Optimizing Industry Water Use

Evaluation of the Use of Water Stewardship Tools by Great Lakes Basin Industries




May 7, 2012

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ACKNOWLEDGMENTS

This report describes the outcomes of Phase II of the Great Lakes Protection Fund Project #926 titled

Optimizing Industry Water Use Evaluation of the Use of Water Stewardship Tools by Great Lakes Basin Industries

Funding for this project was provided by:

The Great Lakes Protection Fund (GLPF)
National Council for Air and Stream Improvement (NCASI)
Electric Power Research Institute (EPRI)
Council of Great Lakes Industries (CGLI)

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We would like to thank the members of the Expert Panel, who generously contributed their time and valuable guidance to the project team. A list of panel members is provided in Appendix A. A special thanks is also extended to Mr. Tom Crane of the Great Lakes Commission who served as facilitator for all three of our Phase II Expert Panel Workshops. Tom's skill greatly enhanced the ability to draw important viewpoints, information, and substantial consensus from the Panel.

This report should be cited as follows:

CGLI, LimnoTech, and NCASI. 2012. Optimizing Industry Water Use: Evaluation of the Use of Water Stewardship Tools by Great Lakes Basin Industries.

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EXECUTIVE SUMMARY

A growing number of water stewardship tools are being developed and applied to assess corporate water practices and to support development and implementation of sustainable water strategies. The perspectives and objectives of the tool developers differ, but they share a common intent to support sustainable management of the planet's limited freshwater resources. These tools have largely focused on concerns related to water use in water-stressed regions of the world. This report brings a different perspective to the global water use/water scarcity discussion in that it describes a study that explores the applicability of water stewardship tools to industries operating in the Great Lakes Basin, a water-rich region that encompasses large parts of the United States and Canada.

The Great Lakes are the largest freshwater system on the Earth, holding 84% of the United States' surface water supply, and more than 20% of the global surface water supply. The waters of the Great Lakes Basin are a unique and highly valued freshwater resource managed through a mature governance system. For example, the Great Lakes-St. Lawrence Water Resources Compact and the Great Lakes – St. Lawrence Water Resources Agreement (Compact/Agreement) detail how the States and Provinces will manage and protect the Basin and provide a framework for each State and Province to enact measures for its protection. The Compact/Agreement provides the foundation for attaining sustainable water use approvals when significant new or increased water withdrawal approvals are sought.

In this context, the Council of Great Lakes Industries (CGLI) and Project Partners are interested in gaining a better understanding of the expanding number of water stewardship tools that may be used to characterize industrial water use in the Great Lakes Basin. The focus of this study led by CGLI is an evaluation of the potential relevance and utility of the various tools to large withdrawal volume, self-supply industries that rely on Great Lakes waters. Four pilot facilities were selected that represent a cross-section of industries: an electric power plant; cement plant; pulp and paper mill; and oil refinery. All facilities are located on a Great Lake or connecting channel. The pilot studies addressed only direct water use with the exception of the paper mill, which included a partial supply chain water source (i.e., water associated with wood harvested from the region). While this study was focused on Great Lakes industries, individuals with interest in water use assessments both within and outside of the Great Lakes Basin will find the contents of this report useful when interpreting assessment results.

This study is part of a multi-phase project led by CGLI, with funding from the Great Lakes Protection Fund titled*: Optimizing Industry Water Use – Effective Application of Water Footprinting Methodologies to Industrial Operations in the Great Lakes Basin.* During Phase I, CGLI brought together industry, State and Provincial water resource managers, regional Great Lakes policy architects and decision makers, and environmental non-government organization

stakeholders to serve as an Expert Panel. Through a workshop format, the Panel explored the landscape of available water stewardship tools and developed an understanding of how they could potentially be applied within the Great Lakes Basin. The workshop outcome was a set of questions and issues that the Panel felt should be addressed through application of water stewardship tools. During Phase II, described in this report, pilot testing was completed at four industrial facilities and results were evaluated.

