Remediating Troubled Waters: Total Maximum Daily Load Development and Implementation

The 1972 US Clean Water Act and its amendments define the total maximum daily load (TMDL)

TMDL indicates the maximum amount of a given pollutant that a waterbody can receive and still meet water quality standards

Developing TMDLs that allocate maximum allowable pollutant loads from different sources

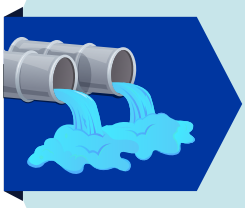
Implementing TMDLs approved by the United States Environmental Protection Agency (USEPA)

Hydrologic, hydrodynamic, and water quality models are essential tools for developing and implementing TMDLs

ASCE collection on models, analytical methods, and insights related to TMDLs and clean water

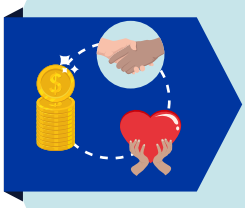
Manual of Practice No. 150, TMDL Development and Implementation

- Evaluations of watershed and receiving water (river, lake, and estuary) models relevant for TMDL
- Integrated modeling systems and linked models for TMDLs of complex waterbodies
- Resources to find model data and properly running the models in developing TMDLs
- Simple models and methods for developing TMDLs under limited data and resources



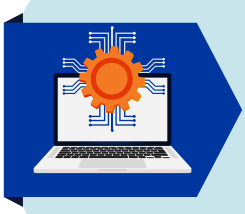
Analysis of pollution sources and associated models

- Comparison of mechanistic soil models for phosphorous runoff due to manure spreading
- Characterization of street-swept material to address TMDL allocations



Socioeconomic perspective on the TMDL development process

- Clarification of state-level socioeconomic and geographic aspects that influence TMDL programs



Capturing the state-of-the-practice in TMDL development using artificial intelligence

- Analysis of how the margin of safety in TMDLs is calculated in practice using natural language processing and machine learning

Optimizing cost effectiveness in TMDL implementation

- Optimal selection and placement of green infrastructure to control polychlorinated biphenyls
- Assessment of uncertainty in performance metrics for stormwater control measures

Together, these studies provide a thorough perspective into TMDL development and implementation for engineers and decision makers, which will pave the way to

- Cleaner waterbodies and healthier ecosystems
- Cost-effective management of watersheds
- Robust guidelines for developing useful watershed and receiving water models and analytical techniques
- Greater public safety through improved water quality

Continuous assessment and improvement of TMDL action plans is key to keeping waterbodies clean

TMDL and Clean Water
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