Stormwater Management 101: Past, Present, and Future

Presented by:
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Center for Watershed Protection

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Rockville Commission on the Environment

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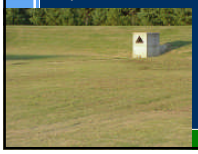


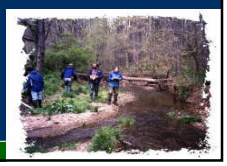
Presentation Overview

- Why do stormwater management?
  - Streams
  - Regulations
- Stormwater management "Market Outlook"
- What to do with this information
  - As community leaders
  - As property owners

About the Center for Watershed Protection

- Non-profit 501(c)3, non-advocacy organization
- Work with local watershed groups, local, state, and federal governments
- Provide tools communities need to protect streams, lakes, and rivers
- Stormwater Institutes

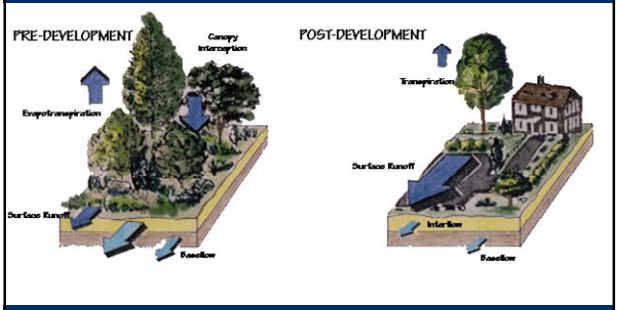
Center for Watershed Protection



Terminology

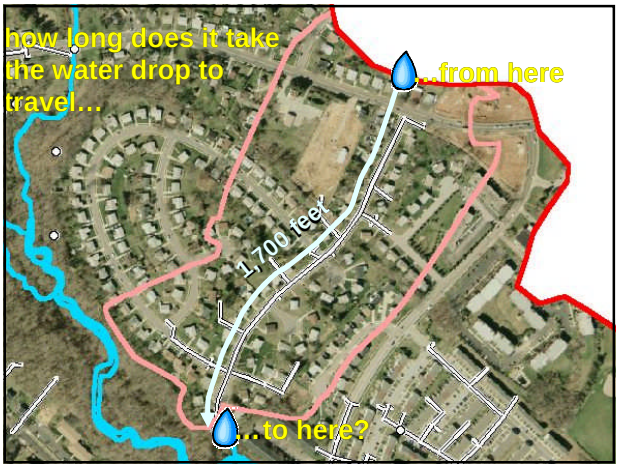
- Stormwater – runoff from rainstorms
- Stormwater Management – *physical measures* to mitigate the impacts of urbanization on water quality, aquatic life, infrastructure

Impacts of Urbanization



Pathway of Runoff to Streams

Rainwater runs off of impervious surfaces → Enters the storm drain system → Directed to streams



How long does it take???

Before Development

About 3,600 seconds, or 60 minutes

After Development

About 600 seconds, or 10 minutes

Runoff Volume for the 1" Storm,

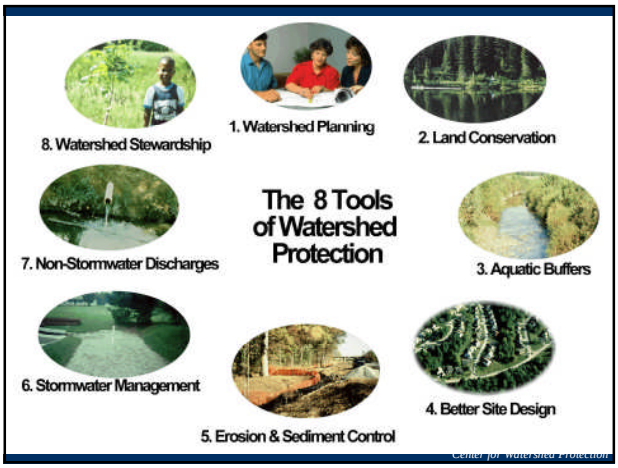
(rainfall depth, P) (runoff coefficient, Rv) (drainage area, DA)

Before Development, = (1") (0.05) (38 acres), or
6,900 cubic feet of runoff (≈ 51,600 gallons)

After Development, = (1") (0.32) (38 acres), or
44,140 cubic feet of runoff (≈ 330,200 gallons)

Water Quality Impacts

- Nutrients (N, P)
- Fine sediments (TSS)
- Stream temperature
- Bacteria
- Pesticides
- Chlorides
- Metals and hydrocarbons
- Trash and debris



A Brief History of Stormwater in the Chesapeake Bay

1960's – Pave it and Pipe it
1970's – Dry Ponds and Sediment Basins
1983 - Maryland's Stormwater Management Regulations adopted
Early 1980's – Wet ponds
1985 - Infiltration (briefly)
1988 - Regional Ponds Reign (briefly)
1990 - Phase I Stormwater permits under Clean Water Act
1992 - Stormwater Wetlands

A Brief History of Stormwater in the Chesapeake Bay

1993 – Urban Streams are Degrading
1995 – Filtering Systems and Bioretention
1998 - Better Site Design and LID
2000 - Maryland Manual – new regulations and design guidance
2002 - Phase II Stormwater Permits

Clean Water Act & Stormwater Management

- Clean Water Act "NPDES Phase I and Phase II" permit programs
  - Municipal Separated Storm Sewer Systems (MS4s)
  - Industrial
  - Construction

NPDES MS4 Permit Program- What it Means

Who is Covered?

