

A Report Card on Urban Erosion and Sedimentation Control in North Carolina

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In 1973 North Carolina enacted what has become one of the most stringent erosion and sedimentation control programs in the nation. This article discusses how a survey of 128 construction sites in North Carolina turned up evidence that practice falls short of state goals to curb urban erosion and sedimentation. The authors then discuss policy options to remedy these shortcomings.

Construction activity in urban areas can increase the amount of soil--up to 500 tons for every acre laid bare--that washes from building sites into nearby rivers, streams and lakes. When erosion and sedimentation go unchecked, a variety of harmful and costly effects result. Aquatic habitat is destroyed, decreasing aesthetic values and fish production. Streams accumulate dirt, losing their capacity to store flood waters and increasing the frequency and severity of flooding. Reservoirs silt up and lose their capacity to store drinking water, requiring additional expenditures for replacement supplies. Channels become clogged, requiring more frequent dredging to maintain navigation. Storm drainage works no longer function as intended, resulting in nuisance flooding and more frequent maintenance. The frequency and severity of those problems have led twenty-one states to formulate programs to control urban erosion and sedimentation.

In 1973 North Carolina enacted what has become one of the most stringent erosion and sedimentation control programs in the nation, matched only by similarly vigorous state programs in Florida, Maryland and Virginia.¹ In this article we provide evidence that in North Carolina practice falls short of state goals to curb urban erosion and sedimentation.

The shortcomings in program practice are the result of slippage at each of four stages. First, a small but significant proportion of urban construction evades the program's regulatory net (that is, grading is begun without attention to erosion and sediment control). Second, erosion and sediment control plans prepared for construction sites sometimes have serious technical deficiencies that limit their potential effectiveness. Third, erosion and sediment control measures specified by those plans frequently are not installed. Fourth, even when measures are installed as specified, they frequently are not maintained adequately.

As a result of those problems, a third or more of urban construction sites release large amounts of sediment to adjacent property and to nearby streams and other water bodies.

The difficulties encountered in North Carolina are serious, but they are not insurmountable. In concluding this article, we suggest a number of options that state and local policy makers can consider to halt, and even reverse, the slippage we identified. Most of those policies stress the importance of establishing a cooperative approach to enforcement that builds commitment in the private sector to the program's goals and private capacity to comply before sanctions must be invoked. We also stress, however, the importance of effective sanctions that can be applied quickly when provisions of the law are ignored. We believe our research findings are relevant to a variety of local and state regulatory programs and have applicability beyond control of urban erosion and sedimentation in North Carolina.

Sources of Data

Data for this article come from a comprehensive evaluation of the North Carolina Erosion and Sedimentation Control Program, commissioned by the N.C. Department of the Environment, Health and Natural Resources.² A number of different approaches to data acquisition were employed.

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We gathered information about erosion and sedimentation control practices and effectiveness in nine locales across the state. The nine locales include three from each of the three physiographic regions of North Carolina--the coastal plain, the piedmont and the mountains. In each region, we selected one county where the state administered the program and one city and one county where local governments administered the program (see map below). After first completing a pilot study in Orange County to develop a field protocol, we collected data in each of the nine locales through structured interviews with supervisors, plan reviewers, and inspectors, through inspection of records and other documents, through technical review of control plans developed for construction projects under the regulations, and from field inspections of those projects.

