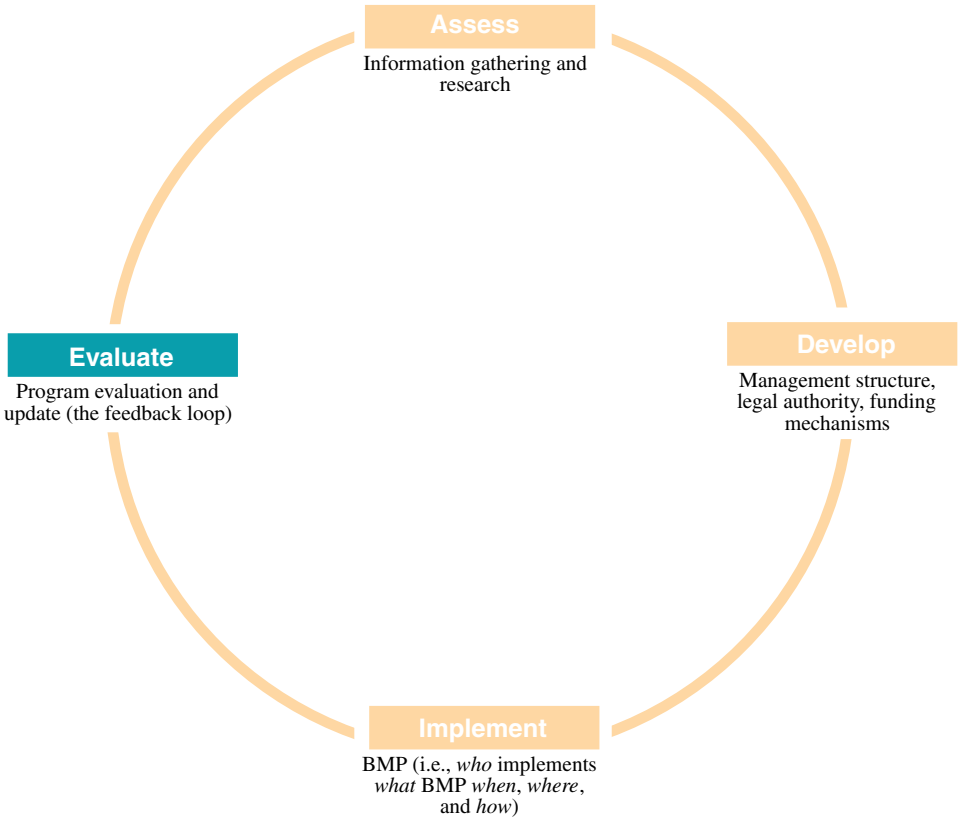
5 Evaluation of Urban Runoff Program



Regardless of whether you choose to implement the six minimum control programs or you tailor your URP based on your assessment of significant pollutant sources or geographical areas of concern, it is necessary and important for you to review your URP periodically. This review helps to determine if water quality is improving in your area and whether the efforts and resources are directed at the right source or pollutant of concern. Then if the current use of resources is not providing the improvements you expected, then what should you do differently? This review is also important from the viewpoint of your permit because the permit is likely to require the municipality to demonstrate progress made towards measurable goals and to justify the appropriateness of the BMPs that it has chosen to implement. Periodic evaluations are also useful to help gain program support. This section of the MURP presents some ideas on how to report on progress and how to evaluate and revise your URP.

5.1 Progress Reporting and Program Evaluation

NPDES Phase II municipalities will be required at least during the first 5-year permit period to submit annual reports to the RWQCB. NPDES Phase II regulations also suggest that the municipality establish measurable goals for URP elements. Progress made relative to these goals can then be reported in a simple annual report.

This MURP guide suggests measurable goals for BMPs in each of the control programs in Sections 4.1 through 4.8. The municipality should use these ideas to establish such goals for each year. Note that measurable goals are somewhat similar to performance standards that are being used by some Phase I municipalities; performance standards also define the level of implementation necessary for a given BMP or control program to be effective. Compliance with the performance standards is being used by these URPs to demonstrate that they are achieving pollution reduction to the maximum extent practicable. In some instances, it may not be possible to identify a measurable goal. In such cases, it would be appropriate to report work completed in that year.

