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**A GENERALIZED MODEL FOR SIMULATING LAKE
ECOSYSTEMS**

By

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A GENERALIZED MODEL FOR SIMULATING LAKE ECOSYSTEMS

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Abstract: CLEAN, a generalized lake-ecosystem model with strong ecological realism, has been developed in response to one aspect of the growing need for models suitable for helping man to manage his environment. The model currently consists of twenty-eight ordinary differential equations which represent approximately sixteen compartments, including attached aquatic plants, phytoplankton, zooplankton, bottom-dwelling aquatic insects, fish, suspended organic matter, decomposers, sediments, and nutrients. These equations can be linked in any meaningful combination to simulate a given point in a lake (a separate model for lake circulation is available to represent spatial variations and to couple simulations of different regions of the lake).

Subprogram functions exist for each principal physiological and ecological process, and a submodel for lake water balance is presently being implemented. The program is written in FORTRAN for UNIVAC and IBM time-sharing systems.

The model has provided intuitively realistic simulations and has given us insight into the effects of nutrient enrichment on the functioning of the lake ecosystem as a whole. Sensitivity analysis has indicated priorities for further studies to obtain more precise estimates of parameters. Also, evaluation of the logic and organization of the model by experimenting with it are providing information to use in planning new experimental approaches. CLEAN is presently being tested using data from Lake George, New York, and Lake Winnebago, Wisconsin.

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