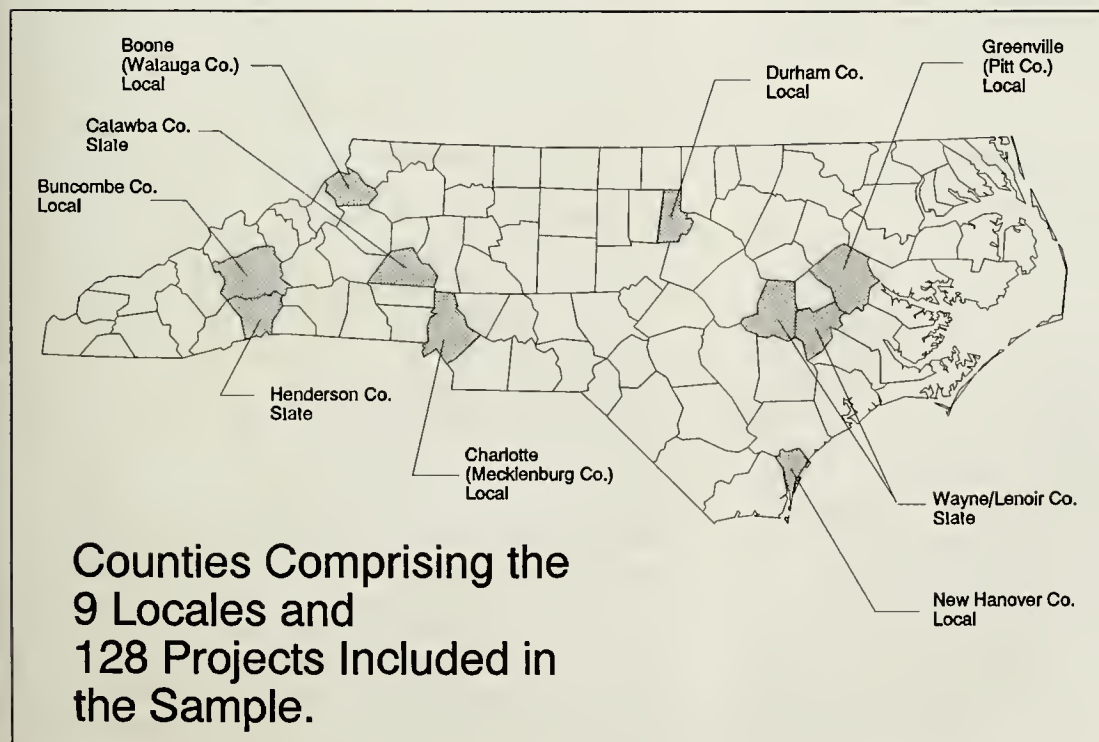
The control plan reviews and field inspections focused on a random sample of 128 construction projects, selected from the active projects of the agencies in the nine locales. This approach provided a representative sample of residential projects and non-residential projects (mostly retail commercial and office developments) in the private sector. (See Table 1 for the number of sites by type of land use in each of the nine locales.) We collected information on each project through technical

Table 1. Number of Construction Sites in Sample for Each of Nine Locales

Locale	Residential		Non-Residential		Total
	State	Local	State	Local	
<i>Coastal Plain</i>					
Wayne/Lenoir Counties (Washington Office)	11		4		15
New Hanover County (locally administered)		5		10	15
Greenville (locally administered)		6		9	15
<i>Piedmont</i>					
Catawba County (Mooresville Office)	5		9		14
Durham County (locally administered)		6		9	15
Charlotte (locally administered)		3		11	14
<i>Mountains</i>					
Henderson County (Asheville Office)	11		4		15
Buncombe County (locally administered)		4		10	14
Boone (locally administered)		5		6	11
<i>Totals</i>					
State Totals	27		17		44
Local Totals		29		55	84
Residential	56		72		
Non-residential					
<i>Grand Total of Construction Sites</i>					128

evaluation of its erosion and sedimentation control plan, on-site observations of erosion and sedimentation control measures as installed and maintained, and observations of off-site sediment pollution. We gathered additional information about the projects from a mail survey of the projects' owners and developers. We received 103 responses, providing data on the developers of 80 percent of the 128 projects.

To provide a broader perspective on the program, we surveyed by mail the administrators of all seven state regional offices and 27 of the 37 cities and counties with local programs. We also conducted a telephone survey of the representatives of various groups interested in the program. The survey of interest group representatives covered 33 organizations, including oversight groups such as the N.C. General Assembly and N.C. Sedimentation Control Commission, professional groups, trade groups, and environmental groups. These structured interviews probed people's opinions about the



strengths and weaknesses of the program and their recommendations for improvement. Finally, we conducted a mail survey to determine North Carolina citizens' willingness to pay for the program. We obtained responses from 319 households surveyed in three metropolitan areas--Buncombe County, representing the mountains; Durham County, representing the piedmont; and New Hanover County, representing the coast and coastal plain.

In combination, the data collected for this evaluation provide the most comprehensive set of information ever assembled about the performance of urban erosion and sedimentation control in any state. These data provide a sound basis in fact and in opinion with which to evaluate the program and to suggest improvements.

**Slippage at Stage One:
Coverage of the Eligible Population**

Slippage at Stage One addresses cases in which builders do not submit erosion and sedimentation control plans or obtain approval of those plans before proceeding with clearing, grading, and construction of projects over one acre in size. About 25 percent of the construction projects regulated by the state and about 10 percent of those regulated by local programs which were in violation of the law were initially detected through surveillance and follow-ups to citizens' complaints. They did not come to the attention of agencies through normal channels. Since neither state agencies nor local governments devoted much time--less than 10 percent of available personnel--to general surveillance to detect land disturbing activities taking place without approved erosion and sedimentation control plans, the data suggest to us that slippage here could be serious, particularly in areas of North Carolina where the program is administered by the state.

