Sustainable Development and Landscape Management

It has long been recognized that land use has serious implications for water quality and habitat preservation. Many water quality problems and habitat losses can be attributable to urban and suburban development that in many cases occurred before there was even rudimentary stormwater management. With a population of 14,000,000 in the Bay watershed and a rapid growth rate, the challenge is to correct the problems of the past and prevent the recurrence of similar problems in the future.

Only recently have land use planning and site design begun to address these concerns. An innovative aspect of the *Chesapeake 2000* agreement is the formal recognition of the linkage between land use and water quality. Accordingly, many of the *Chesapeake 2000* commitments are designed to ensure that "sound land use" encompasses water quality and habitat concerns. In fact, many of the *Chesapeake 2000* commitments depend on the effective use of development and land management practices.

One of STAC's objectives is to "provide knowledge on techniques and tools to manage land-based resources through land use planning, site development, land use conservation, and on-site property management." Accordingly, STAC has systematically examined the agreement commitments and identified the important scientific and technical needs that should be addressed to meet these commitments.

While the common focus is on managing what happens on the land, it involves a range of disciplines including engineering, biology, urban planning, modeling, monitoring, economics, and education.

Modeling and Analytical Tools

Priority need

1. Make a wide variety of analytical tools and techniques readily accessible to facilitate widespread application of Environmentally Sensitive Site Design (ESSD) and Low Impact Development (LID) practices.

Background

As agricultural lands shift to more intensive practices or move into suburbanization, dramatic alterations in flows off and under the land occurs. Those remaining undeveloped or in easements (or under other protective modes) require economic assessments to encourage continued protection, as best intentions can be offset by economic realities. The movements of water, nutrients, sediments, and toxics from the altered lands to the tributaries and Bay must be recognized at the lowest planning levels as this is where decisions on land use and hence delivery of these materials are made. For the lands developed, there is a demonstrated a linkage between imperviousness and poor water quality and habitat. ESD/LID (Environmental Sensitive Site Design/Low Impact Development) technology and practices offer excellent prospects for restoration of

watersheds impacted by development and protection of undeveloped watersheds as new development occurs.

Recommendations

1) **Modeling:** It is very important to actively expand the use of computer modeling in land use planning. Therefore, it is recommended that the development and enhancement of computer models to better assess water quality, habitat, and economic impacts (costs and revenues) of development and redevelopment be a high priority within the CBP. Such tools and others (e.g., computer-based engineering, environmental, and economic models and the supporting analysis to ensure their validity) could be an indispensable adjunct to land use, zoning, and site planning decisions via the ability to project potential land use changes resulting from anticipated development pressure and the ability to assess the impact of alternative development scenarios. The integration of ESSD/LID in site plans for both new and retrofit development creates a need for new computer-based models available to site designers and site plan reviewers.

2) **Large Scale Land Use Characterization:** Assessing all land use in the watershed can only be accomplished with a large spatial scale tool, such as aerial or satellite remote sensing. New sensors and analytical tools for data derived from the sensors need to become routine portions of the CBP, for quantifying potential transported nutrient and sediment.

3) **Economic Valuation:** There is a need to better understand and assign a value to resource lands potentially targeted for protection through acquisition or other conservation techniques. Ideally, such mechanisms should reflect sound science and economics and also be readily accessible for agencies, land trusts, and others involved in land acquisition and preservation.

Stormwater Management

Priority need

1. Improve design and siting of best management practices to control nutrients, sediments, bacteria and toxics, and to approximate predevelopment hydrology.

Background

Water quality problems are particularly challenging for managing stormwater on the urban/suburban landscape. Although the sources and impacts were intensively studied and documented more than two decades ago, until fairly recently urban stormwater has been viewed by the general public as largely a drainage problem, with little regard for downstream effects. Only in the last decade or so has there been a concentrated effort to address water quality conditions. Equally challenging are the problems of controlling runoff from rural areas where nutrients, sediment, pesticides, and herbicides are of concern.

Recommendation

1) **Testing/Evaluating Stormwater Management Strategies:** Technological innovation is needed in all aspects of runoff control, including approximating the ideal of replicating pre-development hydrology, and controlling nutrients, sediment, bacteria, and toxics. Substantial research and development, including field-testing, is needed in terms of improving the technology of stormwater management. The focus should be on both separate "BMPs" and also on integration of controls into the development landscape.

Stream Corridor Protection

Priority need

1. Develop economical and cost-effective approaches to protection of biological integrity in streams.

Background

The aquatic and terrestrial habitats of stream corridors are particularly vulnerable to the impacts of development. From sediment deposition to streambank erosion to excessive paving to pollution runoff, special attention is needed on the science and technology of stream corridor restoration and protection.

Recommendation

1) **Stream Corridor Restoration & Approaches:** The restoration of stream corridor habitat is essential to the restoration of biological integrity. As existing technology and practices are often prohibitively expensive, a major focus should address cost-effective approaches.