

## Present Status of Lobster Cage Culture in Vietnam

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### Abstract

In Vietnam, cage culture of lobsters started in the year of 1992 in the Khanh Hoa province, and significant expansion took place in the Southern Central Vietnam from Da Nang city to Binh Thuan province in the year of 2000. Ornate or spiny rock lobster (*Panulirus ornatus*) is the most important cultured species among others (*P. hormarus*, *P. timpsoni*, and *P. longipes*). There are approximately 35,000 cages of which approximately 20,000 cages are located in the coastal waters mainly of the Khanh Hoa sea. These marine cages are responsible for approximately 1,500 metric tonnes of products and valued more than US\$40 million in 2003. This paper reviews the current status of cage culture of lobsters, and identifies major technical, and socio-economic constraints to further development.

### Introduction

In 1992, actual marine cage culture developed in the form of lobster culture in Khanh Hoa province based on the study conducted by Ho Thu Cuc (UoF) in collaboration with Khanh Hoa Department of Fisheries. By 2003 there were more than 35,000 lobster cages in the whole country. The main culture areas are Khanh Hoa, Phu Yen and Ninh Thuan provinces (figure 1). The main species cultured are Ornate lobster *Panulirus ornatus*, among others such as *P. hormarus*, *P. timpsoni*, and *P. longipes* (Tuan, 2000).

Lobster cage culture has great potential to develop in Vietnam. There is a 3,200 km-long coastline, an exclusive economic zone (EEZ) of one million square kilometres, more than 4,000 islands, and many lagoons and bays, which are suitable for cage culture (MOF, 1994<sup>a</sup>). In the future when Vietnam can produce hatchery seed, lobster cage culture is predicted to develop strongly.

### Issues

#### Seed

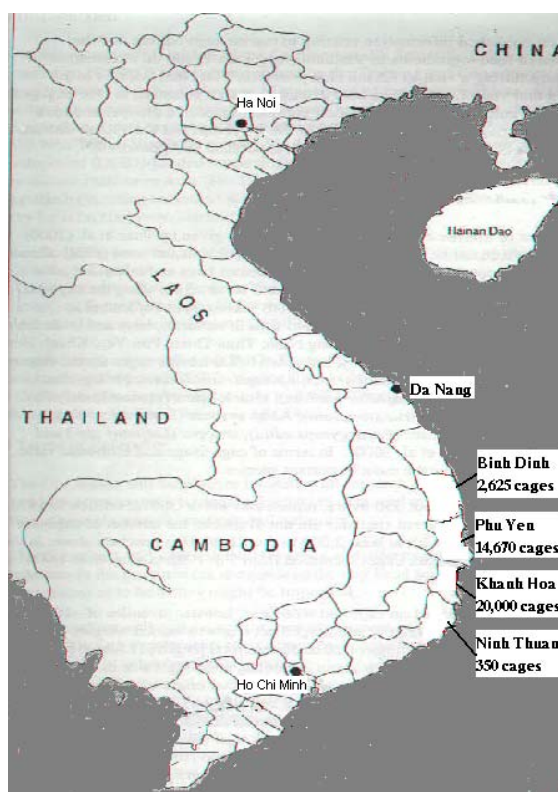


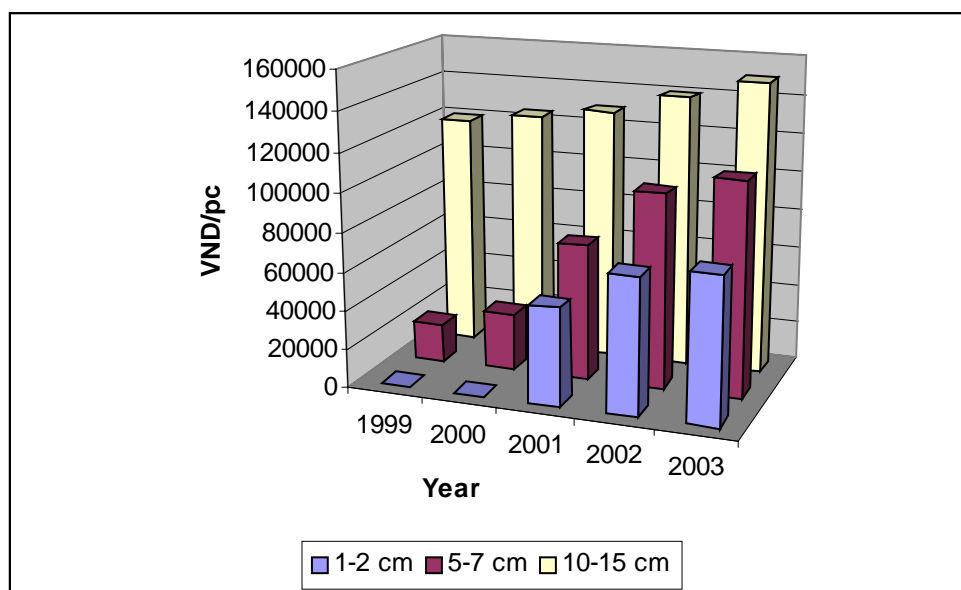
Figure 1. Major lobster culture areas in Vietnam

Lobsters are distributed mainly in the Central sea from Quang Binh province to Binh Thuan province. Among 9 identified species in the region, 3 species have rapid growth, large size, bright colour, and high export-value. These are *Panulirus ornatus*, *P. homarus*, and *P. stimpsoni*. *P. longipes* is also cultured, but in small quantities. In general, each species has its own distribution area. For example *P. ornatus* is found mainly in Ninh Thuan Sea and *P. stimpsoni* in Quang Binh-Quang Tri Sea (Thuy, 1996; Thuy,1998).

