



The Lake CONNECTION

Evaluating the effects of nearshore development on lakes

By Tamara Jackson, Wisconsin Association of Lakes

The Wisconsin Department of Natural Resources has estimated that as much as 90% of the private land adjacent to lakes will be developed by the year 2025. How will increasing amounts of nearshore development affect the future water quality of our lakes?

Changing the lake landscape

Many people appreciate the natural values that make Wisconsin lakes so beautiful; sunsets dancing off clear waters, loons and herons fishing in the shallows, shoreland flowers and plants, and the forested edge that frames the view. These natural values are an important part of the experiences lake enthusiasts associate with their favorite lake—quiet and solitude, scenic boating trips, family time spent swimming and fishing.

A lot of potential property buyers are attracted to lakes because of their natural assets, and decisions about buying waterfront property may be influenced by factors such as water clarity and lakeviews. The trees and shorelands enjoyed by many lake people also protect the lake by helping



Nearshore development can replace a lake's natural filters—wood, wetlands, and shoreland plants—with hard surfaces such as roads and lawns that can increase runoff and nutrient loads. Photo: Sandy Gillum

to filter out pollutants before they enter the water as well as reduce runoff.

However, development often replaces the natural landscape of the lakeshore with roads, buildings, driveways, sidewalks, and lawns. These hard surfaces prevent rainwater and snowmelt from slowly soaking into the ground (infiltrating), increasing runoff. Property owners may make these shoreline changes more pronounced by clearing more trees, shrubs, taller plants, and shoreline “weeds,” and establishing lawns.

Grass clippings, fertilizers and pesticides used on these lakeshore lawns can flow into the lake with runoff.

One nutrient associated with increased runoff is phosphorus, the fuel (food) algae need to transform lakes into a thick, smelly green soup. Phosphorus is a common ingredient in many lawn and garden fertilizers. Two recent Wisconsin studies were conducted by the U.S. Geological Survey to determine the magnitude of nutrient runoff from nearshore development, and whether

nearshore lawn fertilizer application affects phosphorus content of runoff from lawns near lakes.

Undeveloped woods or lawns

A 2003 study of four lakes in north-central Wisconsin measured the amount of nutrients loading into lakes from developed (lawns) and undeveloped (woods) areas, as well as the ability of those sites to infiltrate runoff water. The study found that converting undeveloped wooded areas into lawns can significantly increase both the amount of runoff and nutrients into the lake.

The volume of runoff from lawns was 10 times greater than the amount of runoff coming off wooded sites. The increase runoff volume from lawns resulted in greater nutrients loads being deposited into lakes from developed sites. The amount of phosphorus in runoff from lawns was 10-100 times greater than that from undeveloped wooded sites.

Lawn fertilizer choice makes difference

A 2002 study was conducted on Lauderdale Lakes in Walworth County. The lake's 15 miles of shoreline is about 70% developed and most lakefront homes have sloping lawns maintained to the water's edge. A previous

study on the lake found that runoff from the small nearshore developed area surrounding the lake accounted for only 4% of the water flowing into the lake, but represented 60% of the annual total phosphorus entering the lake. This study measured the concentrations of nutrients (phosphorus and nitrogen) in runoff from nearshore lawns, and whether lawn fertilizer application and the type of fertilizer (regular or phosphorus free) affects the concentrations of nutrients in lawn runoff.

Lawns fertilized with phosphorus fertilizer had twice the concentration of phosphorus in runoff compared to lawns fertilized with phosphorus free fertilizer and unfertilized lawns. Phosphorus levels in lawns fertilized with phosphorus free fertilizer were similar to unfertilized lawns, indicating that using phosphorus free fertilizer may be an effective, low cost way to reduce phosphorus in runoff.

Effects can vary

While these studies offer insight on how nearshore land use and management can impact lakes, neither evaluated the cumulative effect that multiple developments or watershed scale land use changes have on lakes. To understand the relative effects from nearshore development on any individual lake, the

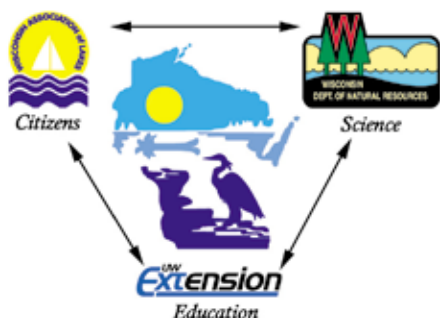
What landowners are doing to limit the effects of development on lakes:

- Using phosphorus free fertilizer or choosing not to add fertilizer to lakeshore lawns
- Not installing lawns on slopes that drain to lakes
- Maintaining a natural landscape with native plants
- Leaving woody vegetation in nearshore areas
- Leaving or maintaining at least 35 feet of buffer strips
- Limiting the amount of impervious areas—sidewalks, driveways, and rooftops—on their property
- Installing rain gardens to help infiltrate runoff from impervious areas

many other sources of nutrients entering the lake also need to be known.

As additional development occurs and a lake becomes more nutrient rich (moves towards a eutrophic state), previous studies have shown that a lake's ability to easily return to a less eutrophic state can diminish over time. Past responses to land use changes are not necessarily a predictor for how a lake will react to additional land use changes.

Wisconsin Lakes Partnership



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