**Slippage at Stage Two: Preparation of
Technically Adequate Erosion and
Sedimentation Control Plans**

The erosion and sedimentation control program does not prescribe most of the specific measures developers must employ to prevent erosion and retain sediment within the bounds of their projects. Instead, it relies on performance standards that developers must meet by preparing and implementing unique plans for every construction site. Stage two slippage can occur if those plans, which are approved by state and local regulators, have technical deficiencies. Even if perfectly implemented, they would not prevent sediment from leaving the construction site.

Interviews with plan review staff indicated that serious deficiencies in the quality of plans when first submitted by developers and their engineering consultants are the rule rather than the exception. Even after staff review and the correction of plan deficiencies, we found that approved

plans could still have a variety of shortcomings. The most frequent problems noted on control plans were those allowing drainage areas that exceeded the capacity of control devices, leading to hydraulically overloaded devices, and over-reliance on silt fences. Furthermore, we inspected the performance of the plans in the field and found that 27 percent of the sample projects had lost sediment because plans failed to specify the placement of sediment control devices everywhere they were needed.

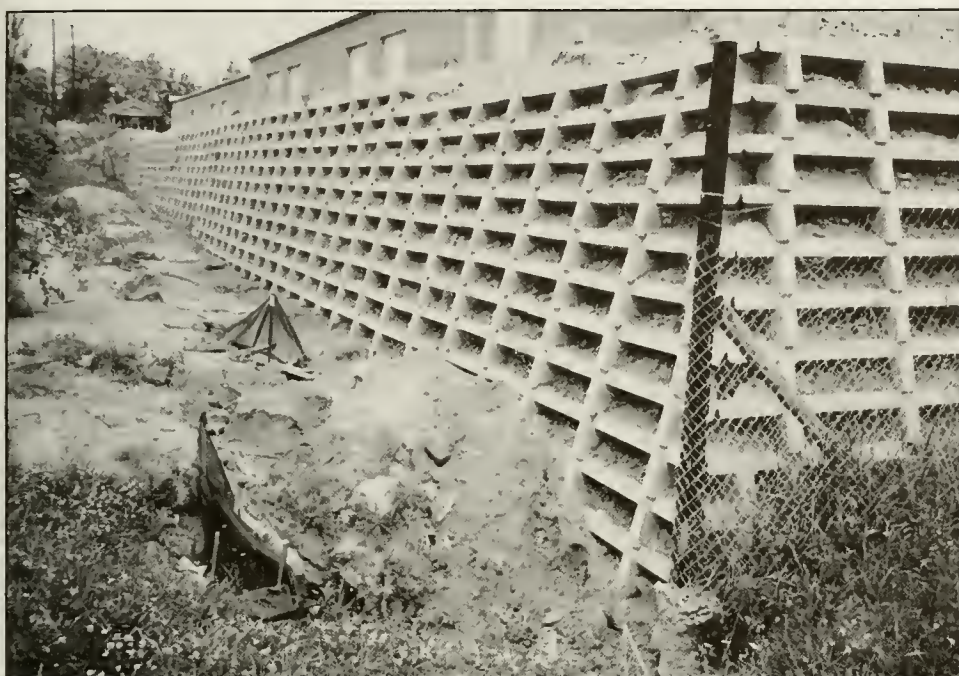
To further evaluate the overall adequacy of control plans, we developed systematic ratings of each of the 128 control plans. The rating scale for the plans ranged from 0 to 100, with a rating of 100 representing a plan which adequately handled all of the sediment generated on site. The meaning of the ratings is as follows:

<u>Rating</u>	<u>Description</u>
100-90	Excellent
90-80	Good
80-70	Satisfactory
70-0	Unsatisfactory

The ratings were calculated by starting with a perfect score of 100 and subtracting points for each time an aspect of sediment control was not adequately handled. Bonus points were given to plans which included exceptional notes to the contractor concerning specific grading problems. The following list indicates the areas of inadequacy and their corresponding additions and deductions.

