

XI. Monitoring and Evaluation Plan

Program Process and Goals-

The primary goal of the Swartz Creek Watershed Planning Project was to develop a plan that will protect and restore the designated uses of Swartz Creek Watershed. A comprehensive watershed management process involves working through a number of phases that ultimately lead to water quality protection. This watershed management process can be generally divided into three phases including watershed planning, plan implementation, and effectiveness assessment. Figure 17 illustrates the relationship between the three phases of watershed management.

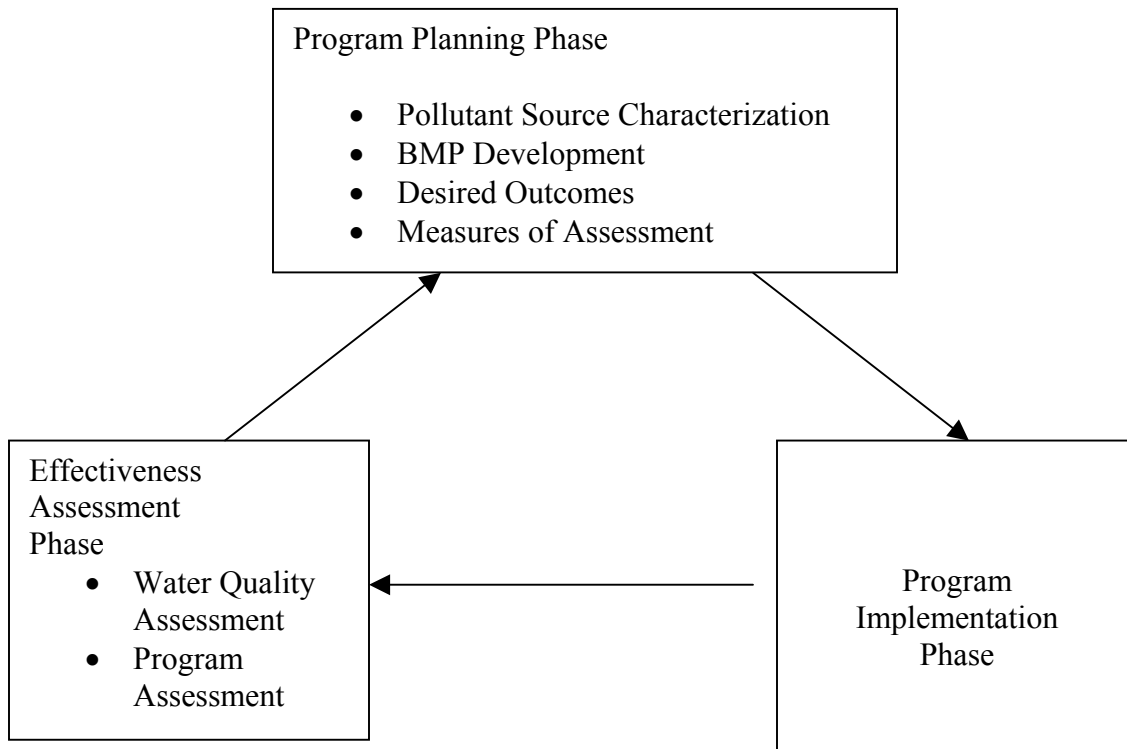


Figure 17 . Watershed Management Cycle taken from the Genesee County Phase II Middle Flint River Watershed Plan.

Currently the Swartz Creek Watershed Planning team has completed the steps associated with the program planning phase including:

1. The identification of known and suspected pollutants, source areas and causes of non-point source pollution
2. The identification of Best Management Practices that need to be implemented to protect water quality
3. The identification of specific desired outcomes related to water quality
4. The identification of measures of assessment

With the Swartz Creek planning process complete, the next step in watershed management involves implementing the watershed plan. As such, activities will need to begin that provide information to evaluate the watershed plan. Figure 18 is a theoretical hierarchy of levels of program evaluation. These levels are intended to provide a conceptual framework that will be reviewed periodically to assess the Swartz Creek Watershed Plan. Below is a short description of each of these levels of evaluation and specific instruction on how the levels are to be used in the evaluation. Several of these levels, including the needs assessment and program theory levels are relatively unimportant at the current iteration of the watershed planning process. The upper two levels including assessment of the program process/implementation and assessment of program outcome/impact are our primary focus in this evaluation plan.

