



Enforcing Sediment Regulations in North Carolina

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One of the most glaring deficiencies in the watershed protection literature today is the lack of research on the behavioral elements that must be met to improve outcomes (Andrews, 1992; Geller, 1989). While the ultimate goal of our environmental regulation is to eliminate or reduce behavior that degrades the environment, very little research has focused on identifying the most effective ways to accomplish that end. In an ideal situation, watershed managers would (1) know all the key cause-and-effect relationships between various program interventions and target group responses, (2) know the frequency, intensity and combination of intervention strategies necessary to evoke long-term behavioral change, and (3) be able to select the most cost-effective interventions among available alternatives. Unfortunately, in virtually all areas of watershed management, our knowledge is far from this level of understanding.

Researchers in North Carolina sought to answer some of those questions within the context of urban erosion and sediment pollution control (ESC) programs. The researchers tested hypotheses about the impact of various enforcement activities to improve compliance in a sample of 128 construction sites drawn randomly from the list of active projects in nine case study jurisdictions. Each site was evaluated for compliance with the approved ESC plan (i.e., the percentage of control measures installed and maintained as required) and the program's overall objective of preventing significant off-site sediment losses (Malcom *et al.*, 1990; Paterson, 1993). Four key enforcement characteristics that emerged were significant predictors of compliance: expertise, comprehension, cooperation and vigilance were identified.

Expertise

Two measures of enforcement expertise were statistically significant predictors of compliance—professional design oversight and the sediment control inspector's experience. For example, maintenance compliance was about 15% better at projects that required professional design oversight (e.g., an engineer or landscape architect) as compared to those that did not. Professional design oversight was also a statistically significant predictor of the likelihood of performance compliance at sites. This is consistent with study expectations since requiring professional design oversight

at a project creates an in-house, on-site enforcement agent with the necessary expertise to solve problems. Furthermore, the engineer or other qualified professional ensures that commitment to ESC is sustained throughout the life of the project.

Better compliance was achieved on sites that were monitored by more seasoned ESC inspectors. This is consistent with expectations given that most inspectors are trained through an apprenticeship process rather than meeting any formal degree or certification requirements.

Comprehension

Efforts to ensure that all the key development personnel understand ESC plan requirements also had a significant payoff in field performance. For example, pre-construction conferences were found to be instrumental in ensuring that control measures are installed and maintained and that the overall program objectives are achieved (see Lemonde, 1987; Thompson, 1984). Pre-construction conferences lead to a 15% better maintenance compliance rate compared to sites where no meeting was held. Similarly, the study found that clear plans with a minimum of clutter, simple maintenance requirements, and precise directions on installation also contributed significantly to better compliance.

Cooperation

While there has been much debate over the merits of pursuing a legalistic—coercive as opposed to cooperative—bargaining approach to regulatory enforcement, there have been few attempts to empirically test which strategy provides a superior outcome (Sigler and Murphy, 1991; Bardach and Kagan, 1982). Using behavioral research methods to determine inspectors' general enforcement philosophy, the study found that the probability of project compliance was enhanced at sites where inspectors adhered to a more cooperative bargaining approach. As the term implies, a cooperative-bargaining enforcement approach tends to involve high levels of interpersonal communication and emphasizes a problem-solving approach to enforcement that only shifts to a stricter enforcement when faced with recalcitrant offenders. This finding is consistent with the study hypothesis which built on case study observations from the regulatory enforce-