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## **The rise and fall of the shrimp supply chain in Vietnam's Tam Giang Lagoon: Is privatisation to blame?**

**H. Truong, M. Lyne and K. Woodford**

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Faculty of Commerce  
PO Box 85084  
Lincoln University  
LINCOLN 7647  
Christchurch  
P: (64) (3) 325 2811  
F: (64) (3) 325 3847

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- 7 Use any recognised method of referencing. Consistency is the key.
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# **The rise and fall of the shrimp supply chain in Vietnam's Tam Giang Lagoon: Is privatisation to blame?**

## **Abstract**

The area of shrimps farmed in Tam Giang Lagoon expanded at an average rate of 400% each year from 1995 to 2004. After peaking at 4,000ha in 2004, the area fell steadily to 2,700ha in 2008. An exploratory investigation of the shrimp supply chain conducted in 2009 revealed that the local industry had succumbed to environmental risk following persistent and widespread outbreaks of disease in the Lagoon. These outbreaks have been attributed to water pollution, which - in turn - has been linked to the rapid growth of shrimp production. This growth was triggered by increased earnings in shrimp farming, and then facilitated by unregulated privatisation of lagoon resources. At first glance, this Coasian view of institutional change appears to explain the deterioration in water quality and subsequent destabilisation of the local shrimp industry. Privatisation encouraged shrimp farmers to adopt more intensive production methods that generated more waste. In the absence of zoning, the earthen walls and fine nets used by farmers to privatise the Lagoon blocked natural waterways causing the waste to accumulate and overload the absorptive capacity of the local ecosystem. This argument has prompted retrospective zoning and proposals to remove all net enclosures. While there is certainly merit in zoning to keep the Lagoon's natural waterways clear, this paper contends that pollution abatement policy should focus not on shrimp farmers' exclusive (private) rights to the lagoon bed but rather on their inclusive (open) rights to the lagoon water.

**Keywords:** Common pool resource, water pollution.

## **About the Authors:**

Hieu Troung graduated with a PhD from the Department of Agricultural Management and Property Studies, Faculty of Commerce, Lincoln University, in 2012. He is currently Vice-Director of the Quangtri Province branch of Hue University in Vietnam. Contact: [hieutc772000@yahoo.com](mailto:hieutc772000@yahoo.com).

Michael Lyne is Associate Professor of International Rural Development in the Department of Agricultural Management and Property Studies, Faculty of Commerce, Lincoln University, and Honorary Professor in the School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, South Africa. Contact [Michael.Lyne@lincoln.ac.nz](mailto:Michael.Lyne@lincoln.ac.nz).

Keith Woodford is Professor of Agribusiness in the Department of Agricultural Management and Property Studies, Faculty of Commerce, Lincoln University. Contact [Keith.Woodford@lincoln.ac.nz](mailto:Keith.Woodford@lincoln.ac.nz).

## **1 Introduction**

An exploratory investigation of the shrimp supply chain at Tam Giang Lagoon revealed a breakdown in chain coordination due to increasing volatility in shrimp supply. Respondents attributed this problem to persistent and widespread outbreaks of aquatic disease since 2004. Tuyen (2002), in turn, attributes the disease problem to water pollution caused primarily by the rapid and unregulated expansion of intensive shrimp farming in the Lagoon. It is important to find a solution to the pollution problem that will sustain a healthy shrimp industry as some 100,000 poor people living in and around the Lagoon depend directly on aquaculture and fish capture as their main livelihood (Tuyen, Armitage & Marschke, 2010). Moreover, the situation at Tam Giang is a microcosm of the challenges experienced in similar systems throughout Southeast Asia (Tuyen *et al.*, 2010).

Growth in the shrimp industry appears to have been triggered by the introduction of *Penaeus monodon*, the giant tiger shrimp that earned high prices on export markets (Huong & Berkes, 2011), and was facilitated by the privatisation of lagoon resources (Tuyen *et al.*, 2010). Privatisation also skewed the distribution of income, marginalising households that rely on the Lagoon's shared fishing waters for a living. These observations prompted the provincial government to adopt a proposal to remove all private net enclosures from the Lagoon by 2010 (Tuyen *et al.*, 2010). Although the government did not succeed in implementing this controversial policy, the notion that water quality and social conditions would improve if private property rights were extinguished warrants closer scrutiny.

