Wisconsin Department of Natural Resources

Erosion Vulnerability Assessment for Agricultural Lands

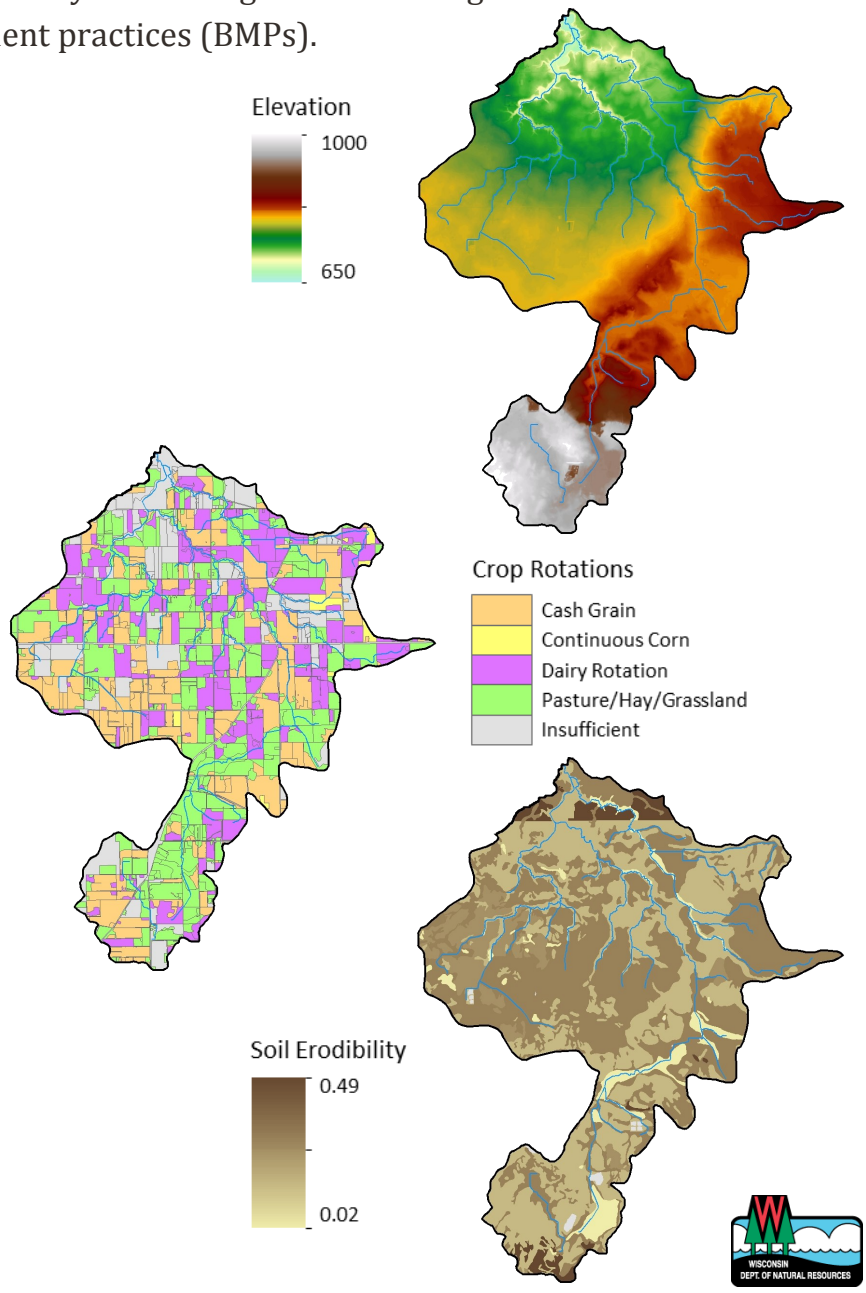
EVAAL is a GIS-based tool that uses readily-available topographic, soils, and land use information to assess vulnerability of agricultural lands to erosion and nutrient export

Why was EVAAL developed?

EVAAL was developed to support the prioritization and implementation of agricultural best management practices for improving surface water quality. It evaluates locations of relative vulnerability to sheet, rill, and gully erosion using information about topography, soils, rainfall, and land cover. This tool enables watershed managers to prioritize and focus field-scale data collection efforts, thus saving time and money while increasing the probability of locating fields with high sediment and nutrient export for implementation of best management practices (BMPs).

How does EVAAL work?

EVAAL was developed using the Python scripting language within ESRI's ArcGIS 10.x Desktop. The tool exists as an ArcToolbox, requiring ArcMap and the Spatial Analyst Extension. It utilizes several readily-available GIS datasets including topography, land cover, and soils. EVAAL was designed to quickly identify areas vulnerable to erosion, and thus more likely to export nutrients like phosphorus, using readily available data and a user-friendly interface. This tool estimates vulnerability by separately assessing the risk for sheet and rill erosion (using the Universal Soil Loss Equation, USLE), and gully erosion (using the Stream Power index, SPI), while deprioritizing those areas that are not hydrologically connected to surface waters (also known as internally drained areas, IDA). These three pieces are combined to produce an erosion vulnerability index value that can be assessed at the grid scale or aggregated to areas, such as field boundaries.



