

Funding Phase II Storm Water Programs

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Abstract

Most Phase II cities are now in the midst of looking at how to fund their stormwater Phase II programs. The cost of Phase II is widely variable but expected to be in the range of \$3.75 to \$6.00 per citizen per year when the program is fully formed. Not all of those costs are new line items in a local budget. This paper explores an approach for funding that combines a variety of methods or sources available to most local governments – many of them not requiring new funds at all but using human resources instead. A hierarchy of methods is established and a cost effectiveness method of program development defined.

Introduction

NPDES Phase II programs are in the final stages of planning. Assuming you have the authority and organizational issues worked out (a BIG assumption), at about this point in the process Municipal Separate Storm Sewer system owners and operators are asking the difficult question: “so how do we pay for the six minimum controls?” Perhaps a better question is, “how can I best define a program that I can pay for?” Under Phase I many communities defined a program, often in a vacuum, and then attempted to find ways to fund it. Under Phase II the majority of the efforts under the six minimum controls required are highly integrated with current stormwater program efforts. Thus, it makes sense to formulate a stormwater program by working from both ends toward the middle – funding or resource sources and program requirements.

Phase II Costs

There have been several attempts to estimate the probable costs of the NPDES Phase II stormwater program. EPA’s overall annual estimate for all permittees is nearly one billion dollars. Most individual MS4 estimates are expressed in terms of cost per person per year, though the actual costs do not always lend themselves very well to this yard stick. EPA itself, based on very scattered data and surveys, established their cost estimate as \$1,525 per permittee + \$3.50 per person which, plotted, looks like Figure 1.

Reese, et al, (2000) provide cost estimates for model stormwater Phase II programs for a small town and a city of 50,000 in

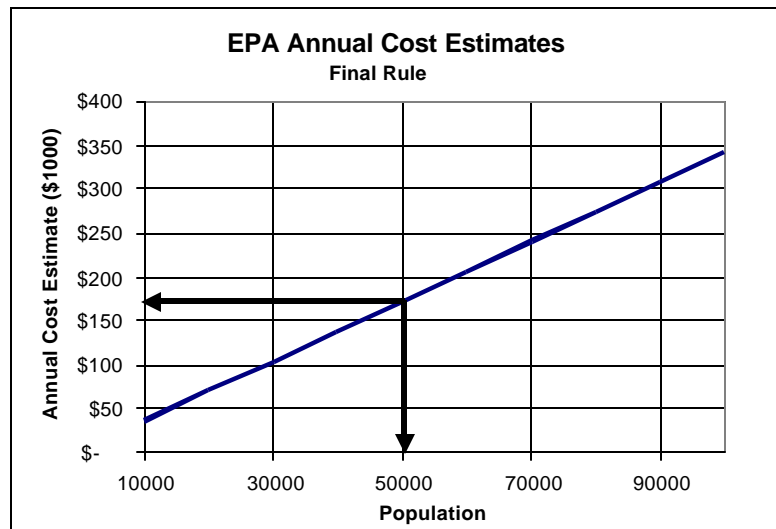


Figure 1. EPA Cost Estimates for Phase II Program Implementation

population. However, as they point out, there are great variations in the potential costs of any stormwater Phase II program due to such things as:

- Character of the MS4
- Climate and geology
- Preferences of the permit writer and specific requirements of the state
- Maturity of current stormwater program
- Character of stream quality and need for improvement
- Ability to share costs with others

Based on that analysis and subsequent work by the Denver Urban Drainage and Flood Control District (personal communication) a range of cost (on a per person per year basis for a fully developed Phase II program) was established between about \$1.50 and \$8.00 in today’s dollars for a very minimal and fairly well developed stormwater program for a city of 50,000 (Reese, et al, 2000). This range is not very helpful in actually estimating Phase II program costs other than to point out and illustrate the great variability and flexibility in the program.

