

NOTICE OF PUBLICATION

RESEARCH REPORTS TITLE XII POND DYNAMICS/AQUACULTURE COLLABORATIVE RESEARCH SUPPORT PROGRAM

Title: Techniques for Assessment of Stratification and Effects of Mechanical Mixing in Tropical Fish Ponds

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Abstract: Density stratification isolates near-surface from bottom pond waters and prevents exchange of dissolved oxygen (DO) and nutrient elements, potentially restricting photosynthesis and production. Destratification strategies have become important for cost-effective intensification of pond aquaculture. Evaluation of methods and devices has emphasized effects on production, with little detailed description of effects on physico-chemical components of pond ecosystems.

This paper describes short-term effects of mechanical mixing on temporal and spatial distribution of temperature and DO in tropical freshwater fish ponds. Intensely stratified ponds of 1.5 m depth were monitored at eight depths for temperature and two depths for DO every 30 min with a modest-cost automated system of commercially available hardware. Results are presented as time-series plots, isotherm diagrams of temperature distribution with time and depth, and a stability index of energy required to mix a pond to uniform temperature.

Required mixing energy is minuscule compared with electrical energy consumption of the lowest-powered mixing devices discussed in literature. Strategy for application of mechanical energy to water is critical for efficiency. A relatively subtle difference between two mixing regimes (daytime mixing for one 2-h period or two 1-h periods) produced potentially important differences in temperature and DO distribution.

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