Progess made relative to measurable goals is adequate for purposes of annual reporting, and under the presumption approach if measurable goals are met, the program can be considered to be improving water quality to the maximum extent possible. This approach will not, however, answer questions such as (1) whether all that you are doing is in fact improving water quality, (2) whether the BMPs you are implementing are appropriate for your area and its problems, or (3) whether

your resources would be better directed at another pollutant source. You likely need to use other evaluation techniques to answer these questions. Table 5-1 summarizes commonly used techniques to evaluate effectiveness of urban runoff programs.

Note that water quality monitoring is the most commonly used technique to assess the effectiveness of the overall URP (as opposed to other techniques that assess a single control program). However, monitoring data from urban waterbodies have not shown any marked water quality improvements and some NPDES Phase I programs are questioning the usefulness of water quality monitoring. Also NPDES Phase II regulations state that small municipalities are not expected to undertake independent water quality monitoring but that they should continue with any monitoring that they are currently doing and/or participate in available regional monitoring programs. Further details on water quality and other forms of monitoring are provided in Section 5.2.

Public awareness surveys are another program evaluation tool used by NPDES Phase I municipalities to assess the effectiveness of outreach programs. Since surveys are expensive to conduct, you should assess your resources before using them for program evaluation. You may want to consider coordinating these surveys with other municipalities or entities to reduce costs. Survey data can be useful in justifying PE/O budgets for subsequent years. As human awareness or behavior is unlikely to change significantly in 1 year, the appropriate frequency for these surveys is every 2 years or so.

Table 5-1. Commonly Used Program Evaluation Techniques

Quantitative Measures

- ✓ Chemical monitoring of practices
- ✓ Chemical monitoring of receiving waters
- ✓ Biological monitoring of receiving waters
- ✓ Stream flow monitoring
- ✓ Sediment monitoring

Qualitative Measures

- ✓ Public opinion surveys and pre- and post-event evaluation forms by targeted groups
- ✓ Indirect indices such as:
  - Increases in the amount of used oil collected
  - Increases in the amount of sediment/debris removed from streets and catch basins
  - Decline in the number of spills of petroleum products, pesticides, etc.
  - Decline in the number of illicit connections detected
  - Decline in the number of illegal dumping incidents/complaints
  - Decline in response time for complaints/spills
  - Decline in the number of enforcement actions taken
  - Increase in number of calls to the Hazmat/URP Information hotline regarding disposal options
- ✓ Increase in the number of new development projects that are being required to implement BMPs
- ✓ Increase in the number of construction sites that are implementing BMPs
- ✓ Increase in maintenance frequencies; inspection frequencies
- ✓ Special studies to evaluate effectiveness of specific BMPs (examples of such studies include testing of catch basin inserts or testing the performance of grassy swales)

5.2 Water Quality Monitoring

This section provides recommendations to small municipalities regarding how they may wish to incorporate monitoring into their programs. Under NPDES Phase II regulations, monitoring requirements are left to the discretion of the permitting authority and the EPA in general does not recommend that small municipalities conduct monitoring in the first permit period beyond what they are already conducting. On the other hand, the EPA is requiring the State to identify how monitoring will show progress regarding implementation of BMPs and water quality improvement pursuant to CWA Section 319, and many local governments have found monitoring to be a useful component in stewardship programs.

Monitoring of urban streams and storm water conveyances can provide valuable information for cities in their efforts to manage water quality. However, not every city, county, or other local entity will see the same benefits of ongoing monitoring programs. The needs of some areas are greater, as potential or known impacts are more severe, and local resources for addressing them are scarce. Other areas may have relatively well-maintained infrastructures that provide for ongoing maintenance of water quality, as well as resources to monitor the effectiveness of their management programs and overall environmental quality. Individual cities and constituents should decide if a monitoring program, whether citizen-based or insitutional, is needed or can provide added water quality protection. Otherwise, these entities may see more value in using resources for implementing as wide a range of BMPs as possible.