<u>Area of Inadequacy</u>	<u>Points</u>
<i>Relating to Notes:</i>	
Vagueness: "Silt fence placed where necessary"	-20
No stated order of construction	-10
Lack of clarity of notes	-15
Incomplete or missing details	-15
<i>Relating to plan drawings:</i>	
Perimeter point not treated	-10
Construction exit not shown	-10
Water escapes site without encountering any measure	-20
Basins or traps are too small	-15
<i>Bonus points:</i>	
Notes concerning grading	+5
Note to minimize time of exposure	+5
Note to minimize disturbed area	+5

We found that the quality of approved control plans was on average satisfactory--the average score for all 128 projects was 75--but the quality of plans varied significantly among the nine locales we studied. The scores ranged from a low of 57 to a high of 89. On average, the quality of plans submitted to and approved by state regional agencies scored 11 points lower than the quality of plans submitted to and approved by local programs. We attribute the higher



Bad practice: This retaining wall and associated silt fences failed, allowing water and soil to seep through.

quality of plans approved by local agencies not to differences in the proficiency of their respective staffs--state staff, in fact, tended to be more highly trained--but to the fact that local agencies, on average, spent twice as much time per plan on plan review as did the state's regional offices.

Slippage at Stage Three: Installation of Measures Specified by Approved Plans

Even good control plans will fail to prevent erosion and sediment pollution if the measures they specify are never installed. The field inspections we conducted at 128 construction sites revealed that on-site compliance with control plans was poor; 30 percent of measures specified in plans were never installed at the construction sites. It was the exception rather than the rule to find all of the control measures specified on approved plans actually installed.

Contractors have an economic incentive not to install required measures if their violations of the law are likely to go undetected and unpunished. We estimated the costs of implementing each of the 128 control plans we reviewed. On average, full compliance with the plans would have cost \$2,700 per acre or almost \$18,000 for the average of 6.64 acres of disturbed area per project. Because of incomplete installation of required control measures the average costs actually incurred were \$1500 per acre or \$9,960 per project. Thus, developers or their grading contractors saved an average of \$1200 per acre, almost \$8000 for a typical project, by not complying fully with the specifications of the control plans. Slippage of that magnitude occurred because of lack of adequate staff to inspect sites and lack of

adequate tools for enforcement. These problems particularly plague state administration of the program. Five of seven state regional offices had only enough staff to inspect construction sites once a month or less frequently to ensure that required measures were installed and maintained, and to work cooperatively with developers to correct problems (see Figure 1). In contrast, only 19 percent of the local programs we contacted inspected construction once a month or less frequently, and 44 percent inspected sites more often than monthly. Reflecting those differences, we found a somewhat higher proportion of sites regulated by local programs than state regional offices, 40 percent versus 30 percent, to be in complete compliance with approved plans.

Neither state nor local programs pursued enforcement vigorously during the year of program operation we studied, possibly because of a pending court case that questioned the legality of fines imposed for

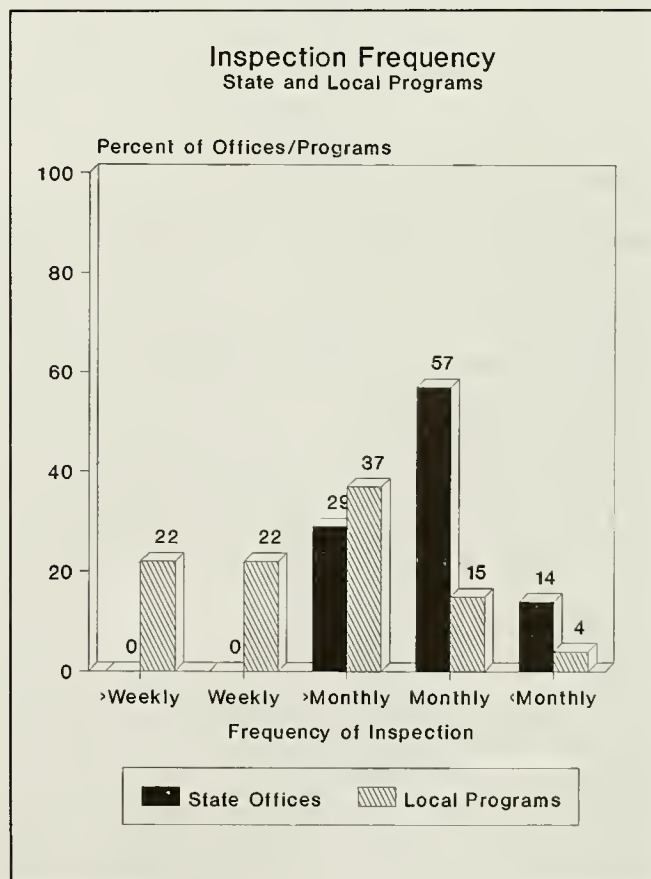


Figure 1.

noncompliance with provisions of the law.³ During the last year of record, state and local sediment control officers conducted over 57,000 inspections of construction sites, but they issued only 1,655 formal notices of violation. Only 182 fines were subsequently imposed, a strikingly low number given the degree of noncompliance we found in the field.