This paper pays particular attention to the property rights that shrimp farmers exercise in Tam Giang Lagoon. It is argued that these farmers enjoy both exclusive (private) and inclusive (open) property rights to lagoon resources, and that pollution abatement policies should focus not on expropriating their private property rights (other than to comply with zoning requirements) but rather on addressing the negative externalities created by their inclusive property rights.

Section 2 of the paper provides a brief description of livelihoods supported by the Lagoon and the growing importance of shrimp production. Section 3 presents the key findings of an exploratory study of the local shrimp supply chain and section 4 outlines the relationship between chain performance and changes in the Lagoon's property right institutions. Section 5 considers policy approaches to the pollution problem. The paper concludes with a recommended policy approach.

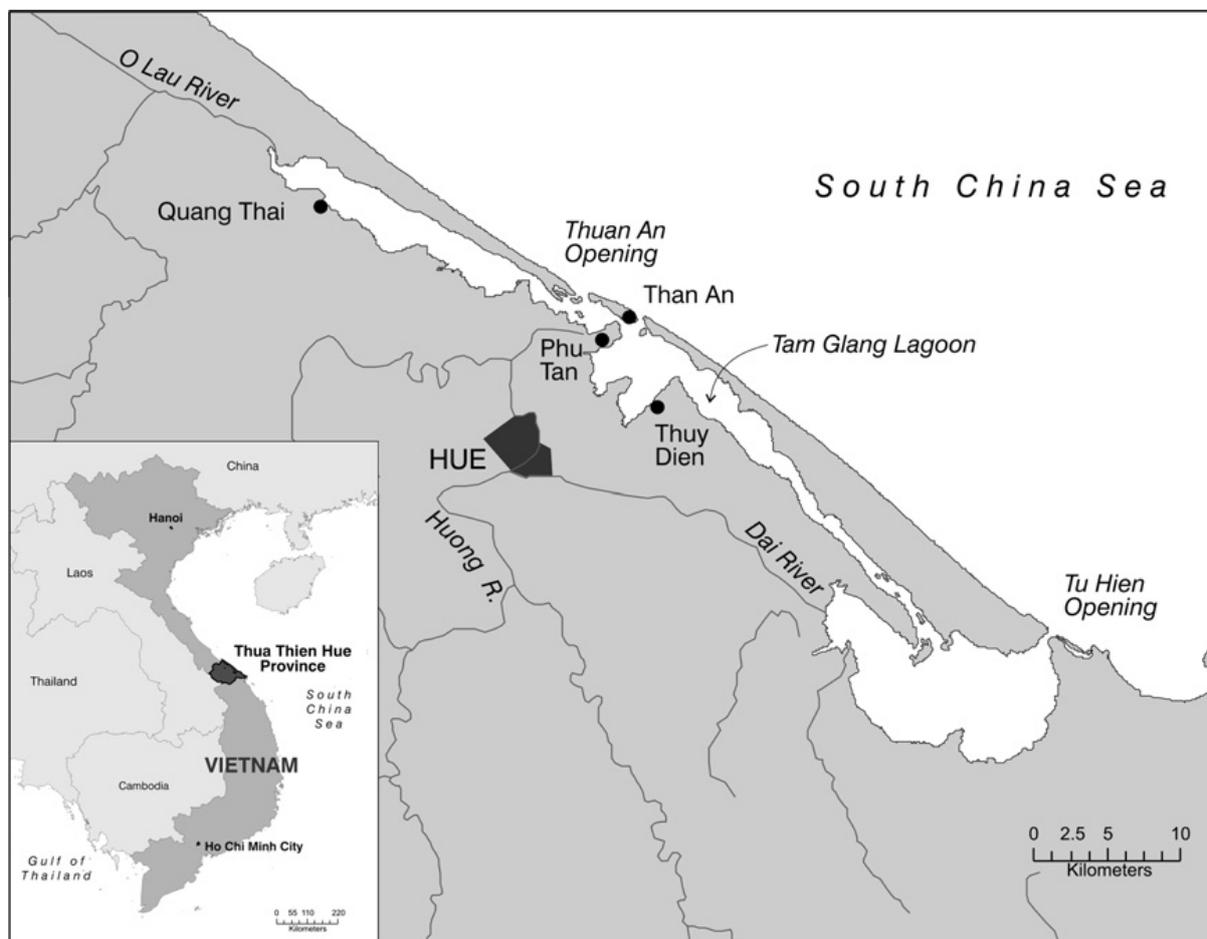
## **2 An overview of Tam Giang Lagoon, its livelihoods and shrimp industry**

