

VERIFICATION AND REFINEMENT OF INTENSIVE SHRIMP CULTURE TECHNIQUES: THAILAND

Mitigation Measures of Effluents from Shrimp Farms on Mangrove and Coastal Resources

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Project Site: Andaman Marine Shrimp Research and Development Center, Phuket, Thailand

BACKGROUND/RATIONALE

More than 80 % of shrimp production of Phuket comes from small-scale intensive farms. Most of shrimp farms use direct supply of seawater from the open sea and released effluents to canals. The effect of the unlimited effluents from shrimp farms cause deterioration in the coastal natural resources and the environment. The effluent quality and loading from marine shrimp farms have been studied in Thailand (Songsanjinda and Tunvilai, 1993; Tookwinas *et al.*, 1994 & 1998). Macintosh and Philips (1992) reviewed the feeding habitats of shrimps and found out that 77.5 % of nitrogen and 86% of phosphorus added to the intensive pond are lost to the shrimp pond environment and would be decomposed at the bottom of the pond. After harvesting, if the effluent is directly drained out to the natural waters it would have a lot of effects on the coastal environment, such as deterioration of water quality for aquatic larva surviving near the coastal or mangrove areas. Therefore, the mitigation measures of effluent from shrimp farming on mangrove and coastal resources should be assessed, in order that the shrimp culture meets the coastal or mangrove-friendly schemes.

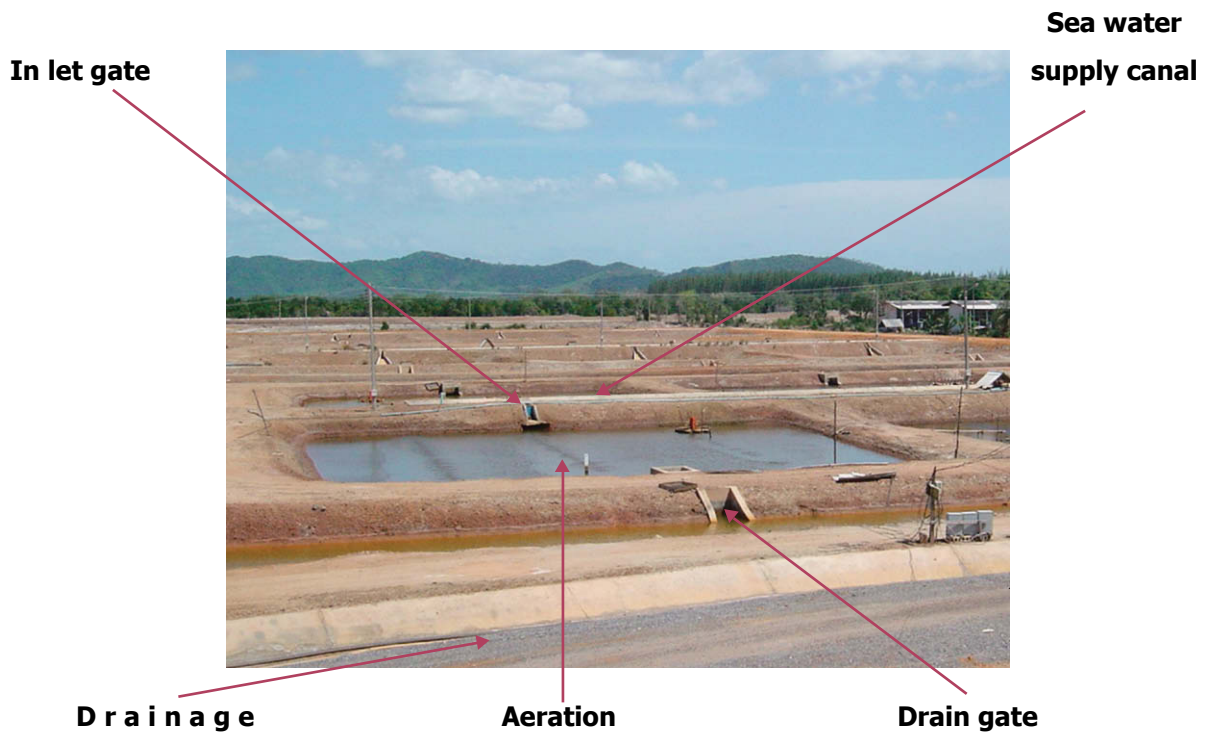
OBJECTIVES

Assessment of the mitigation measures of effluents from shrimp farming on mangrove and coastal resources is necessary in order that shrimp culture meets the coastal or mangrove-friendly system requirements.