State administrators also lack a full complement of enforcement tools, since unlike local programs, the state is not authorized to issue stop work orders. Since "time is money" to developers, stop work orders are a formidable incentive to comply; therefore, the state's inability to use this device is a serious constraint on regulatory efficiency. Injunctions, the alternative available to the state, are cumbersome legally and take considerable time--a month or more--to employ (and time is critical in preventing sediment damage). As a result, injunctions were rarely sought by either state or local programs. Additionally, the state cannot require developers to post performance bonds or letters of credit; thus, if a developer ceases operation, funds may not be available to complete permanent stabilization of the site to prevent erosion and sedimentation pollution.

Slippage at Stage Four: Maintenance of Measures Installed

Shortfalls in inspection and enforcement also contributed to slippage in maintenance. This a critical problem, since failure to repair damaged or overloaded control devices can allow sediment to escape from construction sites. For both state and local jurisdictions, we found that 51 percent of control measures were not adequately maintained. Fewer than one in five of the 128 construction sites we inspected had all of its sediment control measures in full working order. Typical maintenance shortfalls included problems such as failing to muck out traps when they became more than half full, failure to replace silt fencing or storm drain inlet protection devices that had been knocked down, and failure to repair gravel filters that had been damaged by construction activities or storm events. Those and other maintenance deficiencies are illustrated by Figure 2, which shows the percentage of each of the ten most widely used erosion and sediment control measures that were not maintained adequately at the 128 construction sites we inspected.

The Bottom Line: Attainment of Program Goals

As a result of the technical deficiencies in plans and failures to install and adequately maintain erosion and sediment control measures specified in plans, the North Carolina erosion and sedimentation control program is not fully achieving the goals set forth in the Sedimentation Pollution Control Act. Here we draw upon field inspections of construction projects, agency administrators' evalu-

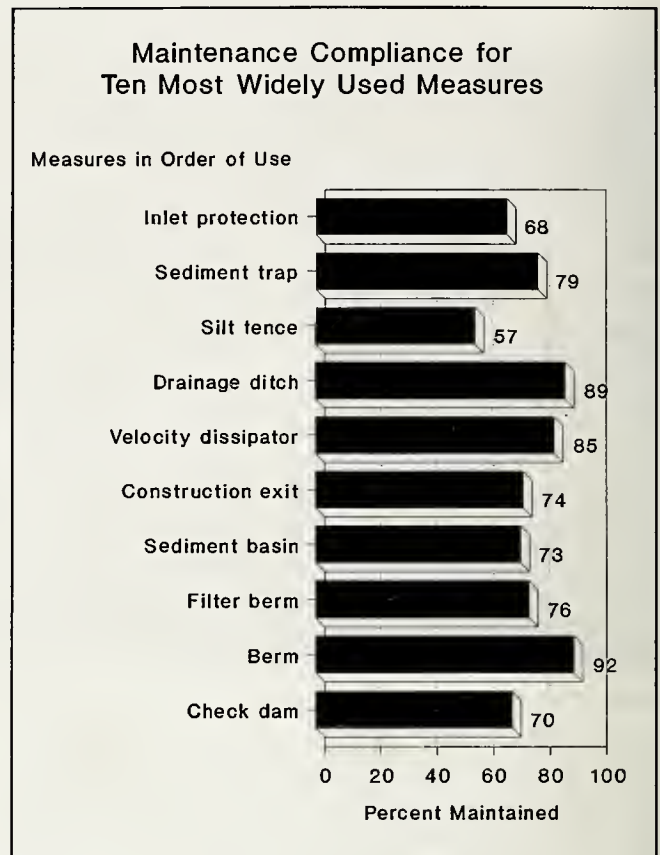


Figure 2.

ations, and interest group evaluations to support that assertion.