Utilize Existing Water Quality Data (Collected as Part of Phase I Effort)

Monitoring to evaluate water quality trends, water quality differences related to land use, or to relate improvements in water quality from implementation of program control measures is quite difficult and usually requires technical expertise and substantial resources. Moreover, extensive water quality monitoring to characterize the pollutants from different land uses has already been accomplished by the Phase I URPs at considerable expense and these data should generally be adequate for most Phase II applications.

Therefore, in lieu of implementing an aggressive water quality monitoring program, the municipality may choose to evaluate results of monitoring conducted by other storm water programs (e.g., programs regulated under Phase I) under conditions representative of your municipality. Use this information to (1) help characterize expected water quality from different land uses and/or facility types, (2) identify constituents of concern based on toxicity testing and/or evidence of beneficial uses impairment, (3) understand important pollutant sources within your jurisdiction, and (4) evaluate the effectiveness of alternative control measures. Three studies conducted for other URPs provide useful information on variations in pol-

lutants of concern and land use (Woodward-Clyde 1996; Strecker et al. 1997; Bannerman et al. 1996).

Document and Participate in Regional Monitoring Efforts

Municipalities should participate as appropriate in regional monitoring strategies and use data from existing monitoring, rather than undertaking expensive monitoring on your own. Such coordination is especially relevant for receiving water monitoring and watershed-scale monitoring where multiple pollutant sources (i.e., point and nonpoint sources) are usually involved and cooperatively funded monitoring programs can provide multiple benefits at a low cost.

As a first step, identify other regional monitoring efforts. The programs to consider include the POTW monitoring program, other point source dischargers, and the other wet-weather flow monitoring programs to determine if the monitoring objectives and protocol of the regional programs address the URP's needs. Next, coordinate sampling locations, frequency, sampling protocol, data analysis, and presentation with the larger program(s).

In many areas, the RWQCBs are working with other groups to develop regional monitoring programs. Currently the Central Coast RWQCB is working with the Monterey Bay National Marine Sanctuary's Water Quality Protection Program and its member agencies to develop a monitoring program in the Monterey Bay area that can better coordinate and build on the individual monitoring conducted by various permit holders, county, state, and federal programs. The Central Coast RWQCB is also developing a monitoring program for its entire region. Participating in regional efforts can help cities interpret their data and water quality issues in relationship to other watershed sources, and the city's local data can in turn strengthen the regional assessments.

Develop Monitoring Objectives

The development of any monitoring program should begin by assessing what questions to address. In part, the municipality should determine what type of information municipal departments (Environmental Health, Public Works, Flood Control, etc.) are collecting for general purposes. The various departmental entities can then determine what types of data need to be collected, and as a result, may share information more effectively.

Data should only be collected to address real needs. For example, if an existing program already ensures no cross connections between wastewater and storm water conveyances with appropriate chemical monitoring, no reason exists to include more of that monitoring of the same conveyances. If measures are taken to ensure no cross connections, monitoring for wastewater parameters (e.g., indicator bacteria, ammonia, detergents, etc.) may be justified to assess the effectiveness of these measures, or the possibility that these pollutants are coming from other, nonwastewater sources.

Assessment studies and monitoring programs can address questions that local city staff are unable to answer due to lack of information. In many cases the results of these assessments will indicate that the cities are doing a good job of controlling pollution. In others, they may indicate that urban runoff is being contaminated by common commercial or residential practices, or illicit discharges, and may suggest studies appropriate to more thoroughly determine the sources, or measures that should be taken to improve these practices. In most cases it is important to try and define questions that are fairly narrow in scope, and that can be addressed with the simple tools available. Questions regarding the "health" of the ecosystem are quite broad and generally not required by this type of program.