Another way to arrive at the potential cost is to recognize that most MS4s that have already implemented a fairly advanced stormwater quality program spend about 15 to 25 percent of their total stormwater dollars on stormwater quality aspects – a subset of which is Phase II compliance. Figure 2 shows typical stormwater program costs for a range of stormwater program maturities on a per developed acre per year basis. This is based on the author’s firm’s experience in over 100 cities and counties.

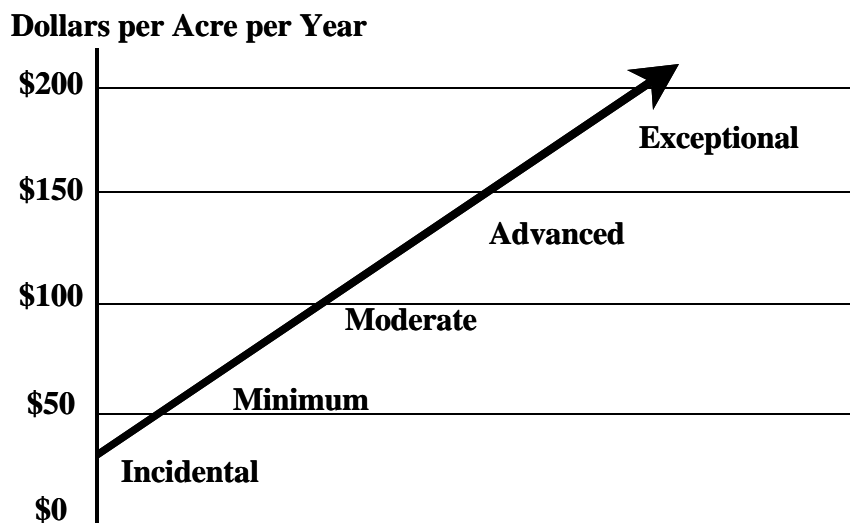


Figure 2. Average Annual Per Developed Acre Stormwater Program Costs

Assuming typical numbers of about three persons per acre (2000 per square mile), and that stormwater quality compliance aspects make up roughly 15 percent of the program then for a moderate program the cost of the stormwater quality program is in the range of \$3.75 to \$6 per person per year.

However it needs to be stated that not all of these costs are monetary, and not all of them are new costs. These numbers simply reflect a level of effort necessary to implement the permit, not a budgetary line item in some City's comprehensive annual financial report. As we will see below, that effort can be realized in many ways, not all of them fully budgetary.

The MEP Standard and Cost

The NPDES regulatory compliance program for stormwater is based on the dual standard of "prohibition" and "maximum extent practicable (MEP)." Prohibition means keeping non-stormwater from the stormwater system. MEP means addressing and mitigating all the ways pollutants get into the system including dirty stormwater, and doing so to one's maximum ability.

MEP consists of the mix of Best Management Practices (BMPs) and measurable goals that will attain reduction of pollution to attain water quality standards. This is described in 40 CFR 68754, Dec. 8th, 1999, as follows (*italics mine*):

The pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each permittee will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process. EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards. If, after implementing the six minimum control measures there is still water quality impairment associated with discharges from the MS4, after successive permit terms the permittee will need to expand or better tailor its BMPs within the scope of the six minimum control measures for each subsequent permit. EPA envisions that this process may take two to three permit terms.

MEP really depends on the consideration of several things as illustrated in Figure 3:

- Do I have, or can I obtain, the legal authority to carry out the program I am describing?
- Is my technical approach sound in that it is a "proven" approach, structural or non-structural that addresses pollutants of concern in an effective manner?
- Are my defined procedures, policies, staff resources and equipment appropriate for the level and type of program described?
- Do I have, or can I obtain, dedicated and sufficient funding to support the program I am describing?