Tam Giang Lagoon is the largest lagoon in Southeast Asia with an area of 21,467ha. It is located on the Eastern shore of central Vietnam approximately ten kilometres from Hue City in Thua Thien Hue Province (Figure 1). More than 300,000 people live in and around the Lagoon (IMOLA 2006) of whom some 100,000 depend directly on aquaculture and fish capture as their main livelihood, and many of the remaining 200,000 engage in related activities further down the supply chain and work part-time in aquaculture and fish capture (Tuyen *et al.*, 2010). The incidence of poverty in Lagoon communities ranged from 55-70% in

2000, exceeding the national poverty rate of 36% in rural Vietnam that year (Phap, Mien & Thuan, 2002). Of the economically active population, 58% had no skills training.

Vietnam has a long coast line and the government prioritised the development of sustainable commercial aquaculture in 1998. This decision was formalised as a Central Government Resolution (09/NQ-CP) in 2000. Between 1995 and 2005, the national area of aquaculture grew at a compound rate of 13.8% per annum, and production grew 33% per annum (GSO, 2007). The export value of the fisheries sector increased from US\$697 million in 1996 to US\$2,650 million in 2005 (GSO, 2007). By 2006, aquaculture ranked as the third-most prominent economic sector after the oil and garment industries (GSO, 2007).

In Tam Giang Lagoon, the area used for shrimp production increased from just 100ha in 1995 (Phap, *et al.*, 2002) to nearly 4000ha in 2004 (TTH Statistical Bureau, 2005). However, the area declined steadily after 2004 as did the dominance of shrimps in the mix of aquaculture products (Table 1).



Source: Tuyen *et al.*, 2010.

**Figure 1: Tam Giang Lagoon, central Vietnam**

**Table 1: Aquaculture production in Tam Giang Lagoon, 2002-2008**

Year	Aquaculture area (ha)	Shrimp culture		Other aquaculture	
		Area (ha)	%	Area (ha)	%
2002	3,212	3,197	99.5	15	0.5
2003	3637	3,622	99.5	15	0.4
2004	4,027	3,998	99.3	29	0.7
2005	3,883	3,464	89.2	419	10.8
2006	3,778	3,024	80.0	753	19.9
2007	3,783	3,053	80.7	730	19.3
2008	3,771	2,733	72.4	1,038	27.5

Source: TTH Statistical Bureau, 2005, 2006 & 2009.

Aquaculture products that have been substituted for shrimp include fish (mainly tilapia), crabs and molluscs. This substitution was by induced by higher expected profit. According to PRAs conducted by the Integrated Management of Lagoon Activities Project (IMOLA) in six of the 33 Lagoon communes, shrimps would still be chosen ahead of other aquaculture products under normal conditions (IMOLA, 2006) when profits are much higher than those earned from tilapia and crabs. However, conditions are no longer normal as diseases have increased yield risk and reduced expected profits in shrimp production.

### **3 Exploratory investigation of the shrimp supply chain**

An exploratory study of the shrimp supply chain was undertaken in 2009. In-depth interviews were conducted with ten farmers, nine wholesalers - ranging from very small to large in size, three local retailers and the only shrimp processing-exporting company located in Thua Thien Hue Province. The respondents were purposively selected at each stage of the supply chain to ensure variation in the size of transactors and markets served. Large wholesalers also supply credit and feed to farmers. Shrimp seed is purchased from hatcheries, mostly from hatcheries located outside the Province. Hatcheries were not sampled and information about business relationships between hatcheries and farmers was gathered mainly from the farmer respondents. Relevant research papers, and reports and documents issued by government and non-government agencies, were studied to inform the interviews and to triangulate information provided by respondents.

