Our Urban Landscape

Connecting land and water

Stormwater in the City

September 27, 2007
The Center for Land Use Education and Research

- Lab for Earth Resource Information Systems
- NEMO
- National NEMO Network
- Geospatial Technology Extension Program
- Green Valley Institute
- Land Use Planning Program
- Land Use Academy
- Extension Forestry Program
Stormwater management: assistance from NEMO

nemo.uconn.edu
Today at the L.O.B.

- water and development
- the CT landscape
- an inconvenient indicator
- so, now what?
Watersheds
A tale of 2 water cycles

Diagram showing two water cycles. On the left, a rural area with 10% evaporation, 50% precipitation, and 50% run-off. On the right, an urban area with 55% evaporation, 15% precipitation, and 55% run-off.
Hydrologic Impacts of Development

- more water
- arriving more quickly
Water Quantity

Increased runoff quantity

Decreased groundwater recharge
Water Quality

- Nutrients
- Pathogens
- Debris
- Toxic Contaminants
- Sediment
- Thermal Stress
- Etc., etc., etc.
The Effects of Urbanization
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The Statewide Story

Connecticut’s Landscape: 2002

- Forest: 56%
- Developed: 19%
- Turf/Grass: 4%
- Grasses/Ag: 12%
- Wetland: 4%
- Water: 3%
- Other: 2%
1985 → 2002

2002
Developed Area: 930 sq. miles

Developed since 1985: 119 sq. miles
(14.6% increase over 1985 levels)
Another way to look at it...

119 square miles is about 2.4% of the entire state, which is equivalent to the combined areas (for instance) of Norwalk, Old Saybrook, Waterford, Avon and Lisbon.
Where we’ve developed, historically

Percent developed land, 2002, by town
Where we’ve developed, recently

Percent increase in developed land, 1985 – 2002, by town

Percent Change 1985-2002
- 1 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 44
Total percent increase in developed land (1985-2002) 13.6%
Park river land cover

46% developed
Park River change 85-02

7% increase in developed land
Hockanum River

33% developed
Hockanum river change 85-02

17% increase in developed land
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Impervious Surfaces

Materials like cement, asphalt, roofing, and compacted soil that prevent percolation of runoff into the ground.
Imperviousness varies by use

- 0 – 5%
- 0 – 15%
- 5 – 65%
- 50 – 95%
The Impervious Surface Budget

Transportation (Parking Lots, Roads, Driveways, Sidewalks)

Structures (Offices, Stores, Houses, Patios)

Urban

- 65%
- 35%

Rural

- 80%
- 20%

Connecticut’s Changing Landscape study, CLEAR, 2002
The (Famous) Impervious Cover Model

- Watershed Impervious Cover
  - Sensitive
  - Impacted
  - Non-Supporting
  - Urban Drainage

- Stream Quality
  - Good
  - Fair
  - Poor
The Strength of the Evidence

- More than 200 studies on relationship between IC and stream quality
  - Geomorphic (stream form) indicators
  - Hydrologic Indicators
  - Stream Habitat Indicator
  - Water Quality Indicators
  - Aquatic Diversity Indicators

*CWP (2003). Impacts of Impervious Cover on Aquatic Systems*
And here in CT?

- **CTDEP / CLEAR study**
  - Supports ICM for CT streams

- **Jordan Cove study**
  - Supports hydrologic impacts of I.C.
  - Demonstrates effectiveness of low impact development techniques
Impervious Surface as an Indicator

1. it simplifies complex impacts but is based on solid science
2. it’s generated by local land use regulations
3. it’s tangible & measurable

It’s a framework
So, now what?
The Ancient NEMO Three-tiered Strategy for Coping with Stormwater

1. Natural Resource Based Planning
2. Site Design
3. Best Management Practices
Restorative Redevelopment

- Reduce & disconnect stormwater pathways
- Multifunctional green space
- Maximize redevelopment opportunities
- Rehabilitate trees & soils
- Restore stream buffers
Jordan Cove Study

- cluster layout
- grassed swales
- pervious road
- pervious driveways
- rain gardens
- bioretention cul-de-sac
- low mow areas

LID Cluster

Traditional
A Real Storm at Jordan Cove

Discharge (m³/s/ha)

Precipitation (mm)

Control

Traditional

BMP

Time

September 2, 2003
And in an ‘ultra-urban’ setting...

**Heritage Park** redevelopment in Minneapolis was built on a 145-acre site that formerly contained public housing developments. The emphasis is on stable, mixed-income affordable and sustainable urban neighborhood on the western edge of Minneapolis’ downtown area.
Heritage Park under construction
Stormwater as an amenity
Stormwater as an amenity
So, let’s talk Hartford...