

Photo:  
Ambleside Beach, WV  
February 25, 2017

# EXPLORING THE WATER BALANCE

on your property



THE UNIVERSITY OF BRITISH COLUMBIA

**Master of Land and Water Systems**

Faculty of Land and Food Systems

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# My Goal



**WATER**  
**Balance**  
**MODEL** *express*

[dnv.waterbalance-express.ca](http://dnv.waterbalance-express.ca)



[geoweb.dnv.org](http://geoweb.dnv.org)

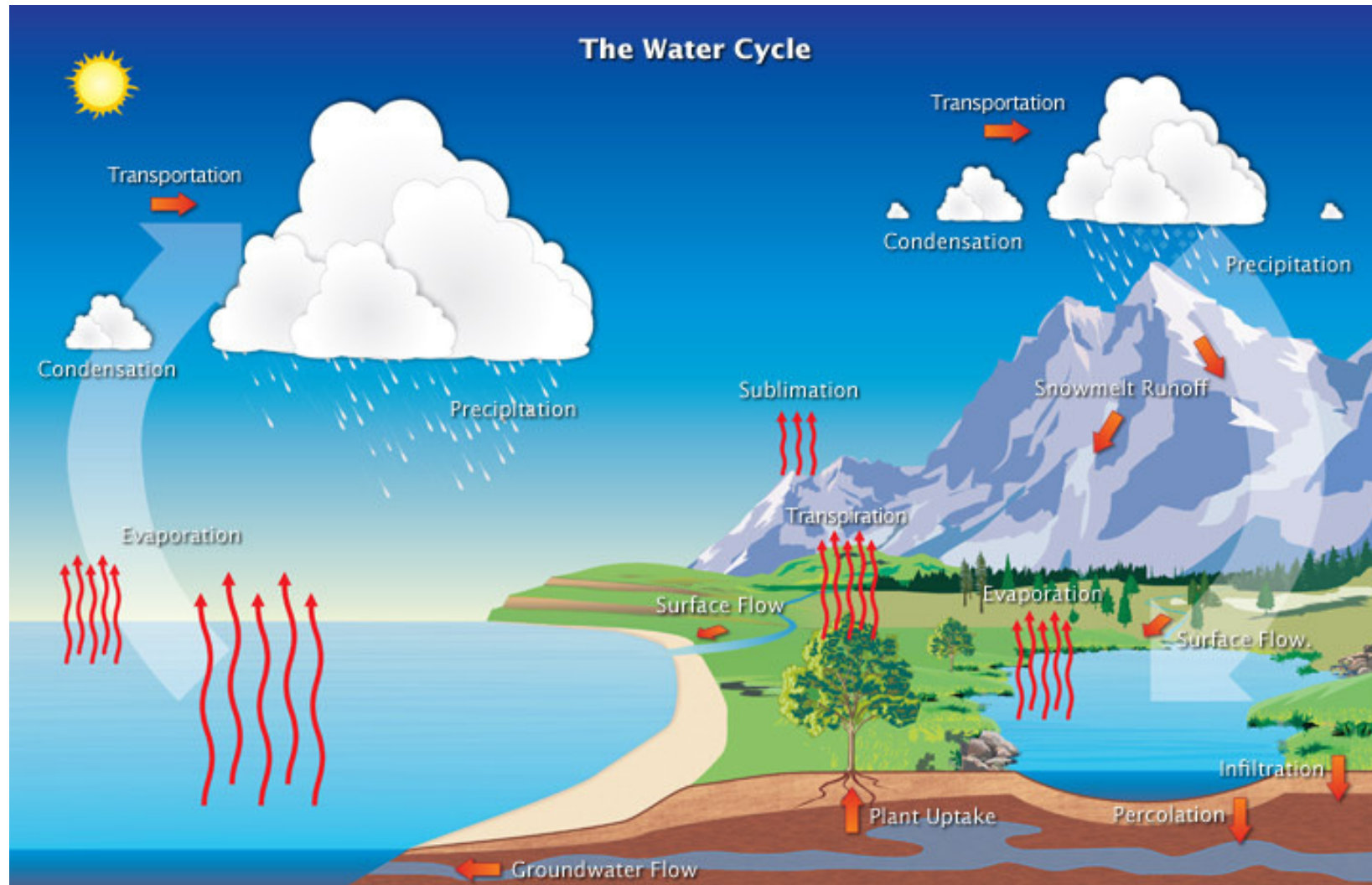


Image: NOAA National Weather Service



# Water Balance

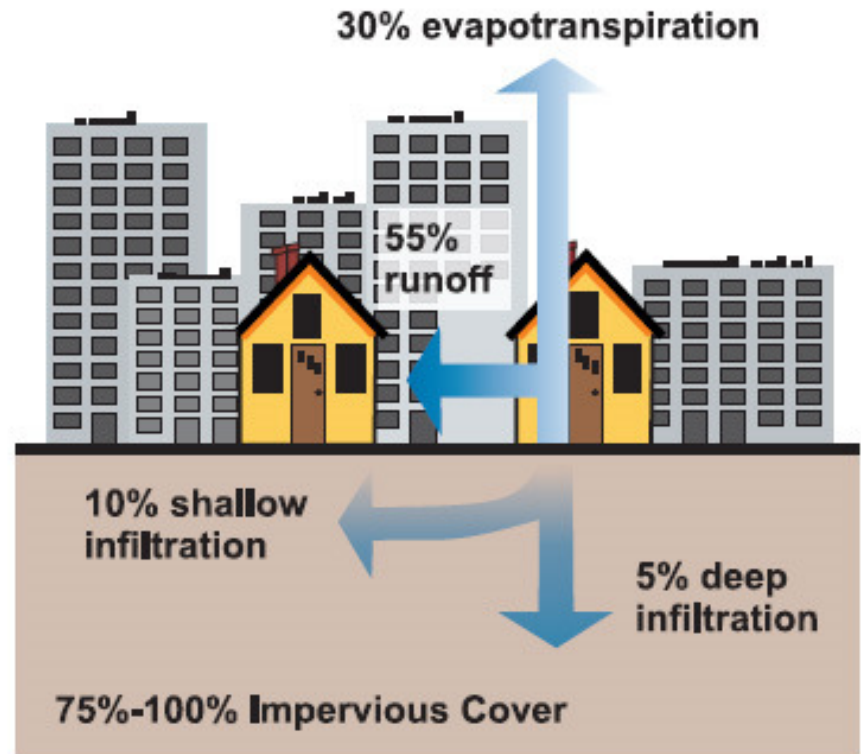
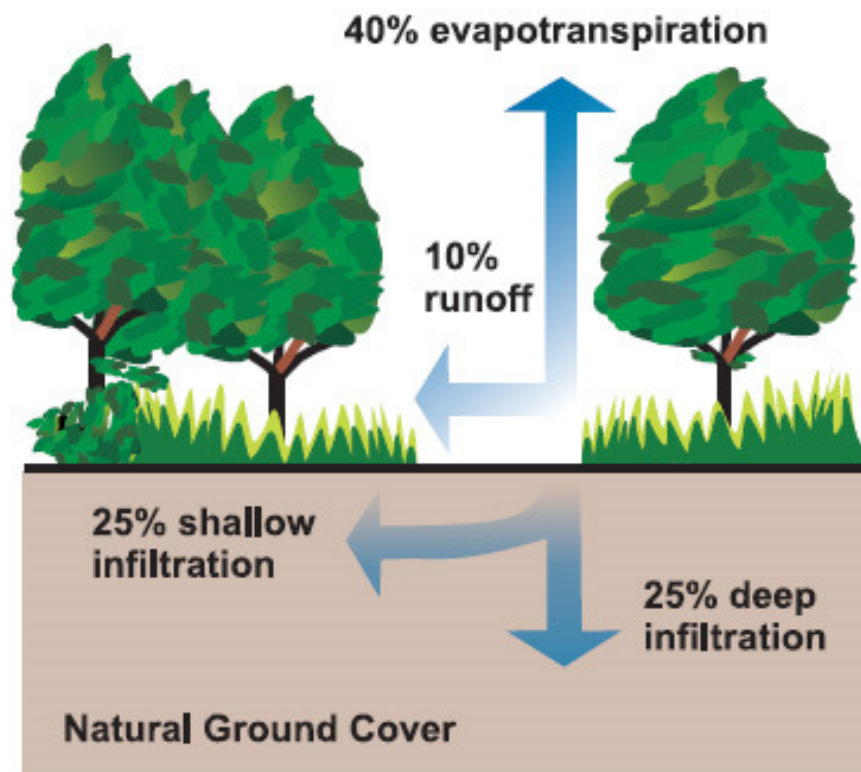
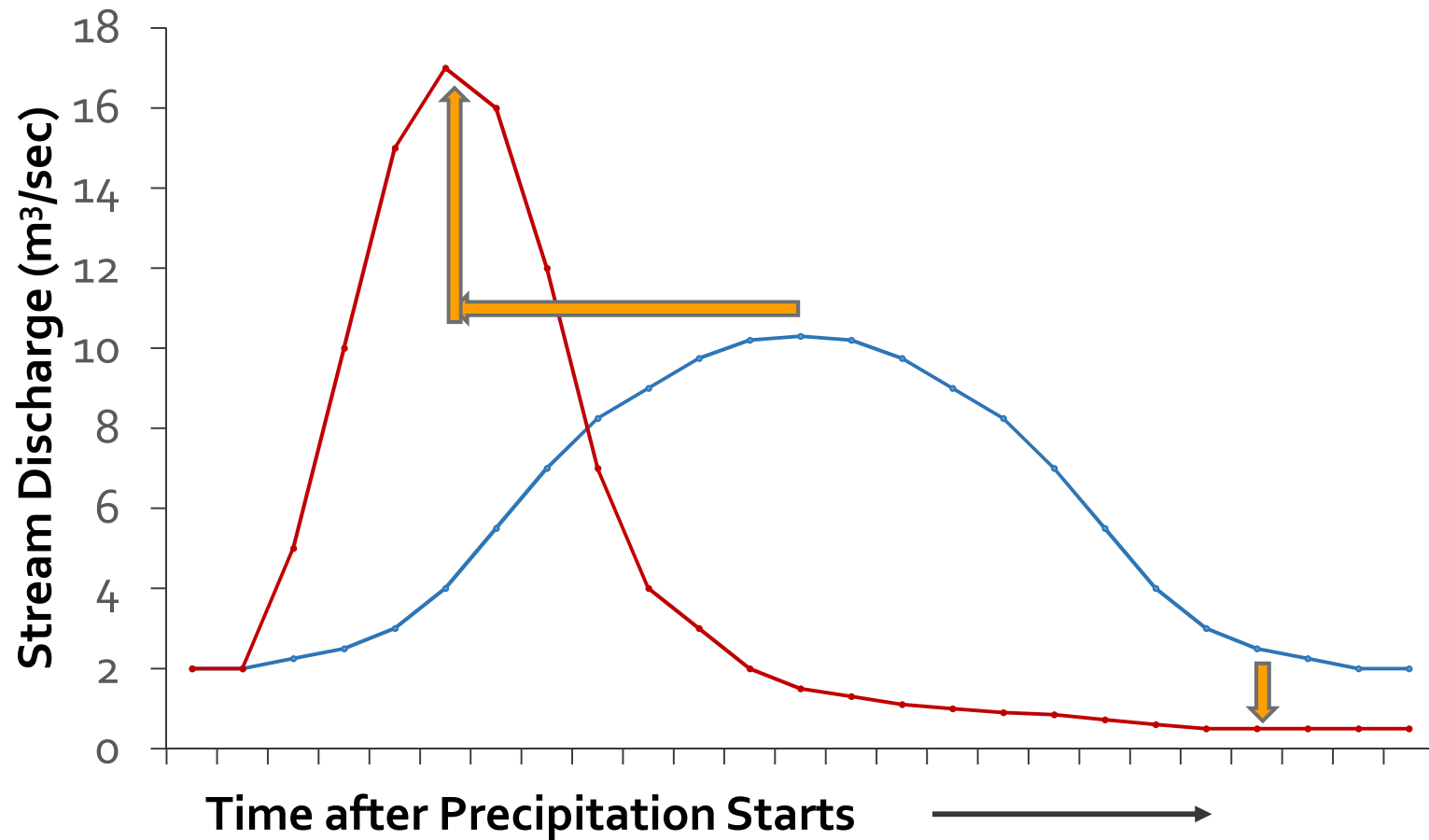


