



NATURAL RESOURCES USE AND WASTEWATERMANAGEMENT: A STUDY IN BUFFER ZONE OF XUAN THUY NATIONAL PARK - VIETNAM

Nguyen Thi Trang Nhung¹, Tran Huu Cuong², Philippe Lebailly¹

(¹)Liège University, Department of Rural Development

(²) Vietnam National University of Agriculture, Department of Marketing

I. Introduction

- ❑ Xuan Thuy National Park (XTNP), the largest coastal wetland ecosystem in the North of Vietnam, is located at right bank side of Red river estuary in Nam Dinh province.
- ❑ The overall area includes the Core Zone of 7,100 ha and 8,000 ha of 5 buffer zone communes.
- ❑ The park was the first wetland area to be announced a Ramsar site in south-east Asia and is internationally significant as a migratory bird habitat.



I. Introduction

- There are about 215 extensive shrimp households occupying 1,730.7 ha produce 516 ton and 40 intensive households amounting to 90 ha produce 450 ton in this international important wetland (Department of Agriculture and Rural Development of Giao Thuy district, 2015).
- Shrimp contribute significantly to local food basket and economy but it is overshadowed by environmental concerns.
- There are diversity of natural resources invested in intensive shrimp farming (wetland, tidal water and sand).
- Although these kinds of resources located in the buffer zone of XTNP, the uses of land, water and sand have influences on the protected area because they are belong to the same ecosystem.

