

Nonpoint Source Pollution

Background: The focus of water pollution has traditionally fallen on point source pollution - single, identifiable sources that discharge pollutants into the environment - such as discharge from industrial facilities and sewage treatment plants (Figure 1). However, many of these discharges have been cleaned up or eliminated due to legislation such as the Clean Water Act of 1972 as well as many state and local efforts.



Figure 1: Point Source Pollution



Figure 2: Polluted Runoff

Despite these efforts pollution is still a problem. This has caused a shift in focus toward the number one water quality problem in America, nonpoint source pollution. Nonpoint source pollution, also known as polluted runoff, is pollution whose sources cannot be traced to a single point. This occurs when rainfall, snowmelt, or irrigation water moves over the land or through the ground, picks up pollutants, and deposits them into our streams, lakes, and oceans; or introduces them into our ground water (Figure 2).

In an undisturbed environment, water falls to the ground, either hitting the surface and running off or percolating through the soil into the groundwater. Through both routes, water makes its way to our streams, ponds, wetlands, rivers, lakes, and oceans. As we develop and alter the landscape this natural cycle is disturbed, impacting water quantity and quality. Increased runoff can lead to more frequent and severe flooding; decreased infiltration, which leads to less groundwater recharge and a decrease in base flow to streams; and generation of more pollution from our land use, which is delivered to our waterways.

Types of Nonpoint Source Pollution: There are many types of pollutants that can impact our water resources. Pollutants commonly associated with nonpoint source pollution include: toxic contaminants, sediment, nutrients, pathogens, debris, and thermal stress.

Toxic contaminants are compounds like heavy metals (e.g. mercury, lead, cadmium), organics (e.g. polychlorinated biphenyls, PCBs; polycyclic aromatic hydrocarbons, PAHs), fire retardants (e.g. polybrominated diphenyl ethers, PBDEs), and estrogenic substances (e.g. dichlorodiphenyl tri-chloroethane, DDT) that can threaten the health of aquatic life and humans, and are often resistant to breakdown (Figure 3). Sources of toxic contaminants include combustion of fossil fuels, pesticides, industrial waste, petroleum spills, and auto emissions.



Figure 3: Toxic Contaminants

Sediment is eroded soil or sand, which smothers aquatic habitat, carries pollutants, and reduces water clarity (Figure 2). Sources of sediment include construction sites, agricultural fields, disturbed areas, and stream banks.

Nutrients such as nitrogen and phosphorus are substances needed for plant growth, but elevated levels can become a health hazard in drinking water and stimulate excessive aquatic plant growth, which can ultimately lead to lower dissolved oxygen levels in the water. Sources include animal waste, fertilizers, and malfunctioning septic systems.



Figure 4: Presque Isle Bay Shoreline Contaminated with Debris

Pathogens are disease-causing bacteria and viruses associated with the presence of fecal matter that can cause beach closures and health hazards in drinking water. Sources include combined sewer overflows, leaking septic tanks, sewer malfunction, contaminated storm sewers, and animal feedlots.

Debris includes plastics and other trash, which threaten aquatic life and detract from recreational and aesthetic values (Figure 4). Sources may include illegal dumping, street litter, beach litter, and boating waste.

Thermal stress is an elevation in water temperature that can harm native species while helping nonnative species to spread. Sources may include runoff from heat-absorbing impervious surfaces (pavement) and removal of streamside vegetation (riparian zone).

Reduction of Nonpoint Source Pollution: Polluted runoff is commonly the result of the way we develop, use, and maintain our land, which is largely decided by policies at the local level through the decisions of municipal officials and commissions. There are many practices (e.g. porous pavement), regulations (e.g. ordinances), and state and federal programs (e.g. NPDES Phase II) that can greatly reduce the effects of polluted runoff.

Municipal officials, commission members, and state and federal personnel are not the only ones that can reduce the effects of polluted runoff; there are many ways in which individuals can help. By limiting nonpoint source pollution at the household level, the overall impacts of nonpoint source pollution on water quality can be greatly reduced. Individuals can help by limiting the application of fertilizers placed on lawns and gardens and properly storing chemicals. Chemicals and oil should never be emptied into sewer drains where they can cause major water quality problems. Pet wastes, a significant source of nutrient contamination, should be disposed of properly. Where possible, households can replace impervious surfaces with more porous materials.

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EPA Fact Sheet: *Opportunities for Public Involvement in Nonpoint Source Control* – <http://www.epa.gov/owow/nps/facts>
Nonpoint Source Pollution - <http://nemo.uconn.edu/publications/index.htm>

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