



# Watershed Planning Tools

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Overview of Planning Tools and When to Use Them



# Topics

- Prioritize, Target, Measure – Concepts
- Tools, Models, and Methodologies:  
Recommendations
- How and when to apply in planning



# Topics

- **Prioritize, Target, Measure – Concepts**

Tools, Models, and Methodologies:  
Recommendations

How and when to apply in planning



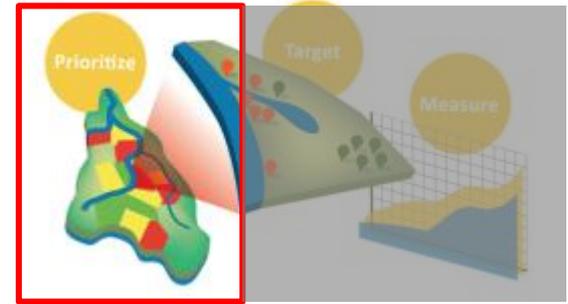
# Prioritize: Definitions

*(paraphrased from Encarta & Merriam Webster dictionaries)*

- Rank things according to importance
- To organize (things) so that the most important thing is done or dealt with first



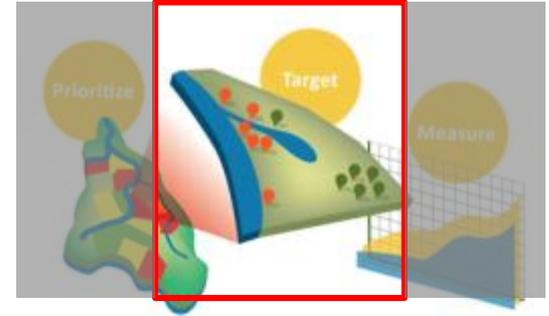
# Prioritize: Concept



- Prioritization of water or natural resources and associated issues, and
- Prioritization of strategies and actions to address the issues



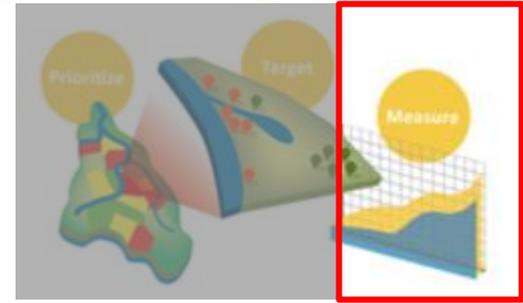
# Target: Concept



- Closer look at priority issues
- Identifies specific actions, locations, and management practices for addressing the issues



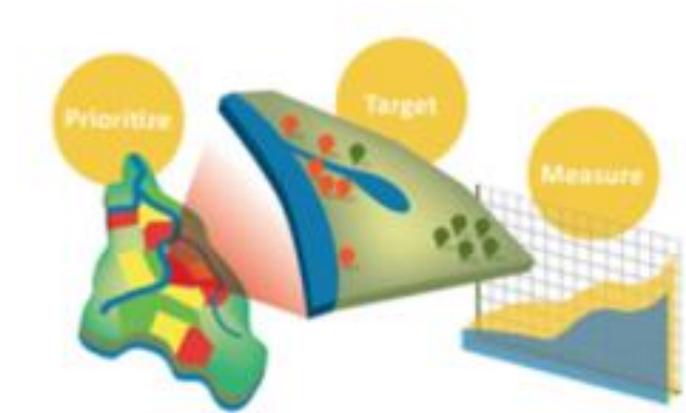
# Measure: Concept



- Ability to demonstrate progress towards the achievement of restoration and/or protection goals over time

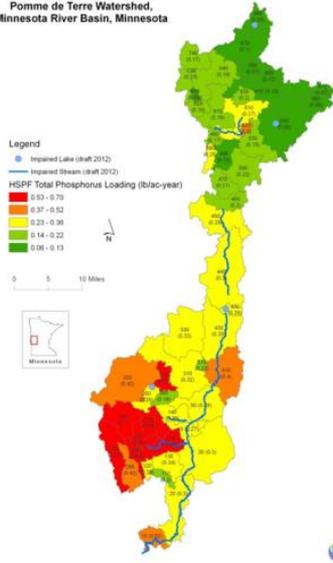
# So...How do we accomplish PTM?

