

*Improving water quality (nutrient loadings) in the Mississippi River:
Assessing and optimizing the environmental results of specific projects at
multiple spatial scales, considering cost and feasibility*

**EXCERPTS FROM FULL WALTON FAMILY FOUNDATION DRAFT
FOR McKNIGHT FOUNDATION FINAL REPORT**

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Background and Focus

This “white paper” is part the National Great Rivers Research and Education Center (NGRRECSM) project funded by the Walton Family Foundation (WFF or Foundation)

The goals of this project are jointly shared with the McKnight Foundation and some of the detail extracted from this paper speak to McKnight Goals, which are highlighted below.

Goal 3a

Despite the angst regarding any near-term scrutiny of water quality trends, visualization tools can be developed that will be widely used by stakeholders to plan and track watershed scale interventions, and to learn over time from their efforts.

- The USGS is developing statistical tools and guidelines to help users track water quality trends for individual reporting stations.
- GLTGSM is developing tools that will allow users to define the temporal and spatial framework of interest; to visualize reporting station data as being below, at, or above user-specified criteria (e.g., nitrate concentrations or loading); and to overlay other pertinent information (e.g., land cover, fertilizer use, impaired streams).
- Explorations and discussions are underway for how GLTGSM can integrate and/or interface with leading relevant assessment models and related efforts including:
 - Conservation Effects Assessment Project (CEAP), <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/>
 - SPARROW Surface Water-Quality Modeling, <http://water.usgs.gov/nawqa/sparrow/>
 - SERA-46 effort, Framework for Nutrient Reduction Strategy Collaboration: the Role for Land Grant Universities, <http://northcentralwater.org/sera-46/>
 - Watershed Planning Tool: Agricultural Conservation Planning Framework (ACPF) <http://northcentralwater.org/acpf/>

- Explorations and discussions are underway for how GLTGSM can develop and integrate new modeling approaches (currently intellectual property within National Security agencies) to assess vast amounts of geospatially referenced water quality data to identify redundancies, likely gaps, and anomalies in monitoring efforts.

Goal 3b

With respect to advancing water quality, the transformation of “data to knowledge” is in a frontier stage.

- The GLTGSM effort has thus far been focused mainly on the integration of water monitoring data, which is a substantial challenge in and of itself. Especially for data sets extending beyond the key federal agencies, each acquisition presents challenges regarding metadata, quality control standards, terminology, agency silos, and more. While there has been strong affirmation of the GLTGSM effort by states, agencies, and scientists, the integration of water monitoring “stations” is just an elemental step toward progress.
- Water monitoring could be improved by emerging technologies that are able to be temporally and spatially expansive and scalable. “Traditional” water quality monitoring should be augmented by remote sensing (satellites, especially multispectral nanosatellite systems that are emerging). (see http://www.merid.org/en/Content/Projects/Using_Remote_Sensing_to_Empower_the_Public_to_Address_Water_Pollution.aspx)

State Nutrient Reduction Strategies (NRS) are uneven and under resourced. Currently there is no reason to conclude that enabling conditions are in place to affect change at the scale needed. (<http://www.msrivercollab.org/wp-content/uploads/Decades-of-Delay-MRC-Nov-2016.pdf>)

- There is a struggle regarding various perspectives of a “accountability.” States are slow to specify water quality standards as goals.
- There is uncertainty and concern on many levels about assessing water quality trends (measures of progress) given the complexities of the related factors and spatial and temporal variabilities.
- With respect to the state NRS, given limited resources, hard decisions are being made about the trade-off of directing resources to improve monitoring vs. investments to incentivize changes on the land.
- The need for transparency of water quality data, while generally acknowledged by the states and many of their key stakeholders, is also a source of angst regarding the potential for showing “no progress” in nutrient reduction, and/or misuse and misinterpretation of the data.

- There is a widely-held perspective that progress on the land will likely have a lag effect of many years before being confirmed by (traditional) water quality monitoring,
- The “surrogate” or near-term indicators of progress seem to have a focus on tracking enabling conditions for change, and benchmarking changes on the land that would logically contribute to water quality improvements.

Similar to the challenge of standardizing water quality data and reporting, there is an urgent need to standardize the “surrogate” or near-term land and water conservation measures (e.g., nutrient trapping BMPs) for benchmarking progress within and among states, and regionally.

Goal 4a

The real potential of transforming “data to knowledge” to address water quality is in the integration of land and water related measures starting at tractable spatial and temporal scales.

- Data integration efforts should span weather, soils, hydrology, land use, topography, surface and subsurface water, agronomy, and farm enterprises (e.g., yields and net income are fine spatial scales).

NGRRECSM sees potential and need for a systematic and comprehensive measuring/monitoring solution that is both environmentally effective and cost effective.

- That solution would employ digital technologies and analytic approaches that are being tested and employed in non-agricultural sectors, which over time could come to the natural resources/agriculture space.
- There needs to be a focused effort to develop such decision support tools to incrementally improve the economic and environmental performance of land and water conservation policies, programs, and practices.