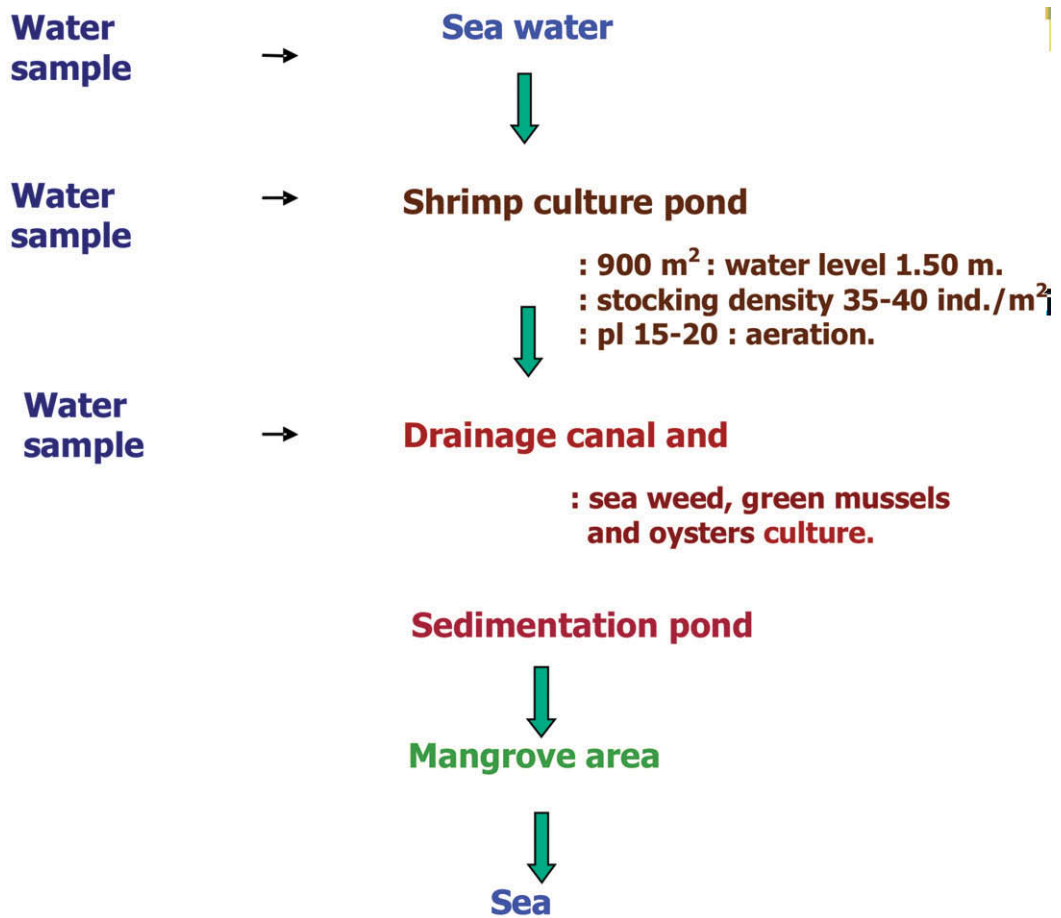
PROJECT ACTIVITIES

The study was conducted in the shrimp culture system of the Andaman Marine Shrimp Research and Development Center in Phuket, Thailand in 2002 and 2003. The water quality conditions in the shrimp farm system and the discharge directions treated by seaweed, bivalves such as oysters and mussels were regularly monitored. The mitigated volume of seawater in front of the Center was also analyzed. The effluents from the shrimp farm system were released to discharged canal and sedimentation pond where marine algae (*Caulerpa* sp and *Acanthophora* sp), green mussels and oysters were cultured during the shrimp culture period. Water samples were collected every month from the shrimp ponds, sedimentation pond and from natural seawater in front of the Center. Water quality conditions such as salinity, BOD, DO, pH, alkalinity, NO₃-N , NO₂-N , NH₃-N , PO₄⁻³ were measured.

The shrimp culture ponds were stocked with shrimps following the protocol and practices promoted by DOF Thailand. Water samples were collected from the natural seawater in front of the Center and measured every month, as well as in grow-out ponds and sedimentation pond. The results of parameters measured are shown in the following tables and figures.