- Models
- Methodologies
- Tools



# Models, Methodologies, and Tools

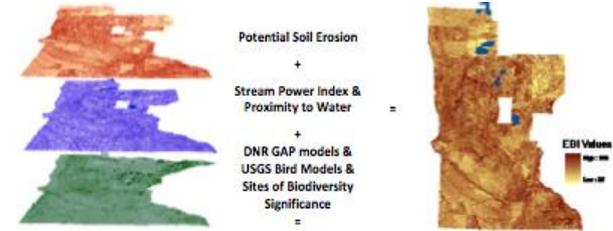
Pomme de Terre Watershed, Minnesota River Basin, Minnesota



Models



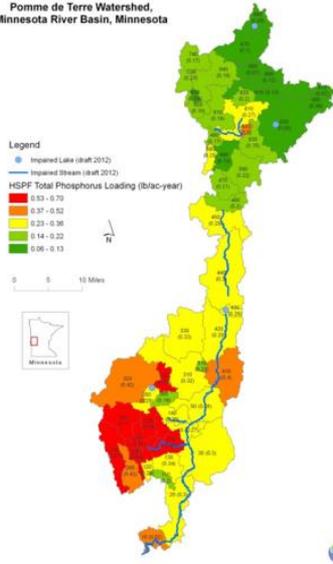
Methodologies



Tools

# Models, Methodologies, and Tools

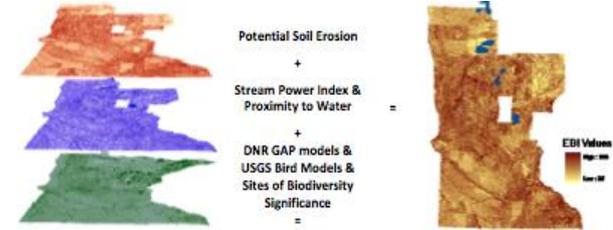
Pomme de Terre Watershed, Minnesota River Basin, Minnesota



Models



Methodologies

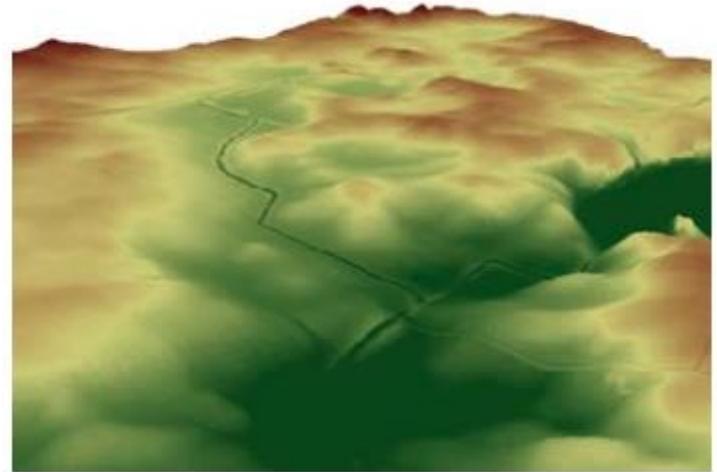


Tools



# Methodology: Geographic Information System (GIS) Analysis

- LiDAR-derived DEMs
- GIS Analysis:
  - Pollutant-loading maps
  - Terrain analysis layers
  - Other sources
    - Can be weighted to reflect stakeholder values

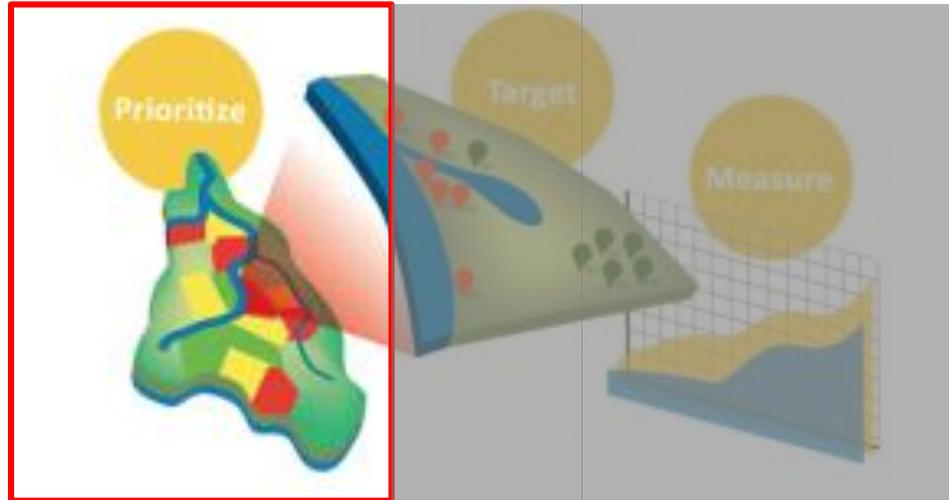


# Methodology: Terrain Analysis

- Spatially model landscape features
- GIS and remote sensing technology
- Attributes Analyzed:
  - Slope, aspect, flow direction
- Baseline info:
  - Hydro-conditioned DEM



