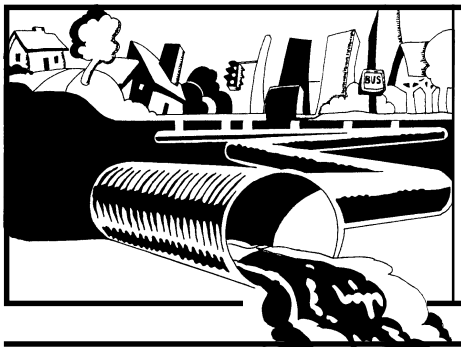

Stormwater Problems & Impacts: Why All The Fuss?

Stormwater Fact Sheet No. 1

This fact sheet is No. 1 of a four-part series for local government officials on stormwater runoff problems and control strategies. The series covers:

1) Stormwater Problems and Impacts
2) Control Principles and Practices
3) Rules and Regulations
4) Local Program Elements and Funding Alternatives

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Introduction

Local Governments Spend Millions Each Year Rectifying Flood Damage.

Controlling stormwater runoff and its impacts is a serious issue facing many local government officials across North Carolina and the nation. Citizens are complaining about flooding caused by increased amounts of stormwater runoff, and the state and federal governments are mandating local stormwater programs to control stormwater pollution.

This series of fact sheets is designed to help local officials better understand the problem and how it can be addressed. A Guidebook is also available for more detailed information and assistance.

What Is Stormwater Runoff?

Stormwater runoff is rainfall or snowmelt that runs off the ground or impervious surfaces like buildings, roads, parking lots, etc. and drains into natural or manmade drainage ways. In some cases, it drains directly into streams, rivers, lakes, sounds or the ocean. In other cases, particularily urbanized areas, it drains into streets and manmade drainage systems consisting of inlets and underground pipes commonly referred to as "storm sewers." These sewers are not to be confused with sanitary sewers that transport human and industrial wastewaters to a treatment plant before discharge to surface waters. Stormwater entering storm sewers does not usually receive any treatment before it enters streams, lakes and other surface waters.

What Is The Problem?

❑ **Increased Flows Cause Flooding**

Stormwater runoff problems and impacts are most evident in areas where urbanization has occurred. Changes in land use have a major effect on both the quantity and quality of stormwater runoff. Urbanization, if not properly planned and managed, can dramatically alter the natural hydrology of an area. Increased impervious cover decreases the amount of rainwater that can naturally infiltrate into the soil and increases the volume and rate of stormwater runoff. These changes lead to more frequent and severe flooding and potential damage to public and private property.

Under natural conditions, typically 10% of rainwater falling on a piece of property runs off the land surface into streams, rivers or lakes. The remainder either evaporates into the air or infiltrates into the soil replenishing groundwater supplies (Figure 1). Development of the site increases the percentage of impervious surfaces. As the percentage of impervious surfaces increases, the percentage of runoff increases since there is less vegetated area to soak up the rainwater.

The rate of runoff and streamflow after a storm event also shows dramatic increases under post versus predevelopment conditions (Figure 2). The higher and more rapid peak discharge of runoff and streamflow can overload the capacity of the stream or river, causing downstream flooding and streambank erosion.

Local governments spend millions of dollars each year rectifying damage to public and private property caused by uncontrolled stormwater runoff. In heavily developed areas, damage to public and private property occurs during heavy rains. This damage includes road, culvert and water and sewer line washouts, flooded homes and yards, the deposition of sediment and debris on properties and roads,

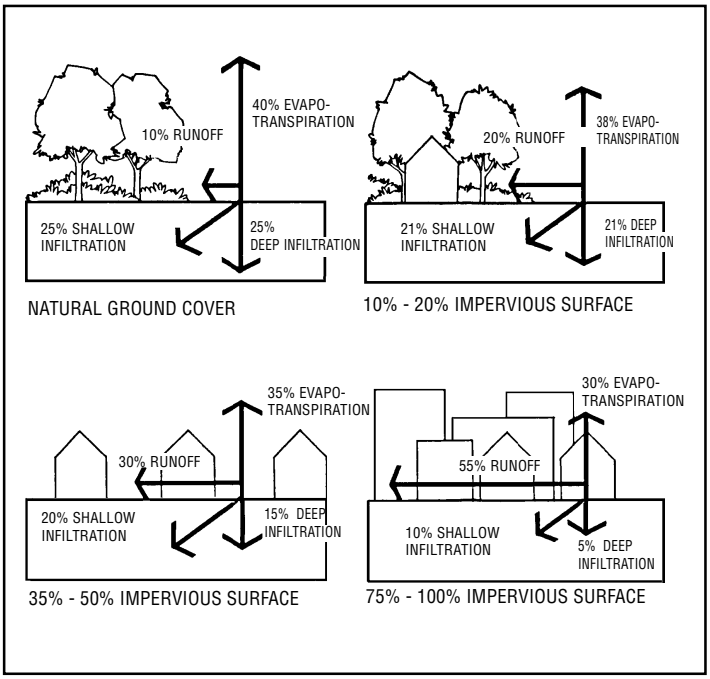


Figure 1: Changes In Runoff Flows Resulting From Paved Surfaces. (Source: Tourbier, et. al, 1981.)

