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RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

Title: An organic matter and nitrogen dynamics model for the ecological analysis of integrated aquaculture/agriculture systems: I. model development and calibration

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Abstract: A dynamic and mechanistic mass balance model (Integrated Aquaculture/Agriculture System model, or IAAS) for predicting nitrogen and organic matter outputs from aquaculture ponds and their subsequent recycling in conventional agriculture practices has been developed and calibrated using data from Honduras, Thailand and Malawi. The model, developed using Stella™ modeling software (High Performance Systems, Inc. Hanover, New Hampshire), simulates individual fish growth, organic matter, nitrogen (organic, total ammonia and nitrate), dissolved oxygen and phytoplankton, crop growth, soil nitrogen concentrations and soil water balance. Processes included in the model are fish growth, crop biomass growth, allochthonous and autochthonous organic matter production, organic matter decomposition, nitrogen input, nitrogen mineralization, nitrification, denitrification, diffusion, uptake and leaching. The model has been calibrated using literature and observed parameter values from experiments. The calibration procedure involves running the model using inputs from observed data, comparing the model output to observed data, and making appropriate adjustments to parameter values until a general fit between the model and observed values is observed. The structure of the model allows users to modify parameter values to suit different simulation scenarios via a user interface display that also includes graphs and tables for model output.

This abstract is excerpted from the original paper, which was in *Environmental Modelling and Software*, 17(6):583-592.

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