Elements to Consider in Developing a Water Quality Monitoring Program

In the event no regional program is available to participate in, and/or the municipality elects to develop its own monitoring program, consider the following while developing this program:

- ✓ Begin with visual monitoring and introduce grab sampling and water quality analysis only as needed and appropriate.
- ✓ Limit the scope of chemical analysis to a few parameters (e.g., total settleable solids, pH, dissolved oxygen, and temperature) within the staff's capability.
- ✓ Utilize volunteers to the extent possible, providing them with training and simple kits to use.
- ✓ Conduct short-term focused studies rather than long-term monitoring efforts.
- ✓ Focus monitoring on water bodies within the jurisdiction of the muncipality, leaving the monitoring of larger regional receiving waters (such as the Bay) to the regional programs.

Urban runoff problems can be identifed through visual monitoring

The municipality or agency responsible for coordination of monitoring should indicate what the minimum parameters for the program will be. Even though some of the basic parameters (e.g., dissolved oxygen, pH, temperature) do not measure a pollutant directly, they are potentially impacted by a wide range of pollutants from a variety of sources. Monitoring of these basic parameters may be included in a program as a broad screen to indicate other sources of impacts.

Each program should develop a list of physical, chemical, and biological parameters to address important questions, and appropriate tests/analyses that are effective and within the capabilities of the groups conducting them. Appendix 5A summarizes the parameters and tests that are applicable and appropriate. Procedures

should be chosen from an appropriate set of standard methods (e.g., APHA 1994; Rigney et al. 1996; SFEI 1997; EPA 1993) that will result in data of a quality acceptable to municipal, county, and state agencies. The list should include assessments of the accuracy, detection limits, and utility of the methods so the appropriate one is chosen for a given problem. For example, a nitrate method that has a lower detection limit of 5 mg/L for nitrate-nitrogen may by acceptable for assessing potability, but is not sensitive enough to address potential eutrophication in surface waters. Depending on the data's intended use, different levels of precision may be required. For monitoring programs intended as a screening level assessment of gross water quality, or for educational purposes, accuracy and precision may not be as critical as for characterization studies that may need to describe these physical and chemical features on a fine scale.

Sampling for water quality monitoring will require training of staff

Each monitoring program should adopt a quality assurance project plan to assure the quality of data from collection through analysis and reporting (EPA 1993, 1994a,b). The intent of any plan should be to make the data acceptable to as wide an audience as possible, but particularly to regulatory agencies that may need to respond to the problems the data suggest, or to accept the view that water quality is being protected and maintained. The plan should be the basis of the type of information/data collected, the precision of measurements required to meet the goals of the program, the methods used to obtain the information, and a discussion of the appropriate use of the data, with stated intentions for analysis and interpretation methods. Quality control methods (e.g., duplicate samples, spiked samples, analysis of standards) and how frequently they are included in the sampling regime should be defined.

This plan should also include descriptions of methods to be used (standard operating procedures) for sampling, analysis and transfer. It should include a copy of standardized forms, including:

- ✓ Station log forms that include all aspects of the field sampling effort, dates, times, sample identification numbers (if appropriate), names of field crew members, and signatures of field crew leaders
- ✓ A "chain of custody" for samples that are transferred from one individual or laboratory to another between collection and analysis

Aside from forming the "blueprint" for all monitoring activities, quality assurance project plans are required by many agencies that may be sources of funding for the program.

As stated above, data should only be collected for specific purposes and the intended methods of analysis and interpretation should be planned ahead of time. The means of reporting the results of the monitoring program and the intended audiences should be planned before the program begins. Collecting data simply to say that monitoring is being done is pointless. Ideally, a schedule for producing reports should be part of the overall plan.

Select and Apply Environmental Indicators in Lieu of Water Chemistry Monitoring Alone

The monitoring community generally recognizes that traditional compliance-type chemical monitoring developed for continuous point source discharges under NPDES permits is not effective for transient discharges typical of nonpoint sources. In response to this concern, EPA has developed the concept of environmental indicators that rely on a variety of methods to assess the environmental consequences of nonpoint source discharges. These indicators include water quality indicators, physical and hydrologic indicators, biological indicators, social indicators, programmatic indicators, and site indicators. The Center for Watershed Protection (1996) has provided guidance in selecting appropriate indicators for monitoring based on local conditions. The overall concept relies on a program selecting a set of integrated indicators that provide more insight than with only one monitoring tool. A number of these indicators use observational information and other easily obtainable data that can be collected through citizen volunteer programs.

