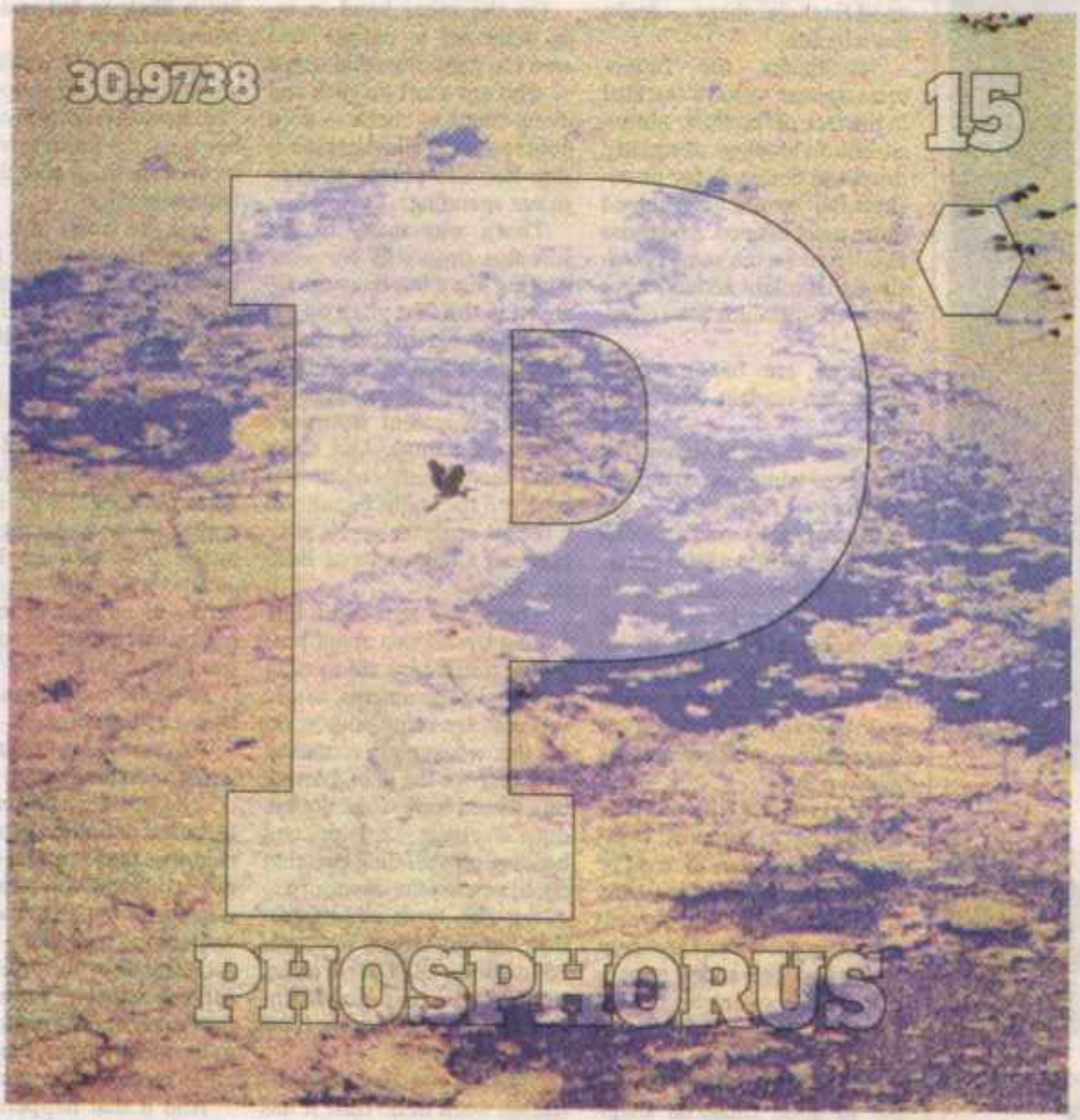
ENEMY



OF THE LAKE

Phosphorus turns our waters green. Wouldn't you rather see your toes?

By LARRY BAKER

Why is there so much P in my lake?

Like most Minnesotans, you probably prefer to see your toes when you're standing in your favorite lake. Unfortunately, many of our lakes turn green in summer, the result of too much phosphorus (P), making your toes disappear. More than 200 Minnesota lakes are actually considered legally "impaired" by excess nutrients (mostly P), requiring local governments to develop plans to clean them up.

We now know that lake clarity depends on two things: 1) the nature of the lake and its watershed; and 2) the amount of P that enters it during a year (its "loading"). For two lakes of the same dimensions, the lake with a larger watershed can handle a higher P loading than the one with a smaller watershed, because runoff from the larger watershed flushes the lake out. For a given lake, clarity depends on its P loading. If the P loading goes up, algal abundance increases and clarity goes down. If the P loading is reduced, the algal abundance decreases and clarity increases. A classic example is Shagawa Lake, near Ely. The lake was quite green in the early 1970s, until the installation of an advanced wastewater-treatment system reduced P loading by 75 percent. Since then, clarity has more than doubled, from 5 feet in the late 1970s to 11 feet today.

We have taken major steps to reduce the amount of P entering surface waters. Banning P in laundry detergents back in 1977 reduced concentrations in wastewater by nearly half. In a few places, advanced treatment systems now remove more than 90 percent of P in wastewater. Farmers have learned to use P fertilizer far more efficiently. A Wisconsin study showed that in 1975 only half of the P added to cropland as fertilizer and manure became part of the harvested crop, while the other half accumulated in the soil. Twenty years later, farmers were removing 85 percent of the added P in their crops, leaving only 15 percent to accumulate.

Despite this effort, lake clarity hasn't improved much in recent years.

Baker continues: What we can do to keep P out of our watersheds. **OP6 ►**

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ENEMY OF THE LAKE

◄ BAKER FROM OP1

An analysis of satellite images of lakes throughout the state conducted at the University of Minnesota shows virtually no change in average clarity from 1985 to 2005. Of the nearly 10,000 lakes analyzed, most did not show much change in clarity; of those that showed large changes, 5 percent had greater clarity and 6 percent had reduced clarity.

So why aren't Minnesota's lakes getting clearer? One reason is more development — there are simply more homes, more lawns and more impervious surfaces than there used to be. Failing septic systems may be another. According to the Minnesota Pollution Control Agency, 40 percent of Minnesota's septic systems are substandard. Our research suggests there may be a cumulative effect. Year after year, more P is imported into watersheds (as a component of animal food, human food, fertilizers and other products) than is deliberately exported (for example, in the form of crops and animal products — good P!). The remainder of the P accumulates in the soil, year after year. Unfortunately, P cannot accumulate in soils forever — eventually it starts bleeding out, toward streams and lakes. We found strong evidence of continued P accumulation in about a dozen watersheds we studied and think that it occurs in most watersheds.

What needs to be done to keep P out of our lakes? First, we should tailor lake management based on sensitivity of individual lakes to P inputs. We now have the databases and computer tools to do this, at least for major lakes. Second, the MPCA should modify its P reduction strategy, which currently focuses mainly on point-source discharges (mostly municipal wastewater). We need to go beyond this, with the goal of reaching a balance between P that is brought into a watershed and P that is deliberately exported, with no P left over to accumulate. This would require expanding regulations of animal feedlots to include smaller operations, rethinking the use of septic systems on shorelines, decreasing the amount of sewage sludge that can be applied to crops, and in some cases, reusing treated sewage to irrigate crops or parks to "harvest" P.

This strategy wouldn't produce instantaneous change, but it would over time, so your kids' kids will be able to see their toes.