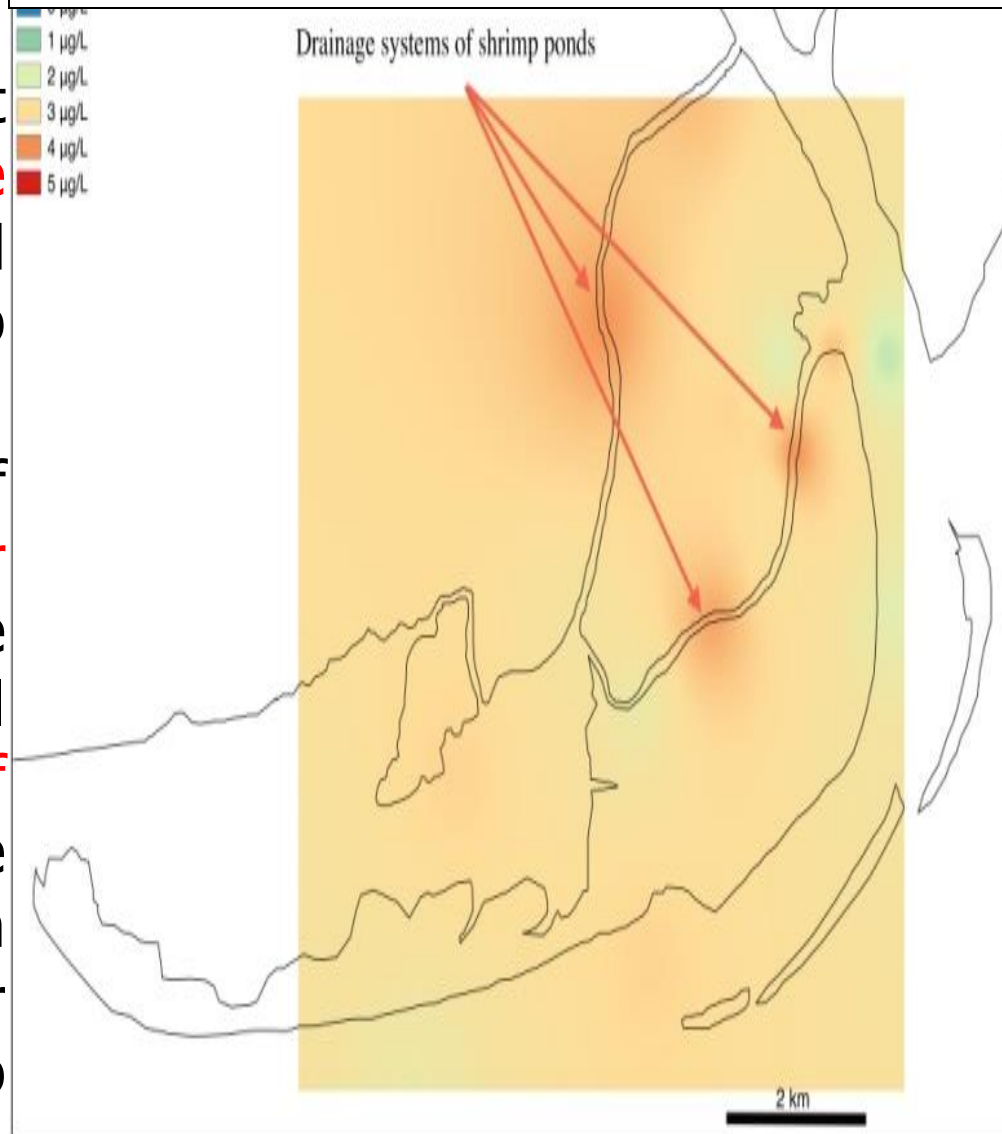
I. Introduction

Many researchers revealed that the XTNP ecosystem is polluted recently due to shrimp farming:

-The available records infer that the main factor of **mangrove loss** in the past lay on land reclamation for shrimp aquaculture.

- There was a tendency of **higher concentration of copper** surrounding the drainage system of shrimp ponds as well as **extremely high values of coliforms** index inside the shrimp ponds and in surrounding water of water channeling system for shrimp culture (Haneji, 2014)

Higher concentration of copper surrounding drainage system (Haneji, 2014)



