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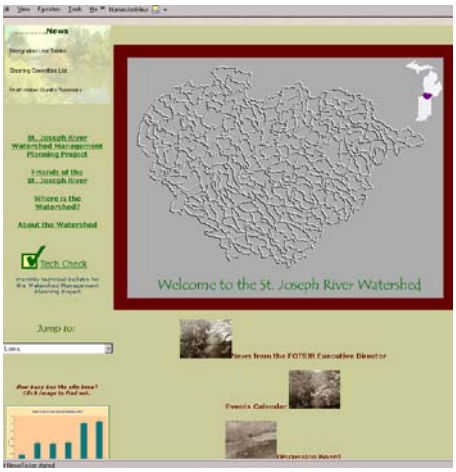
Project Costs: **$275,000 (K&A $125,000)**

Project Completion: **2005**



A Section 319 Watershed Management Planning grant from the Michigan Department of Environmental Quality, Water Division (MDEQ) was obtained by KIESER & ASSOCIATES (K&A) on behalf of the Friends of the St. Joseph River. The grant was used to develop the first of its kind, bi-state Watershed Management Plan (WMP) for the St. Joseph River Watershed. The planning process began in November 2002 and culminated in an EPA-approved, web-based WMP. The fundamental objective of the project was to provide the watershed community with a plan that will facilitate and guide implementation of desired goals for water quality improvements and protection, as well as a consistent venue to communicate, adapt and revise the overall plan as new information is obtained and milestones completed. The plan now serves as a template for established jurisdictions to adopt short-term and long-term goals that accommodate existing infrastructure and established community visions, as well as allow growing areas of these subwatersheds to enact new policies and practices which better address water quality protection.

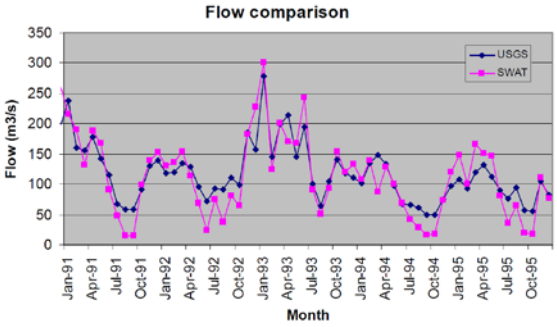
Located in the southwest portion of the Lower Peninsula of Michigan and the northern portion of Indiana, the St. Joseph River Watershed spans the Michigan-Indiana border and empties into Lake Michigan at St. Joseph, Michigan. The watershed includes 3,742 river miles and drains 4,685 square miles from 15 counties According to the 2000 U.S. Census, 1,524,941 people live in the 15 counties of the watershed with 53.6% living in Michigan. The most populated county is St. Joseph, Indiana. The watershed is largely agricultural. More than 50% of the riparian habitat is agricultural/urban, while 25-50% remains forested. Agricultural production accounts for 84% of the land use of the watershed in Indiana.

The working framework for this project targeted the following efforts:

- Secure and build upon partnerships with municipalities, townships, county, MDEQ, IDEM, industry, private sector, conservation and environmental groups, and other watershed stakeholders.
- Create and maintain a Project Steering Committee to direct and maintain the focus on both project and local objectives.
- Conduct all technical elements through private sector assistance responsible to the Steering Committee and the Project Administrator.
- Create a project web page (www.stjoeriver.net) to host all major project components for communication, dissemination and cost-effective updates.

This unique electronic format of the Watershed Management Plan and all of its related components facilitates lower costs for adjustments and updates as well as superior capabilities to more rapidly and cost-effectively provide any revisions to interested parties. It allows the Plan to be a "living" document.

Coordinating a bi-state planning effort in a largely agricultural watershed was an unprecedented task for the region. Moreover, the Michigan Department of Environmental Quality (MDEQ) was for the first time, being required by EPA to add quantitative loading assessments ("EPA Nine Elements") to their funded planning projects. K&A developed and successfully negotiated with MDEQ, Indiana Department of Environmental Management and EPA what these additional quantification efforts should include. As such, the various analyses summarized below were identified as the appropriate methods to achieve these new requirements, thus setting the precedent for all future WMPs in Michigan.