# Prioritize

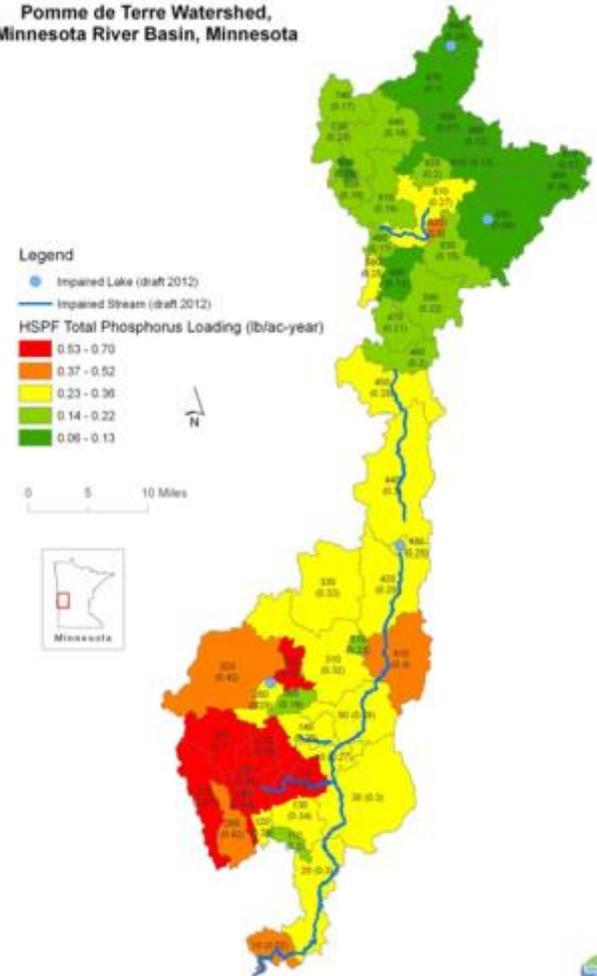




# Is this Prioritized?

- Phosphorus loading by subwatershed in Pomme de Terre Watershed WRAPS

Pomme de Terre Watershed,  
Minnesota River Basin, Minnesota

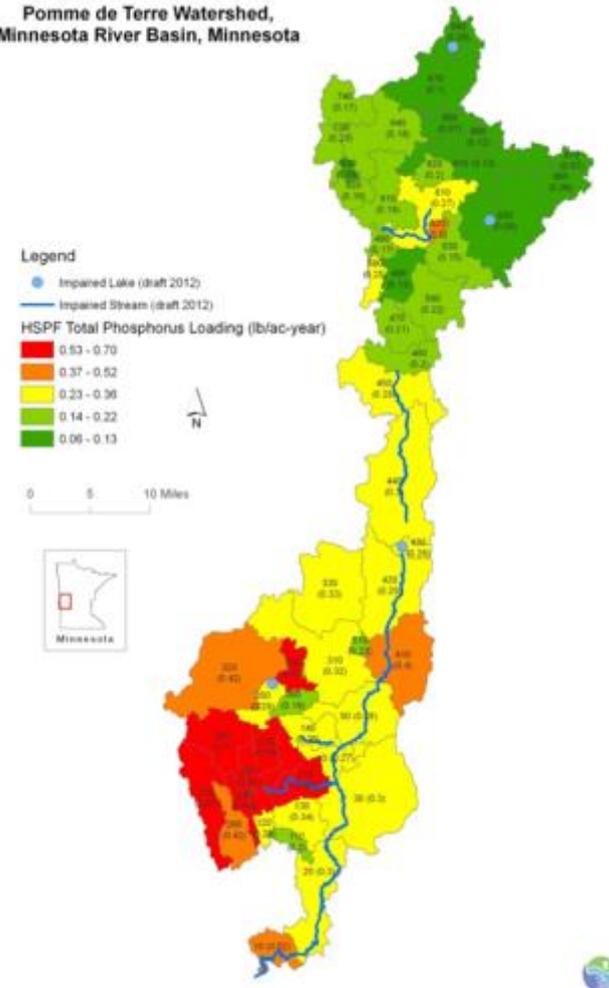




# Prioritize: GIS Analysis

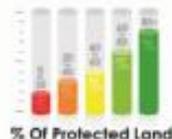
- Different layers can be used to guide prioritization of issues and water resources in a major watershed

Pomme de Terre Watershed, Minnesota River Basin, Minnesota

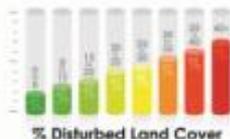


# Our protection approach: Determining risk...

Protected Land Use + Disturbed Land Cover + Water Quality Trends = Risk Classification



The distinction between public and private lands is important. From a planning perspective, watersheds with a high percentage of public land are not as at-risk for future water quality impacts and may not require the same level of focus as watersheds with a smaller percentage of public land. Public land is considered to be already in a protected state as are water bodies such as lakes, streams, and wetlands.