The primary goal of the Sedimentation Pollution Control Act is to keep sediment pollution within the boundaries of construction projects. This bottom line goal was attained completely at 39 percent of the construction sites we inspected. The fact that less than half of the construction sites complied with the program's key performance standard--retention of sediment on the site--reflects the inherent infeasibility and inefficiency of preventing all sediment from reaching water bodies. Part of the sedimentation problem obviously cannot or, for economic reasons, should not be prevented from occurring. For example, some particles are too fine to be captured in entrapment devices. In recognition of that fact, we distinguished between minor losses of sediment (less than thirty cubic feet) and major losses (losses of thirty cubic feet or more, or losses of any magnitude directly into streams and other water bodies). We found serious losses of sediment at 33 percent of the construction sites we inspected. Approximately one-third of sites regulated by both state regional offices and local programs experienced major losses of sediment. However, a higher percentage of state-regulated construction sites than construction sites regulated by local programs (41 percent versus 22 percent) experienced minor losses of sediment, reflecting greater slippage at

each of the stages of the control process we examined.

As a final way of gauging the performance of the erosion and sedimentation control program, we asked program administrators and the group representatives we consulted to rate the program in terms of its accomplishment of two key goals: protection of water quality and prevention of sediment damage to property adjacent to construction sites. The following percentages rated program performance as excellent or good:

Table 2. Percent Rating Performance as Excellent or Good

	Protection of Water Quality	Prevention of Sediment Damage
State administrators (n = 7)	29%	43%
Local administrators (n = 27)	63%	74%
Legislators (n = 5)	0%	0%
Sedimentation Control Commission (n = 8)	50%	63%
Professional groups (n = 13)	38%	46%
Trade groups (n = 11/10)	27%	30%
Environmental groups (n = 18)	11%	11%

Those figures, we believe, reflect rather widespread recognition of the slippage in control which we found in the field and document in this article. Until that slippage is corrected, we do not believe the program will be able to achieve consistently high performance ratings from either program administrators or groups interested in and affected by its operation.

Policy Options for Improving Program Performance

There are a number of ways to improve the performance of the North Carolina Erosion and Sedimentation Control Program. Those that we think have some merit and deserve further analysis are presented here for each of the stages of the program where slippage was detected. Readers should be aware that these are presented as ideas for further discussion and analysis; we have not analyzed them in terms of either their cost-effectiveness or feasibility. Thus, we put them forward to stimulate discussion and additional policy analysis and not as a set of policy recommendations.

Stage One: Failure of Eligible Land Disturbers to Submit and Obtain Approval of Control Plans Prior to Clearing, Grading, and Construction

A 1981 evaluation of the North Carolina Erosion and Sedimentation Control program sponsored by the University of North Carolina Water Resources Research Insti-

tute estimated that fully half of all land disturbing activities occurring at that time were not being captured by the program. By 1990, we estimate that stage one failure had fallen to about 10 to 20 percent of the eligible population, a significant improvement over the decade of the 1980s. Improved program coverage may reflect greater public and industry awareness as well as the effect of 1988 legislative amendments that prohibit issuance of building permits to projects that are eligible for erosion and sedimentation control program coverage but have not obtained approval of their erosion and sediment control plans.

While progress has been made, in our opinion, coverage of the eligible population is still too low. The following policy options address that problem:

1. Increase promotional activities to attain public awareness of the program. Consider establishment of a 1-800-Sediment Control Hotline and the use of streamwatch programs to supplement agency surveillance.
2. Increase program funding of surveillance activities, including ground-level surveillance and aerial surveillance.
3. Enhance intergovernmental cooperation in surveillance by training inspectors associated with other programs so that they can detect and report violations of the law.
4. Incorporate the emerging technology of geographic information systems (GIS) in the detection and surveillance functions.

Stage Two: Technical Inadequacy of Approved Erosion and Sediment Control Plans

A variety of factors contribute to the quality of the erosion and sediment control plans we inspected. For example, when agencies are overloaded with plans submitted for review, some control plans are approved by default when the 30-day time limit for completion of agency reviews is exceeded. Overburdened agency personnel find that they have inadequate time to check all hydraulic calculations, particularly when the original plan submitted is especially rudimentary. Inaccurate topographic maps are another source of problems. Ideally, plan reviewers should visit proposed construction sites to check topographic accuracy and to hold preplan conceptual conferences with plan designers; however, program staff in only a few of the locales we visited had time for that. In addition, many agency administrators and plan reviewers strongly believe in the need to improve the quality of the control plans on initial submission, which will require incentives for developers to invest in better plans.

