

Nine Element Watershed Plan: A Blueprint for Restoration and Protection of Maple Watershed 04050005

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**Background:** The Maple Watershed is divided into three key zones: the North zone, characterized by numerous lakes; the Central zone, home to the Maple River; and the South zone, where streams primarily converge and drain. Major challenges facing the watershed include limited forested riparian zones, agricultural impacts, and road-stream crossings, all of which contribute to its degradation. To address these issues, a Nine-Element Watershed Plan for Restoration and Protection has been developed and explained below.

1. Pollutant Sources:

Central Zone

- Most significant source of pollution in the watershed.

Challenges:

- Severe erosion due to steep slopes.
- Minimal forested riparian buffers.
- Agricultural activities and road-stream crossings.
- Highest number of stream segments on the 303(d) list of impaired waters.

South Zone

- High population density contributes to pollution per square kilometer.

North Zone

- Characterized by high erosion rates and limited forested riparian buffers.

**Focus of Efforts:** Targeted strategies in the Central Zone to address critical pollution sources effectively to aim to restore watershed health while minimizing costs and effort.

2. Pollutant Load Reductions:

Agricultural Runoff

- Reduce nitrogen and phosphorus runoff from farmlands.
- Improve water quality through better practices with less interaction with animals.

Road-Stream Interactions

- Limit the number and size of road-stream crossings; pollutant entry into waterways.

Forested Riparian Buffers

- Increase and restore buffers in priority areas to enhance natural filtration processes and strengthen ecosystem health.

**Overall Goal:** Implement strategies to significantly reduce pollutant levels and foster a healthier, more resilient watershed.

3. Management Measures:

**Fencing:** Around farms and agricultural lands to decrease animal interference and nutrient runoff.

**Planting native trees:** Restore forested riparian buffer.

**Replacing culverts with higher capacity:** Limit road-stream interactions.

**TDMLs:** Total Daily Maximum Loads for 303(d) impaired streams.

4. Financial Analysis:

Restoration Costs

- Fencing:** Estimated at \$10 per foot for agricultural areas.
  - Total cost: Approximately \$19 billion for 177.35 sq kilometers.
- Vegetation Restoration:** Planting trees for riparian buffers at \$100 per tree.
  - Total cost: Approximately \$50 million.
- Culvert Management:** Addressing road-stream crossings at \$1,500 per culvert.
  - Total cost: Approximately \$1 million for 687 road-stream points.
- Total Estimated Cost**
  - Comprehensive restoration efforts for the three HUC 12 areas: **\$19.51 billion.**
- Funding Sources**
  - Grants and financial assistance programs.
  - Contributions from local stakeholders.
  - Fundraising campaigns and community events.
  - Volunteer support to offset costs.

**Objective:** Ensure the feasibility and impact of the restoration plan through effective financial planning and resource allocation.

5. Outreach and Education:

Importance of Community Engagement

- Essential for restoring the watershed and improving overall quality.

Key Contributors

- Friends of the Maple River:** A volunteer group dedicated to raising awareness and driving restoration efforts.

Strategies for Public Involvement

- Host community workshops to educate and involve residents.
- Launch social media campaigns to broaden outreach and engagement.
- Distribute educational pamphlets to inform the public about watershed challenges and solutions.

Collaboration Goals

- Work with Friends of the Maple River to educate and inspire action and promote collective responsibility for the health of the Maple Watershed.

Outcome

- Strengthen restoration efforts through community awareness and involvement.
- Ensure a sustainable future for the watershed through shared commitment.

6. Implementation Schedule:

1. Educate the Public

- Raise awareness about the challenges facing the Maple Watershed.
- Secure financial and volunteer support.
- Expected duration: A few months.

2. Hands-On Restoration Activities

- Engage volunteers in planting shrubs and trees in three HUC 12 areas with least.
- Construct fencing in the three HUC 12 areas with the highest agricultural activity.
- Reduce the footprint in four HUC 12 areas with the most road-stream crossings.