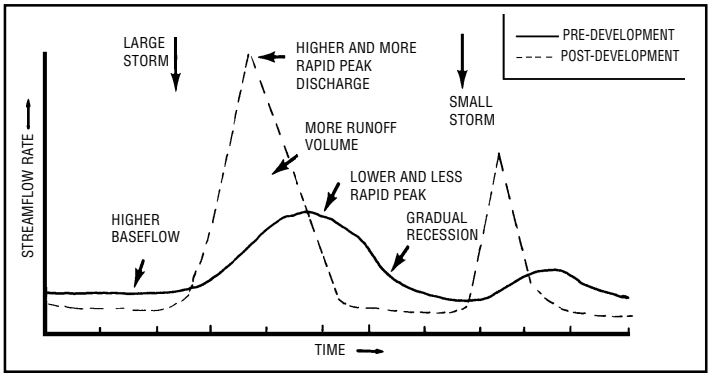


Figure 2: Pre Versus Post Development Streamflow Rates (Source: Schueler, 1987).

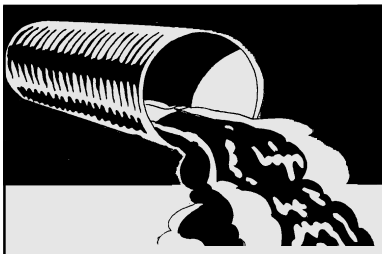
and damage to bridges. When streambanks erode they clog stream channels, culverts, and pipes with sediment contributing to flooding problems. Sediment is washed into ponds, lakes and other impoundments reducing their capacity to store water and requiring costly removal efforts. The increased volume and velocity of runoff and streamflow can also cause accelerated channel erosion and changes in streambed composition. This can destroy fish habitat and disrupt the natural ecology of the stream or river.

❑ **Runoff Degrades Water Quality**

Stormwater runoff is also a major source of water pollution. Various pollutants are deposited on surfaces due to man's activities and are washed off during storms into storm drains or directly into streams, rivers and lakes. Pollutant levels are typically much higher in the first inch of runoff commonly referred to as the "first flush." Some studies have found that approximately 90% of the pollutant loading is contained in the first flush. Therefore, effective water quality protection requires the treatment of the first flush through the use of various preventive and control measures. In addition, some pollutants are dumped or discharged accidently or illegally into storm sewer systems. Stormwater pollutants and their sources are listed in Figure 3.

Photo By George Johnson. Courtesy Of Sea Grant Program.

Lawn Chemicals Are One Source Of Toxics.



Stormwater Pollutants & Sources

Sediment – Construction sites, disturbed areas, streambank erosion and alterations

Nutrients – Fertilized lawns, roadsides, leaky sewers & septic tanks

Bacteria – Leaking sewers & septic tanks, pet wastes

Oxygen Demanding Substances – Leaky sewers & septic tanks, organic matter, pet wastes

Oil and Grease – Leaky automobiles, industrial areas, illegal dumping

Trace Metals – Automobile wear and tear, exhaust, industrial areas

Road Salt – Applications to snow and ice

Toxic & Synthetic Chemicals – Pesticide applications, automobiles, accidental spills, illegal dumping

Thermal Impacts – Heated landscape/impervious areas, tree removal, shallow ponds

Figure 3

Cumulative Impacts

The cumulative effects of stormwater runoff on water bodies are evident across the state. Streams draining urbanized areas have fair to poor water quality due to stormwater runoff and leaking sewer lines. Some shellfish waters along North Carolina's coast have been contaminated and closed due to stormwater runoff and other pollution sources. Uncontrolled stormwater runoff has many impacts on humans and the environment including:

- Flooding - Damage to public and private property, including infrastructure
- Eroded Streambanks - Sediment clogs waterways, fills lakes, reservoirs
- Widened Stream Channels - Loss of valuable property
- Aesthetics - Dirty water, trash and debris, foul odors
- Fish and Aquatic Life - Impairment/destruction
- Impaired Recreational Uses - Swimming, fishing, boating, etc.
- Threatens Public Health - Contamination of drinking water, fish/shellfish
- Threatens Public Safety - Drownings in flood waters
- Economic Impacts - Fisheries, shellfish, tourism, recreation related businesses
- Increased Cost of Water and Wastewater Treatment - Stormwater pollution increases raw water treatment costs and reduces the assimilative capacity of waterbodies.

For More Information

❑ **Reference Documents**

• Stormwater Management in NC: A Guide For Local Officials, 1994 Land-of-Sky Regional Council. Tel. (704) 254-8131.

• Stormwater Management Guidance Manual, 1994, NC Cooperative Extension Service and NC DEHNR. Tel. (919) 515-3723.

• Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs, 1987, Metropolitan Washington Council of Governments. Tel. (202) 962-3256

❑ **Contacts**

• EPA Stormwater Hotline - (703) 821-4823.

• NC DEM Stormwater Management Group - (919) 733-5083.

Streambank Erosion Fills Streams With Sediment.

Next Fact Sheet

Fact Sheet #2 describes the principles and practices to control stormwater runoff and prevent or minimize its impacts.

BUNCOMBE HENDERSON MADISON TRANSYLVANIA

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