Image: US EPA

## Difference in Stream Discharge between Urban and Forested Watershed



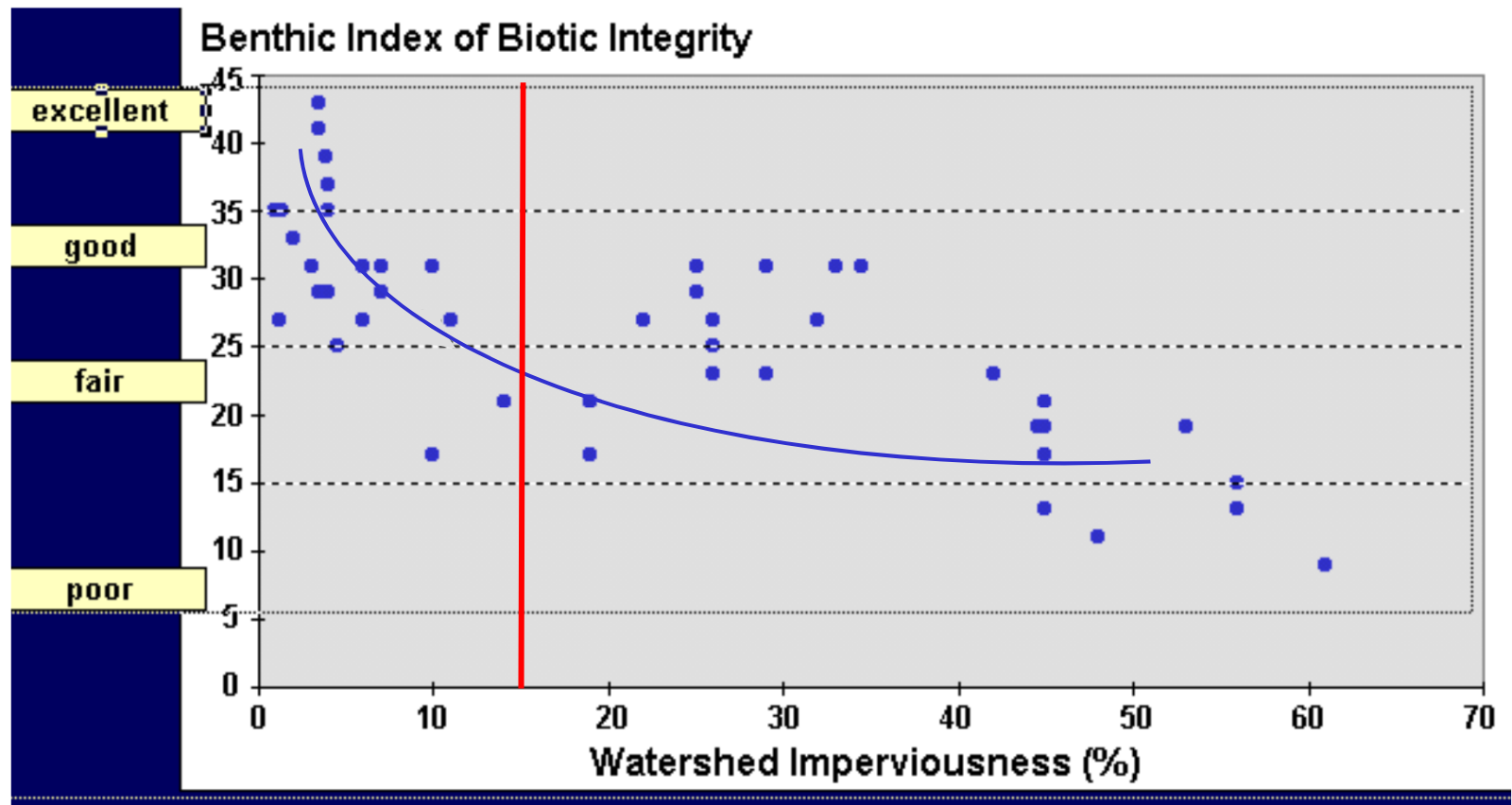
# Water Quality Concerns



## Pollutants

- Metals (Cu, Zn, Pb, Ni, Cr, Hg, Cd, As)
- Organics (Hydrocarbons, Oil, Grease)
- Nutrients (N, P)

# Aquatic Ecosystem Health



Source: H. Schreier



# Grey Infrastructure



# Green Infrastructure



**Rain