3. Financial Resource Acquisition

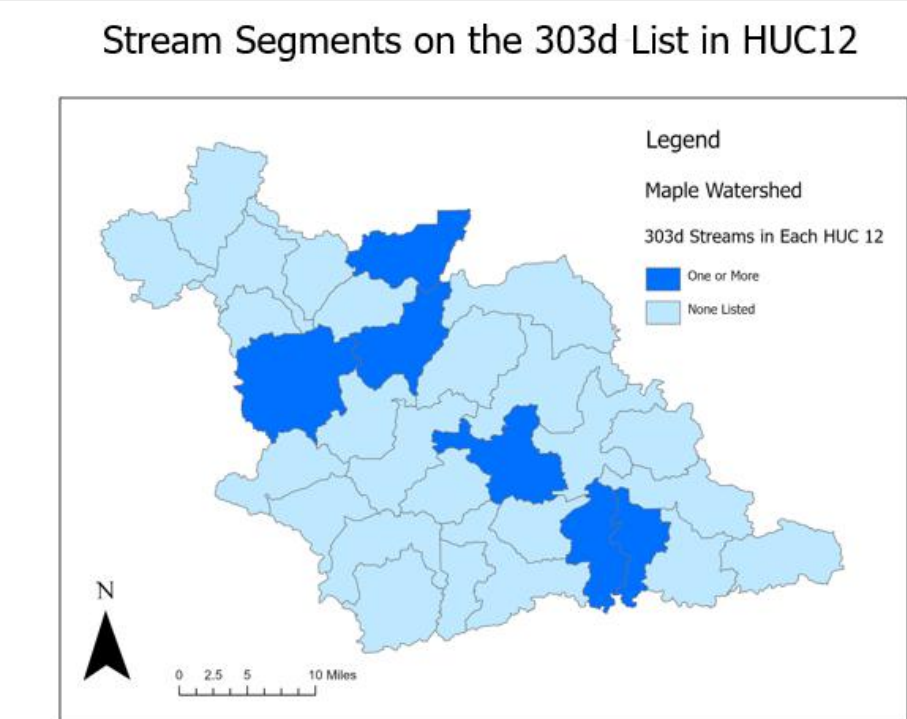
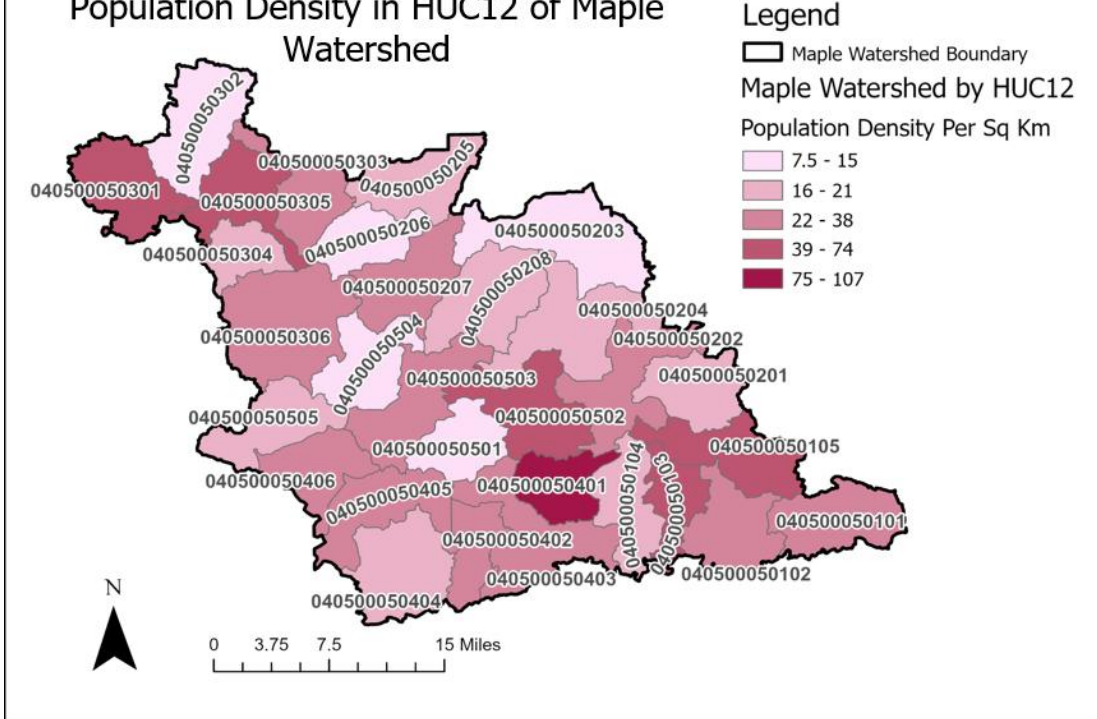
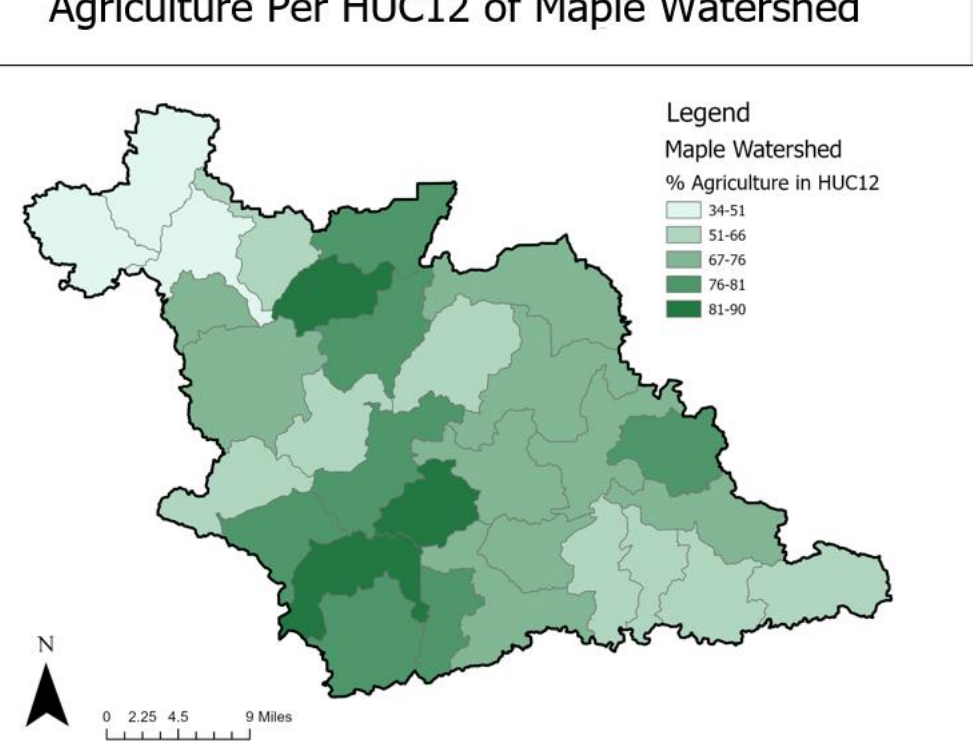