The problem of control plan adequacy also raises a fundamentally important question concerning the program's performance-standard rather than specification-standard orientation. Performance standards are markedly more difficult to administer than specification standards. As knowledge about the appropriate design and effec-



Good practice: A slope drain, anchored in rip-rap, channels run-off to where it won't erode the slope.

tiveness of various erosion and sediment control measures becomes more certain, it may be feasible to switch to more easily administered specification standards. That would ensure that control plans incorporate adequate measures based on available technical information and practical experience, and it would make control plan design, performance, and costs more predictable and, we think, the program more effective. In the meantime, we believe each of the following policy options will contribute to improvement in the quality of plans prepared and submitted for approval.

1. Establish an erosion and sediment control design certification program that all control plan designers are required to complete.
2. Establish erosion and sediment control plan submission standards to set a baseline that all plans must meet before they are accepted for review. Those criteria could include use of base maps with adequate topographic detail, delineation of proposed clearing limits, inclusion of the expected grading and construction schedule, details on temporary stabilization measures, the proposed erosion and sediment control measures with associated hydraulic calculations for runoff directed

toward devices, precautions for critical areas, sequencing of installation and removal of control measures, maintenance scheduling, and procedures for final stabilization.

3. Establish erosion and sediment control plan re-submittal fees to create an economic disincentive for submission of low quality control plans.
4. Increase staffing so that more time can be given to plans during the review and approval process. That also would allow more preplan submission conferences. Possible ways to increase review personnel include: (1) increase funding for permanent plan review positions at the state and local levels; (2) cross-train inspection personnel and plan reviewers, so personnel

can be shifted according to plan submission and monitoring/enforcement demands; and (3) allocate inter-agency or departmental personnel to plan review tasks during peak control plan review periods in late spring and summer.

5. Change the orientation of plan preparation from performance standards to specification standards to help ensure greater consistency and reliability in control



Bad practice: A rip-rap channel, designed to filter out sediment, is ineffective because a trap failed, allowing water to bypass it.

plan design. This will take advantage of available knowledge about what will work, rather than waiting to see if questionable designs will fail in the field.

Stages Three and Four: Failure to Install and Maintain Erosion and Sediment Control Measures According to the Approved Control Plan

We believe increased attention to three sets of factors may improve performance of the program by reducing slippage at stages three and four: (1) measures to stimulate voluntary compliance; (2) measures to enhance the ability of agency personnel to use persuasion effectively; and (3) measures to make sanctions against persistent violators of the law more effective.

To enhance voluntary compliance:

1. Establish greater uniformity in erosion and sediment control standards within regions or across the state to reduce variation in expectations from one jurisdiction to another. When standards differ from one jurisdiction to the next, developers can become confused and unsure about what is considered adequate performance, particularly in terms of maintenance. Greater uniformity would ease that difficulty and was favored by most developers and inspectors we contacted.
2. Increase technical assistance to increase developers' and grading contractors' understanding and appreciation of the rationale for and legitimacy of program goals and procedures. We found that when developers perceived the program's goals as legitimate, they were more likely to comply with program requirements.

To enhance agency persuasive capacity:

1. Increase funding for state regional offices, so that adequate personnel can be hired to pursue a cooperative enforcement strategy. The cooperative approach to enforcement relies on the establishment of close working relationships between the regulator and the regulated, which over time results in mutual trust and confidence. It relies on the background threat of sanctions, but focuses on persuasion and bargaining in which enforcement officers and the regulated will each make small adjustments to reflect the other's interests and points of view. We found that a cooperative approach to enforcement produced much better results than one that relied solely

on the threat of sanctions to obtain compliance. The state has had particular difficulty establishing a cooperative environment for enforcement due to a heavy work load per inspector and the large geographic areas for which inspectors are responsible. For the cooperative approach to work well for the state, inspectors must visit the sites of land disturbing activities more frequently and spend more time on each site.

2. Provide state financial assistance to local programs, so that more personnel can be assigned to surveillance and to cooperative enforcement. Not all localities have adequate staffing to pursue a truly cooperative approach; moreover, financial assistance could provide the impetus for a greater percentage of local governments to establish their own programs, which would remove some of the burden from the understaffed state regional offices.
3. Make preconstruction conferences a precondition for final approval of an erosion and sediment control plan.



Good practice: A well-designed sediment pond includes a vertical riser and trash guard.