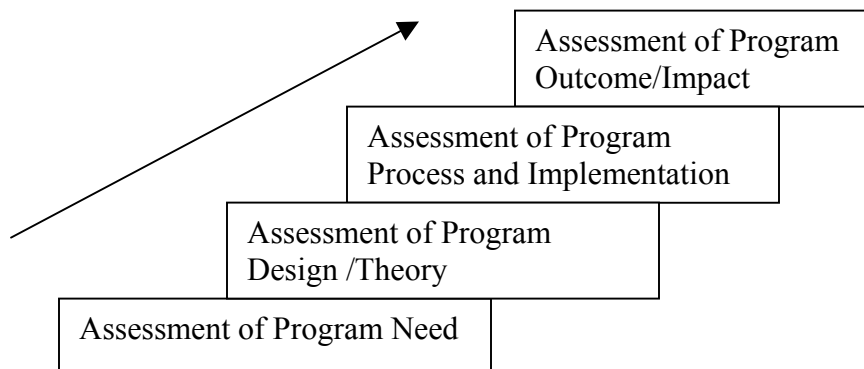


Figure 18 Hierarchy of program Evaluation

Program Need - The assessment of the program need is simply the determination of the necessity of the program. This portion of the evaluation can be conducted by answering the evaluation question: **Do non-point source pollutants impact or threaten the designated use status of the Swartz Creek Watershed?** A response of yes to this question should prompt the evaluator to discontinue the needs assessment and focus evaluation efforts on assessing the program design/theory aspects of the project.

Program Design/Theory – The assessment of the underlying theory that watershed planning and watershed management lead to improved water quality and protection of designated uses is the focus of this step in the evaluation hierarchy. It is currently accepted by the MDEQ based upon their Developing a Watershed Management Plan for Water Quality document, that the planning process and methods undertaken in the Swartz Creek are the most effective way to protect water quality. As continued advancements are made in the academic disciplines focused on natural resources or with techniques used by watershed managers, adjustments to the underlying theory should be made.

Program Process – The assessment of the program process is the first step in the assessment hierarchy that will be addressed in any detail in this evaluation plan. This step in the evaluation process assesses what the program is doing and if it is delivering the services as it was intended to do. The assessment of program process generally falls into two domains including service utilization and program organization (Rossi, Lipsey,

Freeman 2004). This portion of the evaluation should focus on two primary question including: 1) **Is the program reaching the intended target audiences?** and 2) **Are the program services consistent with the program as designed?** Periodic reviews of the implementation documents including meeting attendance, bmp worksheets and the goals, objectives, and task table should be sufficient to make judgments about the success or failure of the program process.

Program outcome/impact – Assessing the program outcome and program impacts of the Swartz Creek Watershed Plan is the most critical and likely most complicated evaluation task. The difficulty in assessing program outcomes is primarily a result of the complex interactions between watersheds, land use, water quality and human society. What is intended by watershed management is that continual steps are made towards protecting water quality in a number of ways using a variety of methods, techniques and BMP's. In order to evaluate the success of these activities, a series of “levels of success” were developed (See figure 19). The remainder of the evaluation plan will use these levels of success to answer the primary evaluation question: **Are advancements towards protecting the designated uses of the Swartz Creek Watershed being made?**

