

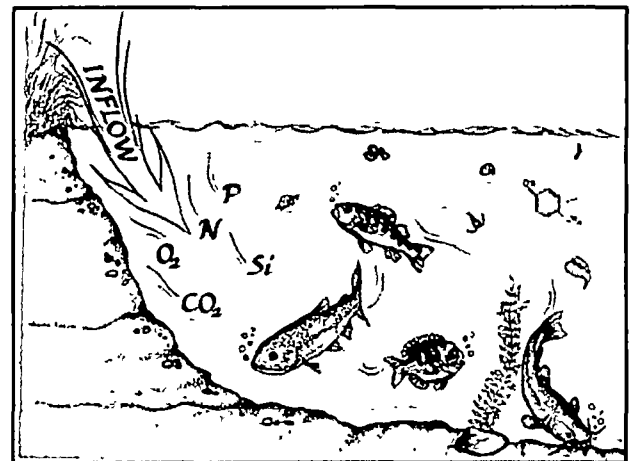


AQUATOX (RELEASE 2.1): MODELING ENVIRONMENTAL FATE AND ECOLOGICAL EFFECTS IN AQUATIC ECOSYSTEMS

*The U S Environmental Protection Agency is releasing an enhanced version of the freshwater ecosystem simulation model **AQUATOX** which predicts the fate of various pollutants, such as nutrients and organic chemicals, and their effects on the ecosystem, including fish, invertebrates, and aquatic plants. **AQUATOX** is a valuable tool for ecologists, biologists, water quality modelers, and anyone who performs ecological risk assessments for aquatic ecosystems. Release 2.1 has enhanced scientific capabilities to more effectively simulate the fate of nutrients and toxic organics and their effects on aquatic ecosystems.*

Background

One of the biggest challenges to protecting or restoring our Nation's waters is to adequately understand the relationships between the chemical and physical environment and the organisms that live there. Ecosystems are complex, with seasonal and annual variations and multiple interactions among species. Excess nutrients are leading causes of water quality impairment. To address this problem, states need the technical resources to establish scientifically sound nutrient criteria and methods to implement them in water quality regulatory programs. Ecosystem models such as **AQUATOX**, which mechanistically simulate nutrient dynamics, can be one tool for deriving and implementing nutrient criteria.



About **AQUATOX** Release 2.1

AQUATOX is a PC-based ecosystem model that predicts the fate of nutrients and organic chemicals in water bodies as well as their direct and indirect effects on the resident organisms. Release 2.1 improves its ability to simulate nutrients and their biological effects by

- More realistic tracking of nutrients, by allowing different ratios of nutrients to organic matter in different components of the ecosystem.
- Ability to better use monitoring data as input or comparison by enabling input and output of multiple forms of nutrient data. The linkage to the **BASINS** watershed modeling system has been updated accordingly.
- Improved simulation of phytoplankton (algae in the water column) and periphyton (attached algae), particularly in river systems.
- Un-ionized ammonia (which may be toxic) and variable pH may now be simulated.

- Simulation of toxicity due to organic compounds that do not bioaccumulate has been improved because it can now be based on external, rather than internal, concentrations
- The user can now get have Steinhaus community similarity indices calculated and exported. The Steinhaus index can be used as one measure of how the predicted composition of the biotic communities varies between simulations.

What can Release 2.1 do?

- Evaluate which of several stressors is causing biological impairment. For example: Are nuisance levels of attached algae in streams controlled primarily by nutrients, sediments, grazing by snails, or flow conditions?
- Explore how changes in land use or agricultural practices in a watershed might affect aquatic life, by linking to the watershed models in BASINS.
- Develop targets for nutrients in lakes and reservoirs with nuisance algal blooms.
- Estimate time to recovery of fish or invertebrate communities after reducing pollutant loads.

Who can use AQUATOX?

AQUATOX is a valuable tool for ecologists, biologists, water quality modelers, and anyone involved in performing ecological risk assessments for aquatic ecosystems.

To get more information

You can get more information about the AQUATOX model and other water quality models by visiting our internet site at www.epa.gov/waterscience/wqm/ For more specific technical information, call the Standards & Health Protection Division, Office of Science & Technology in EPA's Office of Water Ask for the AQUATOX manager at 202-566-0400.