PHASE I
- Communities that have separated storm drain system with a population more than 100,000.

PHASE II
- Communities with pop. of more than 50K and a density greater than 1,000 people/sq mi. States assess whether communities from 10K to 50K should be covered, based on certain criteria.

NPDES MS4 Permit Program- What it Means

What is Required?

PHASE I
- Stormwater quality monitoring
- Mapping storm drain network
- Outfall screening
- Removal of illicit discharges
- Source identification
- Structural and source control measures to reduce pollutants
- ESC program
- Demonstrate legal authority
- Fiscal analysis

PHASE II
- Public education/outreach
- Public participation/ involvement
- Illicit discharge detection
- Construction site runoff control
- Post-construction runoff control
- Pollution prevention

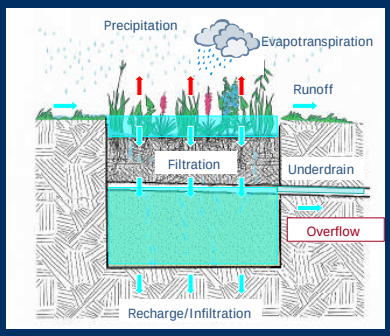
6 Minimum Measures for Phase II Communities

- Public education/outreach
- Public participation/ involvement
- Illicit discharge detection
- Construction site runoff control
- **Post-construction runoff control**
- Pollution prevention

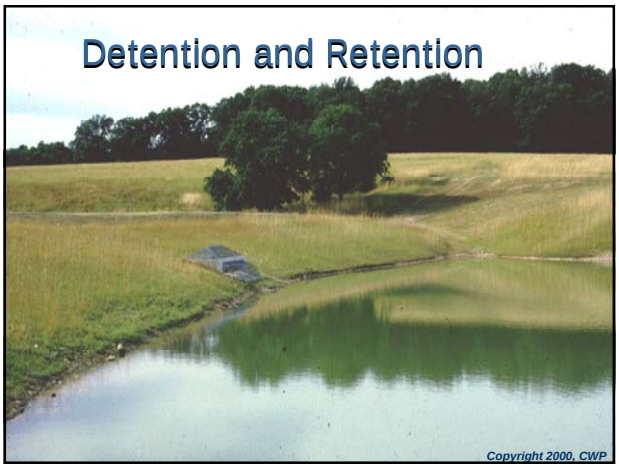
2000 Maryland Stormwater Design Manual

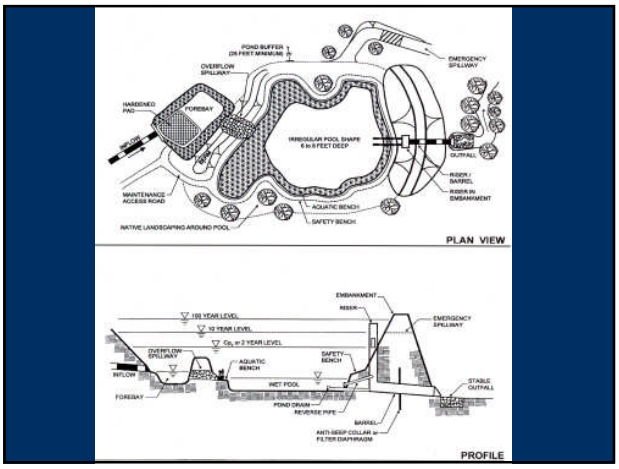
- Water Quality
- Channel Protection
- Overbank Flood Protection
- Groundwater Recharge
- Runoff Reduction (Better Site Design / Low Impact Development Practices)
- Credits

Infiltration and Filtration



Detention and Retention





The Schueler Stormwater Market Outlook

Is your stormwater portfolio under-performing?

Review the history of 8 investment products by BMP, Inc.*

* A wholly owned subsidiary of R.U. Wet Inc.
Remember past performance does not always guarantee future results.
The Center is in no way responsible for your stormwater losses.

1. Municipal Detention Bonds

dry detention ponds, pipes, inlets and curbs and gutters

Very traditional
Straightforward engineering
Low performing, but safe
Still widely accepted by most local and state governments.

