STRATEGIES FOR COPING WITH POLLUTED RUNOFF*

Key Finding

As the intensity of development increases, so does the generation of nonpoint source water pollution, or polluted runoff. A good indicator of the intensity of development in a given area is the amount of *impervious* surface. Studies have shown that the greater the impervious surface coverage in a watershed, the greater the potential degradation of that watershed's water systems. Thus, local officials can do much to protect their water resources by considering the location, extent, drainage and maintenance of impervious surfaces on the town, watershed and individual site levels. Natural resource planning, site design and use of best management practices form an effective three-tiered approach to the problem.

The Problem

Development affects both the quantity and the quality of stormwater runoff, which in turn has impacts on watercourses. By enhancing and channeling surface drainage in favor of natural drainage systems, impervious surfaces like asphalt, concrete and roofing increase the volume and velocity of the runoff, often resulting in flooding, erosion and permanent alterations in stream form and function (see NEMO Fact Sheet #3). In addition, by blocking the infiltration of water and its associated pollutants into the soil, impervious surfaces interfere with natural processing of nutrients, sediment, pathogens and other contaminants, resulting in degradation of surface water quality.

Because of these impacts, a growing body of scientific research is finding a direct relationship between the amount of impervious surface in watershed and the water quality of the watershed's receiving stream. Many studies find that without nonpoint source management of some kind, stream water quality becomes increasingly degraded as impervious levels climb above 15%; in highly sensitive streams, degradation can begin when as little as 8% to 10% of the watershed area has impervious cover.

What Towns Can Do

Pavement is an unavoidable fact of modern life. However, there are still many options available to the municipality interested in reducing the water quality impacts of existing or future development. Strategies can be organized into a three-tiered approach, which can be summarized as: *plan, minimize, mitigate*.

***1. Plan** Development Based on Your Town's Natural Resources.* Remember, preventing pollution by wise planning is by far the least expensive and most effective way to protect your town's waterways. To this end, a working knowledge of your town's natural resources is critical to guide appropriate development. A natural resource inventory is an essential first step. Identifying important natural resources and setting protection priorities provides a framework within which the impacts of proposed or existing development can be evaluated. Formal inclusion of these priorities in town plans and procedures is also important (see NEMO Fact Sheet #5).

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Broad resource protection strategies applied at the town or watershed level, such as buffer zone and setback requirements, are increasingly coming into use. With regard to impervious surfaces, local officials should consider a "budget" approach that sets an overall limit for key areas, and above that limit requires increase in pavement on one site to be compensated for decreases on another site (or some other acceptable method of compensation). This technique might be appropriate, for instance, in a watershed where analyses show a threat to critical water resources from future growth.

***2. Minimize** Impacts Through Site Design*. The site planning stage offers the best chance for local officials, designers and builders to work together to reduce polluted runoff from a site. Evaluate site plans with an eye to minimizing both impervious areas and disruption of natural drainage and vegetation. Cluster development, which reduces the total area of paved surfaces and increases open space, should be considered. Are the proposed sidewalks, roads and parking lot sizes absolutely necessary, or could they be reduced? Brick, crushed stone, or pervious pavement is often a viable alternative in low traffic areas. Are curbing and piping necessary, or could drainage be directed to vegetated swales? Designs which reduce grading and filling and retain natural features should be encouraged. In addition to protecting waterways, such designs can often be less expensive and more pleasing to the eye.

***3. Mitigate** Unavoidable Impacts by Using Best Management Practices*. Best management practices (BMPs) include a whole range of methods designed to prevent, reduce or treat stormwater runoff. Choosing the correct BMPs is often highly site-specific. There are a number of agencies and publications that can provide guidance (see NEMO Fact Sheet #5). There are some basic BMP concepts to keep in mind:

- *Slow that stormwater*. This is the basic idea behind both detention basins, which are meant to slow and hold stormwater before releasing it, and retention basins, which are designed to holed the water permanently until it infiltrates into the ground. In both cases, pollutant removal takes place through settling of particles and through chemical and biological interactions in the standing water or in the soil. As with any device, these BMPs must be correctly designed in order to work properly. For instance, basins must be large enough to treat runoff generated by the combination of local climate and site configuration.
- *Avoid direct connections*. Break up the "expressway" of polluted runoff by using grass swales, filter strips or other forms of vegetative BMPs wherever possible in place of curving and piped drainage. In many cases, these methods are most effective when used in combination with structural BMPs like detention ponds.
- *Ensure regular maintenance*. Most structural BMPs require regular maintenance to retain peak pollutant-removal efficiency. Maintenance ranges from the frequent, but simple (sweeping parking lots, cleaning storm drains) to the infrequent, but complex (sediment removal from detention/retention ponds), but in all cases it must be budgeted and planned for.
- *Don't forget the two "e's": enforcement and education*. It's important to make sure that contractors are following through on agreed-upon designs and methods. Don't underestimate things like storm drain stenciling and hazardous waste disposal days, which can reduce pollution, raise public awareness and help to engender support for all your town's water protection activities.