

# Measuring RIPARIAN RUNOFF

**RIPARIAN AREAS ARE LOCATED ALONG STREAMS, RIVERS, LAKES, OR OTHER BODIES OF WATER. THEY ARE IMPORTANT FOR MANY TYPES OF VEGETATION, FISH, AND WILDLIFE.**

As more and more people are building homes along the shores of our lakes, the visual changes in the landscape raise questions about the impacts of lakeshore development on the quality of our water. Excessive amounts of nutrients that enter our lakes leads to eutrophication (accelerated plant growth). Sometimes plant growth may be in the form of nuisance algae that “bloom,” turning the water pea green and sometimes even causing fish kills.

Some counties have implemented zoning standards for lakeshore development. These standards determine what percentage of lakeshore property can be built on compared to the percentage that must be left undisturbed. Previously, research had been done on the effects of agricultural buffers, but little research has been done in Wisconsin on other shoreline issues like the potential runoff (i.e. the water that runs off the land surface during and after a rain) from lawns on developed sites. As zoning ordinances come up for review, county staff and zoning officials want strong evidence that lawns are a source of excess nutrient input into lakes. The rapid increase of development in northern Wisconsin and letters received from that part of the state supporting more research on lakes led to the creation of a cooperative study with the U.S. Geological Survey called “The Effects of Shoreline Development on Water Quality.” Steve Greb, research hydrologist and project manager, indicates that the study is currently expanding to encompass the whole state and not just the northern region.

This project is specifically designed to examine differences in runoff *volume* (i.e. amount of water) and runoff *nutrient concentrations* entering lakes from developed lawn sites compared to forested or natural areas. The study is broken down into two phases. The first phase started in the summer of 2000 and was completed in the summer of 2002. That phase focused on four lakes in Forest and Vilas counties. The second phase, which started in the fall of 2002, is focusing on how well riparian buffers capture runoff. The sites for the second phase of the study are statewide. Researchers will complete this phase of the study in the fall of 2004.

In the first phase of the study, researchers installed plastic sheet flow collectors (e.g., lawn edging) at the bottom of hills coming down to the lake from lawn or forested areas. The sheet flow collectors funnel collected stormwater through a pipe into a bottle where the volume was measured. At the same time they also measured the total volume of

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rainfall so they could compare the runoff volume to the total volume of rainfall. Additionally, nutrient concentrations (e.g., nitrogen and phosphorus) were determined in the runoff.

In the second phase of the study, researchers are using electronic moisture sensors to monitor naturally occurring runoff from rainfall. They are also physically dumping water on the sites and monitoring runoff down the hill. By doing this they hope to discover what length of riparian buffer is required for infiltration of the runoff that may occur from gutter downspouts. A riparian buffer refers to an area with diverse vegetation as opposed to a monoculture lawn. The area could be unmowed grassy or forested buffer. Currently, the recommendation is to maintain vegetative buffer at least 30 feet from the watermark. This research will strengthen the validity of the 30-foot buffer zone that has been prescribed.

Up to this point samples have been collected from a number of storms over the past two years. Preliminary results indicate that there is more runoff volume from lawns than wooded areas. However, preliminary results did not find significant differences in runoff nutrient concentrations from lawns compared to forested sites. To interpret what these results indicate, Greb and his colleagues looked at the *nutrient load* entering the lakes. To calculate nutrient load (reported as pounds per acre per year) the runoff volume is multiplied by the runoff nutrient concentration. What they found was that the nutrient loads for nitrogen and phosphorus from lawns were much higher than the loads from forested areas. On average, the phosphorus load was *eight times higher* coming from a lawn than from a forested area. Since preliminary results did not find significant differences in runoff nutrient concentrations from lawns compared to forested sites, researchers concluded that the difference is in the *volume* of water, not the *concentration* within the water.

These preliminary findings reveal to us that an effort must be focused on reducing the volume of water running into the lake, more so than reducing the amount of nutrients in that water. One way of reducing the volume of water is increasing the size of the riparian buffer zone that can absorb the water. This is a very complicated issue. At the county zoning level, it is hard to tell landowners what portion of their lot can be opened up as a view corridor to the lake. The issue also raises concerns for private property rights. The DNR sets state standards on which counties base their ordinances. The impacts will ultimately reach the landowners, who will benefit from their own best management of their lakeshore property. Good science leads to smart management of the resources, and this information will be used to help protect our lakes. ●

Phosphorus nutrient loads from lawns and forested areas.