Currently there are no specific numeric criteria for stormwater discharges (unless established under a TMDL or court induced program), and there will not be until 2013. MEP is considered a flexible, narrative, technology-based standard. If you do what you say you are going to do you are, by definition, in compliance – regardless of the actual water quality. Monitoring may be required in the second round for a percentage of MS4's to prove that water bodies are attaining water quality standards. If not...the requirements will be tightened. Remember that the congressionally mandated goal is to meet water quality standards (as they are currently defined or may change as newer wet weather approaches are developed),

Maximum Extent Practicable				
	LEGAL	TECHNICAL	ADMINISTRATIVE	FINANCIAL
Public Education				
Public Involvement	✓	✓	✓	✓
Illicit Connection				
Construction	✓		✓	✓
Post-Construction		✓		
Pollution Prevention	✓			

Figure 3. Definition of Maximum Extent Practicable

and EPA plans to negotiate a change in the definition of MEP for you on the basis of existing or collected monitoring information in each successive permit period.

Language throughout the preamble to the permit language and in the congressional record describing MEP definitions also contains the term “cost effective” when it describes BMP programs. This term “cost effective” has not been defined either but can serve as a critical basis when selecting among BMP options, the level of the stormwater quality program, and funding needs.

The fact that cost should and can be considered when developing an MEP program is incontrovertible – to what extent, that is a source of controversy and must be balanced with other considerations. Consider:

- President Clinton’s Clean Water Initiative (USEPA, 1994) addressed a number of issues associated with NPDES requirements for storm water discharges and proposed establishing a phased compliance with a water quality standards approach for discharges from municipal separate storm sewer systems with priority on controlling discharges from municipal growth and development areas and clarifying that the maximum extent practicable standard should be applied in a site-specific, flexible manner, taking into account cost considerations as well as water quality effects.
- EPA has stated (see footnote 1) that MS4s need the flexibility to optimize reductions in storm water pollutants on location-by-location basis. EPA envisions that this evaluative process will consider such factors as conditions of receiving waters, specific local concerns, and other aspects included in comprehensive watershed plan. Other factors may include MS4 size, climate, implementation schedules, current ability to finance the program, beneficial uses of receiving water, hydrology, geology, and capacity to perform operation and maintenance.

- In California the State Water Quality Board provided the following explanation of MEP¹: "There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis."

Funding Sources

The objective of a local stormwater manager in setting up his or her Phase II program is to find a program that attempts to meet the long-term objective of the Clean Water Act while being affordable – knowing there is both an ability to consider cost (and funding) in developing the program and a mandate to not let cost rule the final outcome.

Much has been written about the program side of the equation – focusing first on the worst problems and on those problems that are important to the local community and then filling in the rest of the six minimum controls. Lets focus on the funding side of the equation.

There are many ways to help resource the NPDES program that cost little – but it will take some imagination. As local communities look at the potential program needs they have a variety of ways to resource the program. These ways fall naturally into a hierarchy of ease of resource acquisition or use. A local community should systematically look to the following resource sources prior to looking to the general fund and the other usual culprits. In this discussion I will assume that there is currently little or no actual stormwater quality work being done in the community.

1. Modify local programs The first step in the resourcing analysis is to look at the current local program and see what is being done that looks and smells like Stormwater Phase II. Based on looking at several stormwater programs we have found that, perhaps, 25 percent of a typical Phase II program is already being done to some extent by current staff, or similar things are being done. With suitable adjustment and refocus some responsibilities can be covered by current staff as part of, or a redefinition of, their current duties. In some cases it will take little effort to redefine or describe current practices. Table 1 contains a set of potential areas to look for each of the six minimum controls.

2. Share costs with neighbors or region/state-wide Much of what can be done can be done more cheaply sharing the cost. After determining what you can already do in-house, or offer to others, the next step is to see what others can offer to you. Phase I saw large numbers of group permits issued causing regional approaches to spring up. There are various types of relationships that can be formed for sharing. In one set of cities each agreed share costs for a minimal program and go independently for a more advanced program. Costs can be shared for all activities that each community has to do in a similar fashion. This includes a whole host of things for each of the minimum controls including things like models, joints and bulks:

¹ California State Water Quality Board Order WQ 2000-11, page 19.

