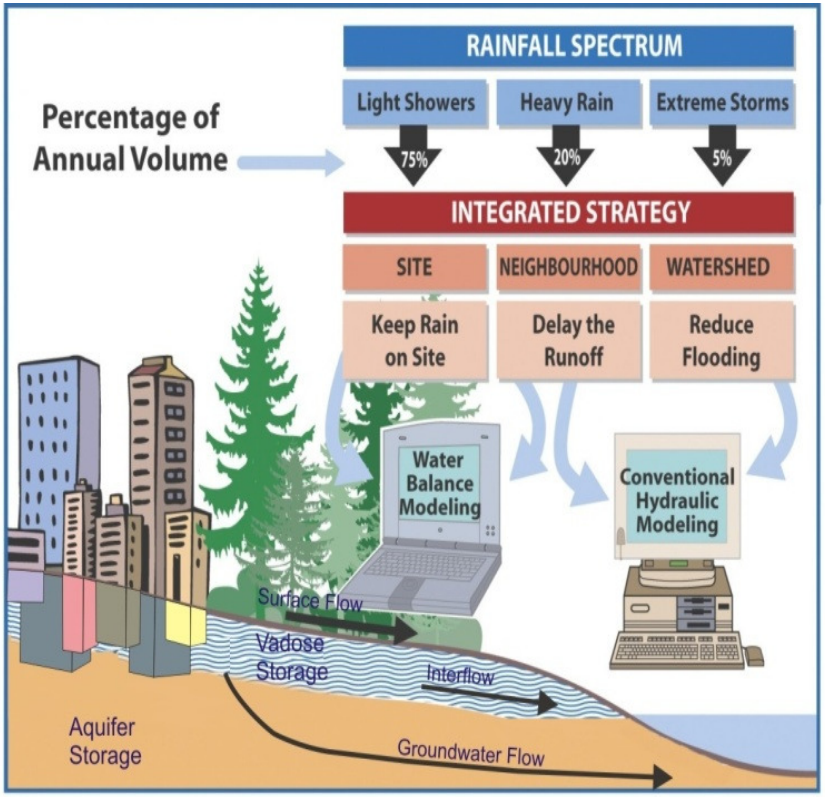
***Connecting Past and Present Research***

September 2016

visit waterbucket.ca & go to page for 'Guidance Documents & Resources'

*The Primer is written to help multiple audiences – whether elected, technical or stewardship – ask the right questions and ensure that "science-based understanding" is applied <u>properly and effectively</u> to implement practices that restore the hydrologic integrity of watersheds.*