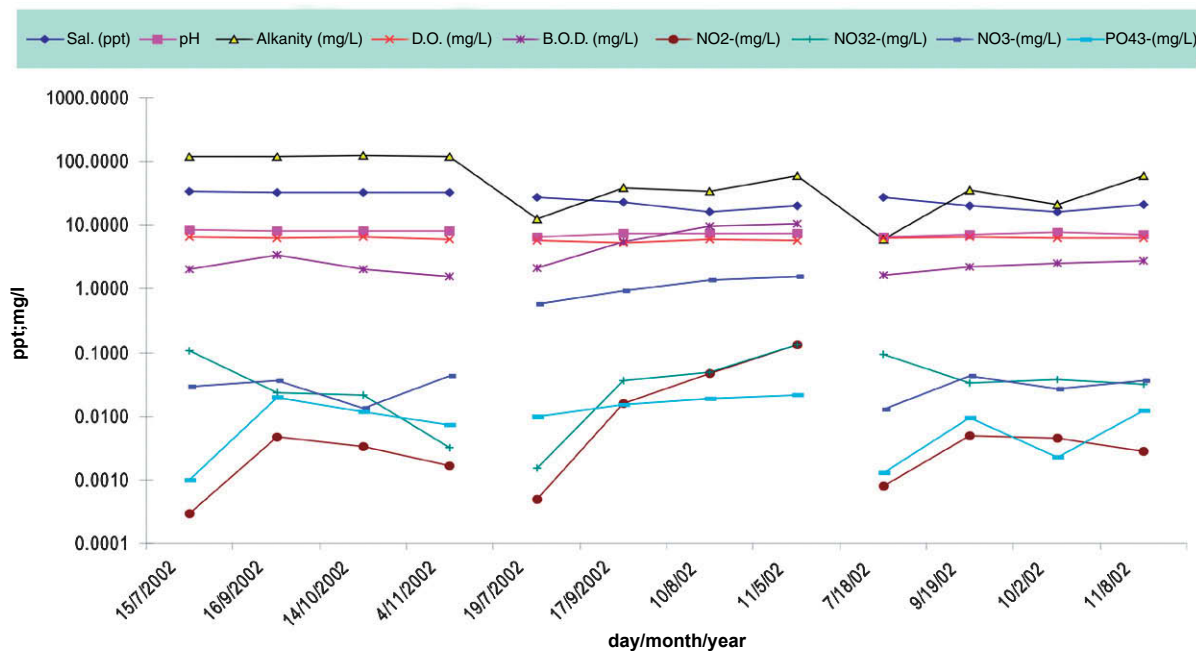
Grow-out pond, 30x30 m² with super charge aeration



Monitoring the water quality conditions in the shrimp farm system and discharge directions

Table 1. Some parameters measured from seawater, grow-out pond and sedimentation ponds

	Date	Sal	pH	Alkalinity mg/l	Chemical Parameters					
					DO mg/l	BOD mg/l	NO ₂ -N mg/l	NO ₃ -N mg/l	NH ₃ -N mg/l	PO ₄ ³ mg/l
Seawater	15/7/02	34.0	8.60	120.5	6.60	2.000	0.0003	0.1049	0.0292	0.0010
	16/9/02	33.0	8.30	120.0	6.40	3.500	0.0048	0.0236	0.0358	0.0194
	14/10/02	32.0	8.19	124.0	6.70	2.000	0.0034	0.0212	0.0131	0.0119
	4/11/02	32.0	8.17	120.8	6.10	1.600	0.0017	0.0032	0.0425	0.0073
Grow-out pond										
	19/7/02	28.0	6.45	12.5	5.80	2.100	0.0005	0.0015	0.5695	0.0098
	17/9/02	23.0	7.48	38.5	5.40	5.500	0.0158	0.0357	0.9515	0.0154
	3/10/02	16.5	7.60	34.5	5.90	9.500	0.0473	0.0486	1.3832	0.0189
	6/11/02	20.0	7.55	59.0	5.70	10.500	0.1358	0.1324	1.5764	0.0212
Sedimentation pond										
	18/7/02	28.0	6.49	6.0	6.30	1.650	0.0008	0.0925	0.0128	0.0013
	19/9/02	20.0	7.20	35.0	6.50	2.200	0.0050	0.0326	0.0432	0.0094
	21/10/02	16.0	7.87	21.0	6.40	2.500	0.0045	0.0380	0.0268	0.0023
	8/11/02	21.0	7.27	61.0	6.30	2.750	0.0028	0.0320	0.0365	0.0124



Data of some parameters measured from seawater, grow-out pond and sedimentation pond



Green mussels and oysters cultured in sedimentation pond (left and second from left); students planting mangroves along drainage canal (third from left); and *Caulerpa* sp. culture in sedimentation pond (right)