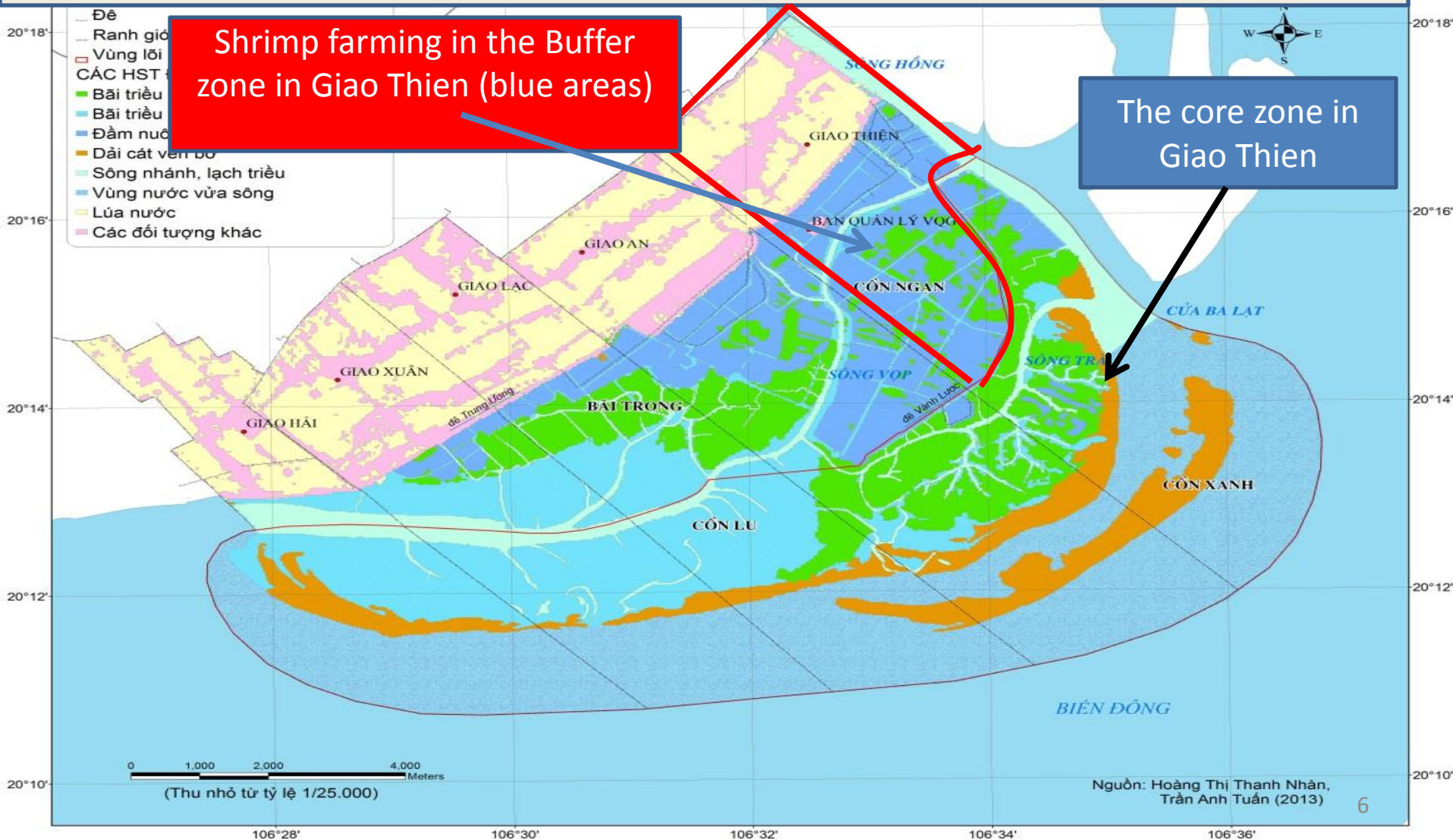
I. Introduction

Whether these resources used in XTNP's buffer zone are based on environmental responsibility?

This paper aims at describing the ways farmers use natural resources in the adjacent core zone and how they manage effluent in shrimp production to find the unsustainable aspects of this culture to the XTNP ecosystem.

II. Methodology: study site

Giao Thien commune is chosen to conduct the research because it has largest areas for intensive shrimp farming among 5 buffer comunes (blue areas 90 ha)



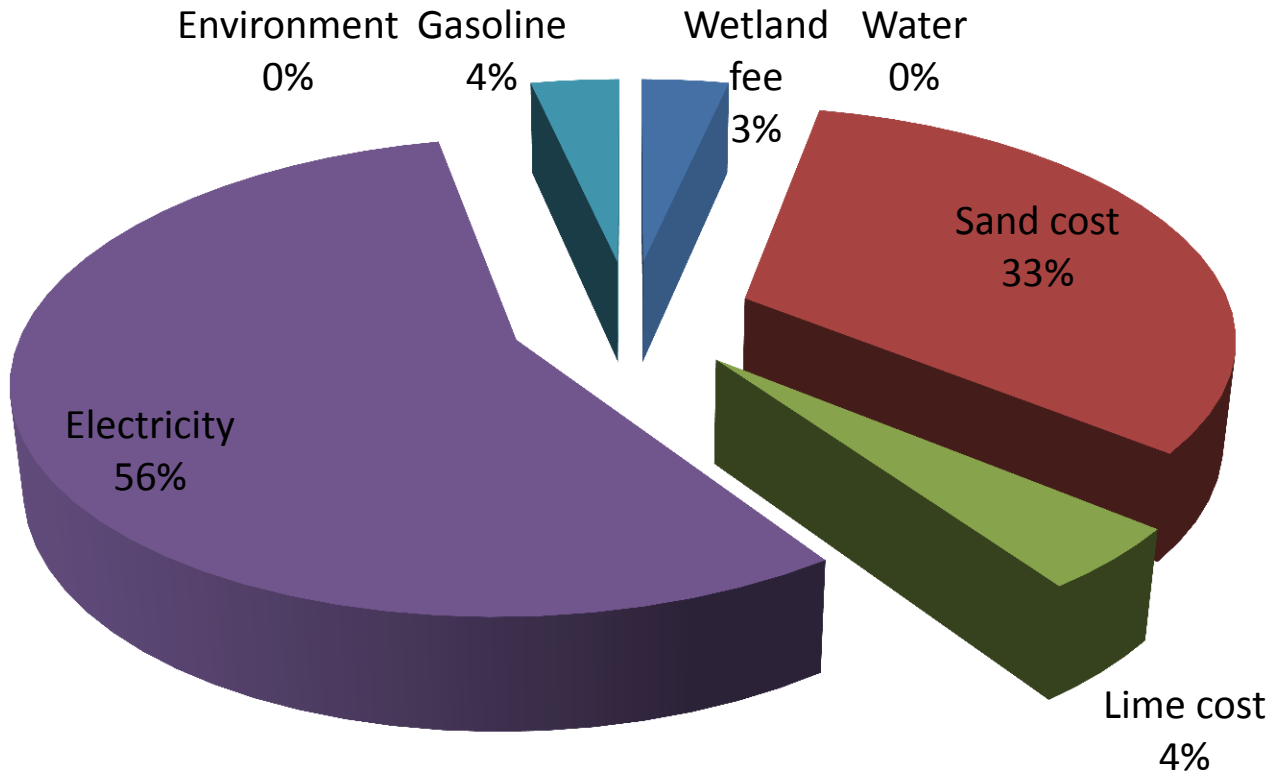
II. Methodology (cont.)