*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

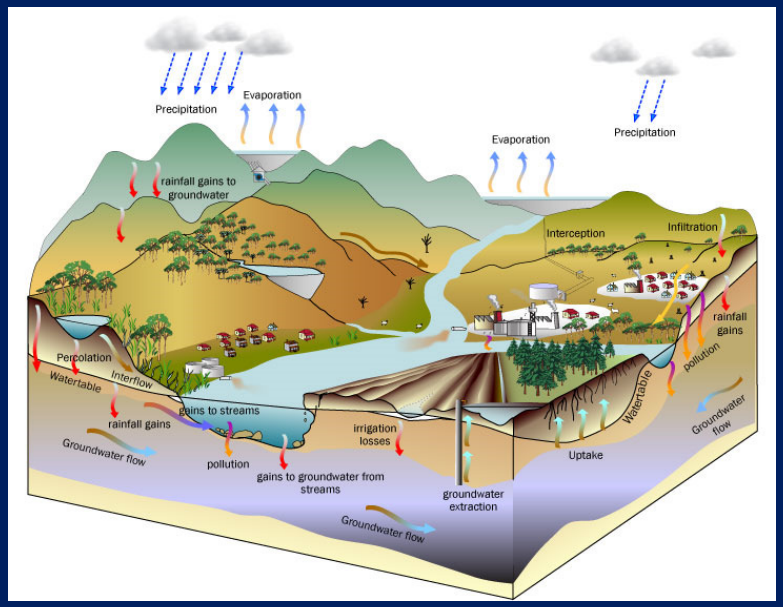
*from years to decades or more*

**GUIDING PRINCIPLE #1:**

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

# Water Balance in a West Coast Watershed

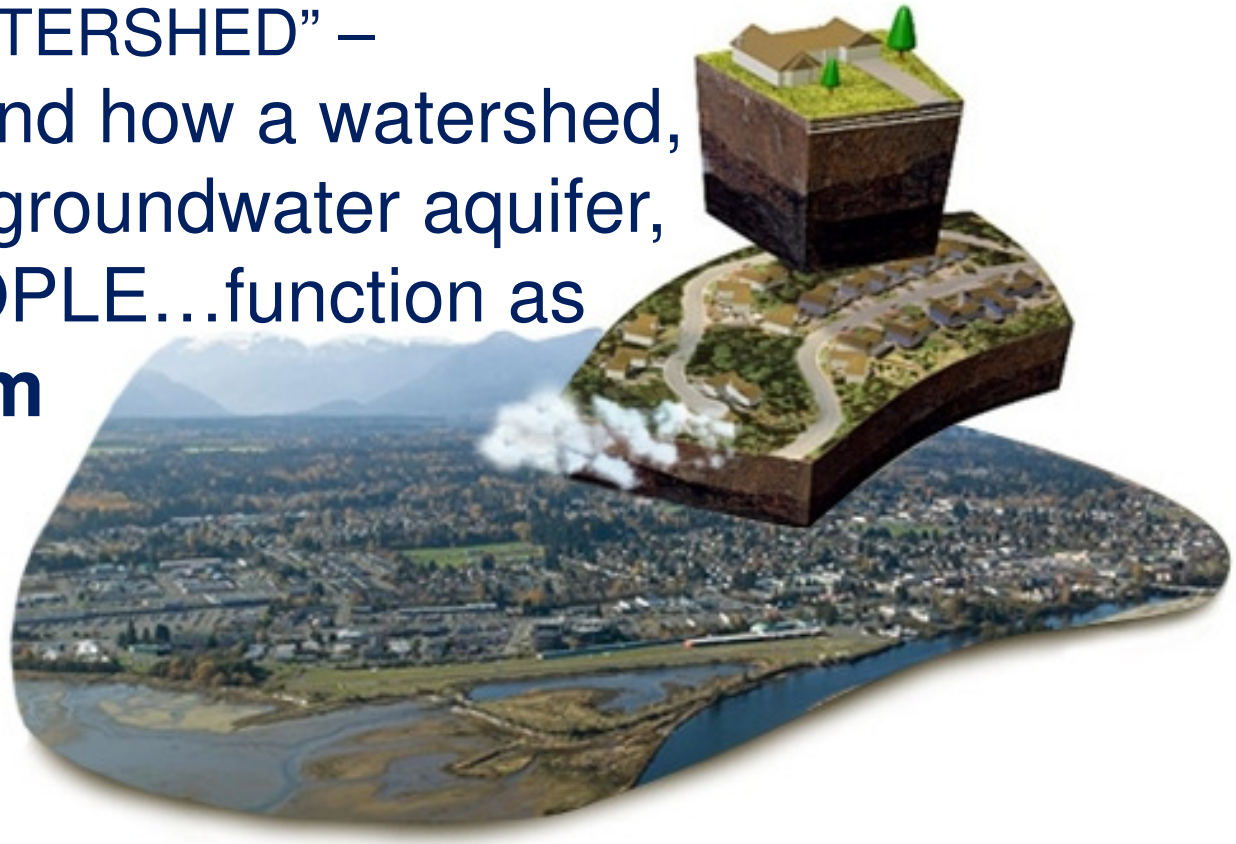
**Guiding Principle #2 :** *Understand where the water goes naturally and reproduce those conditions*




| | | |
|---|---|---|
| **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 #3:** *Restore interflow to maintain hydrologic integrity*

"THINK LIKE A WATERSHED" –
means understand how a watershed, its streams, the groundwater aquifer, sites….and PEOPLE…function as a **whole system**



Use and develop land in a way that mimics the natural **FLOW-DURATION** to:

1. Reduce Risk
2. Improve Watershed Health
3. Comply with Regulatory Requirements

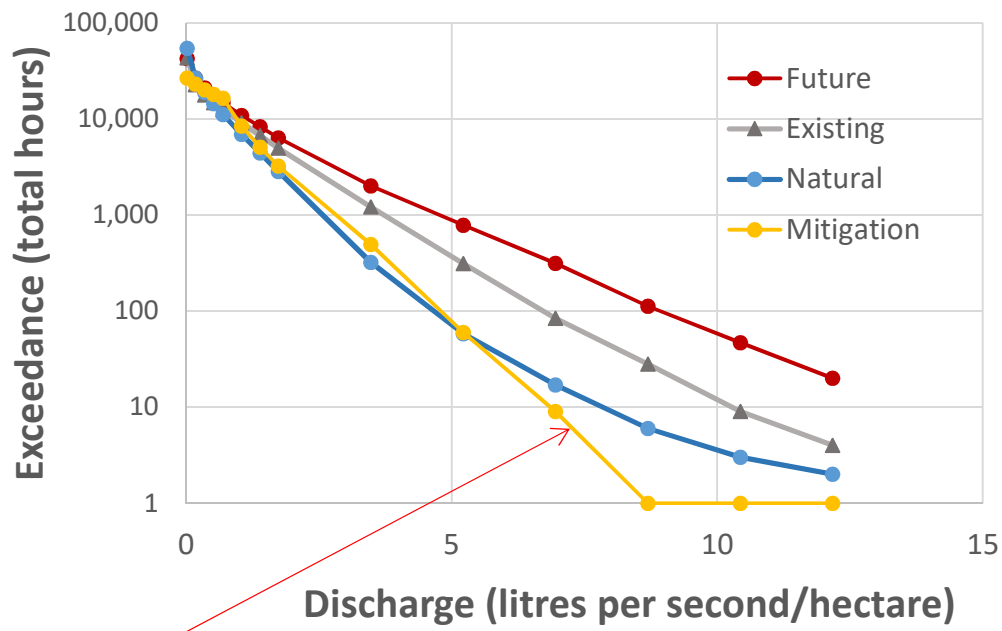
If the desired outcome is to limit **stream erosion,** prevent flooding and improve water quality, then……

GUIDING PRINCIPLE #4 –

*Replicate the flow-duration pattern to mimic the Water Balance*

Flow-Duration Relationship

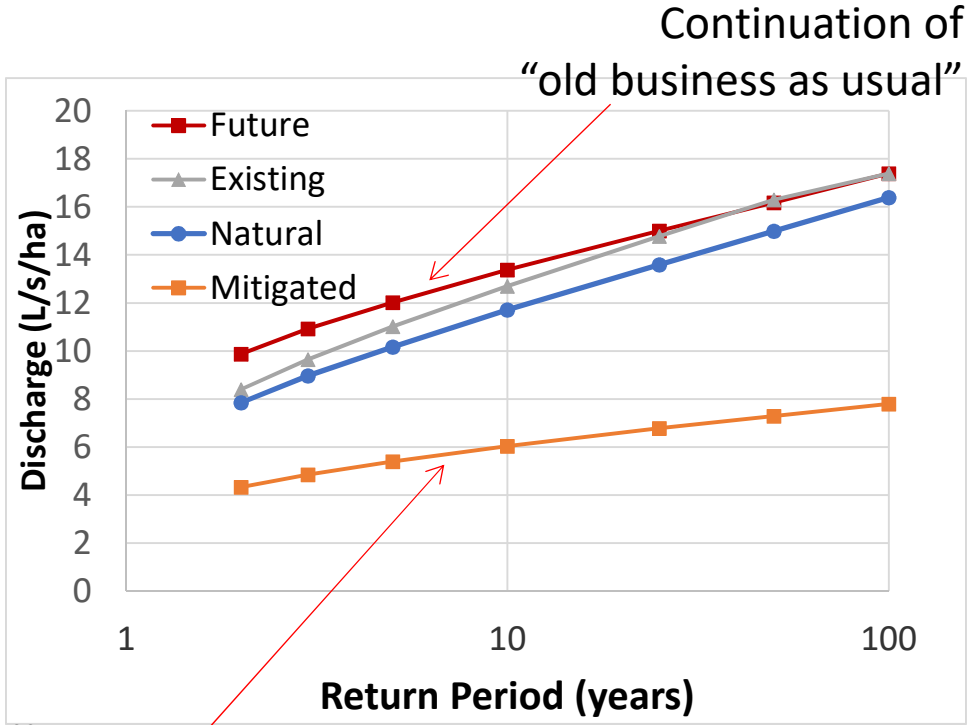
**Mitigation Objective:**
Reduce flow duration to Natural Conditions