There have been some studies on seed production of lobster (*P. ornatus*, *P. homarus*) in the Research Institute for Aquaculture No. III (RIA III) in Nha Trang, but the results have not been recorded. At present, lobster seed is sourced from the wild. Lobster seed was transported mainly from northern central provinces such as Hue, Da Nang, Quang Nam, Quang Ngai and Binh Dinh to meet the demand in southern central provinces including Phu Yen, Khanh Hoa, and Ninh Thuan. However, farmers prefer to stock local seed because of the seed quality. The demand for the lobster seed has increased markedly. The annual demand was from less than 500,000 animals in 1999 to approximately 3,500,000 animals in 2003 for the whole region.

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**Figure 2.** Price trends for lobster seed in Khanh Hoa province, Vietnam (1 US\$ = ca. VND 15700).

Knowledge of the fishery is still inadequate to be able to determine the maximum sustainable yield, and this information is unlikely to be available in time to be useful for management purposes. However, price gives a reasonable indication of the relation between supply and demand, and this has increased significantly in recent years for all sizes of lobsters, suggesting a shortage of supply and the possibility of over-exploitation (Fig. 2).

### Cage

Cages are designed in various ways depending on characteristics of culture areas and the farmers' financial conditions (Table 2).

*Floating cage:* The bag of the floating cage is supported normally by a frame with buoys. Lobster cages in the Nha Trang bay (Khanh Hoa) belong to this kind. This kind of cage is commonly located in waters with the depth of 10-20 m, e.g. in the Nha Trang bay.



**Figure 3.** Floating cages

**Table 1.** Summary of commonly used cages in Vietnam for spiny rock lobster

Cage				
Type	Shape & size	Frame	Bag	Culture Area
Floating	Bottom: rectangular; Various size: 4x4x(1.5-4), 3.5x3.5x(1.5-4), 3x4x(1.5-4) m, etc.	Salt-resistant wood and buoys	Net	Sites with depth of 10-20 in bays (Khanh Hoa)
Fixed	Bottom: rectangular, square Various size: 2x2x(1.5-4), 3x3x(1.5-4) m, etc.	Salt-resistant wood	Net, 2a= 2-5 cm	Shallow sites in bays (Phu Yen, Khanh Hoa)
Submerged	Bottom: rectangular, square; Various size: 2x2x1.5, 3x3x1.5 m, etc.	Iron	Net	Shallow sites in bays (Phu Yen, Khanh Hoa, and Ninh Thuan).

*Wooden fixed cage:* The framework is made of salt-resistant wood. Wooden stakes with 10-15cm diameter and 4-5m length are embedded every 2 meters so as to create a rectangular or square shape. The bottom area of a farm is normally 20-40 square meter, but may be as much as 200-400 square meters. The cage size is also varied. Each cage normally has a cover. The cage may be on or off-bottom. Fixed off-bottom cage is about 0.5 m far from the sea bed. Fixed on-bottom cage is lined with a layer of sand. This kind of cage is suitable for sheltered bays and behind islands where there is shelter from big waves and typhoons. They are common in the Van Phong bay, Khanh Hoa province.

*Submerged Cage:* The framework is made of iron with a diameter of 15-16mm. The bottom shape is rectangular or square with an area normally between 1-16 square meter. The height is 1.0-1.5m. The cage has a cover and a feeding pipe. This kind of cage is common for nursing lobster seed in Nha Phu lagoon, and for grow-out farming in the Cam Ranh bay in Khanh Hoa, and in Ninh Thuan, Phu Yen provinces.

Materials for making cages such as wood, iron, net, etc. are available in Vietnam. The marine cages are often of small size suitable for family-scale operation. That is why the number of cages has increased significantly in recent years. While individual developments may have no significant impact on the environment or society, a



**Figure 4.** Wooden fixed cages

large number of developments, however small, may have significant impacts on the wider social and economic environment, and on each other.



**Figure 5.** Submerged cages

### Feed

Lobsters are fed exclusively with fresh whole or chopped fish and shellfish. The most commonly used species/groups for feeding lobster are Lizardfish (*Saurida* spp); red big-eye (*Priacanthus* spp); Pony fish (*Leiognathus* spp); pomfret; snails, oyster and cockles; small swimming crab, other crabs and shrimps. Finfish comprises about 70% of the diet, with 30% shellfish. The preferred fish (comprising 38% of fishes in diet) was lizardfish.