- “Models” – model brochures, ordinances, bill stuffers, checklists, instruction manuals, white papers, curriculum, etc.
- “Joints” – joint design criteria, videos, billboards, procedure manuals, brochures, web sites, advertising, etc.
- “Bulks” – Bulk orders for printing, stencils, placards, other PR materials, manual printing, etc.

Table 1. Some Potential Existing Stormwater Program Modification Areas

<p>1. Public Education</p> <ul style="list-style-type: none"> • Inserts in other bills • Speakers bureau • PAO staff person • Brochure printing and distribution capability and channels • Public access TV • Web site • Watershed signage • Library 	<p>3. Illicit Connections</p> <ul style="list-style-type: none"> • GIS coverage • SARA Title III program • Pretreatment program • Land use mapping • System inventory • Mayor’s complaint hotline • Water and wastewater monitoring program • Camera and smoke testing capability in water and wastewater • Household hazardous waste collection day • Recycling programs • Field personnel • Used oil programs • Web site 	<p>5. Post Construction BMPs</p> <ul style="list-style-type: none"> • Current zoning, stormwater and subdivision ordinances • Current design criteria manual • Open space and related ordinances • Current overlay districts • Master plans • Floodplain program
<p>2. Public Involvement</p> <ul style="list-style-type: none"> • Citizen advisory group or panel • Festivals • Scout troops • Internships • Non-profit groups • Clubs • Web site • Storm drain labeling programs • Stream walks 	<p>4. Construction BMPs</p> <ul style="list-style-type: none"> • Current ordinance and development process • Site inspections • Other building inspectors (e.g. electrical, plumbing) • Mayor’s complaint line • Web site • Bonding program • Plan review checklists 	<p>6. Municipal Housekeeping</p> <ul style="list-style-type: none"> • Street, storm drain and other maintenance programs • Current employee training programs • Current materials handling programs • Current flood control specifications and in-place structures • Recycling program • Adopt a highway programs • Neighborhood and non-profit groups • Street sweeping program • Waste disposal program

3. Get free information on the web The Internet has hundreds of sites giving examples of BMPs, manuals, ordinances, documents, guidance, pamphlets, etc. Literally almost every written document that might be necessary has been developed somewhere and is available free of charge. The experience of other Phase I cities is especially helpful for Phase II cities. Fort Worth (<http://ci.fort-worth.tx.us/dem/sitemap.htm>) especially has a helpful web site with multiple links to other sites. The Center for Watershed Protection

(<http://www.cwp.org/>) offers a multitude of helpful documents and links and their stormwater center (<http://www.stormwatercenter.net/>) has hundreds of references and assistance tools. Other useful sites include <http://www.mtas.utk.edu/bmptoolkit.htm> , <http://www.dfstormwater.com>, which have links sorted by each of the six minimum controls. EPA's website (best found from a search as it changes quite often) offers significant Phase II guidance as well as information on many related programs.

4. *Partner with non-profits* There are hundreds of non-profit organizations created to accomplish various environmentally related functions. Often these groups will adopt a watershed, provide workers, perform monitoring, do public education and involvement campaigns (they are a public involvement campaign), and find sources of money not available to local governments (501(c)(3) grants to non profits). Some local communities actually assist them in finding and applying for grants. They also are less willing to file a lawsuit against a local government when they are partners with it. Areas to investigate beyond the obvious watershed type grants include Greenspace, parks, quality of life, sustainable development, education, etc. Sites include: <http://www.adopt-a-watershed.org/>, <http://www.cwn.org>, <http://www.iwla.org>, <http://ctic.purdue.edu>, <http://www.nrdc.org/nrdc/>, <http://www.tnc.org>, <http://www.waterkeeper.org>, <http://www.rivernetnetwork.org/> (provides a complete listing of other organizations as well as a funding source catalog).