A possible future scenario with mandated mitigation for all new development & redevelopment

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

Flood Discharge Relationship



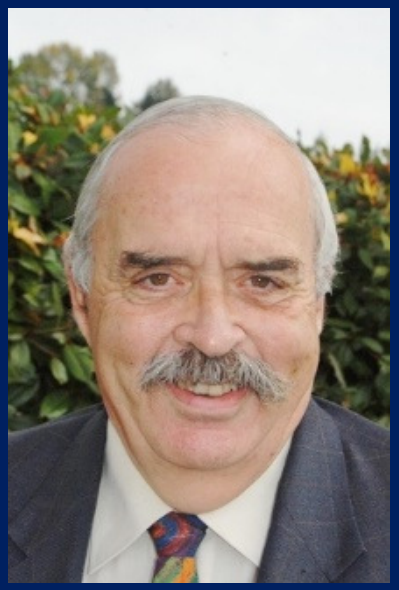

**Mitigation Objective:**
Reduce flood frequency to Natural Conditions

Achieving the goal of reduced stream erosion, by reducing flow-duration to natural conditions, provides the added benefit of substantially reducing flood risks

MANAGING BY THE NUMBERS: For the past decade in BC, thought leaders have encouraged practitioners to "think like a system" rather than "like an accountant"…

**About Sustainable Service Delivery:**

- focus is on desired outcomes, not prescriptive methodologies
- it is about the SERVICE, not the asset
- what 'services' are important, what is the desired 'level-of-service' for each, and how will the services be delivered sustainably



Wally Wells
Executive Director
Asset Management BC

"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
&
CAO, City of Courtenay


## Asset Management Continuum for Sustainable Service Delivery

**GROUND ZERO:** In the beginning, no **Asset Management Plan** exists. A consequence is an 'unfunded infrastructure liability'.

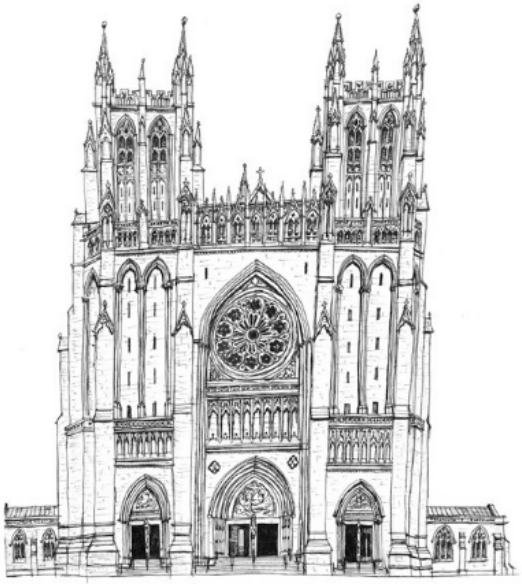
**STEP ONE:** Local governments embrace the BC Framework, with an initial focus on core engineered assets (water supply, sewage, roads) and embark on an **Asset Management Strategy / Plan / Program** process.

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

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

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

# **“Cathedral Thinking”** aptly describes the vision for **Sustainable Watershed Systems, through Asset Management**



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, visit
www.waterbucket.ca

To add your name to the database for our weekly e-Newsletter,

email the Partnership for Water Sustainability in BC at

outreach@waterbucket.ca