Map 2 shows the percentage of land that has been converted from a natural forested condition to other land uses, such as crop and pasture land and developed areas. Minimizing or managing these changes in a watershed is a good way to maintain high water quality.



In addition to protected areas and land use disturbance, watershed health is also influenced by the water quality of the lakes / streams that they contain. Watersheds with lakes with a declining trend in water quality based on data collected over many years were classified lower simply because of this declining trend.



The data from the three previous maps leads to our designation of risk classifications. Crow Wing County is part of 3 major watersheds and has portions of 120 minor watersheds. For this plan, a watershed based model was used that classified each minor watershed by the amount of protected land as well as by various risk factors and water plan profiles.

- Vigilance:** Less than 50 % protected lands, less than 8 % land use disturbance, no risk factors such as agriculture, development, diffuse drainage or extractive uses.
- Protection:** 60 to 75 protected lands, 8-30 % land use disturbance, minimal risk factors, and water quality that is stable or improving, multiple high quality resources could be protected.
- Enhance / Protection:** Less than 40 % protected lands, moderate amount of risk factors, water quality that is stable, declining or impaired, manageable risk factors, one or more water resources that could be protected.
- Enhance:** Less than 40 % protected lands, greater than 30 % land use disturbance, multiple to significant risk factors, limited resources to protect.

