# *Human Health Impacts from Stormwater Runoff*

Stormwater Fact Sheet No. 2

This fact sheet is No. 2 of a eight-part series focused on stormwater runoff problems and control strategies. The series covers:

1) Stormwater Impacts
2) Human Health Impacts
3) How Citizens Can Help
4) Prevention and Control
5) Control for Development
6) Rules and Regulations
7) “How to” for Local Officials
8) Municipal Prevention

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## What Is Stormwater Runoff?

As was discussed in Fact Sheet No. 1, stormwater runoff is the rain or snowmelt that runs off streets, rooftops, parking lots, lawns and other land surfaces and eventually runs into our streams. Stormwater also picks up pollutants as it flows across land surfaces. Pollutants include sediment, pesticides, fertilizers, bacteria and disease causing organisms from pet waste and failing septic systems; petroleum products such as oil and grease; salt used on roads and sidewalks; and even auto wear and exhaust. Sometimes pollutants (e.g., used oil, paint thinners, etc.) are illegally dumped directly into storm drains and waterways. These all contribute to the human health affects listed below.

*The following are excerpts taken, with permission, from the following article: Dr. Stephen Gaffield, Robert L. Goo, Lynn A. Richards MSES, MPA, and Richard J. Jackson, MD, MPH. Public Health Effects of Inadequately Managed Stormwater Runoff. American Journal of Public Health. September 2003, Vol 93, No. 9. pp 1527-1533.*

## Public Health Effects

The expansion of urban areas is creating more impervious surfaces, such as roofs, roads, and parking lots, which collect pathogens, metals, sediment, and chemical pollutants and quickly transmit them to receiving waters during rain and snowmelt events. This non-point source pollution is one of the major threats to water quality in the United States and is linked to chronic and acute illnesses from exposure through drinking water, seafood, and contact recreation. Impervious surfaces also lead to pooling of stormwater, increasing potential breeding areas for mosquitoes, the disease vectors for dengue hemorrhagic fever, West Nile virus, and other infectious diseases.

Traditional strategies to manage stormwater and treat drinking water require large infrastructure investments and face difficult technical challenges. Reducing stormwater runoff and associated non-point source pollution is a potentially valuable component of an integrated strategy to protect public health at the least cost.

Various pollutants are commonly found in urban and suburban stormwater. Runoff from roofs, roads, and parking lots can contain significant concentrations of copper, zinc, and lead, which can have toxic effects in humans. Insecticides are frequently found in fish in at levels considered harmful to wildlife, raising concerns about carcinogenic effects and disruption of hormonal systems in humans.

## Possible Sources of Illness

Pollultants from increased traffic volume in recent decades has resulted in higher concentrations of polyaromatic hydrocarbons— known human carcinogens—in urban lake sediments, these concentrations commonly exceeding levels set to protect aquatic ecosystems.

Community drinking water supplies are commonly disinfected with chlorine and, if the source is surface water, filtered to remove sediment and associated pollutants. Several common disease carrying microorganisms are resistant to treatment with chlorine and filtration, although the effectiveness of filters varies with their pore size. Suspended sediment in source waters further reduces the effectiveness of chlorine.