5. *Federal, regional and state consulting programs* Various Federal programs provide consulting either gratis or cost share.

- For example, TVA supplies Stream Teams to any local community willing to pursue a watershed protection program (http://www.tva.gov/river/landandshore/landuse_contacts.htm).
- The National Park Service provides a Rivers, Trails and Conservation Assistance Program that provides meeting facilitators and planning assistance for river corridor development (<http://www.nrc.nps.gov/programs/rtca/index.html>).
- Several Phase II communities received significant assistance from the Corps of Engineers in their Phase II permit application and parts of their implementation.
- The USGS cooperative program will provide monitoring and data analysis (<http://water.usgs.gov/coop/>).
- In many cases a regional flood control authority, planning agency, or a state league of counties or municipalities is more than willing to step in and serve as an integrator programs.
- Pseudo state/university programs often provide consulting free or at greatly reduced rates or can use other Federal grant monies to provide consulting or product services. For example, in several states a university, through a 319 grant, developed a statewide BMP manual to serve all communities in the state. The Ohio Department of Natural Resources "Rainwater and Land Development Manual" is an excellent BMP source in Ohio.
- Sometimes state programs can serve to partially fulfill one, or more, of the minimum controls. For example in several states an erosion control or channel protection and permitting program operated by the state is being relied on for part of the construction minimum control.

6. *Federal, State and regional grants* States and federal agencies administer or provide grant monies for local governments to pursue environmental projects:

- State administered programs such as Section 319 (recent congressional action extending the ability to use 319 money for Phase II for one year, after that some agencies allow "horse

trading”), 604(b), 104(b)(3), HUD block grants (<http://www.hud.gov/progdesc/cdbgent.cfm>), Coastal Zone (<http://www.epa.gov/owow/watershed/wacademy/fund/coastzone.html>), Well head protection, FEMA (http://www.fema.gov/regions/iv/2000/r4_06.shtm), etc. provide funds for various programs.

- Much of this information can be gleaned from Federal web sites including <http://www.epa.gov/efinpage/fundings.htm> (the environmental finance program), <http://www.epa.gov/OWOW/watershed/wacademy/fund.html> (watershed Academy funding site), and EPA regional sites.
- The TEA water quality mitigation retrofit demonstration projects also can be used along with other TEA-21 mandatory set asides (<http://www.fhwa.dot.gov/tea21/>).
- Several states have grants set aside for environmental education projects through schools.
- Greenspace programs abound at both the Federal, state and private grant areas and could be explored as part of a Low Impact Development or Smart Growth approach .

While some of these programs are not, per se, to be used for compliance activities many Phase I cities and regulators have been cagey about how to bend rules and waive requirements in order to secure funding for key projects and programs.

7. *Special fees for service* Another source of funding is to charge special fees for added services including inspection fees for BMPs, additional construction program related fees, plans review fees, etc. These fees can be scaled to cover part of or a whole program area. Some communities have instituted a simple “environmental” surcharge on a water bill as a special assessment. There are really four basic ways local governments get money: taxes, service charges, exactions and assessments. Each of these basic ways have rules that vary somewhat state to state, so it is important to know what you are getting into. I recently visited a city that had 108 different fees and charges based on specific services offered – not sure if that was a good thing !

8. *Private resources* Having your corporate name associated with a clean environment is still considered a good thing. This leads naturally to looking to private resources to fund public environmental projects. This can take the form of corporate grants, corporate involvement in adopt a stream programs, and other visible volunteer-based activities:

- Several communities have benefited from industry providing bags, gloves, vests, hats, key chains, pens, trinkets, coffee cups, new cars... well ok not new cars.
- Others sponsor stream clean ups, partner in restoration projects, construct greenways, etc.
- Another innovative approach is to allow them to put their logos on such things as storm drain plaques or banners. A firm called adopt-a-storm-drain specializes in this approach... perhaps among others (<http://www.adoptastormdrain.com/>).