Gardens**



**Rain Barrels**



**Infiltration Swales**



**Constructed Wetlands**



**Green Roofs**



# Mimic the Natural Water Balance



Three flow pathways:

1. Surface runoff
2. Seasonal interflow (shallow horizontal flow)
3. Water stored deep in aquifers which then discharges at some future date.

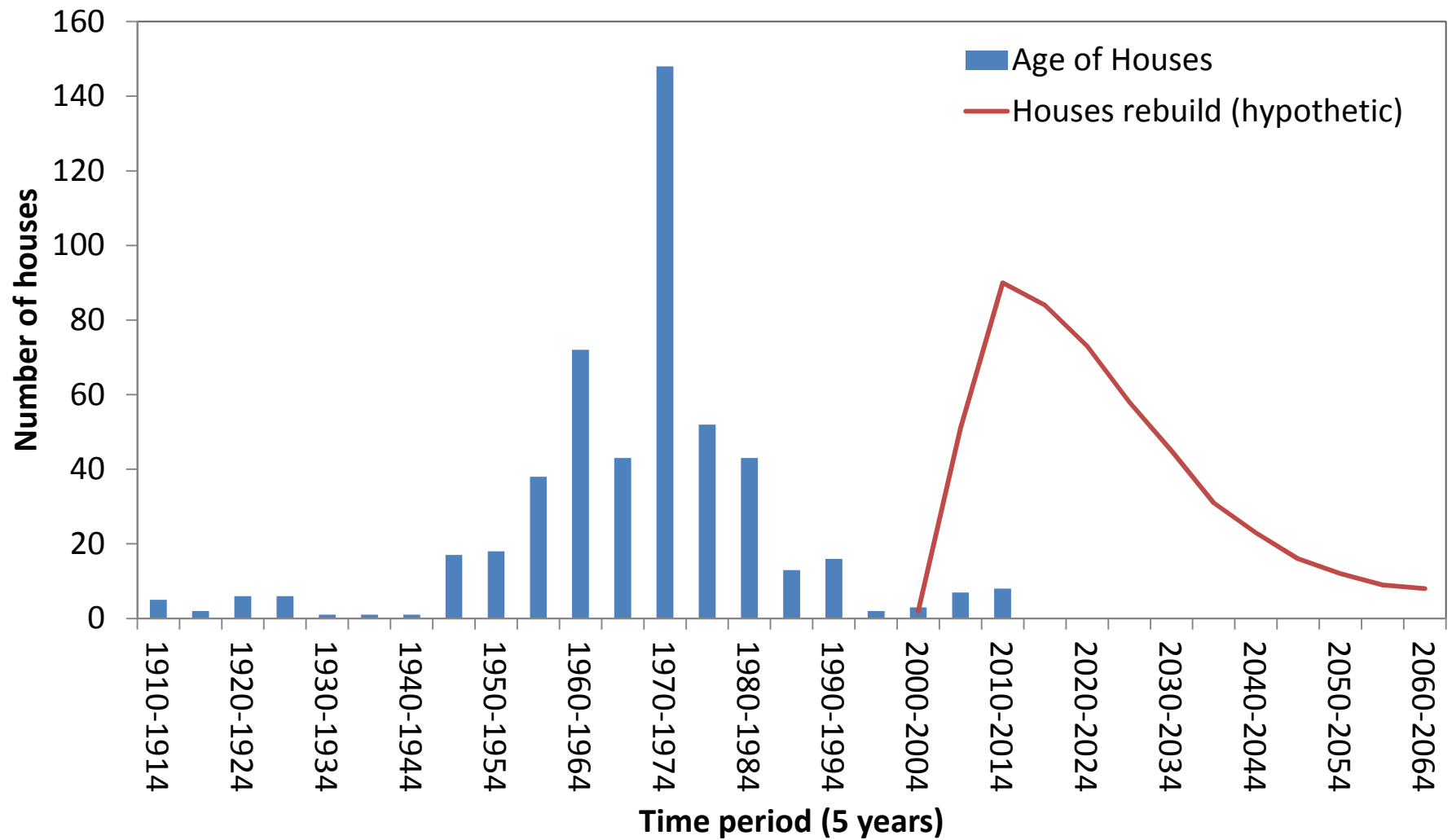
**“SLOW, SINK AND SPREAD”  
THE WATER!**