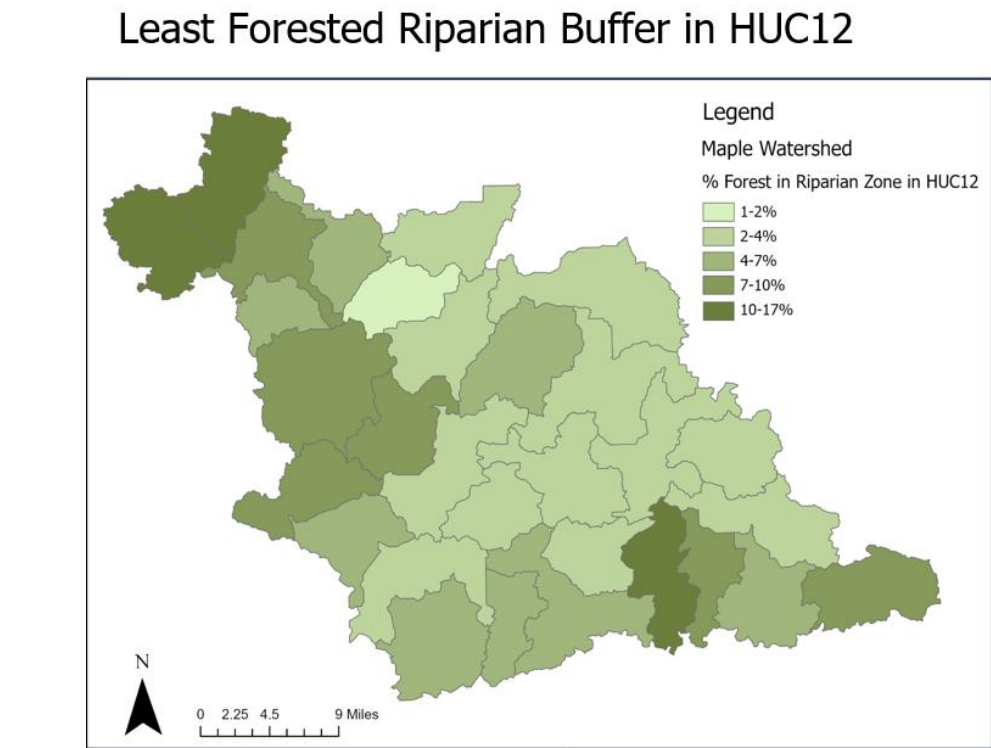
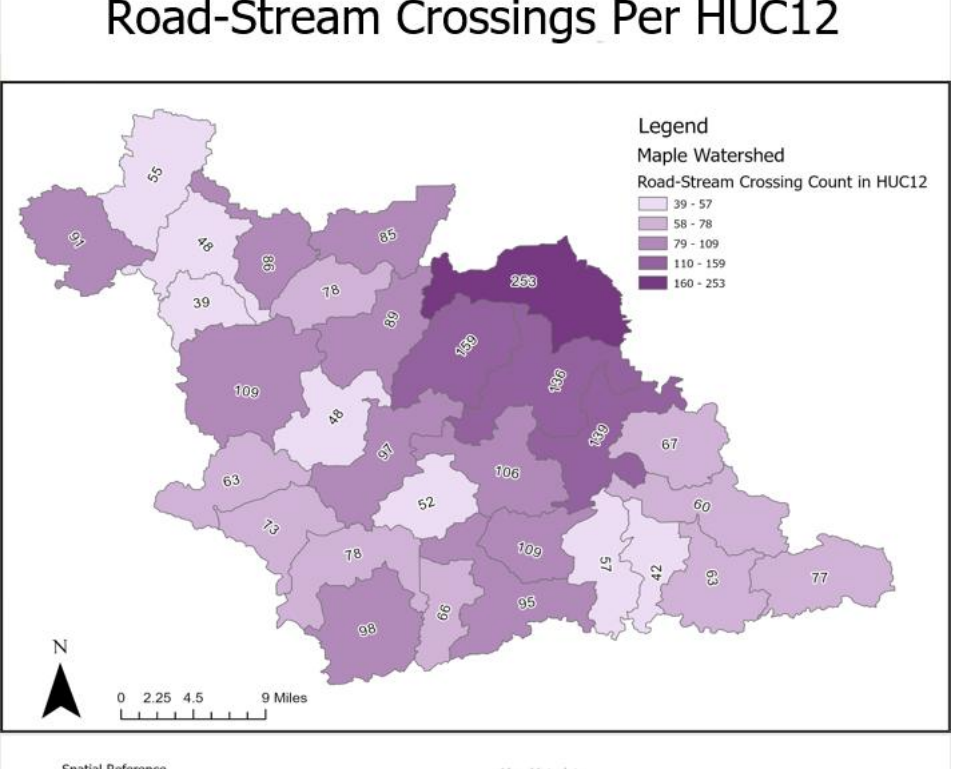
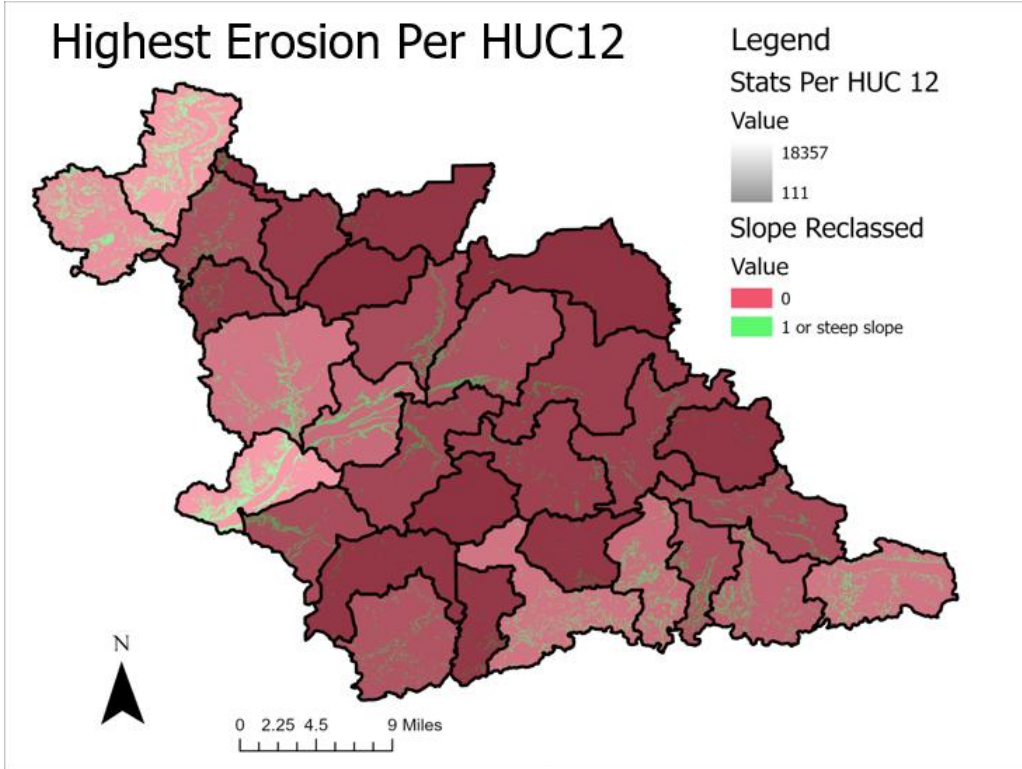
- Fundraising through campaigns and events.
- Contributions from local stakeholders.
- Volunteer support for cost-effective implementation.