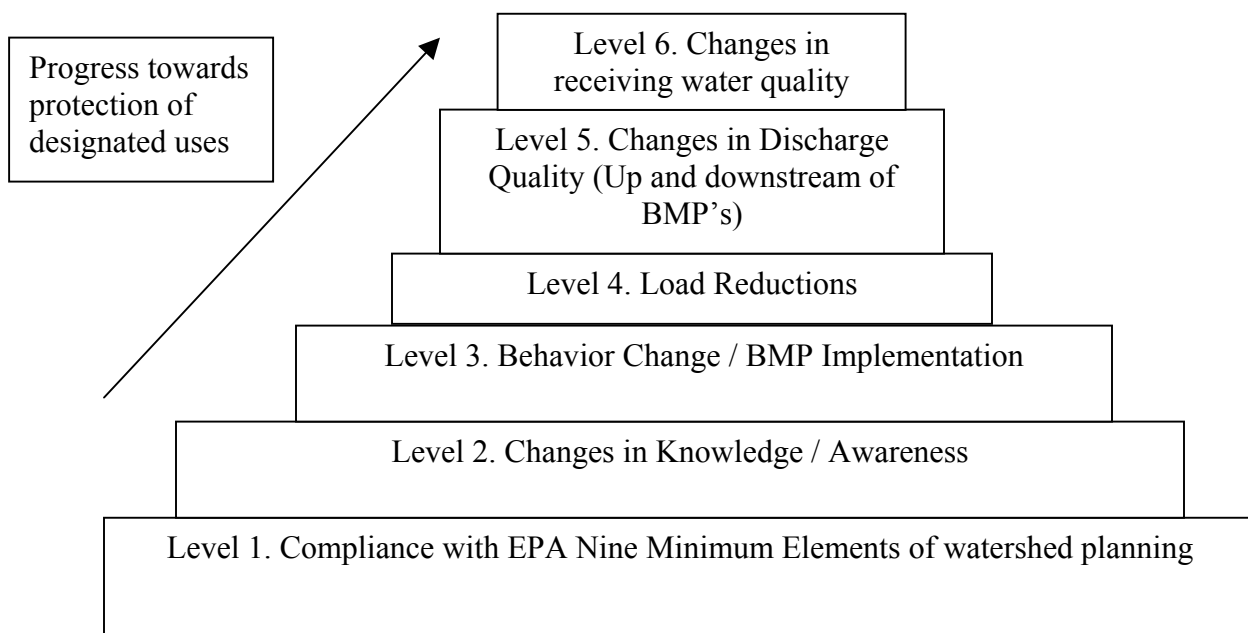


Figure 19. Levels of success necessary to protect the designated uses of the Swartz Creek Watershed (Modified from the Middle Flint River Watershed Plan, Genesee County Drain Office spring, 2004)

In attempting to answer the primary evaluation question its necessary to ask several additional questions that, when answered collectively, will provide an answer to the primary question proposed above. These additional “sub questions” are directly related to the levels of success described above and provide specific measures that can be evaluated to gauge the success or failure of portions of the watershed management plan. The sub questions include:

- Is the watershed plan in compliance with EPA requirements of watershed plans?

- Are changes in knowledge taking place because of the watershed plan?
- Are behavioral changes taking place as a result of the watershed plan?
- Are reductions in the amount of pollution delivered to the stream a result of the watershed plan?
- Are changes in the water quantity of the Swartz Creek being achieved because of the watershed plan?

Measures of success are critical to assessing of the effectiveness of the Swartz Creek Watershed planning effort. Identification of quantifiable measures provides measurability and accountability throughout the six levels of the program. Data collection and analysis will be developed for each of the levels of success necessary to protect the water quality of the watershed. In the next section standards, measures and data gathering methods will be developed and detailed for each level of success.

Level one: Compliance with EPA nine minimum elements of watershed planning- Compliance with the EPA's minimum standards to watershed planning is a requirement of all watershed plans funded using federal dollars. This is achieved by including several key elements in all watershed plans. Compliance with the requirements is expected to positively impact water quality because inclusion of these elements has been proven to increase the success of watershed planning efforts. The standard for this level of success will simply be that the Swartz Creek Watershed Plan meets these requirements. Measures that apply to this level of success will be directly related to the ability of the plan to remain in compliance with EPA standards as they change. Data gathering for this indicator will simply be conducted by reviewing the most recent copy of the watershed plan and comparing it to the current requirements of the EPA.

Level two: Changes in Knowledge / Awareness- Changes in knowledge of watershed residents are targeted through the information and education campaign. Measures and data collection for this level of success would likely take place in two ways including a social survey and pre and post testing targeting individuals involved in education activities. Focus should also be on identifying changes in knowledge related to specific issues targeted in the Swartz Creek Education Plan. The standards for changes in knowledge should be based on statistical significance that will need to be established.

Additional measures of knowledge change should be conducted on individuals who are specific targets of the Education Plan. Data collection methods with these target individuals will primarily include pre and post tests at conferences or workshops focused on specific water quality issues in the Swartz Creek Watershed. Again, standards of improvement would need to be established regarding the specific policy or group of individuals.

Level Three Behavior changes / BMP Implementation-

The intended outcome of this level of success is a change in behaviors as a result of changes in knowledge. Similar to level two, changes in behavior across a population will

be relatively difficult to monitor because of the other ongoing education campaigns in the area. The same approach used above with a control group outside of the watershed and an experimental group in the watershed could be used and measures of statistical variation between the groups measured.

