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Clinton River Hydrologic Project

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The Clinton River Hydrologic and Geomorphic Project was part of an ongoing effort in Macomb County to reduce sediment loading in the Clinton River and Lake St. Clair. The Clinton River Watershed encompasses 760 square miles and lies primarily within Oakland and Macomb Counties. The land use in this area consists of commercial, industrial and numerous residential areas, as well as large portions of agricultural, forested and open areas. This project focused on developing an understanding of geomorphic stability of the Clinton River Watershed. It included characterization of various reaches as stable or unstable, areas to focus implementation work in, and measures needed to reach stability in a pilot area. The detailed final report also includes a recommendation for a watershed-wide ordinance to address storm water.

Clinton River Watershed

Grant Amount:	**$ 123,600**
Match Funds:	**$ 39,383**
Total Amount:	**$ 162,983**

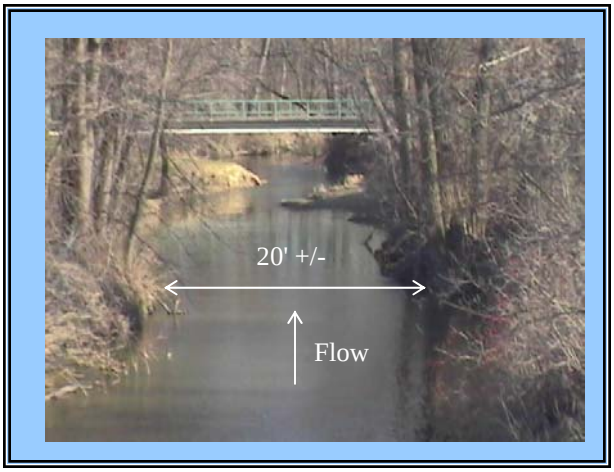
Project Goals: To answer:

- **Is the hydrology of the Clinton River stable?**
- **What has been the impact of hydrologic variations on the river geomorphology?**
- **If the river geomorphology is not stable, what land protection measures could be taken that would make it stable?**
- **What hydraulic parameters (velocity, water depth, bed shear stress) can be used to make links between geomorphic and hydrologic issues?**
- **What is the anticipated hydrologic impact of future development?**

Project Conclusions

- **The project quantified and demonstrated substantial changes in the river hydrology. Specifically, analysis of hydrologic data at 16 long-range gage stations shows that there is a 54% average increase in flow trends over the past forty years.**
- **It is expected that the greatest potential for harmful and unstable future increases in flows are in areas that are currently categorized as rural.**
- **Approximately 57% of the reaches studied are in an incised state (disconnected from the active floodplain). This is obviously due to a combination of interlinked factors such as velocity, depth, and shear stresses. Exact correlations were not done due to lack of resources and past field data.**
- **Using Rosgen Level II Classifications, the existing stream reaches are primarily "C", "E", "F", and "G" streamtypes.**
- **The erosion analysis shows that many of the streams have fair to poor erosion ratings. The poorest ratings were strongly correlated to "F" and "G" stream types.**
- **Data collected in the pilot study area shows that floodplain connectivity is a major driver of river stability or instability.**
- **A long range restoration plan was drafted for the pilot study site, which could serve as a guide to the subwatershed's restoration strategy, should funds become available to implement this study's recommendations.**

The watershed for the Middle Branch of the Clinton River was chosen as the Pilot Area for this study. The photo shows the Middle Branch, upstream view.



Middle Branch of the Clinton River, downstream view.

Middle Branch of the Clinton River

- **Drainage Area = 41.0 square miles**
- **Very Large future forecasted increase in population**
- **Very Large increase in mean annual flow**
- **Moderate Increase in peak stream flow**
- **Moderate Increase in population growth from 1900 to 2000**

A detailed field study was conducted on the Middle Branch of the Clinton River. Cross sections were surveyed every 1,000 feet and the bankfull flow (or channel forming flow) was identified. The bankfull elevation (or the elevation when the vankfull flow is occurring) is an important value for the Rosgen Classification of Natural Rivers.