

Inland Shrimp Farming as the Impacts in Agro-ecosystem in Thailand

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Introduction Within the last few years, shrimp aquaculture has been shifting inland as farms in coastal areas have become contaminated and abandoned. About one-fifth of all Thailand' shrimp is now produced inland. Last 2 years , rice farmers started to complain that waste water from the farms was lowering yields and leakage from the shrimp ponds threatened to salinate their paddies. Only about ten percent of inland farms operate as closed systems. The Government decided to propose an end to inland shrimp farming based on studies and recommendations by the Thai National Environmental Board.

On July 1998, Thai Government sparked a continuing controversy with the announcement of a proposed ban on inland shrimp farms, which have damaged neighboring rice fields and orchards and polluted freshwater. The ban would close down some 900 shrimp farms in more than ten provinces of the central basin and northeastern plains of the country.

The week after the announcement, 1000 shrimp farmers petitioned the Constitutional Court to declare the ban unlawful on grounds that it infringes on the farmers' right to make a living. They argued that the ban should be revoked in favor of implementation of environmental regulations. But Thai environmental officials maintain that immediate action needs to be taken-that the operations of inland shrimp farmers pose a serious threat to the nation's agricultural lands and that environmental regulations have not proven to be sufficiently effective in the past.

The country's environmental laws regulating shrimp farming have often been ineffective because the laws have not been clearly articulated. For instance, an existing law banning shrimp farms in environmentally sensitive mangrove areas has often been ignored because it does not set out clear boundaries marking the prohibited areas. Similarly, as the boundaries of National Parks are seldom clearly delineated shrimp farming often takes place within the parks even though such practices are legally forbidden.

Thai government agreed to establish an integrated team to review the impacts of shrimp farming in fresh water area as the fact for setting the clear boundary marking the prohibited areas.

Objectives

1. Surveying, mapping of inland shrimp farming and studying the impact of inland shrimp farming in agro-ecosystem and socio-economics.
2. Setting up boundaries marking prohibited areas for inland shrimp farming to make environmental law regulating shrimp farming clear.

Methodology

Secondary data study.

1. From Satellite imagery of 23 Provinces in Thailand in March 1998, 22,454 hectares of low saline level shrimp ponds were found of which 25 % are in fresh water areas and the rests are in seasonally tidal flat areas.

2. By surveying of low saline level areas by March 1998 in 13 provinces, 6,650 hectares of fresh water low saline level shrimp ponds and 2,496 hectares of low saline level at seasonally tidal flat were found.

3. Areas of 2 systems of shrimp aqua culture in the whole country was made as follow:

3.1.1 Coastal area shrimp farms = 64.000 hectares

3.1.2 Low saline level shrimp farm = 32.000 "

that can be divided into:

- 1) Fresh water areas of central plain 20 %
- 2) Fresh water areas in coastal plain 13 %
- 3) Seasonally tidal flat (sea water) 65 %

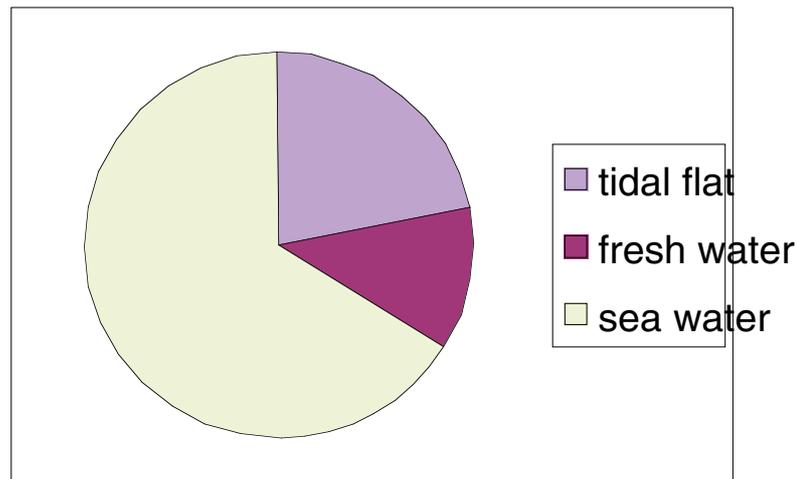


Figure 1 Shrimp aqua culture in different landforms in Thailand

Field Survey

Among 12 % of low saline level fresh water areas, 22 farms of different duration, area, methodology and management in 10 provinces were selected as the case study. It was found that

1. Ten farms are less than one year, six are one to three years, five are three to five years and one is more than five years old.

2. Methodology

2.1 Constant saline level culture:

Fill the pond with 5-8 ppt and 60-80 centimeters water depth and add fresh water until water level is 1.2-1.5 meters at harvesting time. Finally salinity in the pond will be 1-3 ppt. 4-6 tons of salt is required in every crop.

2.2 Fenced culture

Plastic fences of 50-100 square meters are builded in the pond for nursery with 7-12 ppt. salinity in 1 meter depth. After 10 -14 days, salinity will be reduced into 1-3 ppt . then fences are taken out.

3. Management

3.1 High management: A pond that has a reservoir with surrounded by canal and no drainage after harvesting.

3.2 Low management: A pond that has reservoir and canal and the saline water will be drained out.

Table 1. Methodology and management of selected 22 farms

Area (rai)*	Methodology %		Reservoir %		Drainage %	
	fenced	Not fenced	+	-	+	-
50>	45	55	55	45	100	-
50-100	56	44	86	14	57	33
>100	50	50	100	-	-	50

1 hectare = 6.25 rai

Impact on soil and water qualities and plants.