Expert technical support for Phase II of the project was provided by the internationally-recognized freshwater consulting firm, LimnoTech, the paper industry's environmental research organization, National Council for Air and Stream Improvement (NCASI), technical resources from other participating industry sectors including the Electric Power Research Institute (EPRI), and technical and engineering staff members from participating companies. In addition, representatives of pilot industries and on the Expert Panel provided valuable insights. The pilot studies and Expert workshops also provided an opportunity for awareness-raising and stakeholder engagement with numerous leaders in the Great Lakes community.

STUDY APPROACH

Water stewardship tools can generally be grouped into four broad categories based on their major elements: water use accounting tools; business risk assessment frameworks; reporting and disclosure protocols; and standards and certification frameworks. This study evaluated water stewardship tools in all four categories, focusing only on the tools that were available (not still under development) at the start of the project.

The key components of water stewardship tools are numeric and narrative metrics for characterizing water use, impacts and risks associated with use by an individual, nation, industry or other entity. Nineteen water stewardship tools were first reviewed to identify metrics that are common to many, an indication that they are important to a wide range of stakeholders. These metrics were compiled and reviewed for relevance to study objectives and to water sustainability objectives relevant to Great Lakes industries as identified through this project (Table ES-1).

Table ES-1. Water Sustainability Objectives Relevant to Great Lakes Industries

Objective	Examples
Protect ecosystem uses	Impact on water quantity
	Impact on water quality
Not impair other human uses	Availability for other users
	Reserve water for growth
Sustain existing industrial use	Establish and maintain efficient water use plan
	Response plans for dry periods
Demonstrate good water stewardship	Water reuse or recycling
	Maximize return flow
	Ethical governance
	Permit compliance
	Response actions where impacts
	Out of basin transfers (avoid)

The outcome of this process was a list of 22 metrics that were selected for application to four industrial facilities. Five water stewardship tools were found to provide good coverage of the 22 metrics, so the metric definitions used in these tools were followed during the industry applications. These tools are: Water Footprint Network (WFN) methodology; Global Water Tool (GWT), Carbon Disclosure Project (CDP) Water Disclosure Project; Global Reporting Initiative (GRI); and the European Water Stewardship (draft) Standard (EWP).

The individual selected metrics were applied to the four facilities, and detailed results were provided to personnel at each facility for feedback and for potential future use by the companies. Throughout the pilot applications, observations describing the metrics' relevance and applicability were made, and advantages and challenges were noted. The findings of the individual pilot studies were then integrated into overall project conclusions and recommendations, as summarized below. These conclusions reflect the team's critical analysis, reactions from the pilot companies to the pilot study results and findings, and extensive discussions with the Expert Panel through four full-day workshops (one during Phase I and three during Phase II).

SUMMARY OF CONCLUSIONS

1. Individually and collectively, water stewardship tools have potential for significant value.

The combined metrics from the selected water sustainability tools provided a framework that allowed the facilities to determine water withdrawal and consumption as compared to available renewable supply, and provided a framework for reporting on the regulatory environment, best water management practices, wastewater treatment and reuse, and the economic benefits of the industry. The Great Lakes pilot applications tell a favorable story about water use. Application of tool metrics was found to provide an effective mechanism to help companies better understand their water uses, practices, and potential impacts in both a qualitative and a quantitative manner. Assembling water use information for the analyses required substantial resources but was found to be an effective means for identifying gaps in knowledge. Some tools provide a structured framework for companies to communicate externally about their water uses and practices to investors, media, and the public. Some differences in definitions were identified through application of the metrics, and the pilot studies highlighted the need to understand and communicate these differences when reporting and interpreting results. Failing to do so could lead to misleading results and misdirected conclusions. Participants reported that they gained a greater understanding of the differences between tools, and the need to make sure that water uses are reported accurately.