As one of the major contributors of sediments, nutrients and pesticides to Lake Michigan, this type of quantification was important to assess for a St. Joseph River WMP. Nonpoint source modeling efforts by K&A therefore initially targeted agriculture. To assess these, K&A calibrated the SWAT model for the St. Joseph River watershed. The model was used to simulate the current (baseline) loading conditions of TP, TN, and sediment for each of the 229 subwatersheds delineated in the St. Joseph River watershed, and atrazine loads at the outlets of three major agricultural tributary watersheds. Five agricultural BMP scenarios were simulated for the three major tributary watersheds to derive effects that BMP implementation would have on water quality at their confluence with the main stem of the St. Joe River (see: http://www.stjoeriver.net/wmp/docs/SWAT_final_report.pdf).

Among the four individual agricultural BMPs considered, edge-of-field filter strips were the most effective in reducing loadings for all pollutants examined. No-till for corn (including corn silage) was particularly effective for sediment and TN in watersheds with more permeable soils and dominated by the corn-soybean rotation. The combined BMP scenario (no-till, filter strips, and contour farming), as expected, provided the most load reductions in all cases. SWAT modeling study yielded valuable quantitative information on the effectiveness of agricultural BMPs in reducing pollutant loads and improving water quality, and the costs associated with these improvements.

Although predominantly agricultural, the St. Joseph River Watershed has 19 of 217 subwatersheds with over 10% of the land area in urban uses (commercial, residential, industrial, or transportation). Therefore, while controlling pollutant loadings from agricultural lands in the watershed is central in managing the overall water quality of the watershed, it was critical to quantity and as necessary, reduce stormwater pollutant loadings from urban areas in order to protect and restore water quality in the streams draining urban subwatersheds. An empirical model was used by K&A to estimate NPS pollutant loadings from urban areas. This study showed that in the St. Joseph River watershed, urban storm runoff is a significant source of TP and TSS loads in subwatersheds with the substantial presence of urban landuses.

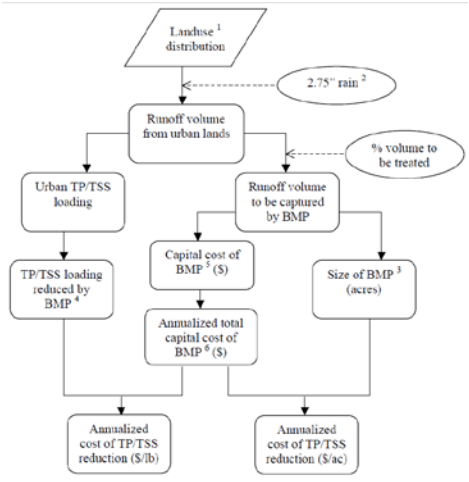


Figure 1. Flow Chart of Urban Stormwater BMP Cost Calculations.

Among the five urban BMPs examined (wet retention ponds, dry detention ponds, vegetated swales, rain gardens, and constructed wetlands), wet

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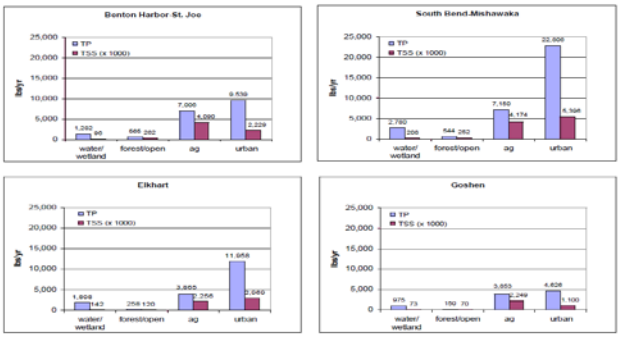

Figure 7: Total TP and TSS loadings from subwatersheds of the urban centers. (Note: TSS values shown in the graphs are in 1000 lbs.)

retention ponds and constructed wetlands provided the highest load reductions for TP and TSS while vegetative swales showed the highest cost-effectiveness (lowest per pound cost of load reduction). This portion of the K&A study also provided easy-to-use equations for calculating load reductions and cost-effectiveness of stormwater ponds.

To address future concerns and to help define critical areas of the watershed for protection, a unique "build-out" analysis (http://www.stjoeriver.net/wmp/docs/landscape_analyst.pdf) identified sensitive and vulnerable areas of the watershed potentially subject to urban sprawl. Urban non-point source modeling analyses provided (http://www.stjoeriver.net/wmp/docs/Urban_BMP_Analysis.pdf) vital information to identify current and future impacts of growth as well as the costs for urban stormwater retrofits. Several subwatersheds in both Michigan and Indiana have subsequently used these K&A analyses and the WMP to refine local needs through access to funding now available to them with the approved plan.