Soils:

Soils from bottom of the ponds, on the dikes, 5, 20, 50 and 100 meters from the dikes are sampled at 0-15, 15-30, and 30-100 centimeters were analysed. It was concluded that several places are found to be critical areas because the salinity were more than 2 milimoh/cm.

Table 2. Electronic Conductivity: an everage from every depth with different methodologies and management

Method & management	Age of ponds (yrs)	Electronic conductivity							
		botto m	dike	From dike				Land use	
				5m.	20m.	50m.	100	Paddy	Fruit Orchard

Drained									
<u>Fencing</u> (KAnchanaburi)	<1	.44	0.82	0.31	0.29	-	.21	0.20	-
<u>Nonfencing</u> Suphanburi	<1	3.24	1.71	1.63	1.76	2.48	-	1.17	-
Nakornpathom	<1	3.65	2.78	1.77	2.30	2.96	-	1.47	-
Nakornpathom	1-3	2.73	5.43	1.93	2.87	2.91	5.79	-	-
NakornNayok	1-3	1.33	0.27	0.33	0.20	0.19	-	0.18	-
Not drained									
<u>Fencing</u> Nakornpathom	3-5	1.42	3.35	1.31	0.74	0.43	-	0.39	0.57
NakornNayok	<1	1.81	1.17	1.43	1.50	1.19	-	-	0.76
NakornNayok	<1	1.27	1.61	1.23	1.24	0.91	-	1.10	-
<u>Nonfencing</u>	-	-	-	-	-	-	-	-	-

Water qualities:

By inland water analysis: Quality of water from inland farms are very different due to different in location. The results from active tidal flat are not clear because of salt water influent. The analysis therefore are only from fresh water areas. The results is in table 3.

Table 3. Salinity in the ponds.

Method & magement	Salinity				Duration (Crop);yo
	Salinity (ppt)	EC Milimoh/cm	TDS (mg/l)	SAR	
Fencing	0.4-1.9	1.000-4.174	648-2633	2.24-11.0	13-105
Nonfencing	1.3-5.8	2500-10250	1435-6900	7.00-21.1	10-90

Table 4. Salinity in reservoirs and canals surrounding.

Methodology	Salinity				Salinity			
	Salinity (ppt)	EC Milimoh/cm	TDS (mg/l)	SAR	Salinity (ppt)	EC Milimoh/cm	TDS (mg/l)	SAR
Fencing	0.6-3.6	610-5720	525-4618	0.9-18.6	0.6-2.8	575-4360	801-3885	2.0-7.6
Nonfencing	0.4-1.4	536-6070	304-4152	1.7-8.0	0.3-1.5	567-3128	290-1379	1.1-5.7

Plant Growth:

Rice fields around drained ponds were directly affected by salinity seen by abnormal less tillers, unfilled seeds and irregular growth. Influenced in fruit trees is the same as rice fields.

Impact on Socio-economicAreas of Shrimp Culture:

A proposed a ban on inland shrimp farms will caused 27 % lost of shrimp production (63.000 tons: 170 Baht/Kg = 70.000 rai)

Agriculture:

1. Rice production area in central plain will be reduced without a ban on inland shrimp farms.
2. Damage of neighboring areas especially in rice fields.
3. Land rehabilitation will cause a lot of money.
4. Lost of suitability lands for agriculture.

Water Resources:

1. More sharing in water used by agriculture in dry season
2. Water consumption is less.
3. Confliction in careernamely: Rice farmer and shrimp farmers.

Country Policy:

1. Opposed to environmental management policy for agricultural sustainability.
2. Opposed to food security especially in rice production areas.
3. Opposed to WTO regulation.

Zoning

Criteria for zoning of shrimp aqua culture areas are set by follow natural sea water barrier characterized by Land Development Department (LDD) and Royal Irrigation Department that refered to satellite imagery interpretation. This was used in 7 provinces along Upper Thai Bay. It connect to 16 more provinces occupied by low saline level shrimp culture.

No clear natural sea water barrier is found in another 13 provinces along the east coast and southern Thailand. Inner coastal development areas by LDD are therefore the best choice.

The boundaries of land suitable for shrimp farming are out of seawater barriers to the seashore the land beyond that are non-suitable and are prohibited in 23 first provinces.

Conclusion

1. The total area of shrimp farming (black tiger) are 600,000 rai (1 km² = 6.25 rai). It was comprised of 66 % at normal level saline area along the seashore, low saline level at seasonally tidal flat and 12 % at low saline level fresh water areas.

2. Among 12 % of low saline level fresh water areas, 22 farms in 10 provinces were selected for pilot areas. It was found that: Salinity on the bottom of non fencing and drainage are over critical value i.e. >2 milimoh/cm and the salt seems to accumulate in the whole depth. It can be explained that the salinity is from soils and drainage water. While in the fenced ponds are lower than critical level but still higher than in natural culture. Penetration of salt is from neighbor pond sides. Distances of penetration depend upon soils, time and level of management.

3. Saline was found in the ponds themselves, reservoirs and canals around the ponds. It was over standard of irrigation water in most places. But it still can be used in agriculture. Salinity in neighbor pond was also over standard. Saline in non drainage ponds can flow over to neighborhood.

4. Saline water from the ponds can affect to rice cultivation. There will be no tillage and no grain filling. There will be a chance to effect in fruit trees plantation .e. citrus, mango, guava and chili.

5. In socio-economic point of view, inland shrimp farming will affect land degradation, loss of land suitable for agriculture, loss food security and low rice productivity which will affect to national trade as a whole. Last but not the least, inland shrimp farming will affect irrigation water sharing, water quality control and mis-understanding among neighborhood as a whole.

6. The boundaries of land suitable for inland shrimp farming are out of seawater barriers to the seashore the land beyond that are non-suitable and are prohibited.

References

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