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Summary

Much of our understanding of biogeochemistry in shrimp ponds (such as for extensive, improved extensive, semi-intensive, intensive systems), fish ponds and fish cages has focused on water column processes. However, some aquaculture species, such as shrimp, live at the sediment-water interface where chemical processes in the sediments and the interaction with water quality could potentially impact shrimp health and overall pond productivity. The aims of the current ACIAR rice-shrimp project (SMCN/2010/083) are to understand the mechanisms, processes and functionality of rice–shrimp farming systems through rigorous scientific investigations to achieve sustainable production. The specific objectives are (i) to better understand the key components of the sustainability of rice–shrimp farming systems; (ii) to determine the sustainability of the rice–shrimp farming system by testing the identified key risk factors and system components; (iii) to determine, explain and quantify the benefits to productivity of integrating rice and shrimp farming; and (iv) to identify and promote better management strategies to improve productivity and sustainability of rice–shrimp farming systems.

This proposed thesis would complement this ACIAR project by examining sediment biogeochemical processes in detail and how they impact on water quality. The focus would especially like to be on how biogeochemical processes affect shrimp health and production, and to recommend options to modify conditions to improve shrimp pond productivity. The overarching aim of the proposed project is to study the sediment biogeochemistry with a focus on the effects on shrimp productivity in rice-shrimp systems. Specifically, the project would: (i) Examine the key sediment biogeochemical processes that impact on shrimp health including oxygen, metal species, nitrogen, phosphorus and carbon dynamics; and (ii) Assess the impact of sediment nutrient dynamics and metal transformations on water quality and shrimp health.

Research Expertise

- Research on aquaculture pond dynamic;
- Research on monitoring techniques for assessment of environmental impact;
- Construction and evaluation of chemical analyses for specific water samples in aquaculture