2. The tools were developed for different purposes and no one tool provides all the answers.

A key outcome of the study was an improved understanding of the differences between the wide variety of water stewardship tools that exist or are under development. The distinction between "water footprinting" (as defined by the WFN) and other water stewardship tools was clarified, and participants gained a better understanding of the various perspectives of the tool developers. The pilot studies demonstrated that it is important to understand the purpose and objectives for any water stewardship tool prior to applying the tool or interpreting results. Study results also highlighted that none of the tools addresses all needs or interests related to water management in industrial settings. No tools were identified that can support optimal allocation of water resources in a region, by accounting for environmental, economic and social considerations. In

fact, none of the tools provided any substantive assistance with quantifying economic or social aspects of water use. Consequently, the tools cannot be considered water sustainability tools, which must examine all three elements: economic; social; and environmental.

3. Data precision, site boundary delineation and metrics definitions can significantly affect the results.

Each of the 22 water-related metrics were applied to the four pilot facilities, and the team attempted to follow the approaches exactly as outlined in the relevant guidance from the five selected tools. The process of requesting, assembling, and interpreting required information revealed a number of challenges related to input data and definitions. In some cases, measurements that were sufficiently precise for regulatory reporting or internal management were insufficient for metrics calculation. The development of the water budget also highlighted the need to carefully draw a spatial boundary that corresponds with the comprehensive metrics assessment of the entire facility. Details related to definitions were also found to be important. Some metrics are defined similarly across most water stewardship tools, but other definitions varied considerably.

4. Context can be critical to defining the value of a metric.

Metrics reflecting withdrawal volumes are most useful when considered in context of water availability and at an appropriate scale. When properly managed, even large volumes of water use can be sustainable in locations where the resource is sufficient to support the use. However, when large withdrawals are reported without context of the volume returned to the source and the available supply, the numbers may be misunderstood. The impacts of water use must be assessed at the local and regional levels and must consider the magnitude and timing of use, location of withdrawal and discharge points, and the volume and quality of the discharge. Not all tools provide guidance on the scale to be used when evaluating metrics related to impacts on water availability; this provides flexibility but can lead to varied results depending on the decisions made by the user.

5. Some metrics are redundant, insufficient or missing.

Many metrics in the water stewardship tools evaluated for this study were designed to address concerns over water scarcity and were found to be less useful than others in the toolbox for the water-plentiful Great Lakes Region; in some cases the issue is too much water rather than too little. While the team was able to account for stormwater to some degree, the metrics were not generally designed to address stormwater runoff, contributing to some uncertainty around the calculations. Some metrics, such as the WFN "grey water footprint" are external to and redundant to what is already being reported for regulatory purposes, and these were generally found to have limited or no value for Great Lakes industries. Metrics related to recycling and reuse, an important function in industrial water use, exist in some form in all five tools examined; however, most tools simply ask for the volume recycled and provide no method for interpreting it in the context of overall water use. Accounting for the variability associated with the data collected for each metric is important. In some cases, the values for metrics sought (e.g., consumptive water use or water loss) cannot be measured directly in real time and may be too small to be calculated indirectly with a high degree of accuracy.

6. Available tools only partially address the most important water resource management needs in the Great Lakes Basin.

The water stewardship tools do not address many critical issues in the Basin such as invasive species, habitat loss and legacy contaminants. Rather, the tools were primarily developed to assess water use in water-stressed regions, with a focus on water quantity. Some water stewardship tools have the potential to support the Great Lakes Compact/Agreement decision-making processes for approval of new or increased withdrawals or consumptive use. The tools have the most potential to address *impacts on water quantity*, rather than *impacts on water quality*. Most tools include metrics that address *ecosystem impacts* to some degree, but they generally offer information gathering and discussion frameworks and do not provide guidance for how to define such impacts. The tools provide a structure for describing the water stewardship practices that are being used, but none of the tools provide guidelines as to what is "good" or "bad" practice. At present, the tools do not provide a means for objectively rating the environmental implications of water use nor do they offer substantive metrics to allow for consideration of social and economic aspects of water use.

SUMMARY OF RECOMMENDATIONS

Knowledge gained from these pilot studies can be used to: a) guide the expectations of potential users of water sustainability tools; b) aid interpretation of results derived from application of these tools; and c) guide refinements in water stewardship tools. This section translates the outcome of these pilot studies into recommendations for both potential users of water stewardship tools and those involved with development of such tools.