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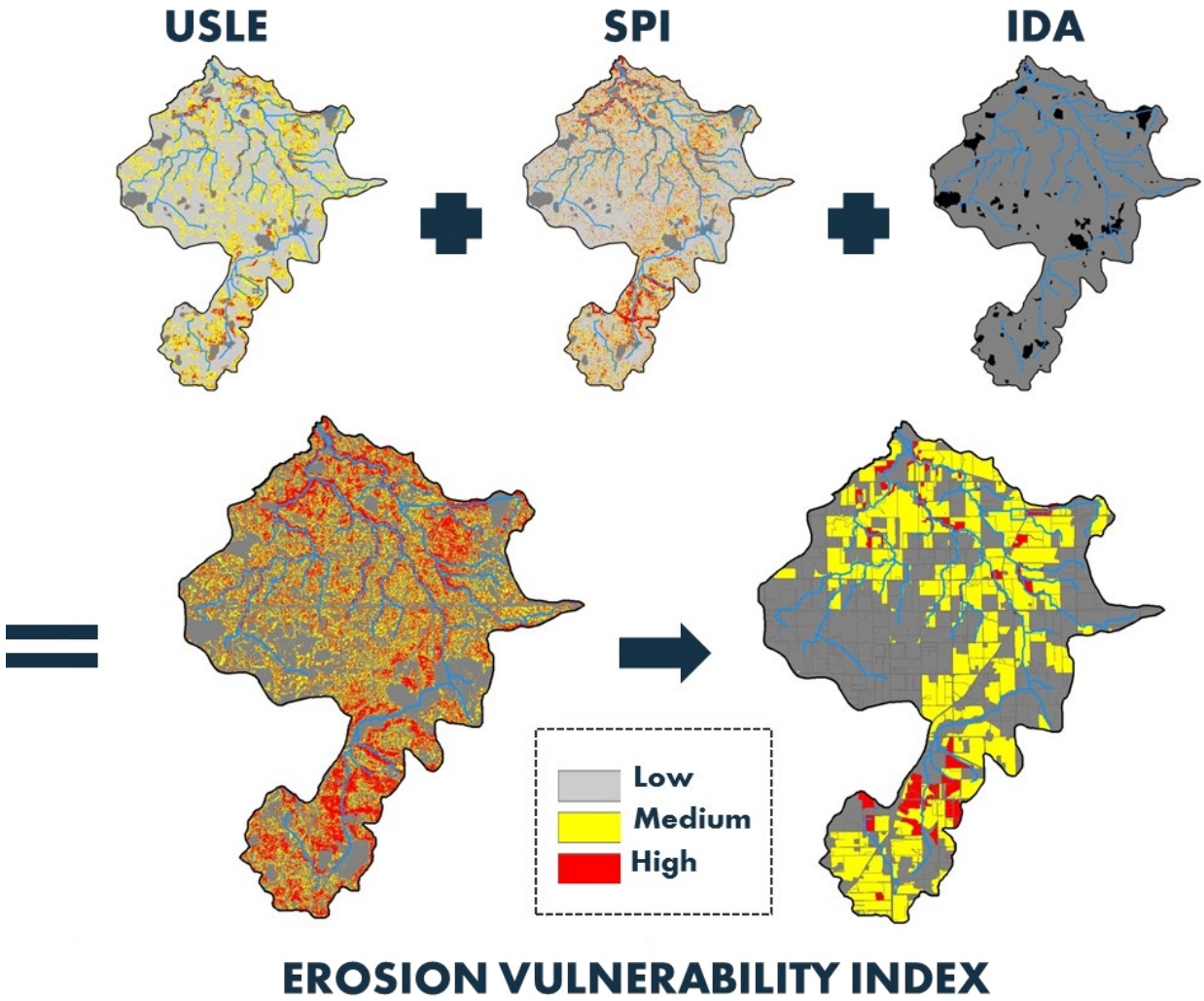
EVAAL

What information does EVAAL provide?

The intention of EVAAL is to locate *where* BMP assessment should be prioritized. Therefore, the results are provided as a series of maps. The primary results of EVAAL are the erosion vulnerability index and then the components of this index: soil loss, stream power index, and internally drained areas. Any of these results can be interpreted at their base resolution or aggregated to the level of an agricultural field or other boundary dataset.

It is important to note that EVAAL is designed to prioritize lands vulnerable to erosion, however an assumption can be made that loss of soil may also coincide with nutrient loss. Water quality monitoring has demonstrated that measured high concentrations of sediment are often associated with high concentrations of total phosphorus.



Is EVAAL available to download?

The EVAAL Toolbox (Version 1.0), Methods Documentation, Tutorial, and Tutorial Datasets can be downloaded from the DNR website (Keyword: EVAAL). For additional questions please contact the Water Quality Modeling Technical Team: dnrwqm@wisconsin.gov or 608.266.7037.

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