**CROW WING COUNTY 2013-2023 WATER PLAN**

A Watershed Protection Approach to Local Water Management



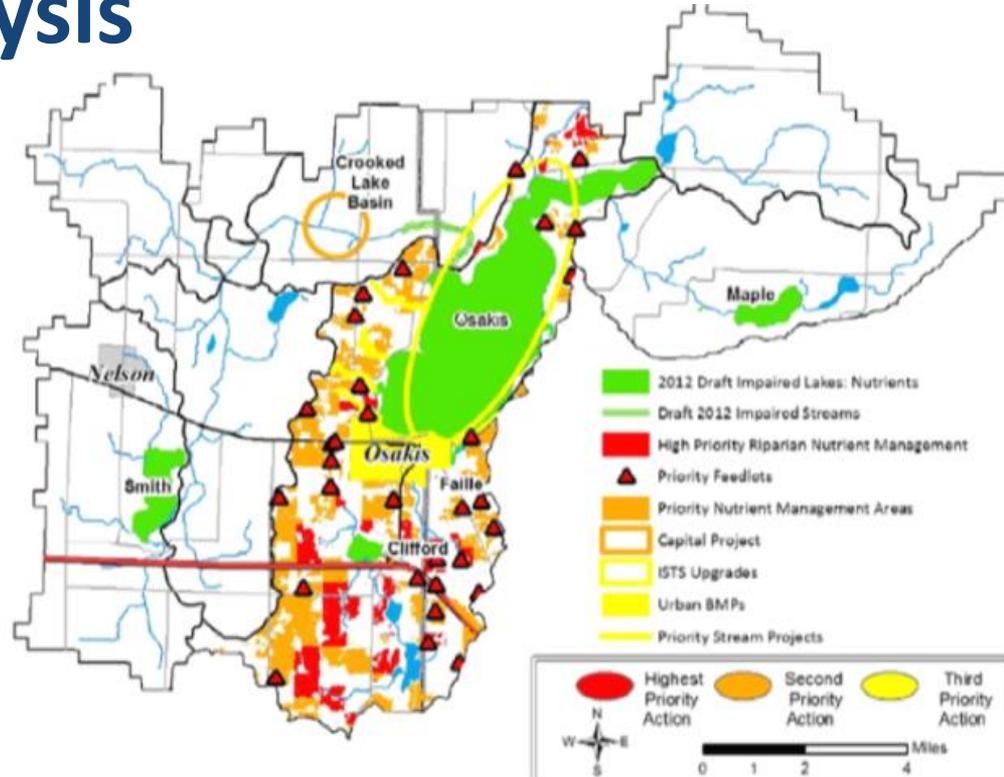
# Target





# Target: GIS Analysis

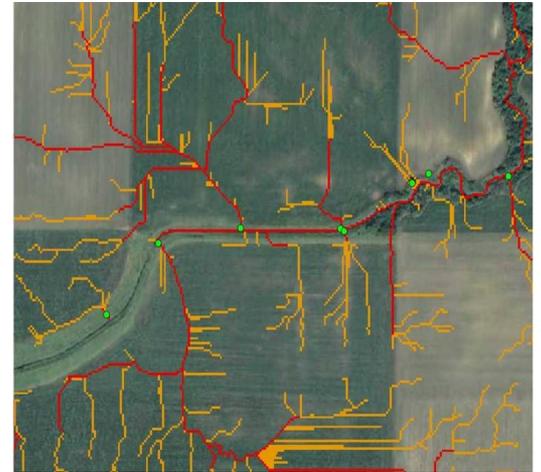
Example: Sauk River Watershed District Plan (prioritized and targeted)





# Target: Terrain Analysis

- Slope, aspect, flow direction
- Target problem sites related to upland erosion and surface runoff

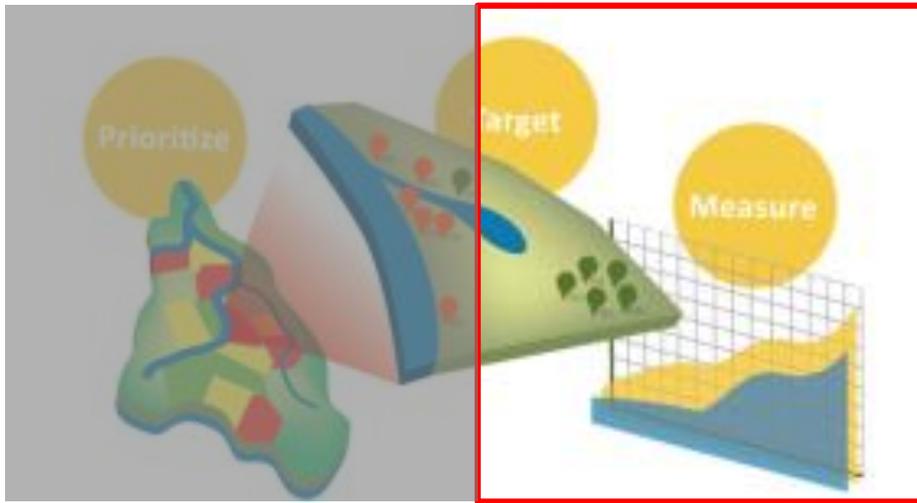




# Tailoring the target...

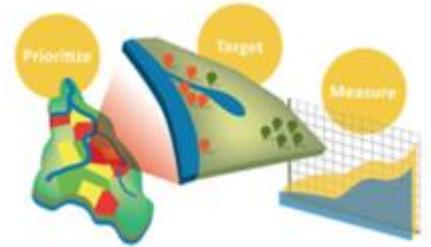
- Increased specificity through implementation (working directly with landowners)
- Many potential tools and methodologies to assist with tailoring
- Occurs after the plan is complete

# Measure





# Measure: Approach



- Measure **activity** if supported by model & scenarios
- Measure **results** (monitor) dependent on priorities, goals, funding, and actions

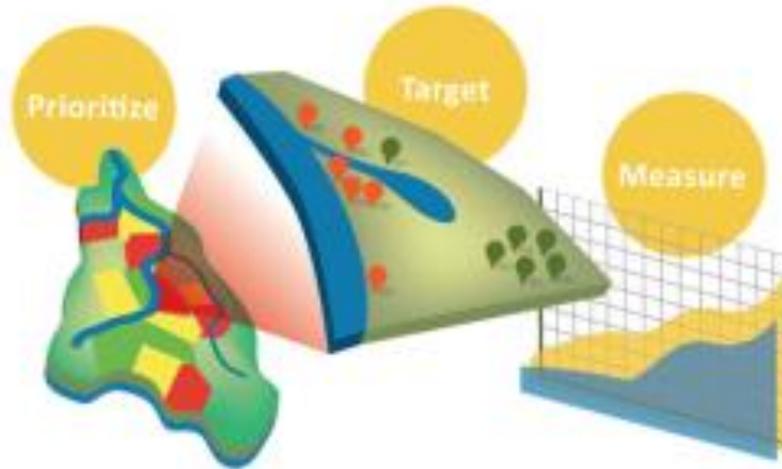


# Estimated change (measure)

Estimated Results for Cumulative Projects at Excessive N and P Loading Problem



# Putting it all together..





## Example: Pope SWCD - Lake Minnewaska



- **Priority:** Lake TMDL Completed/High Valued Lake,
- **Targeted:** LiDAR used to pinpoint: WASCObS, ravines/shoreland issues, and
- **Measurable:** Chippewa Watershed Staff monitoring site.