- Both quantitative and qualitative methods.
 - Quantitative method: Face to face interviews (with 30 farmers) with structure questionnaires are used to gather data about current practices of shrimp farmers in the study area.
 - Qualitative method of Participatory Rapid Appraisal (PRA) is applied to determine some constraints and implications for more friendly environmental practices. From the 30 farmers above, we chose 15 people who are most willing to discuss the further solutions.
- We conducted the field work on May and June of 2016.

III. Research results

Characteristics of Intensive shrimp culture: **Natural resources and other costs** (mil.Dong/ha/crop)

Wetland fee	Sand cost	Lime	Electricity	Gasoline	Environment tax	Water	Total
1.9	18.4	2.5	31.7	2.0	0.0	0.0	56.5



III. Research results

Characteristics of Intensive shrimp culture: Land used

Key issues	Value
Land ownership	
- Own (%)	0
- Rent/lease (%)	100
Land use prior to intensive shrimp farm	
- Tidal mudflat with mangrove (% households)	33
- Tidal mudflat without mangrove (% households)	67
Average total area for shrimp per household (m ²)	13,000
Average pond size (m ²)	1,300
No. of shrimp ponds per household (ponds)	5.7
Households have clarifying ponds for fresh water storage (%)	26.7
- % for fresh water storage in total shrimp area	15
Households have clarifying ponds for discharging waste water (%)	16.7
- % for discharging waste water in total shrimp area	11
Stocking density (head/ m ²)	78.4
No of crop per year	1-2
Growth period (days)	70-90
Duration of crops (days)	120
Diversity of species	Monoculture

III. Research results

Characteristics of Intensive shrimp culture: Land used

- All shrimp farmers have bid land with rental agreement from communal authorities. The duration of rent land are reviewed and extended every each **5 year**.
- The average area for shrimp farming in households is with mean of 1.3 hectares.
- There are only **26.7%** households design ponds for storing fresh water and **16.7%** households have area for waste water treatment.
- Especially, among these households, both of areas mentioned above are not more than 15% of total areas in shrimp systems. It is obvious that these areas are **smaller than 20%** which suggested by Vietnamese Ministry of Aquaculture.

III. Research results

Characteristics of Intensive shrimp culture: Land used

- Stocking density in XTNP is 78.4 head/m² which is **higher** than suggestion of Department of Agriculture and Rural Development of Giao Thuy district (30 - 60 head/ m²).
- All of shrimp farmers in XTNP have preferences only for **monoculture**.
 - *The first crop usually starts with pond preparation in March and harvest in June with average shrimp growth period is around 80 days.*
 - *The second crop lasts from July – October in winter time with more difficulties.*
 - *Fallow time in 3-4 months after 2nd crop.*
- The average annual fee for land is 1.25 mil.dong/ha/year depending on specific locations. It account for 3% in total natural and some other costs.