How to Begin a Volunteer Monitoring Program

Should you decide to conduct monitoring by involving volunteers from your municipality, several basic steps should be followed in developing a volunteer monitoring program:

- ✓ Meet with city public works officials who can tell you what information is needed that might be within the capabilities of a volunteer monitoring program and fall within the city budget constraints.
- ✓ Map out the problem areas that could be safely monitored by a citizen volunteer force.
- ✓ Contact local nonprofit organizations, colleges, or watershed groups in your area who are involved with monitoring. Decide on a volunteer program that works for your region.
- ✓ Recruit volunteers through press releases to local papers and radio stations, and distribute flyers through nonprofit organizations, community centers, city information counters, and public meetings.

The benefits of a citizen-based monitoring program are illustrated in a program developed for the City of Monterey. An Urban Watch monitoring program was implemented for dry-weather period (July-October) sampling. In addition to generating data for the City, it helped build community involvement and interest. The City purchased a dry-weather *Urban Watch Kit* (approximate cost $350) to moni-

tor possible contaminants coming from storm drain outfalls. The kit is sold through NAPCO chemical company (phone 800-929-5976) and includes all the parameters required in EPA's NPDES permit regulations for dry-weather storm drain monitoring (chlorine, copper, detergents, phenols, pH, turbidity, and color), plus a thermometer and a test for ammonia-nitrogen.

A local nonprofit organization, the Coastal Watershed Council from Santa Cruz, was contracted to train the volunteers on how to properly use the monitoring kit and tabulate the data for the city. Monterey Bay National Marine Sanctuary was used for media recruitment notices and to coordinate with local nonprofit organizations to enlist volunteer assistance. Volunteers were divided into teams and given a monitoring schedule with dates and times (to coordinate with low-tide schedule).

Volunteers were able to detect consistent detergent runoff from a storm drain outfall bordered by a large restaurant community. Agencies and volunteers were able to trace the pollutant source by walking up the street and peering through grates and following the detergent plume to a restaurant where it appeared that the kitchen mats were being washed off and runoff allowed to enter storm water catch basins. This exercise led to another outreach technique — training volunteers to educate restaurant staff about proper techniques to prevent urban runoff. Posters in English and Spanish were distributed to restaurant staff, explaining how clean water is not only a health concern but also an economic one. A collaborative approach between cities and other local groups, linking monitoring to outreach and project prioritization can be an effective environmental protection tool.

Monitoring programs can also be piggybacked on existing events, such as National Coastal Clean Up Day, which takes place every September. This nationwide cleanup concentrates on collecting and tabulating amounts and types of trash from beaches, lakes, and rivers. Volunteers could collect trash from storm drains and tabulate this data to be included with cleanup day.

The regulatory and scientific community has some concerns about using volunteer groups to collect water quality data. Some of these concerns relate to field kits that have subjective measurements and may vary depending on the sampler, the commitment of the volunteers to work for the entire season to obtain consistent results; and lack of precision and accuracy. Many of these problems can be overcome by properly training volunteers. Reference materials have been developed by EPA and SWRCB to guide volunteer groups to ensure that they use appropriate methods and quality control/assurance measures. Bear in mind the type of information volunteers can provide at a useful level of quality can be limited, and that monitoring by your municipal staff or a regional monitoring program is likely to be necessary. At the same time, volunteer monitoring has enormous benefits beyond just data gathering, including public involvement and support, and eventual ownership of the program.

5.3 Program Updating

The Feedback Loop

Thus far, this section of the MURP guide has described methods to be used to evaluate your own URP through performance standards, water quality monitoring, and other indicators and effectiveness measures. Assuming that you have gone through this evaluation exercise, developed an annual report and submitted it to decision makers, the question before you now is, "so what?" If this report simply takes its place among other dusty documents on the shelf, then you may have satisfied reporting requirements, but what have you really *gained*?