Recommendations to Potential Users of Water Stewardship Tools

The advent of water stewardship initiatives has, in effect, challenged the perception that water management by business, in concert with local governance, is adequate for long term protection of freshwater resources. While exploration of the utility of water stewardship tools is justified, some cautionary notes are appropriate.

1. Understand that while tool metrics help to define the new water stewardship landscape, important business-related shortcomings remain to be incorporated

Considered collectively, water stewardship initiatives have served to broaden the scope of water-related information that could be considered relevant by the initiative sponsors and, presumably by extension, the public. Specifically, the tools can promote transparency and disclosure of water sources used, destinations for wastewater, impacts to aquatic ecology or other water users, and water management plans. Those wishing to demonstrate stewardship of water resources may be expected to disclose such information. Concern about global water scarcity is the motivating force behind most stewardship initiatives and, therefore, water use reduction is a prominent theme. Unfortunately, the tools offer little or no detail about how to contrast the benefits of water use reduction with the inevitable economic or environmental tradeoffs associated with making such a reduction. This is a notable shortcoming and businesses will need to inject these concepts into the dialogue. Mandatory or advocated water use reductions that provide no benefit should be avoided.

2. Select a tool that is well-matched to the users' need.

The five tools of primary focus in this study represent the disparate perspectives of their developers and potential users of these tools should recognize these perspectives. Sections 5 and 6 of this report offer counsel as regards to tool selection for industrial facilities located on or near the Great Lakes.

3. Apply water stewardship tools thoughtfully while considering shortcomings or gaps.

Regardless of the tool(s) selected, users are advised to thoroughly explore both the basis for the metrics identified and previous experience in their use before undertaking a stewardship analysis or disclosing related information. Further, the current state of tool development is such that users should not anticipate that the application of these tools will necessarily allow an industrial facility to claim that its water use is "fully sustainable" or an external auditor to conclude that use is "not sustainable." The concept of "sustainable" water use is considered to embody not only environmental elements, but also economic and social elements. The tools evaluated in this project help to define environmental metrics for water stewardship but do not incorporate information or guidance that lends itself to making a claim of environmental, economic, and social sustainability of water resource use. More work in this area is needed.

Recommendations to Water Stewardship Tool Developers

The researchers involved with this project offer the following suggestions to developers of water stewardship tools.

1. Assist potential users of stewardship tools by emphasizing context; being more explicit about the objectives, appropriate use, and value associated with a particular tool. Describe where application is appropriate, where it is not appropriate and, where possible, alternative tools or approaches that are better suited for related needs.

2. Provide detailed definitions, methodologies for calculating or quantifying tool metrics, and instructive examples of metric applications. In cases where similar stewardship tools contain similar metrics (e.g., water consumption), contrast any differences in calculation methodologies in a substantive way.

3. Explore convergence of similar water stewardship tools and the synergies that may result from that convergence (e.g., fewer, more powerful tools that are more widely adopted or applied). Seek "cross walks" so that analyses using tool 'A' can be recognized as also meeting criteria 'X' and 'Y' of tool 'B.'

4. Recognize the desire of business to adopt and demonstrate sustainable practices including those related to water use. Work toward frameworks that will facilitate sustainability demonstrations by integrating measures of environmental stewardship with social and economic stewardship in a meaningful and comparative way.

ADDITIONAL REFLECTIONS FROM THIS PROJECT

This report described the evaluation of numerous water sustainability tool metrics that were applied to four pilot industries in the Great Lakes Basin. This exercise was, to our knowledge, the first of its kind with respect to the pilot application of multiple water stewardship tools at the

same sites. Findings from this work will be useful to those who may advocate for use of water stewardship tools, users of the tools and tool developers. To the extent that water stewardship tools are used in the Great Lakes Basin, we hope that the information presented in this report contributes to the establishment of better practices for recognizing good water stewardship and promoting reasoned improvements in water stewardship. Looking forward, it is our hope that the continued evolution of these tools will lead both industry and environmental advocates to a common place with respect to the unimpeded use of verifiably sustainable water management practices. Sustainable utilization of the water resources within the Great Lakes Basin can support important and far reaching economic development opportunities.