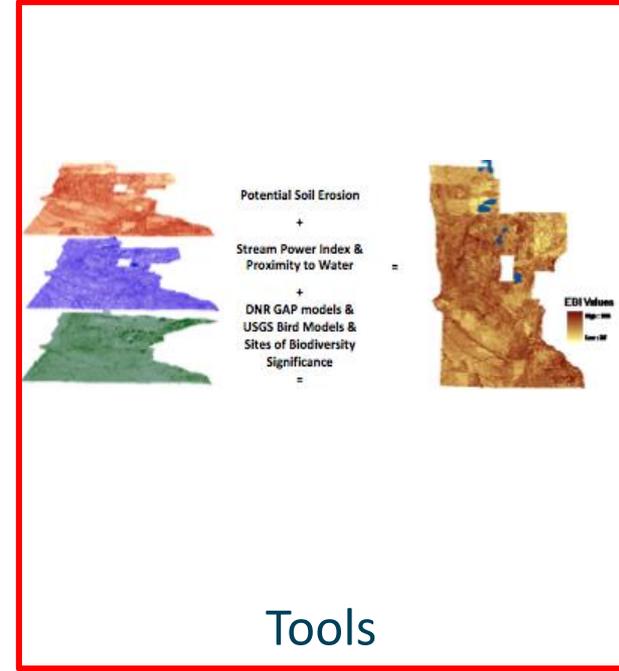
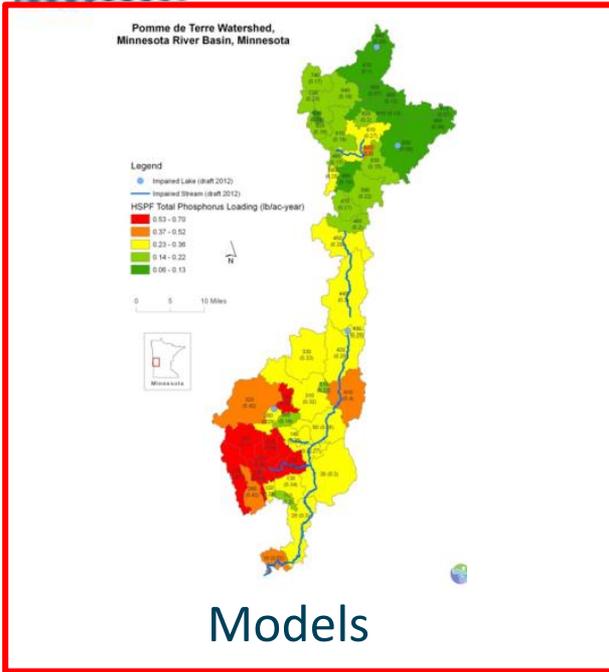


## Example: Chisago SWCD - St. Croix River



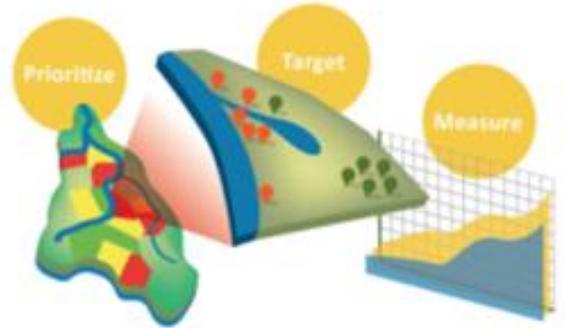
- **Prioritize:** Lake St. Croix TMDL & County Water Plan
- **Target:** SWCD mapped, inventoried, repaired gullies
- **Measure:** Estimated reductions & modeled result