This investigation revealed a substantial level of coordination in the supply chain prior to 2004. Large wholesalers developed long-term relational contracts with famers that linked credit and feed supply to the purchase of the farmer's crop. By 2009, much of this coordination had been lost and the chain lacked customer focus and effective systems to share information and control product quality. What caused the chain to weaken? The owner of Thanh Tin Ltd., a large wholesaling company that was still trying to maintain its trust-based supply contracts with shrimp farmer even though they had defaulted on their loan repayments, answered the question when he stated that "*the amount of appropriated*

*capital is really high, but we have to stand it. Farmers had to deal with too many difficulties in recent years, and we share these difficulties with them because we want to keep good relationship with farmers in a long time".* The farmer and wholesaler respondents confirmed that widespread and persistent disease problems had reduced both the quantity and quality of shrimps produced throughout the Lagoon since 2004, making it impossible to fulfil supply contracts. In short, relational contracts had been damaged by environmental uncertainty (covariant yield risk) rather than by behavioural uncertainty (opportunism). Heightened yield risk had undermined efforts to coordinate value-adding activities, rendering the supply chain ineffective.

#### 4 Institutional change and performance of the shrimp industry

The data presented in Table 2 provide some insight into the effects of disease on shrimp production in the Lagoon. White-spot kills shrimps within a few days and MBV stunts their growth resulting in an undersized product.

**Table 2: Shrimp diseases during the period 2000-2008**

Year	Shrimp production (ha)	Area infected with disease (ha)	Share of production area infected (%)	Type of disease		
				White-spot (ha)	MBV (ha)	Others (ha)
2002	3197	171	5.4	28	64	79
2003	3622	122	3.4	45	26	51
2004	3998	1383	34.6	1126	125	132
2005	3464	582	16.8	350	145	87
2006	3024	170	5.6	138	4	28
2007	3053	1084	35.5	890	3	191
2008	2733	146	5.4	119	0	27

Source: FSPS II, 2008.

Pathogens and the environment play an important role in the spread of shrimp diseases (FAO, undated). Water pollution is the underlying problem as it leaves all producers vulnerable to diseases even if their seed is disease free. There are several sources of water pollution in the Lagoon. These include aquaculture and other livelihood activities within the lagoon, and emissions from agriculture, industry and urban settlements located in the catchment area (Hop, Long, Phong & To, 2005; Nga, 2006). Although the respective contributions of these different sources of pollution have not been quantified, aquaculture - and shrimp production in particular - is regarded as the main culprit. Tuyen (2002) and Huong and Berkes (2011) clearly link the Lagoon's environmental deterioration to rapid growth in its shrimp industry. According to these researchers, the dense distribution of ponds and net-enclosures impeded water exchange, restricted the dispersion and development of aquatic plants and accelerated sediment deposition. Intensive production

methods (e.g. supplementary feeding and use of medicines) adopted by farmers aggravated the problem (Linh, 2005).

Some authors blame the pollution on uncontrolled privatisation of the Lagoon that facilitated the 'boom' in shrimp production (Phap, *et al.*, 2002). To examine this argument it is useful to trace recent institutional changes in the Lagoon. Before 1975, there were two kinds of lagoon use, namely *Dai Nghe* (fixed-gear fishing) and *Tieu Nghe* (mobile fish catching). Fishing was regulated by village authorities, implying that lagoon water within their areas of jurisdiction was a common property resource. However, village authorities also auctioned off exclusive use rights to fixed-gear fishers (Tuyen, 2002) and these rights could be transferred between generations. By 1975, much of the peripheral lagoon bed had been *de facto* privatised even though natural resources were statutorily owned by the state. Between 1975 and 1986, fishing cooperatives replaced village authorities as the administrators of use rights to catch fish in lagoons (Huong & Berkes, 2011). After 1986, *Doi Moi* policy reforms shifted production decisions and property rights to households, starting with use rights but extending to temporary transfer rights in 1993 and to permanent transfer rights in 2003 (Huong & Berkes, 2011).

