The MNPI is based on extensive research across MN.

What the MNPI Doesn't Do

The MNPI does not estimate the actual amount of P delivered to surface water. Actual amounts vary widely from year to year depending on weather – e.g., the intensity and timing of rainfall in relation to P applications, plant senescence, and soil freeze-thaw. The MNPI can tell you that under the same set of weather conditions, a site with a risk index of 4 will probably deliver twice the amount of P as a site with a risk index of 2.

The MNPI does not consider the environmental costs of P loss, nor the cost of adopting practices to reduce P losses. The MNPI also does not consider the susceptibility of the receiving waters to a change in P inputs.

Manure and Nutrient Management Rules

The MNPI was designed as a land management decision-making tool, not as a regulatory tool. With this in mind, the Minnesota Pollution Control Agency allows greater flexibility with certain manure application rules if the MNPI shows a low risk of P loss from a site. The USDA Natural Resources Conservation Service in Minnesota is considering using the MNPI to provide greater flexibility in nutrient management decision making processes.

Where to get the MNPI

Download the MNPI and supporting information from http://www.mnpi.umn.edu. The MNPI is available as a paper worksheet or as a Windows-based program.

Credits

The Minnesota Phosphorus Index was developed by the University of Minnesota Department of Soil, Water, and Climate in cooperation with the Minnesota Department of Agriculture, the Minnesota Pollution Control Agency, and the USDA Natural Resources Conservation Service in Minnesota; with funding from the Minnesota Environmental Quality Board, the University of Minnesota Extension Service, and a U.S. Environmental Protection Agency 319 Grant sponsored by the Minnesota Department of Agriculture.

For more information

Visit http://www.mnpi.umn.edu/

Or contact:

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Minnesota Phosphorus Index

To estimate risk of phosphorus loss from agricultural fields into lakes and streams

The Minnesota Phosphorus Index (MNPI) can help farm managers, watershed planners, and conservationists to:

- Identify sources of excess P loss
- Plan environmentally sound manure applications
- Evaluate alternative land management options

Environmental Impacts from Phosphorus

Minnesota lakes and streams are great places for recreation and are important to our economy and health. But when excess phosphorus (P) gets into water, algae blooms can result. As algae die and decay, oxygen in the water is depleted and water quality declines. Fish and other aquatic organisms may be negatively impacted.

Excess P may come from many sources, including runoff from agricultural fields, municipal and industrial waste, urban runoff, and wind-eroded sediments.

P in agricultural runoff comes from soil, plant residue, and fertilizer and manure applied to support crop production. The challenge is keeping the P on the land and out of the water.

The MNPI Can Help

When P levels in water are elevated, the excess P may be from only a few sites in the watershed. The MNPI helps identify those sites and helps evaluate the effectiveness of a variety of management changes that can reduce P loss from a field. Then, users can focus time and money on the places and practices that will make a real difference in each unique situation.

The MNPI also can be used to plan environmentally sound manure applications, especially near sensitive features and for winter application of manure.

How Does the MNPI Work?

The MNPI is a Windows-based program. (A paper worksheet version is also available.) The user provides field-scale information about the land, crops, P applications, and tillage. The MNPI estimates erosion, and then calculates a P loss risk value for the field. The MNPI value is an estimate of the long-term relative risk of P delivery from the field into nearby water. If the value is less than 2, risk of P loss from the field is low and only minor changes may be recommended. If the result is more than 4, the risk of P loss is high and some significant changes will be recommended, such as minimizing tillage to reduce erosion, tilling across the slope to reduce snowmelt runoff, or injecting instead of surface applying manure. Results for alternative management scenarios can be compared to determine which proposed changes would effectively reduce P delivery.

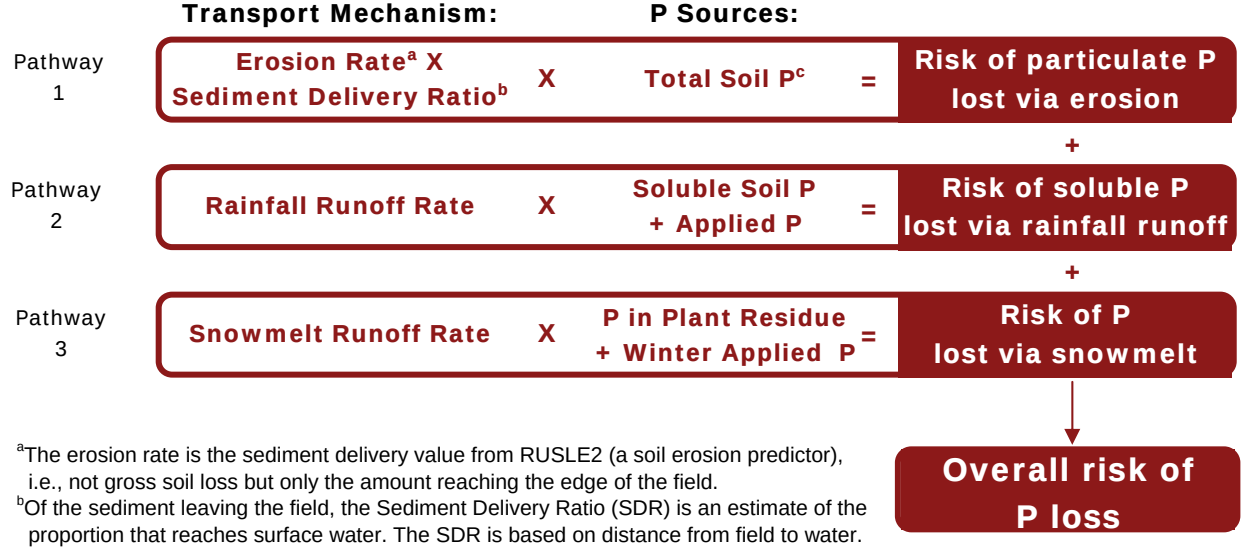
P is Lost by Three Paths

The MNPI considers three paths by which P travels from fields to water – erosion, rainfall runoff, and snowmelt runoff (see graphic). For each pathway, a transport mechanism is multiplied by P sources to calculate a P loss risk for that pathway. The three pathways are summed to get a total P loss risk value. Usually one pathway is more important than other pathways for overall P loss risk. Management changes that address that pathway will be the most effective method for reducing the overall risk.

It's Not Just Manure

Manure applications are not the only source of P loss from ag fields. The MNPI can identify sites with risk of P loss due to high erosion rates, proximity to water, fertilizer P application, high soil test P from former manure applications, and other causes.

Structure of the MNPI



[a]The erosion rate is the sediment delivery value from RUSLE2 (a soil erosion predictor), i.e., not gross soil loss but only the amount reaching the edge of the field.
[b]Of the sediment leaving the field, the Sediment Delivery Ratio (SDR) is an estimate of the proportion that reaches surface water. The SDR is based on distance from field to water.
[c]Total soil P is estimated from soil test P and soil organic matter.