# Models, Methodologies, and Tools



# PTM: Recommended Models and Tools

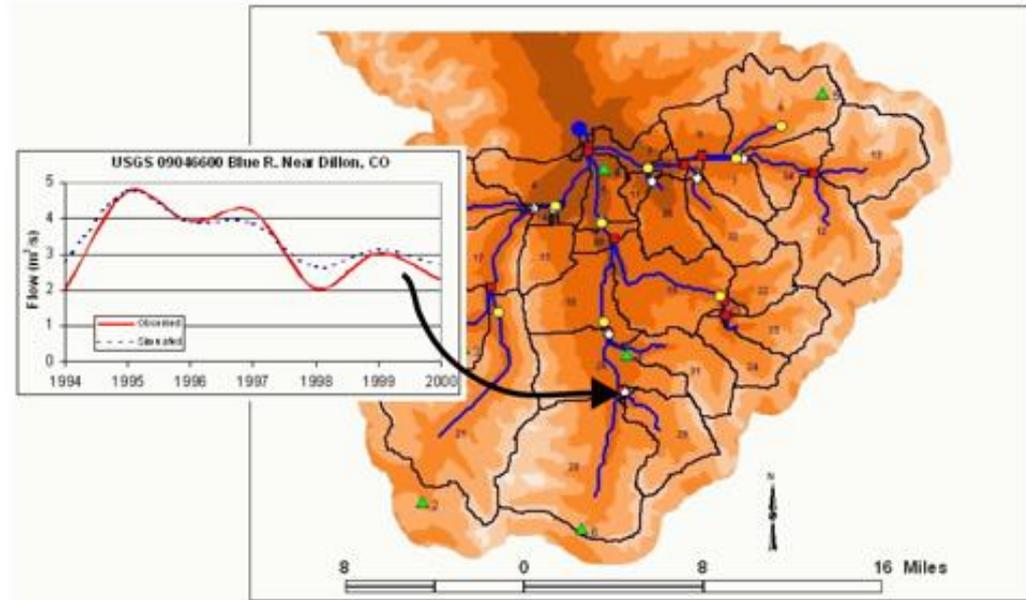
- Models and Tools
  - Models: HSPF, SWAT
  - Tools that leverage GIS, such as Zonation, EBI, and HSPF-SAM (*under development*)
  - Tools that leverage terrain analysis, such as Tomer, PTMA (*under development*)



Note: model and tool use is iterative in planning process.