4. Increase state efforts to train state and local inspectors in cooperative enforcement strategies. That training should emphasize the importance of one-on-one discussions with developers and grading contractors, informal verbal warnings prior to formal written notices of violation, the importance of being visible during inspections, and conducting on-site discussions during visits to monitor construction sites.

To enhance agency deterrence capacity:

1. Authorize state sediment control officers to use stop work orders where verbal and written notices of non-compliance have been ignored. The effectiveness of a cooperative approach to enforcement is contingent on having enforcement sanctions that are quick, certain, and potentially costly to persistent violators who do not take remedial action following such notices.
2. Authorize the state to require performance bonds or letters of credit for all land disturbances covered by the program. The stop work order is effective on active projects; however, it is of no use on projects where the developer has filed for bankruptcy or where land is left idle for an extended period of time. Financial performance guarantees cover such contingencies.
3. Provide enabling legislation to have certificates of occupancy withheld on all construction projects until agency personnel verify that all necessary final stabilization steps have been taken. This check-off requirement ensures that final compliance is obtained before developers become disassociated with projects.
4. Increase legal assistance from state attorneys for enforcement of cases. Inspectors may hold back from vigorous enforcement if they perceive that legal support is or will be inadequate. Since virtually all of the available sanctions now available to state regional agencies require legal intervention, that perception can create a serious hindrance to enforcement.

Citizens' Willingness to Pay for the Program

As the preceding lists suggest, there are number of ways the slippage we found in the North Carolina erosion and sedimentation control program can be reversed so that it is more effective in halting sediment pollution. Most of those policy options will require additional state appropriations to this program. Our survey of North Carolina households indicated that people in the state value the program highly and are willing to pay far more than state and local governments currently spend on its operation.

In recent years, the state of North Carolina has appropriated approximately \$2 million per year for the urban erosion and sedimentation control program, and we estimate that altogether the thirty-seven local governments with programs spend between \$1.5 and \$3 million per year. In contrast, our survey data indicate that the residents of metropolitan counties in North Carolina are willing to pay approximately \$44 million for the erosion and sediment control program. Thus, the program produces what econo-

mists term a consumer surplus of about \$40 million annually. Some of that surplus, we think, could well be devoted to improving program performance. In this article, we've documented the degree to which the program has fallen short of its goal to control urban erosion and sedimentation, and we've suggested a number of policy options for further analysis and action by state policy makers. □

Acknowledgements

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Endnotes

1. The most ambitious state programs have been put in place in eight states: Delaware, Florida, Georgia, Maryland, Michigan, New Hampshire, North Carolina, and Virginia. Those states have a comprehensive, statewide program that either requires local governments to adopt regulations to state standards, or their equivalent, or allows them to do so in lieu of state administration of state standards. One additional state, New Jersey, also requires local government to adopt programs, but without a supplementary tact of direct state-level administration. Those nine states that approve local programs have authority to employ sanctions, such as power to rescind the local program or withhold state aid, to obtain compliance of local governments, and they actively monitor local government performance, including making on-site visits and requiring written reports. Florida, Maryland, North Carolina, and Virginia match a stringent regulatory approach with a significant commitment of state resources to erosion and sedimentation control, an average of twenty-seven persons per state. In the remaining states with strong programs (and each of the twelve states with weaker programs) states seem much less committed to erosion and sedimentation control, since state personnel resources average less than three persons per state.
2. A report on the full findings, *Evaluation of North Carolina Sedimentation Control Program, Volumes One and Two*, is available from the Land Quality Section, Division of Land Resources, North Carolina Department of Environment, Health and Natural Resources, Archdale Building, 512 North Salisbury Street, Raleigh, NC 27611-7687.
3. In that case, Harris-Hall appealed a \$4,200 fine assessed for violation of the Sedimentation Pollution Control Act. A superior court vacated the penalty as "arising from a legislative grant of judicial power, prohibited by Article IV, Section 3 of the North Carolina Constitution." That 1988 judgment was reversed by the N.C. Supreme Court in 1989, but while the Supreme Court's decision was pending, the case cast a cloud over the legality of the program's enforcement procedures that, according to state program administrators, may have led field inspectors to shy away from enforcement actions. (*In re Appeal from the civil penalty assessed for violations of Sedimentation Pollution Control Act*, 92 N.C. App. 1, 373 S.E.2d 572, *disc. rev. allowed*, 323 N.C. 625, 374 S.E.2d 873 (1988), *rev'd and remanded*, 324 N.C. 373, 379 S.E. 2d 30 (1989))