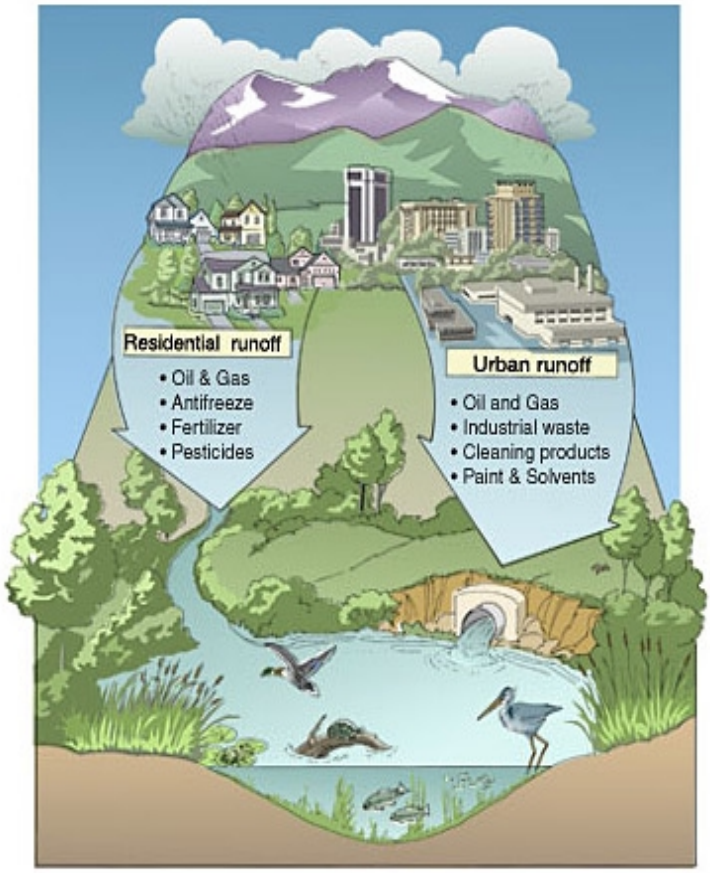
Nitrogen also poses direct health threats. Exposure to nitrate in drinking water increases the risk of methemoglobinemia, causing shortness of breath and blueness of the skin, especially for infants. Consumption of water with elevated nitrate is also suspected to increase miscarriage risk. Major sources of nitrogen from urban and suburban areas may include fertilizers carried by stormwater, vehicle exhaust, and septic systems.

Fecal coliform bacteria in surface waters commonly exceed standards for recreation, and exposure to bacteria and parasites from swimming and other forms of recreation in water contaminated with urban runoff has caused numerous cases of illness, including ear and eye discharges, skin rashes, and gastrointestinal problems.

Approximately 42 million people in rural and suburban areas use their own private water supplies, typically shallow groundwater wells that are not covered by the Safe Drinking Water Act and are rarely treated or monitored. Concerns with this use include cross-contamination from runoff and surface water and contamination by nitrates and pathogens from septic systems.

Increasing impervious surface without stormwater controls leads to increased runoff. Increased runoff volume generates greater pollutant loads. In response to an 18% increase in urban area in a watershed near Indianapolis, IN, between 1973 and 1991, annual average runoff volume increased by 80%, and average annual loads for lead, copper, and zinc increased by more than 50%. High proportions of urban land cover and steep slopes—predictors of high runoff volumes— correspond with high fecal coliform levels in South Carolina watersheds. Elevated fecal coliform levels also have been detected in suburban streams.


Protecting public health by reducing urban stormwater runoff and associated non-point source pollution makes sense as a complement to water treatment infrastructure and health care interventions. In fact, stormwater management needs to be integrated into a comprehensive water management scheme that addresses water supply and sewage treatment.




**For more information**

- Appropriate Local Government Officials www.seris.info/RiverLink/techinfo.shtml
- Land of Sky Regional Council 251-6622.


- Dr. Stephen Gaffield, Robert L. Goo, Lynn A. Richards MSES, MPA, and Richard J. Jackson, MD, MPH. Public Health Effects of Inadequately Managed Stormwater Runoff. American Journal of Public Health. September 2003, Vol 93, No. 9. pp 1527-1533.
- Curriero FC, Patz JA, Rose JB, Lele SD. The association between extreme precipitation and waterborne disease outbreaks in the United States, 1948–1994. Am J Public Health. 2001;91:1194–1199.
- Schwartz J, Levin R, Hodge K. Drinking water turbidity and pediatric hospital use for gastrointestinal illness in Philadelphia. Epidemiology. 1997;8:615–620.
- Schwartz J, Levin R, Goldstein R. Drinking water turbidity and gastrointestinal illness in the elderly of Philadelphia. J Epidemiol Community Health. 2000;54: 45–51.


- Center for Watershed Protection. www.cwp.org.
- North Carolina Division of Water Quality Stormwater Unit: Manuals and Factsheets
- www.h2o.enr.state.nc.us/su
- North Carolina Division of Water Quality Stormwater Permitting Unit: Stormwater Permitting Unit Home h2o.enr.state.nc.us/su/stormwater.html
- North Carolina Phase II Stormwater www.ncphase2sw.org/
- North Carolina State University www.bae.ncsu.edu/stormwater/
- RiverLink www.seris.info/RiverLink/techinfo.shtml or www.riverlink.org

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