For your evaluation to have meaning, you need to *use* this knowledge to modify your URP as necessary to address the new opportunities, new problems, and new information accumulated since your URP's initial development. You have learned important lessons and your priorities may be shifting and expanding — or even contracting. In essence, you are now ready to begin the process anew. That is not to say that you will now need to re-craft a "new" URP, rather that you need to take a step back and revisit the iterative development process that is the URP conceptual framework. You now "know" more about your municipality's particular urban runoff issues and this information can be used to prove and disprove initial assumptions, programmatic and BMP choices, implementation strategies, etc. Welcome to the feedback loop.

A review of NPDES Phase I municipalities shows that some programs adopted an annual workplan approach to program implementation. At the time they submitted the annual report for the previous year, they also submitted a workplan for the next fiscal year indicating therein the programs they would continue with unchanged, the programs they would suspend, and the new programs they would launch. These municipalities incorporated changes in their programs each year. Other Phase I municipalities chose to conduct an evaluation in the third and fourth years of their permits when they had had some time to establish and run their URPs, and were able to see the problems and shortcomings more clearly.

Regardless of when you do it, as you become more familiar with your municipality's unique urban runoff problems and as your control programs are developed and implemented, you are likely to make several changes. Changing does not mean that you need to prepare a new URP, you merely need to revise it by removing those control programs or BMPs that don't work or are not appropriate or necessary in your municipality, or by adding other new programs. In some instances, the changes may be limited to a change in the frequency at which inspections are conducted for a particular control program such as the illicit connections program or the geographic area of focus (i.e., increased frequency of street sweeping in

certain problem areas in your municipality). In some instances that change could be a reduced emphasis on a certain BMP or an increased emphasis on another BMP.

Points to Note

Remember to institutionalize program update.

Initial program development of any kind is typically a very involved, time and resource-consuming process that has a clearly defined end (i.e., the finished 'program'). Program update, on the other hand, is oftentimes viewed as an afterthought. Once a program is developed, the collective sigh of relief can give way to the rote predictability of long-term implementation where update is perceived as an infrequent undertaking. For your URP, you need to be sure that program update is an institutionalized portion of your program. By that we mean that not only should a portion of the yearly evaluative report be given over to potential URP modifications, but also that staff must be assigned to utilize the new information to reprioritize program components and strategies as necessary. Just as your URP required an initial investment in program development (e.g., your municipal assessment), it also requires an ongoing investment in program development.

Remember to keep up with changing regulatory requirements.

While this MURP guide has been designed to achieve regulatory compliance with NPDES Phase II and consistency with CZARA 6217 as of the date of its printing, these programs are more than likely to change over time. For example, while NPDES Phase II does not currently require water quality monitoring, future compliance may depend upon yet to be determined monitoring standards. To ensure that your program continues to comply with all water quality requirements, program update must include an analysis of the current federal, state, and local regulatory framework.

Remember to reach out to the watershed and/or region.

If your initial URP was specific only to your own jurisdictional borders, you have an opportunity now to expand the program regionally to encompass watershed and/or regional concerns. This process can be viewed as a spiral of expanding coverage and achievement. Remember, watersheds provide the fundamental resource unit for managing polluted runoff since runoff within a watershed flows to a common outlet. It may be that the specific shortcomings that you have identified in evaluating your URP are actually due to activities outside of your jurisdictional boundaries. Now that you have successfully implemented a program to address polluted runoff within your own jurisdiction (you have put your own house in

order, so to speak), you can help neighboring jurisdictions to achieve similar results. You may choose to pursue a regional URP, expanding your own to encompass the watershed or other regional boundary, or you may choose to help your neighbors institute their own URPs. Either way, you are seen as a regional leader in addressing urban runoff at the same time as reaping the direct benefits of reduced pollutant loading within the watershed, but outside of your own URPs current enforcement boundaries.

Remember the main goal of your URP.

The purpose of your URP is to improve water quality within your community. If your program evaluation indicates improvement is not happening, then program update is all the more critical. As you have seen through the course of this MURP guide, a myriad of proven methods, with innumerable implementation options, exist. If your focused URP elements do not seem to be working, by all means change the URP. It may take subtle tweaking, or it may take full scale revisions, but regardless, you need to make the changes.

Sources of Additional Information

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