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## RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

**Title:** Minimizing Environmental Impacts of Freshwater Aquaculture and Reuse of Pond Effluents and Mud

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**Abstract:** A wide range of aquaculture systems is practiced in Asia, predominantly in semi-intensive systems with fertilization and intensive systems with formulated feeds in pond culture. This paper describes various means to minimize environmental impacts and reuse pond effluents and bottom mud, based on a series of pond experiments of the most commonly cultured species in Thailand, hybrid catfish (*Clarias macrocephalus* × *Clarias gariepinus*) and Nile tilapia (*Oreochromis niloticus*). Experiment 1 was designed to improve feeding efficiency through optimization of feeding regime to reduce nutrient inputs in Nile tilapia culture; the results show that there were no significant differences in fish yield among daily feed rations at 50%, 75%, and 100% satiation, but the nutrient loading was escalated with increasing rations. The second experiment on hybrid catfish and Nile tilapia culture in cage-cum-pond systems shows that major nutrient input from formulated feed could be effectively recycled in a closed pond where hybrid catfish were cultured intensively with formulated feed in cages and Nile tilapia with natural food in an open pond. The third experiment was conducted to determine appropriate harvest methods and draining treatments for reducing pollutants from Nile tilapia ponds; the results show that liming pond water a day before draining and gradually draining ponds to a 25-cm depth during harvest was most effective. An experiment conducted to reuse effluents from hybrid catfish culture to fertilize rice crops demonstrated that the rice crop removed 32% total nitrogen (TN) and 24% total phosphorus (TP) from the effluents, with rice production comparable to that which received regular fertilization regime. The last experiment was to determine the efficiency of rooted aquatic plants in extracting nutrients from pond mud. The results show that the economic aquatic plants, such as lotus (*Nelumbo mucifera*), were able to remove 300 kg N and 43 kg P/ha/year from pond substrates.

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