This brief description of institutional change is both naive and misleading. It is naive because it does not define what was being privatised, and misleading because it creates the impression that institutional change was driven exogenously by the state. It was the lagoon bed that was privatised, and not the water above it. The exclusive rights enjoyed by fixed-gear fishers related to a specific part of the lagoon bed on which nets and bamboo fences were erected. The water above the lagoon bed washed through the nets and fences much like the air above a privately-owned farm. From a fisher's perspective, the water was a common property resource because rules governing the extraction of fish were policed and enforced (at least during the time that fishing was regulated by village authorities). However, this situation changed when the water gained a new use – shrimp production.

In 1985, the government introduced *Penaeus monodon* (the giant tiger shrimp) that could be sold on lucrative export markets. However, households were denied the right to practice aquaculture. This privilege was granted only to state-owned enterprises, but these enterprises were poorly managed (Quyen<sup>1</sup>, personal communication, 2009). In 1993, the state relented and issued Decree 64/CP which allowed households to exercise exclusive rights to the lagoon bed (in certain parts of the Lagoon) in order to practice aquaculture. Demand for secure property rights was strong because export prices for giant tiger shrimps were increasing (FAO, undated) and farmers wanted to protect their investment in shrimp enclosures (Phap *et al.*, 2002). The Provincial People's Committee responded by issuing 'Red Book' property rights to fixed-gear fishers located near the shoreline who converted their net and fence enclosures into earthen-walled ponds for shrimp production (Huong & Berkes, 2011). Shrimp farmers operating in deeper water further from the shore privatised the lagoon bed by erecting fine-mesh nets. Many of these farmers were allowed to formalise their *de facto* exclusive rights to the lagoon bed by taking up five-year and one-

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<sup>1</sup> Mr. Quyen is the Coordinator of Fisheries Sector Program Support Phase II in Thua Thien Hue Province, Department of Agriculture and Rural Development.

year permits issued by district and commune authorities respectively (Huong & Berkes, 2011). The permits sanctioned exclusive operational rights within the enclosed area.

This process of institutional change is consistent with the Evolutionary Theory of Land Rights (Demsetz, 1967) or Coasian 'transaction cost' model of institutional change which, in the context of property rights to land, contends that secure tenure and low transaction costs emerge in response to population growth and new technology (Feder & Noronha, 1987). The generic explanation starts with land becoming relatively scarce owing to population pressure and better prospects for commercial farming. This is expected to induce a change towards private land rights because farmers have an incentive to invest but are unable to internalise the benefits of their effort unless they can exclude other users (Ault & Rutman, 1979). While the Coasian model been criticised for ignoring problems of collective action that may prevent farmers from launching an effective lobby (Olson, 1971), political resistance (Thomson & Lyne, 1993) and path dependency (Bardhan, 1989) these potential barriers to institutional change were obviously not binding in *Doi Moi* Vietnam.

Regardless of what drove privatisation in Tam Giang Lagoon, it is important to remember that it related only to the lagoon bed. To emphasise this point, it is useful to distinguish between shrimp farmers who constructed earthen-walled ponds in the shallows of the Lagoon and those operating in deeper water who erected net enclosures to contain their shrimps. When considering net enclosures, it is clear that the water passing through the nets is not a private resource (characterised by exclusive property rights) but rather a common pool resource (characterised by inclusive property rights). Moreover, the use of water to grow shrimps was not governed by the common property rules that regulated the extraction of fish. Like the air above a factory, the lagoon water became an open access resource to farmers producing shrimps in net enclosures. The same argument can be applied to pond farmers if they are able to discharge polluted water into the lagoon. In theory, regulations preventing the discharge of polluted water from shrimp ponds would internalise the cost of pollution to these farmers, encouraging them to adopt cleaner production methods. In practice, it is not cost-effective to police such regulations given the existence of thousands of small and inaccessible ponds.