Timeline

- Financing and implementation stages are projected to take 6 months to 2 years.

Outcome

- Ensure successful education, implementation, and completion of the restoration plan.
- Achieve a healthier and more sustainable Maple Watershed.



7. Measurable Milestones:

Key Milestones for Progress Tracking

- Achieve a 20% reduction in the number of road-stream crossings.
- Decrease the total area of road-stream crossings by 40% with culverts.

Environmental Restoration Goals

- Plant over 1,000 trees in riparian buffers to enhance natural filtration and stabilize streambanks.
- Fence in more than 50% of farms to reduce agricultural runoff.

Outcome

- Substantially reduce overall pollution sources, especially in 303(d) streams.
- Use these benchmarks to evaluate the plan's success and ensure long-term watershed.

8. Evaluation Criteria:

- Measure reductions in nitrogen and phosphorus levels in agricultural zones.
- Track increases in the percentage of forested riparian buffers.
- Monitor reductions in the number and area of road-stream crossings.

Key Indicators of Progress

- Meeting water quality standards and enhancing watershed health and biodiversity.

Comprehensive Approach

- Address other sources of pollution to complement priority efforts.
- Leverage improvements in one area to create positive ripple effects throughout the watershed.

**Overall Goal:** Reinforce restoration efforts and achieve sustainable, long-term watershed health.

9. Monitoring Plan:

**Objective:** Regularly evaluate progress and adapt strategies to ensure ongoing effectiveness of the restoration plan.

Monitoring Methods:

Water Sampling:

- Conduct consistent sampling at key locations (e.g., Central Zone around Maple River).
- Track changes in nutrient levels, sedimentation, soil quality, and overall water quality.

Biological Assessments:

- Perform macroinvertebrate surveys to measure stream health.
- Identify trends in biodiversity and ecological conditions.

Purpose of Monitoring

- Collect critical data to assess restoration success.
- Inform adjustments to strategies and guide future actions.

Outcome

- Ensure the long-term health and sustainability of the Maple Watershed.

**Conclusion:** The Nine-Element Plan for the Maple Watershed for restoration and protection addresses critical challenges through targeted actions, including reducing agricultural runoff, minimizing road-stream interactions, and restoring forested riparian buffers. With an estimated cost of \$19.51 billion, funded through grants, stakeholders, and community efforts; the plan incorporates fencing, tree planting, TDMLs, and culvert upgrades to reduce pollution and enhance ecosystem resilience. Public engagement, led by the Friends of the Maple River, ensures collective responsibility through workshops, campaigns, and volunteer initiatives. Progress will be tracked with measurable milestones, such as reduced road-stream crossings, increased riparian buffers, and improved water quality, supported by ongoing monitoring. This collaborative, data-driven approach ensures a sustainable future for the watershed.

Metadata/References:

NCLD Land Cover (2024) [download], USGS. [National Land Cover Database | U.S. Geological Survey](#)

WSIO Geodatabase with Hydrologic Unit Code (HUC12) polygons (2024) [download], EPA.

<https://www.epa.gov/wsio/wsio-indicator>

Section 303d List (2022) [download], EGLE. <https://www.Michigan.gov/egle/about/Organization/Water-Resources/GLWARM/integrated-report>