Farmers showed active selection of the preferred fish species, using a consistently higher proportion than present in typical trash fish landings (Figure 5), and using a higher proportion of lizardfish in particular, despite significantly higher price (average VND5000/kg) associated with this species. Food conversion ratio for lobster using this diet is high at around 17-30 (fresh weight basis).

Feeding small-sized lobsters was carried out 3-4 times/day. Feed amount was increased in the evening. Trash fish was chopped into small pieces, and mollusks' shells were excluded. Feeding Large-sized lobsters (>400g/pc) was 1-2 times/day. There is no need to chop trash fish and exclude mollusks' shells. Feeding intensity of lobster increased strongly just before molting. In last few months of a culture cycle, shellfish amount (mollusks, crustacean) was increased while trash fish decreased.

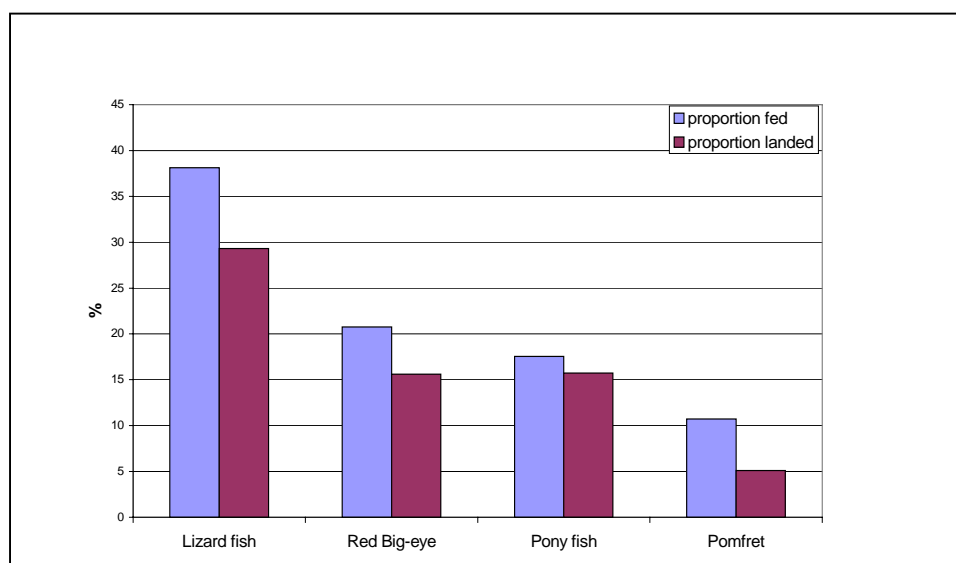


Figure 5. Preferential selection of trash fish species by Lobster farmers

Feeding of trashfish with high FCRs has caused some problems with water quality, such as the total nitrogen content in the sea water exceeded the standard level for aquaculture of 0.4 mg/L in some sites in Xuan Tu, Khanh Hoa (Tuan, 2004).

### Disease

In the past, lobster diseases rarely occur. Recently, stocking lower quality seed (e.i. seed at perruli stage, long distance from the culture area, harmful fishing method using high-pressure lights) in lower water quality (due to rapid increase in number of cages) resulted in some diseases in cultured lobsters in some areas (Table 2).

Table 2. Some common diseases in cultured lobster in Vietnam

Year	Disease	Diagnosis	Protection and Treatment	Damage
1998	Black gill	Gill darken	Remove cages Formalin 100 ppm/3-5 m	Mortality 1 –2%
1999	Black gill Shell necrosis	Shell eroded, flesh ulcerated	As above	Mortality 1 –2%
2000	Black gill Shell necrosis	As above	As above	Mortality 2 - 3%
2001	Black gill Shell necrosis	Shell eroded, flesh ulcerated	As above	Mortality 2 - 3%
	Red body	Body redden		
2002	As above	As above	As above	Mortality 2 - 3%

(Source: Lieu, PTT, 2003; ?)

## Economics

Recently, the total annual production of farmed spiny rock lobster was approximately 1,500 metric tones a year with the farm gate value was VND 420,000 per kg (ca US\$ 26.75). The average profit margin is 50%. Therefore, lobster cage culture is a profitable industry with the profit more than US\$ 20 million annually. This industry involved more than 4,000 farmers/households and created 100 employment in grow-out farms a year. However, the stability of the market is one of the major concerns to the farmers.

## Further research needs

Seed: Studies should be focused to determine the maximum sustainable yield and some other relative issues for management purposes in the short term. Lobster propagation should be studied intensively in the long term.

Feed: Nutritional requirements and improved feeds for nursing and growing-out lobster should be paid more attention. Additionally, optimum feeding regimes should be studied not only in laboratories but also on farms.

Diseases: Protection measures should be prioritised at this time at both farm and water body levels. The quality of lobster seed as well as feeding techniques, should be assessed under the pathological point of view.

Cage: Cage designs and Cage density allocation:

Marketing

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