III. Research results

Characteristics of Intensive shrimp culture: **Water used**

Key issues	Value
Sources of water	Tidal (brackish water)
Water amount for 1000 m ² (m ³)	1200
Water exchange per crop (times)	9.5
Aeration used	Daily
Water treatment before pumping water in ponds (%)	100
Water treatment before discharging waste water to the rivers(%)	16.7
Location of effluent discharge	
- Directly to the common rivers (%)	100
- Other places (%)	0

III. Research results

Characteristics of Intensive shrimp culture: Water used

- Intensive shrimp aquaculture required brackish water which its salinity from 2‰ to 40‰ and exchanged frequently.
- In XTNP, the times of changing water for ponds depend on observation of farmers about water quality inside each pond at the rate of about 10 - 15% of total pond volume.
- All of interviewees applied technique to control water before crop but 83.3% of them release effluent without treatment to the rivers.
- Water is essential role in shrimp culture but currently it is not calculated in ecosystem fees in XTNP.

III. Research results

Characteristics of Intensive shrimp culture: Natural resources used

Sand is the second expense following electricity with 18.4 mil.Dong/ha/crop (= 460 m³). The sand is exploited in Giao Thien estuary.

*Sand mine in Giao Thien estuary
(view from dike)*



III. Research results

Characteristics of Intensive shrimp culture (cont.)

- **Environmental fees:** Farmers responded that they just pay for housing waste collecting, not for aquaculture tax.

III. Research results

Obstacles of sustainable practices

✓ **Internal:**

- Farmers' awareness about sustainable practices is still moderate.
- Farmers invest almost of their capital for shrimp: bidding land from other household (land ownership is belong to Government), infrastructure building, and other inputs cost. Thus, they seem have high preference to use every metre of land to enlarge the area for shrimp pond instead of building some areas for water in and wastewater out.

✓ **External:**

- The duration for land bidding is 5 year which is not stable enough for farmers to applied any well designed pond systems.
- Water conflicts occur between shrimp farmers within the same community because discharge water of upstream households is used for downstream households. There is still no effective mechanism to control in the location.
- There is no shrimp membership to connect farmers network. They practice quite spontaneously.

IV. Conclusion and discussion

- Water, environmental fees are not yet counted in shrimp farming. Thus, shrimp farmers still have not paid fully for ecosystems.
- Sand used with large amount for aquaculture is exploited in the estuary near the dike which may have impacts on the ecosystem and structure of coastal line in the future.
- Majority of farmers follow inappropriate activity when releasing waste water to the environment. According to Paez-Osuna (2001), it is dangerous when redundant feed and waste discharged directly into the river, which renders it disease. The intake of polluted water from neighboring farms often spreads water-born disease from farms to farms.

IV. Conclusion and discussion

- Monoculture itself can be a highly vulnerable production system due to bearing high risk and causing environmental impacts while poly culture helps to recycle the nutrients and increase the yields while monoculture. Soil salinization in shrimp monoculture in XTNP is the constraint elements that highlight the unsustainable farming practices.
- High stocking density and excessive use of feed lower water quality result in stress and diseases among shrimp in intensive farming system (Flaherty and Vandergeest 1998; Paez-Osuna et al. 2003).

In Conclusion, Shrimp farming depended mainly on economic aspects with less consideration of environmental responsibility.

V. Implications

- ❖ Urgent needs for effective interventions of local governments to control effectively water conflict between shrimp farmers.
- ❖ Strengthen awareness of farmers about sustainable practices and environmental protection.
- ❖ Extension the rental land duration to encourage longer term investment.
- ❖ Forming the shrimp farmers group to monitor each others.
- ❖ Monitoring the sand exploiting in the estuary.

THANK YOU FOR YOUR
ATTENTIONS!

