AQUATIC ECOSYSTEMS MODELLING IN THE INSTITUTE OF ECOLOGY POLISH ACADEMY OF SCIENCES

S u m m a r y

Two approaches common in literature were adopted for aquatic ecological modelling in the Institute of Ecology PAS. Following the first approach, in which the models were kept very simple, we developed "empirical" or "input-output" Vollenweider-type models to describe trophic states of lakes. Numerical programs written by Dr M. Giercuszkiewicz-Bajtlik and Dr A. Koczyk from the Institute of Environmental Protection, based on our results, appeared to have vast practical applications to management of Polish lakes and were used in educational processes at some Polish universities. We also modified Sverdrup's critical mixed layer depth model used to predict phytoplankton blooms by phytoplankton self-shading effect inclusion through a reinterpretation of critical light model. Part of our work was also devoted to methodology, e.g. to the problem of model parameters calibration. In addition, we developed so-called "mechanistic models" corresponding to the second approach to describe many complex interrelations that occur in real lakes and that influence the trophic state of the water, phytoplankton seasonal succession and biogeochemical cycles. The dynamic nature of net photosynthesis and the structure of water currents were also simulated, revealing a potentially heterogeneous euphotic zone which suggests that some of the considerations in literature based on the static compensation depth concept need to be verified and that the zone may not be a uniform layer.