Ecological patterns seen in data from online in-stream sensors

Carol Armstrong
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Green Valleys Watershed Association
What are ‘natural’ patterns?

1. Changes in water depth during rain events
2. Changes in depth caused by evapotranspiration
3. Changes in e-conductivity when depth changes
4. Changes in e-conductivity in winter season
5. Changes in temperature in urban settings during rain events
6. Changes in stream pollution around human activity
1. Changes in water depth during rain events

- Most PA streams perennial: Groundwater and surface water
- All of the precipitation that falls into a watershed flows into the streams in that watershed
Depth as measured by a CTD sensor

Pickering Creek
Blue – 1st order
Orange – 3rd order

2020
2. Changes in depth caused by evapotranspiration

Water is transferred from the land to the atmosphere by evaporation from ground surfaces, and by transpiration from plants.

Daily changes of 20-40mm
3. Change in e-conductivity w depth changes

- When the rate of rainfall is faster than the rate of infiltration, then runoff occurs
  - Quality of the ground has big impact on the rate of runoff: sand, loam, silt, clay, impervious
4. Changes in e-conductivity in winter
5. Changes in temperature in urban settings during rain events
6. Changes in stream pollution around human activity

\[ Q = A \times v \]

- \( Q \) = discharge, \( m^3/s \)
- \( A \) = x-sectional area
  \( (m^2) = \text{Depth} \times \text{Width} \)
- \( v \) = velocity (m/s)

Land and human activity are not equivalent, and both determine pollutants.
Conductivity:
- Pennypack
- Pickering

Depth:
- Pennypack
- Pickering
Mason’s studies showed that human activity is an influence beyond land use.