Motivations for Study

To better understand hydrology and pollutant transport through various types of watersheds.

http://chesapeakestormwater.net
Economic impact of swimming, fishing, boating are significant.

- Sales: $379 million
- Income: $134 million
- Jobs: 5,990

(Nordstrom, 2007).
Objective- Build a state-of-the-art, broad scale and high-frequency hydrologic sensing network using simple sensors operated by a diverse group of collaborators, including educators, researchers, government agencies, non-profit organizations, and citizen scientists.
New Hampshire’s Lotic Volunteer, Temperature, Electrical Conductance and Stage Sensing Network

NH LoVoTECS - est. February, 2012
Citizen Science

LoVoTECS is modeled after similar citizen science groups such as NH VRAP(DES) or CoCoRaHS (NOAA).

Motivations: engaging students, fulfilling interests, watershed investigation
Network Design

In Stream/River Measurements-
• Specific conductance
• Water temperature
• Stream height (Stage)
• Statewide distribution of watersheds of all shapes, sizes and attributes

Data-
• 1 to 5 minute frequency (Spring-Fall)
• 15 minute frequency (Winter Months)
• Year-round
• 100 sites
• Barometric reference sites

Rain/Snow Pack Measurements-
• Specific conductance
• Volume
LoVoTECS Sites in Rivers & Streams

In Stream-River Measurements-
• 37 Active Volunteer
• 58 Unique Rivers-Streams
Barometric Reference & Precipitation Monitoring Sites

Barometric Reference Stations
• 15 Sites Statewide

Rain & Snowpack Measurement Stations
• 5 Sites Statewide
11-months of collected data
Median - 45.7 uS/cm

NH VRAP(DES) Standards
• “Normal” Classification
  0-100uS/cm
Emerging conductivity and temperature patterns from all sites reporting data-
Snapshot September 2012
There is a clear positive relationship between monthly median water temperature and specific electrical conductance.

Warmer streams have more solutes in them.

Investigation of the role that human activities play in affecting solutes in streams and rivers.
Dilution of Solutes in Streams/Rivers

Israel River (Israel’s River) - Jefferson, NH

5/21/2012, ~2.25ft

11/1/2012, ~3.85ft
Dilution of Solutes in Streams/Rivers

- Dilution occurs as flows increase
- Specific conductance is highest at low flows
- Lower solutes in rainwater
- Higher solutes in groundwater—some natural in origin
- Human inputs of minerals (particularly NaCl) can elevate conductivity
Local investigation of statewide patterns
Specific conductance and temperature response in an urban brook impacted by storm water input
Specific conductance during a Sep. 2012 storm event illustrating variations in response along an urban brook impacted by storm drain runoff.
December 2012

- Early winter mixed precipitation storm
- Roads pretreated for freezing rain
- Rain on snow
Specific conductance and temperature profile of the storm catchment that flows into the urban brook
Next steps…

• Watershed Delineation to investigate:
  o Land use
  o Population density
  o Road density
  o Geomorphic attributes
  o Watershed size, etc.

• Data discovery tool
  o Make data available for download
  o Web-based visualization

• Analysis of individual sites

• Research products
  • Ashley Hyde- Using Specific Electrical Conductance to Compare Rainfall Runoff in NH Urban and Rural Catchments –MS Thesis Topic
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Additional information and data analysis can be found at: lovotecs.blogspot.com