One Stormy Night

A Presentation on Stormwater
Stormwater is water from precipitation that does not immediately soak into the ground. It picks up pollutants as it travels across the land and becomes nonpoint pollution.
Urban and rural nonpoint pollution is the leading cause of water quality problems in Wisconsin, degrading or threatening
40 percent of the streams
90 percent of the inland lakes
many of the Great Lakes harbors & coastal waters, many wetland areas
substantial groundwater resources
We see the problem in the news when we hear about beach closings. You might have heard about the testing programs on Lake Winnebago and in Door County. The increase in testing has caused the number of closing and advisories to increase. Wisconsin had more than 1,500 beach closings and advisories attributable to storm water runoff in 1998 alone!
Between 1997 and 2001, the rate of development has averaged 2.2 million acres/yr from land that was previously forestland (46%), followed by cropland (20%) and pastureland (16%).

Increases in development is a major reason for increasing stormwater...
As we develop, water that had previously absorbed into the ground and become groundwater, now runs off. This can create a whole host of problems.
Surface water can dry up from lack of groundwater recharge
Notice the base flow of the stream is lower after urbanization. Also notice the peaks after rain events are much higher.
This results in flashflood situations. The more impervious surfaces there are, the more runoff there is.
What's in Stormwater?

Trash
Sediments

Anytime you have bare soil, it can erode and become a problem. This causes increases in turbidity (less light can pass through, more particles in the water.)
Farming too close to waterways, lack of ground cover add to sedimentation.
Turbidity

• Clogs & abrades gills
• Reduces growth rates
• Prevents egg and larvae development
• Solid particles absorb sunlight heating water and reducing oxygen
RELATIONAL TRENDS OF FRESH WATER FISH ACTIVITY TO TURBIDITY VALUES AND TIME

- Turbidity (NTUs)
  - 100,000
  - 10,000
  - 1,000
  - 100
  - 10

- Time
  - Hours
  - Days
  - Weeks
  - Months

- Events:
  - Fish abandon cover
  - Avoidance behavior detected
  - Increased respiration
  - Reduced feeding rates
  - Fish start to show signs of stress
  - Decreased hatching rates
  - Long-term reduction in feeding success
  - Increases coughing rates
  - Death
Another common ingredient in stormwater runoff is excess nutrients such as phosphorous and nitrogen. These result in algae blooms that lower the oxygen available to aquatic life and...
... excess weed growth. Nutrients come from a variety of sources, such as...
Manure and farm field fertilizer runoff.
Organic Yard waste
Like leaves, grass clippings, etc.

Fertilizers
Auto pollutants

- Water runoff from streets, parking lots and driveways picks up oil and grease dripped from cars, asbestos worn from brake linings, zinc from tires and organic compounds and metals from spilled fuels. Autos = heavy metals.

- According to the Bicycle Federation of Wisconsin, an average 4-mile round-trip bike, skate or foot commute prevents nearly 15 pounds of auto air pollution from entering the air. For shorter trips, biking, walking or skating can eliminate 3.6 pounds of auto pollutants per mile.
Four quarts of motor oil can create an 8-acre oil slick and contaminate a million gallons of drinking water.

When your car's leaking oil on the street, remember it's not just leaking oil on the street.
Outdoor car washing has the potential to result in high loads of nutrients, metals and hydrocarbons.

Toronto residents now have a "snitch line" that is designed to discourage home car washing. Fines for car washing, or otherwise polluting local water from your property, range from $200 to $10,000. (Lake Ontario Waterkeeper 6/03)
Pesticides
Landscape Pesticide Advance Notice Registry: If you are on the registry, professional lawn and landscape companies must tell you at least 12 hours ahead of time about pesticides that will be applied to lawns, trees and shrubs in your neighborhood.
Water Quality Affects
Temperature

- Thermal pollution
  - Increase runoff (water warms on impervious surface)
  - Lose of Riparian buffers (home-owners remove trees between house and river/lake to see water)
- Increase rate of photosynthesis
- Metabolic rates of organisms increase, which increases oxygen demand
Dissolved Oxygen

- Directly related to temperature
- Organic wastes
- Increase in aerobic bacteria
- Dissolved oxygen depletions
  - Shift in plants and animals
pH

- Natural levels = 6.5 - 8.5
- Dramatic changes in pH
- causes loss in the diversity of plants
- and animals
Phosphorus and Nitrogen

• Cultural eutrophication
  - Algae blooms
  - Increase water temperature
  - Depleted D.O. levels
– Prolonged retention decreases dissolved oxygen and can increase nutrient loading
– Allows for release of toxic metals from sediments
– Benthic diversity decreases as salinity increases

Chlorides from road salts; often highest in the spring
Typical suburban neighborhood is 30-35% impervious. If we continue to increase impervious surface, we will also increase runoff.
How to Fight Stormwater!!
Keep leaves, grass clippings and litter out of the street.
Stenciling can let public know quickly where water is going!
Wattles and silt fences can hold back construction runoff if used properly.
Flo guard

Used to capture and filter incoming materials going into storm drains
Pervious concrete is much more porous and the cost is comparable to conventional concrete $6-9 per foot
Pavers

$5 per square foot, installed
Geoblock

$3-4 per square foot, installed
• Grassed waterways prevent runoff to streams, and contour farming to slow water down.

• It has been estimated that over a 50-year lifetime, one tree controls $31,250 worth of soil erosion (UCCEF, 2001).

• A study done in 1997 by American Forests found that a 20 percent loss of trees and other vegetation in the Atlanta metropolitan region produced a 4.4 billion-cubic foot increase in stormwater runoff. It would cost at least $2 billion to build containment facilities capable of storing the excess water, according to officials.
Keep your own Stormwater!
Use mosquito proof rain barrels to collect and distribute water to your yard and garden.
Rain gardens add the beauty of native plants with the ability to soak up runoff.
Retention Ponds

Swales

These slow down runoff and allow the pollutants to settle out. Swales allow runoff to percolate back into the groundwater.

Storm water ponds can remove 90 percent of suspended solids, 65 percent of phosphorus, 70 percent of lead and 65 percent of zinc found in runoff.
Most storm water utilities set residential rates based on average amount of paved area. Some communities use zoning classifications. Fees on water bills average $15 to $20 per single or two-family dwelling per six months. Shopping malls, even churches, schools and other tax-exempt entities are subject to storm water fees because the utility creates a user fee, rather than a tax.