Unfortunately, the privatisation of Tam Giang Lagoon for shrimp production was not well regulated. Zoning was not implemented and natural waterways were blocked by earthen walls and fine-mesh nets (Tuyen *et al.*, 2010). Pond farmers were not required to construct treatment ponds where polluted water could be cleaned before it was released into the lagoon. Not only did the area used to produce shrimps increase rapidly but farmers also adopted intensive production methods (Huong & Berkes, 2011). The evolving mix of private and open access property rights would have encouraged shrimp farmers to intensify their production methods as they were able to internalise the benefits of their investment while externalising the cost of their water pollution. In addition, the 'Red Books' issued to many owners improved their ability to finance investments in shrimp farming because formal lenders accepted these certificates as collateral for loans (Xuan & Hoa, 2005; Tinh, 2005). Together, the expansion and intensification of shrimp production elevated the concentration of contaminants (excess feed, shrimp waste and chemicals) over a larger part of the lagoon. In the absence of zoning to keep natural waterways open, it was inevitable that water quality would deteriorate.

## 5 Policy approaches to promote a sustainable shrimp industry

Provincial policy-makers responded to the problem of blocked waterways long before the disease problem emerged. Their response was motivated by concerns about sustainable use of lagoon resources and a burgeoning social problem (Tuyen *et al.*, 2010). *De facto* privatisation of the lagoon bed reduced both access to, and the area of, open water for fishing. Mobile-gear fishers, who lacked the resources needed to privatise the lagoon bed, were thus further marginalised. In 2001, the provincial government adopted a proposal to phase out all net enclosures by 2010. Implementation of this policy stalled in the face of resistance from the owners of net enclosures and it took a threat of force to clear just some nets from designated waterways (Tuyen *et al.*, 2010). No compensation was offered for net enclosures that were expropriated as the owners did not have 'Red Book' property rights.

Failure of this 'top down' intervention encouraged the provincial government to support a strategy of co-management initiated by an interdisciplinary research team based at Hue University. In essence, this strategy involves compromises negotiated between government authorities at the local and district level and Fishery Associations representing multiple user groups at the village or sub-village level (Tuyen *et al.*, 2010). The first priority is to encourage the owners of net enclosures to reduce the size of their enclosures in order to create gaps between them. These gaps will give mobile-gear fishers better access to open fishing water and are also expected to benefit shrimp farmers by reducing disease through improved water flow. Even so, the pilot project described by Tuyen *et al.* (2010) has confronted many challenges and progress has been patchy and slow.

Opening the waterways is a necessary step in promoting a sustainable shrimp industry at Tam Giang, and this process could be expedited by offering compensation for all *de jure* property rights attenuated by retrospective zoning. Some might argue that compensation should be offered to help achieve the provincial government's 2001 policy proposal to remove all net enclosures. However, the Lagoon's own history emphasises the critical relationship between shrimp farming and private property rights to the lagoon bed. Removing these rights would be disastrous for the shrimp industry and local livelihoods. Apart from zoning to clear the Lagoon's waterways, policies to promote sustainable shrimp production should focus on pollution abatement instruments that induce farmers to adopt cleaner production methods. Such instruments could be market based, regulatory or involve institutional innovation to manage lagoon water as a common property resource in shrimp production. Work is currently in progress to evaluate and recommend appropriate pollution policies for Tam Giang Lagoon.

## 6 Conclusions

This paper argues that the private property rights exercised by Tam Giang's shrimp farmers relate only to the lagoon bed whereas the lagoon water is an open access resource in shrimp production. Recognising this distinction helps to resolve a policy dilemma. Removing private rights to address the pollution and disease problems is counterproductive because shrimps cannot be farmed profitably without exclusive rights to the lagoon bed. Instead it is recommended that zoning should be implemented to improve water flow, and that

pollution abatement policies should focus on instruments that induce farmers to adopt cleaner production methods. Such instruments could be market based, regulatory or involve institutional innovation to manage lagoon water as a common property resource in shrimp production.

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