Recommendation: Sell

2. Wet Bonds

Steady performance for mature technology
Major holding in most communities
Brand somewhat tarnished recently
Strong competition from emerging STP technologies

Recommendation: Hold

3. Infiltration Stocks

- Hi risk, hi reward
- Preferred stock in the 1980's
- Sharp downturn in 1990's due to widespread product failures
- Better designs and testing in recent years
- Poised for a resurgence?

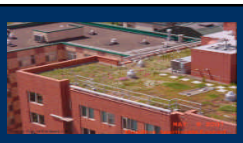
Recommendation: Buy

4. Stormwater Wetland Trusts

- Market favorite in the 1990s
- Strong performer, but weak sales
- Competition from foreign plants
- Potential liability with West Nile Virus has harmed brand

Recommendation: Hold

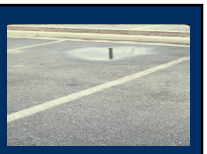
5. Green Roof Stocks



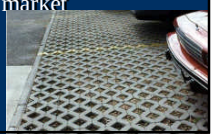
- New product to USA, although it has been sold in Europe for years
- Targeted toward exclusive clientele of high end green owners
- Some analysts consider it over-hyped, while others claim it will be the next Starbucks
- Despite a lot of research, not much product sold yet

Recommendation: Buy?

6. Porous Pavement, Inc.



- First issued in 1980's, was wonderkid of the industry
- Spectacular sell-off in early 1990s due to product failure and poor branding
- Alternative materials and new designs continue to emerge, but lack adequate testing
- Still a small player in the parking lot market



Recommendation: Buy

Typical Appli

Photos: Bill Hunt/NCSU

7. Stormwater Biotech Sector

- Launched in 1990s, fasting growing BMP stock
- Currently the darling of the industry
- "Bio" has enormous brand appeal for most customers
- Recent performance data has not met market expectations
- Possibly a little oversold?

Recommendation: Buy

8. Stormwater Microcaps

Proprietary devices, hydrodynamic structures, stormwater in a can)

- Hundreds of them out there
- Targeted toward consumers that want convenience
- Extravagant claims about performance are seldom achieved
- Hard to pick the few microcaps that will succeed, expect that most will fail

Recommendation: Sell

Tips on Managing Your Municipal STP Portfolio

Read prospectus before investing

Review your current STP portfolio every few years

Diversify your portfolio, but root out non-performers

Invest for the long run, as you need reliable performance over many decades

Choose the STP stocks that will meet your future lifestyle needs

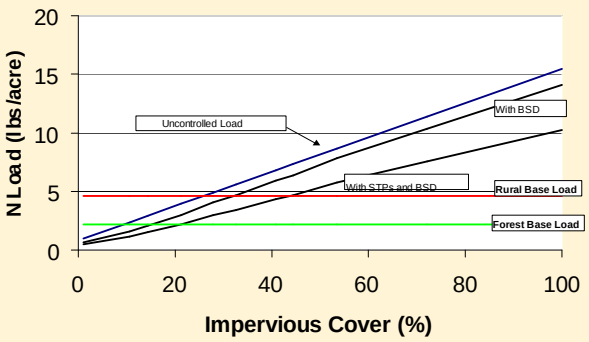
New Paradigms are Needed

- Maintenance –financing and enforcement
- Retrofits

Maintenance

A lot of problems waiting to happen

The Best We Can Do



New Paradigms are Needed

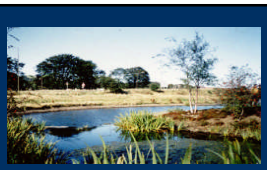
- Better SWM –
  - Improved performance standards
  - Training the designers, regulators, contractors
  - Research
  - Protect receiving waters

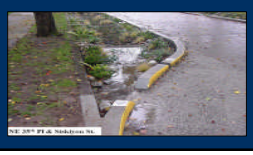
New Paradigms are Needed

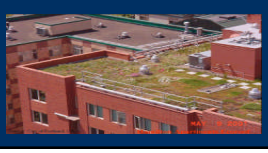
- Incorporating stormwater – wetlands and forests
- Better Site Design

We still get A lot more Subdivisions Like This

Than This







What you can do

Promote new paradigms

- Maintain community association-owned stormwater management practices
- Keep local government SWM programs on track for
  - Funding
  - Inspection and Enforcement
  - Improved standards for new and redevelopment
- Participate in public review of development

What you can do

- Prevent Pollution at Home
  - Test your soil, limit fertilizers and pesticides
  - Pick up pet waste
  - Wash cars at commercial car wash or on lawn, not in street.
  - Take household hazardous waste to collection sites
  - Compost yard waste or participate in City pickup. Don't put yard waste in gutters or streams.

What you can do

- Runoff Reduction at home
  - Minimize turf area
  - Replace lawns with native vegetation
  - Direct roof top runoff to vegetated areas
  - Use a rain barrel for watering landscaping

Resources

- www.stormwatercenter.net
- http://cfpub.epa.gov/npdes/
- http://www.bae.ncsu.edu/programs/extension/