9. *Stormwater Utility* The surest and best way to fund stormwater, if you don’t have lots of gambling loot that is, is through a user fee system based on demand on the stormwater infrastructure. If it looks like water and wastewater it should be funded like those other two public utilities. There is lots of information about how to set a stormwater utility up, some of it has even been developed by persons have set up a large number of them. Here are a few good sources: <http://www.florida-stormwater.org/manual.html>, http://www.forester.net/sw_0011_utility.html, <http://stormwaterfinance.urbancenter.iupui.edu/>. With the demands of Phase II coming there might just be sufficient planetary alignment to attempt it for even the

most reluctant Public Works director. I would not blame EPA for the utility, but it certainly can be the straw that breaks the camels back, amidst the other pressing stormwater program needs. It IS an unfunded Federal mandate after all. Again a word of caution. Do it right. Your opportunity cost of failure due to cutting corners on public education and consensus building is five to seven years of stormwater revenue – maybe millions. The cost to do it right versus cutting corners is less than two months revenue. Do the math.

10. Partner with local organizations/agencies Many local/county organizations may be already implementing programs that fall right in line with the Phase II requirements. For example, educational school programs, teacher monitoring workshops, watershed festivals, storm drain labeling and stream walk/community clean-up events, and watershed signage programs are often taken on by county Soil & Water Conservation Districts (SWCDs). Additionally, construction site plan reviews, inspections, and enforcement procedures are carried out by SWCD offices. Other organizations such as a Public Works Departments or Engineers may have the storm sewer systems and detention areas within the county mapped out. The Health Department may have a map of the septic system locations, thereby making it easier to determine where illicit discharges may be located.

Defining a Program that Can Be Paid For

Environmental Cost Effectiveness is a term that has evolved over the years principally through the Federal government's attempt to quantify habitat or ecological benefits of potential projects (COE, 1994). Traditional benefit-cost analysis is, of course, not possible because costs and benefits are expressed in different units. Costs are expressed in terms of: dollars, volunteer man hours, level of effort ("hassle factor"), resources consumed, etc. Benefits are expressed in a wide variety of metrics in stormwater management including such "measurable goals" as: contact hours, pounds of pollutant removed, stream miles removed from the 303(d) list, increase in some biotic integrity or bio-assessment measure, bank-miles restored, "habitat units" restored or protected, delivered information pieces, constructed BMPs, specific actions taken, etc. Recreational activities such as fishing, boating, biking, etc. can have an associated dollar value.

Because it is difficult to evaluate cost effectiveness in absolute terms, most cost effectiveness analyses seek to determine effective programs relative to other potential options. The goal is not to lead to perfect environmental or economic solutions, but to elevate the decision process above the often emotional cost oblivious arguments. Steps in a typical cost effectiveness analysis modified to fit a Phase II program might include (see figure 4):