# Urbanization Trends



Source: D. Freudiger, 2012

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# Water Balance Model Express

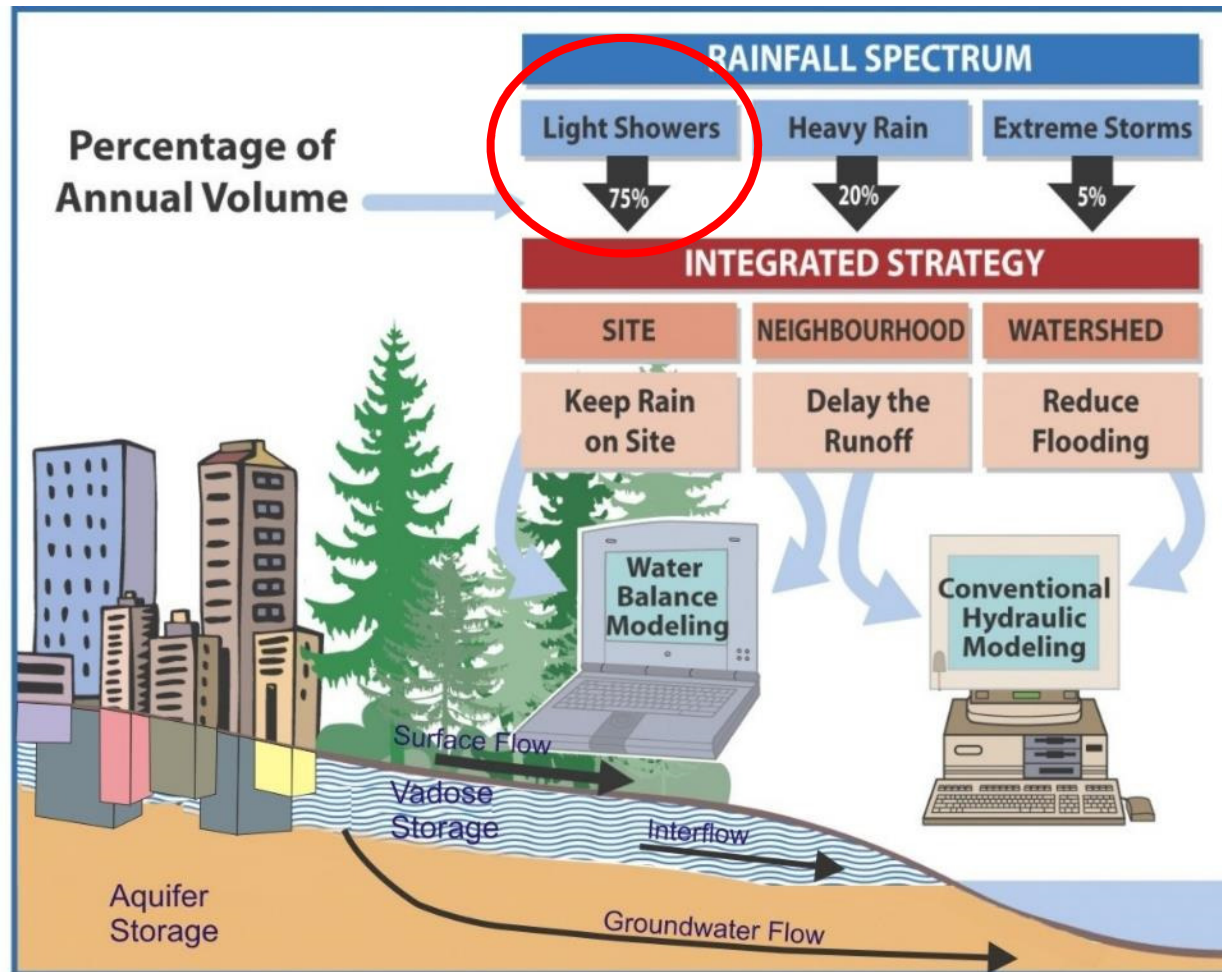


Image: waterbucket.ca

# Watershed-Specific Targets



- The **flow-duration relationship** is the cornerstone of the methodology.
- By maintaining flow-duration,
  - stream erosion is not increased during wet weather, and
  - 'environmental flows' are sustained during dry weather.
- Considers local environmental constraints

Credit: Jim Dumont, Engineering Applications Authority,  
Partnership of Water Sustainability in BC

# DEMONSTRATION

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Check out the video tutorial at [dnv.waterbalance-express.ca](http://dnv.waterbalance-express.ca)

GeoWEB at [geoweb.dnv.org](http://geoweb.dnv.org)



# Design Considerations

- Be aware of your site limitations
- Consult a professional
- Resource: Metro Vancouver Stormwater Source Control Design Guidelines (2012)