Changes in behavior can also be identified in conjunction with BMP installation. This portion of the evaluation design should focus on identifying and tracking individuals who are known to be involved in the planning process and instrumental in implementing BMPs. Tracing changes in behavior related to structural BMPs is more feasible than changes in behavior related to managerial BMPs. This is the case because the implementation of Structural BMPs is tied directly to individual property owners, municipal governments and specific locations within the watershed. Data about the implementation of BMP can be gathered simply through tracking the number of BMPs installed as a result of the plans implementation. Data gathering should be done by project implementers with specific individuals as behavior changes and BMP installations are identified. An example of this may include documenting behavior changes of a local planning commission with regards to a particular policy after an educational seminar (managerial BMP) or by mapping the location of structural and vegetative BMPs. Standards for evaluation the success of these efforts are based on the specific measurable objectives outlined in the plan including the number of sites identified for BMPs or the number of policy changes recommended.

Level Four: Reduction in pollutant loadings to the Swartz Creek-

A pollutant loading is a quantifiable amount of pollution that is being deposited in a river. Pollutant loads are based on an amount of pollutant that enters a stream in a given unit of time. An example could include a statement such as 500 pounds of nitrogen enter the stream per day from a specific site. Pollutant loads can be calculated based on the ability of an installed BMP to reduce the targeted pollutant. Loading are best used at specific sites where detailed data about the reduction of pollutants can be gathered. Pollutant load reductions should be calculated for each installed BMP. Standards for pollutant loads are generally calculated on a cost-effectiveness basis. These are expressed in terms of the dollars spent to reduce a particular unit of pollution. MDEQ has specific standards that are established for BMPs and pollutants. These standards would serve as the standards for this evaluation design.

Level Five and Six Changes in water quality-

The evaluation of achievements in level five and six include activities that directly measures the water quality the Swartz Creek and the Flint River. The monitoring of water quality in these systems is an extremely complex task that involves gathering data from a number of sources. Periodic assessments of the water quality of the Swartz Creek and Flint River are conducted as part of several federal and state water quality monitoring programs. These programs use both randomized and purposeful sampling based on recommendations from local water quality experts. The data gathered from these sampling procedures are compared to the State of Michigan Water Quality Standards.

This complex set of standards is based on both quantitative and some qualitative standards. Data analysis is conducted and published by experts at MDEQ and USEPA. The combining of data gathered under these programs with periodic water quality assessments conducted as part of the watershed planning will provide the best picture of existing water quality in the watersheds. In addition, specific monitoring activities will need to be coordinated with agencies to ensure implementation targets are being met. In order to monitor the affects of the watershed management plan CAER staff and the Flint River Watershed Coalition will work with state and local agencies

Level Five Monitoring-Monitoring of Discharge (Up and downstream of BMP's)
Discharge monitoring will be focused on monitoring the affects of BMP implementation. Monitoring should be targeted to address the warm water fisheries and other aquatic life designated uses. This monitoring will be conducted using GLEAS procedure 51 to assess the in stream habitat conditions. Coordinating with the MDEQ and MDNR is critically important to provide the quality control and quality assurances needed for such monitoring. This monitoring should be conducted during the MDEQ five year rotating basin monitoring.

In addition to using procedure 51 monitoring, the Flint River Watershed Coalition is considering changes to its volunteer monitoring program. FRWC is focusing on increasing the number of professionally trained volunteers and increasing the use of technology in the monitoring program. If increases in the technical expertise of volunteers in this program are achieved these volunteers may be used during those years when DEQ is not conducting monitoring in the basin.

Level Six-Water Quality Monitoring

In addition to monitoring upstream and downstream of BMP's, monitoring of reference sites within the watershed should also take place to provide information about trends in water quality. MDEQ and MDNR currently monitor several reference sites within the watershed. The location of these reference sites appears to be sufficient to evaluate overall water quality within the watershed. Periodic review of these locations should be conducted in order to provide opportunities to monitor newly discovered water quality issues or large scale changes in water quality. If after the implementation of the watershed management plan no increases in water quality trend are noted the watershed plan should be reviewed and altered to address suspected and any new pollution sources.

XII. References

- Cooper, J 2004. A Biological Assessment of the Flint River and Selected Tributaries in Lapeer, Genesee, Oakland and Saginaw Counties, Michigan. June 30- August 2003. Surface Water Quality Assessment Section, Water Bureau, Michigan Department of Environmental Quality, MI/DEQ/WD-03/114.
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