Welcome!

Hosted by
Lake Barrington Shores
Homeowners Association
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Ordinances, Codes, & Planning Activities to Protect Our Watersheds – Part 1: Why Stormwater Matters

Holly Hudson
9 Lakes TMDL Implementation Planning
September 26, 2012
Urban Stormwater Matters: Impervious Cover, Stormwater Runoff, and Stream Health

• Urbanization alters the landscape, inflicting stresses on stream biota
  – “Traditional” development practices strip the land of vegetation and cover it with impervious cover (or compact the soil and install a lot of turf ≈ IC)
  – Storm drain networks are constructed to move water away from developed areas
  – Generates more pollutants & delivery to streams
Changes in Surface Runoff

Before development, most water slowly filters through plants and earth.

After development, most water rapidly runs off surfaces.
10, 20, 30% Impervious Cover

50, 60% Impervious Cover
80% Impervious Cover

How much impervious cover is in your community, your subwatershed today… tomorrow…?
The Runoff Coefficient

• Proportion of rainfall converted to direct runoff

Pathway of Runoff to Streams & Lakes

Runs off impervious surfaces → Enters the storm drain system → Directed to streams and lakes

\[ Rv = 0.05 + 0.009 \times (I) \]

Scheuler, 1987
How the Change in Volume and Rate Affects the Stream Hydrograph

- Large Storm
- Higher and More Rapid Peak Discharge
- More Runoff Volume
- Lower and Less Rapid Peak
- Gradual Recession

Pre-development
Post-development

Impervious Cover Impacts Hydrology (water flow)

- More stormwater runoff & more frequent flooding
- Increased flood peaks
- Lower baseflow
Impervious Cover Impacts Stream Geomorphology

- < 5%
- 8-10%
- 20%
- > 60%
- 30-90%

Impervious Cover Influences Water Quality

- Sediment (TSS)
- Heavy metals
- Oil and grease
- Nutrients (phosphorus, nitrogen)
- Pesticides
- Chlorides (TDS)
- Bacteria
- Oxygen-demanding organic matter
Habitat and Aquatic Life Impacts

![Graph showing the relationship between Percent Imperviousness and IBI (Index of Biotic Integrity). The graph indicates a negative correlation, with IBI values decreasing as Percent Imperviousness increases.](Fairfax Co, VA)

Habitat and Aquatic Life Impacts

![Scenery and images depicting various aquatic habitats and life impacts.](Fairfax Co, VA)
Impacts on Humans

Impervious Cover Model

http://www.chesapeakestormwater.net/all-things-stormwater/the-reformulated-impervious-cover-model.html
Relationship Between Impervious Cover and Zoning Category

ICM Planning Implications

- Does the location of IC matter in a watershed?
- Can we really estimate future IC?
- Do I need to verify field conditions?
- Can BMPs alter the ICM?
- Is there a watershed type or size where ICM doesn’t make sense?
- Most zoning exceeds 10% IC—what can we do?
- So, are you saying we should “sacrifice” non-supporting streams?
- Does it make sense to set hard IC caps?
Management Responses to Mitigate IC

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How can we defeat IC to protect sensitive, impacted, and non-supporting streams?

We can only protect and recover our urban waters when we align planning, zoning, engineering, economics, and regulations at the subwatershed level.
Tools for Protecting Urbanizing Watersheds

1. Land Use Planning
2. Land Conservation
3. Aquatic Buffers
4. Better Site Design
5. Erosion & Sediment Control
6. Stormwater Management
7. Non-Stormwater Discharges
8. Watershed Stewardship

Questions and Comments

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