# Relevant Policies

- Integrated Stormwater Management Plans
- Top Soil Bylaws
- BC Water Sustainability Act
  - “Environmental Flow Needs” must be considered

# Key Messages

- Goal: Water balance of the **urbanized** watershed to mimic the water balance of the **pre-development** watershed.

**SLOW, SINK AND SPREAD**

- Try the WBM Express!
- Change the way you look at rainwater and how it moves through the urban landscape.



Image: Tomas Castelazo, Wikimedia Commons





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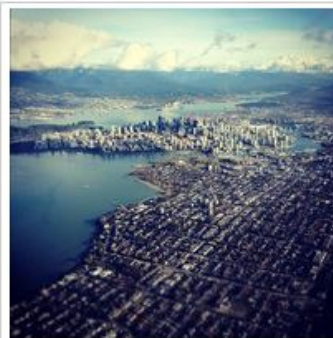
[mlws.landfood.ubc.ca](http://mlws.landfood.ubc.ca)

### UBC Watershed Management Courses

[wmcourses.landfood.ubc.ca](http://wmcourses.landfood.ubc.ca)



**SOIL 515**  
INTEGRATED  
WATERSHED  
MANAGEMENT



**SOIL 516**  
URBAN  
WATERSHED  
MANAGEMENT



**SOIL 518**  
WATER IN  
INTERNATIONAL  
DEVELOPMENT



**SOIL 520**  
AGRICULTURAL  
WATERSHED  
MANAGEMENT





# Happy World Water Day!

March 22



*Waiting for  
Water*

Linocut by  
Catherine Fenton