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AQUACULTURE COLLABORATIVE RESEARCH SUPPORT PROGRAM



RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

Title: Aquaculture Pond Ecosystem Model: Temperature and Dissolved Oxygen Prediction - Mechanism and Application

Author(s): Steven D. Culberson and Raul H. Piedrahita
Department of Biological and Agricultural Engineering
University of California
Davis, CA 95616, USA

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Abstract: Accurate characterization of temperature and dissolved oxygen stratification in ponds used for aquaculture is of critical importance in understanding how these ponds may be constructed, oriented, or otherwise managed biophysically when one wishes to provide optimal environmental conditions for the organisms being cultured. While field studies can provide characterizations of water quality stratification at a single locale, to date there have been few attempts at developing reliable models which can be used at a variety of sites after initialization with appropriate local geographic and atmospheric data. In conjunction with the Pond Dynamics/ Aquaculture Collaborative Research Support Program (PD/ A CRSP), the authors have developed a water quality model (the Aquaculture Pond Ecosystem Model, A.P.E.M.) which predicts temperature and dissolved oxygen stratification at several sites, including Thailand, Rwanda, and Honduras. Advances in model structure and reduction of data requirements relative to previous models reflect the desire to provide for culturists the ability to predict stratification events with commonly available data, obtained either by hand or from a simple weather station located at or near the pond site. Strategies used for dealing with the reduced data sets, and the associated assumptions made, are also presented. Lastly, a series of simulation runs is performed to assess the quantitative effects on temperature and dissolved oxygen concentration generated by varying pond depth and phytoplankton density input values.

This abstract is excerpted from the original paper, which was in *Ecological Modelling*, 89:231–258.

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