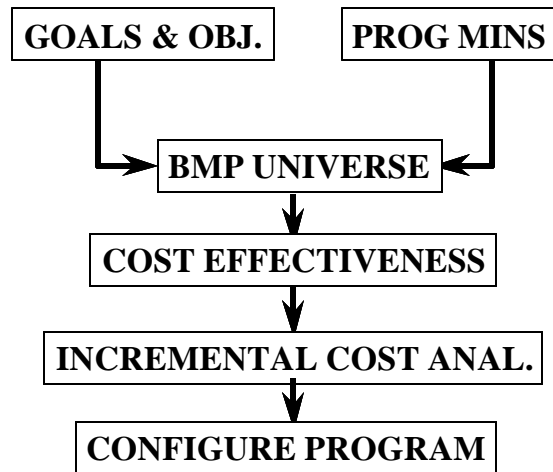


Figure 4. Cost Effectiveness Analysis for Phase II

1. Establish Value. Define the goals and objectives of the overall program focusing on solving apparent water quality problems or protecting key assets or resources, while keeping in mind the need to have a program under each of the six minimums. Identify key streams or other water bodies, ecological systems, habitat areas, and key pollutants of concern. Discuss MS4 values and the environmental characteristic of the community. Seek to define, in some way, what the community wants to achieve – besides compliance at minimum cost. Then insure that you have defined a complete set of goals for all of the minimum controls – even those where you would not normally chose to focus. Your eventual cost effectiveness consideration will be a bit different for those goals and objectives that are “essential” and those that are more “fillers” to round out the program.
2. Define the Universe of Possible Solutions. Brainstorm and screen individual and combinations of BMP programs (both structural and non-structural) including cost or resource estimates, potential type and availability of funding sources, fit with local program, ability to impact the goals and objectives, level of expected impact and benefit, mutual exclusivity. Focus first on the “real” goals and objectives and secondly on meeting each of the six minimum controls. The end product is a set of feasible BMP or combinations.
3. Perform Basic Cost Effective Analysis. Seek to eliminate inefficient and ineffective (economically irrational) solutions. Often a certain level of environmental benefit, or program level can be obtained in several different ways.
 - Efficiency is determined by selecting the BMP programs that can produce a given level of environmental benefit or output at the lowest resource expenditure combination. This analysis would be most appropriate for this minimum control areas that are not seen as key to the overall thrust of the local program.

- Effectiveness is determined by determining the highest level of environmental benefit or output at the lowest cost. This analysis would be most appropriate for those areas of the program identified in step one that are key to the overall surface water health of the community – the “compelling case”.

For example there are several potentially viable options for stream clean up: (1) hiring students during the summer, (2) using non-profit watershed groups, (3) hiring full-time staff, (4) working through scouting agencies, (5) working through neighborhood groups, (6) using local businesses in a way similar to adopt-a-highway. Student hires for stream trash removal may be more cost effective than full-time staff. However, with a higher initial cost and effort, it might be possible to set up self funded and largely self managed “adopt-a-stream” groups as 501(c)(3) non profit groups who will be self sustaining, increase public involvement and education, and provide other ancillary benefits. This option may then be seen as the most cost effective of the options when considering the long term program and the character of the community.

4. Perform Incremental Cost Analysis The Attempt is to optimize cost effective solutions. The goal is to answer the question: “is the increment in environmental benefit worth the increment in cost?” For each cost effective BMP a range of effort and cost may be defined and, if possible a range of environmental outputs in response to that effort input range. That is, if we increase the level of effort for a particular BMP program will the range of environmental benefit also increase – and how?

For example, there will be diminishing returns in public education programs as saturation is reached. Each incremental brochure, billboard, or other means will not yield as high a return – though sometimes only intuition and experience will often define those points, or that curve.

Or using the example from step three, it might be found that student summer hires are the most cost effective way to achieve stream clean up. This step then looks at this options and seeks to find ways to maximize the effectiveness of that particular solution. It might be that providing a certain level of resources, finding private grant money, forming a student organization, etc. will provide maximized returns for this option.

5. Configure the Program. Blend the various BMPs into a cohesive program, seeking synergy and practicality. Insure the program is at a level that is both acceptable to the permit writer and doable within the legal, social, financial, political, technical and physical constraints within the community. Lay out a program and funding strategy, leaving “outs” if anticipated funding sources do not emerge. Develop processes to manage the program and attain measurable goals.

References

Reese, A.J., E. Treadway and D. Noel, 2000. Estimating Costs for the Phase II Stormwater Management Program, Water Environment and Technology, Water Environment Federation, April 2000, pp. 33-39.

US Army Corps of Engineers, 1994. Cost Effectiveness Analysis for Environmental Planning: Nine Easy Steps, IWR Rpt. 94-PS-2, Inst. For Water Resources, 7701 Telegraph Rd., Alexandria, VA, 22315.

U.S. Environmental Protection Agency, Office of Water. 1994. *President Clinton's Clean Water Initiative*. Washington, D.C. EPA 800-R-94-001.