

Total Maximum Daily Loads: Approaches, Implications, and the Role of Microbial Source Tracking

An astonishing number of the nation's waterbodies are categorized as impaired by anthropogenic pollutants. Under the requirements of the federal Clean Water Act, most of these waterbodies shall be remediated using a Total Maximum Daily Load (TMDL). Each TMDL evaluates the maximum pollutant that the waterbody can receive and still meet water quality standards, and allocates that load (minus a margin of safety) to the point and non-point sources within the watershed. This presentation reviews the possible strategies to develop TMDLs, the implications of these approaches, and the role of scientific studies in TMDL development. Load-based TMDLs use a mass balance approach to allocate the allowable mass loading, while number-based TMDLs simply apply a numeric target to the receiving water and/or discharges. Numeric targets often relate to the value (concentration) of the applicable water quality standard, but may pertain to a number of different parameters; for instance, percent impervious area of the impaired watershed. In terms of wasteload allocations, in some cases individual dischargers are held accountable for their allowable loading, while in other approaches all dischargers within the watershed are given one allocation to share. Overall, the varying TMDL development strategies have implications on the approaches used to design and install pollutant-reducing best management practices (BMPs) during TMDL implementation.

It is often the case that water quality data are sparse or unavailable during TMDL development. Thus, an increasingly more common trend is for stakeholders to conduct scientific studies in advance of the TMDL to assist with development and implementation. By conducting scientific studies prior to TMDL development, the accuracy of the developed TMDL and likelihood of success of the corresponding implementation plan can be increased. This presentation will emphasize microbial source tracking (MST) studies and bacteria TMDLs. When applied and interpreted appropriately, MST studies provide meaningful and useful data for regulatory agencies and stakeholders. However, the role and applicability of MST data for TMDLs and implementation plans hinges on one critical aspect: the context in which the data are used.

This review should be of interest to an array of stakeholders involved with compliance with water quality standards, including watershed groups and staff from municipal, agricultural, state, and federal agencies. Examples from TMDLs across with nation, with particular emphasis on EPA Region IV, will be presented.

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