



Extension FactSheet

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Coping With Polluted Runoff

As the intensity of land 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. 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 (BMPs) form an effective three-tiered approach to the problem.

Land 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. In addition, by blocking the infiltration of water and its associated pollutants into the soil, impervious surfaces interfere with the 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 has found a direct relationship between the amount of impervious surface in a 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 Communities Can Do

Pavement is an unavoidable fact of modern life. However, many options are still 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, and mitigate.

1. Plan Development Based on Your Community's Natural Resources.

Remember that preventing pollution by wise planning is by far the least expensive and most effective way to protect your local waterways. To this end, a working knowledge of your community'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 local land-use plans and procedures is also important.

Broad resource protection strategies applied at the local 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 by 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.

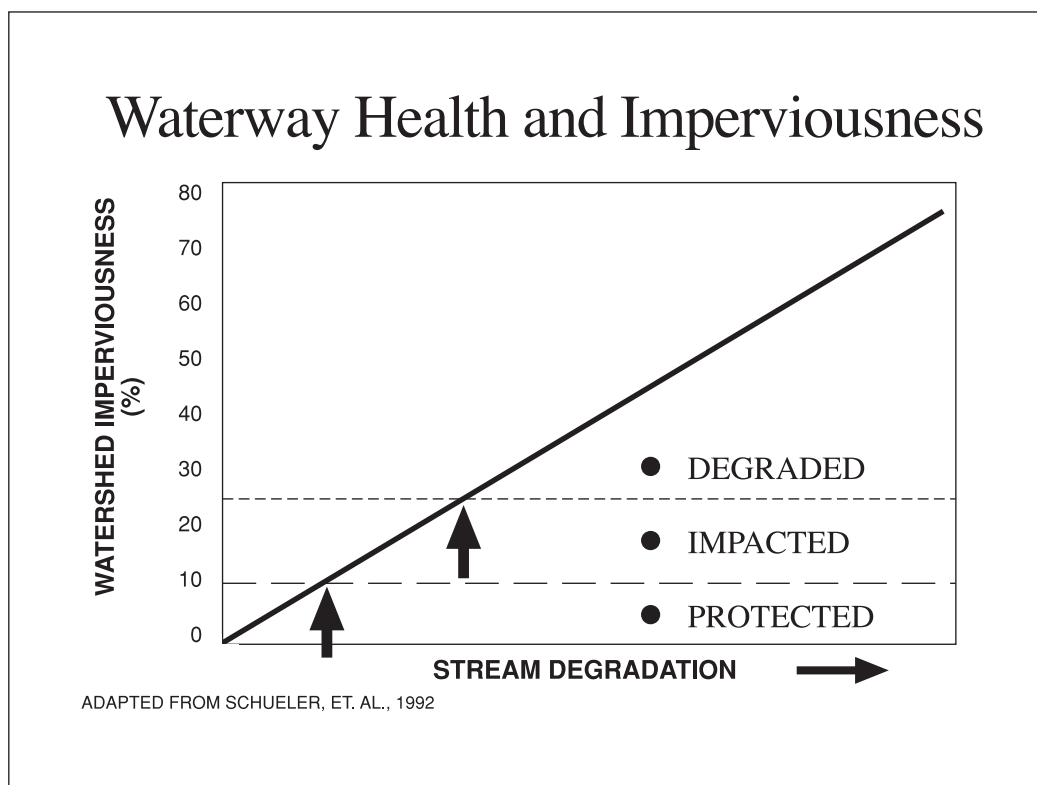
2. Minimize Impacts Through Site Design.

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 that 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 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 hold 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



Research in several geographic locations has demonstrated a direct correlation to surface water quality and the amount of impervious surface area. Water quality is seriously impacted in watersheds with greater than 10% impervious cover area. It is considered degraded when impervious surface area reaches 25% for any given watershed.

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 curbing 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 maintenance to retain peak pollutant-removal efficiency. Maintenance costs are relatively low and include such things as sweeping parking lots, cleaning storm grates, and removing plant material. However, you should anticipate and plan for these costs.

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.

Sources

Schueler, T. and John Galli. 1992. Environmental Impacts of Stormwater Ponds. In: *Watershed Restoration Source Book*. Anacostia Restoration Team. Metropolitan Washington Council of Governments. Washington, D.C. 242 pp.

Reviewers

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