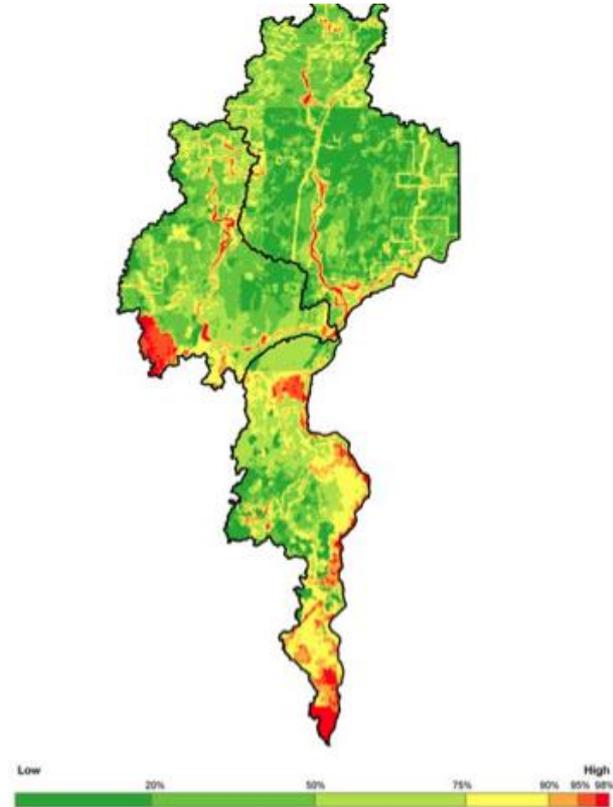


# Soil and Water Assessment Tool (SWAT)



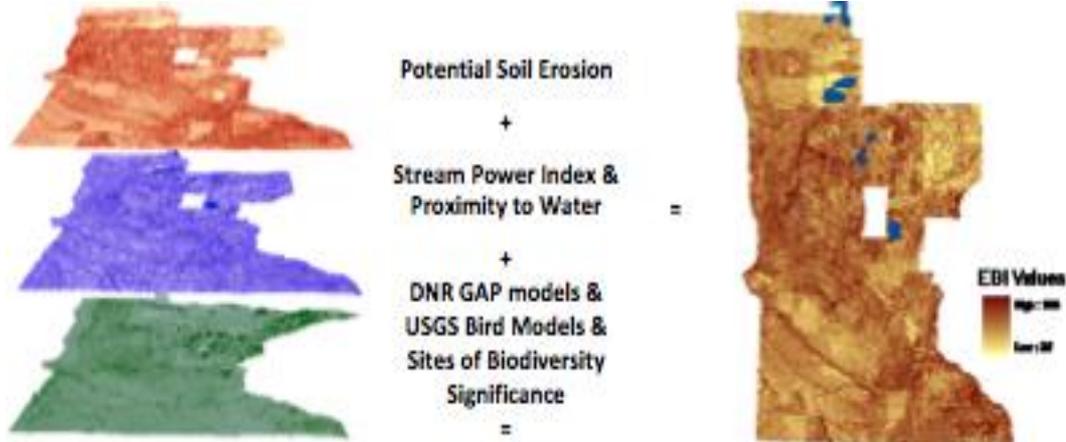


# Zonation



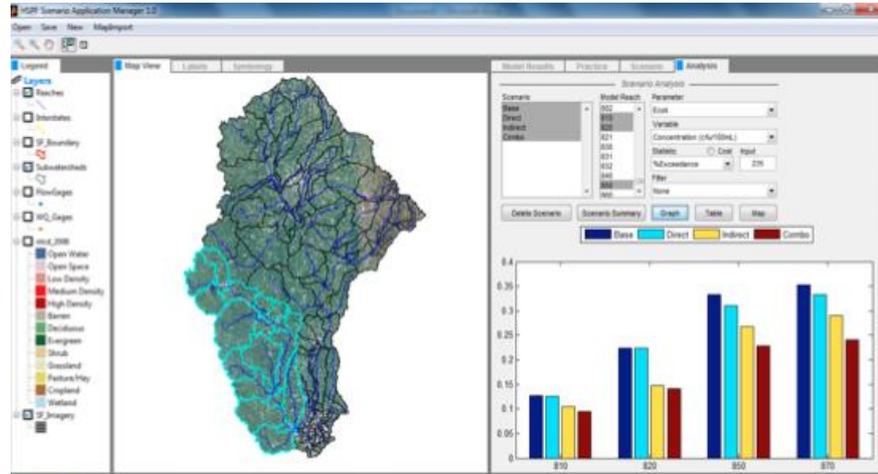


# Ecological Ranking Tool / Environmental Benefits Index (EBI)





# HSPF Scenario Application Manager (HSPF-SAM) (*under development*)

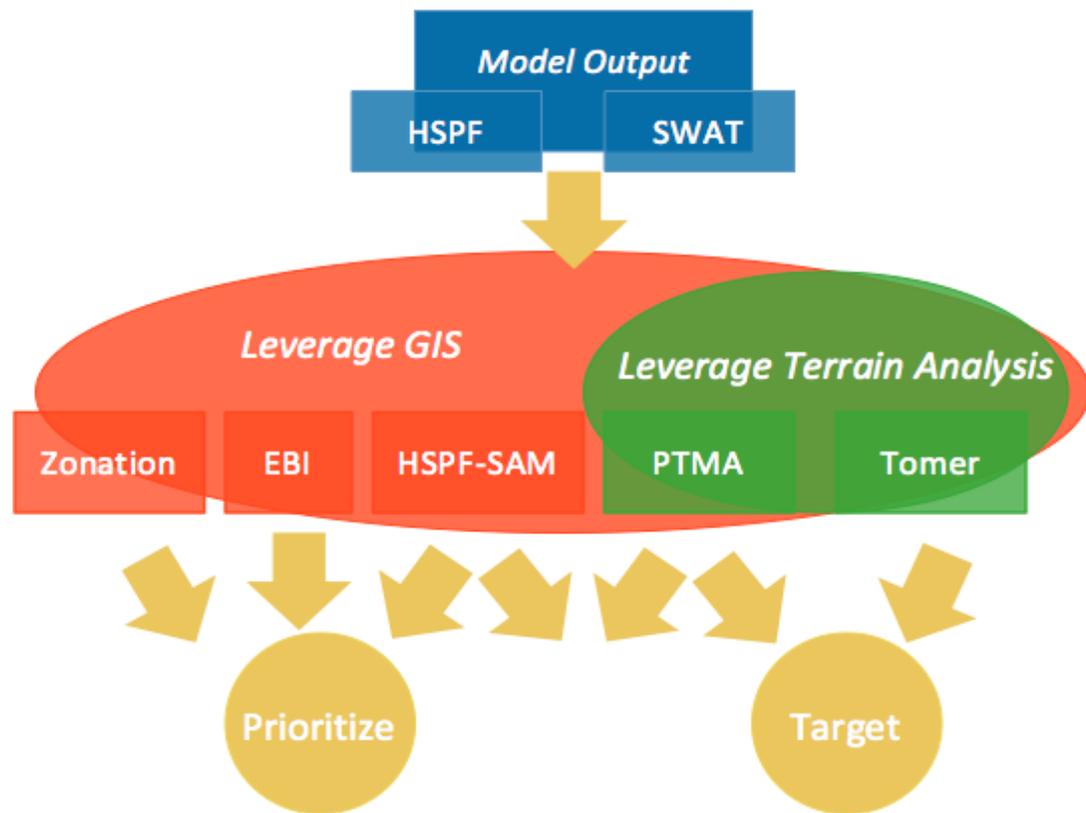




# Prioritization, Targeting, and Measuring Water Quality Improvement Application (PTMA) (*under development*)









# Questions?

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