

# Shrimp Farming on Sand in Central Coastal Region of Vietnam

## Short-Term Benefits Versus Sustainable Development

by LÊ TÂN LUẬT, MBA

The Central region characterized by mountainous typography in the west and coastal sand ridge in the east is recognized as one of the poorest regions of Vietnam. The region is lack of arable soil and most of which is infertile sandy land. The productivity of sandy land is very low and crops are easily suffered from drought. The region often suffers natural disasters such as storm, floods, mountain flash flooding, drought, landslide erosion, and other adverse phenomena that have negative impacts on the economic development of the region. Industries and services are also less developed, as a result, many local people are in poverty and even in hunger.

Fishery industries used to be considered as key elements in reducing poverty strategies of many local governments. However, most of fishing vessels are small; therefore, they have to operate in inshore areas. Overexploitation of the inshore seafood sources with destructive fishing methods such as explosion devices, electric pulses and poison are means of subsistence of poor fishermen (VOV, 2005). Unfortunately, they fell into a poverty trap, overexploitation with illegal methods deteriorates the inshore fishing ground, in turn, it induces poor fishermen continue using destructive fishing methods. The government master plan for offshore fishing is being prepared; however, it takes a long time to achieve the goal because of lack of capital and human resources. In 2003, a report of The World Conservation Union Environment Economic Program for Vietnam (IUCN) showed that aquaculture, especially tiger shrimp, makes more profits compared to other traditional agriculture activities. However, the land resources of this region are limited so the expanding of shrimp culture in the Central region is running out of its potential inland area (IUCN, 2003, p.13). With the available leakage prevention technology, in 2000, researchers in Ninh Thuận province had succeed in cultivating shrimp on sandy land, which is abundant in this region (IUCN, 2002, p.18). Follow the initial success of a small-scale pilot model, many local authorities and farmers applied the new model without carefully investigation for sustainability and environmental issues. They

earned short-term profits from the unplanned and spontaneous expansion of this culture but have suffered many negative impacts both in terms of financial and environmental losses. The purpose of this paper is present the real situation of shrimp farming on sand and finds out appropriate remedy solutions to ensure sustainable socio-economic development.

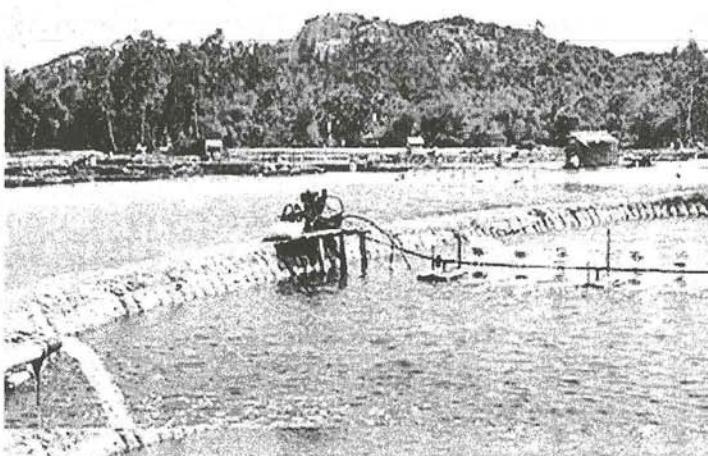
### I. LITERATURE REVIEW

#### 1. Natural resources and economic development of Coastal Central region

According to State of the Environment Vietnam (SOE, 2001), mountainous topography and climate are the two main factors that affect the water resources for agricultural and daily activities of the Central region. This region often suffers floods in the rainy season and drought in the dry season. In the rainy season, floods frequently occur due to heavy rain in a short period of time and the rivers are short and steep. Floods not only destroy crops and properties and lives but also cause soil erosion and land collision. The reserve water of these rivers is limited, that is why there is also drought in the dry season. SOE (2001) reported that desertification was observed in every province of the region. In North Coastal Central, including Quảng Bình, Quảng Trị, Thừa Thiên Huế, Quảng Nam, and Quảng Ngãi provinces, the dry season extends from January to August so river flows are narrowed into small streams or even disappear. In the South Coastal Central from Phú Yên to Ninh Thuận provinces, severe drought is a result of little rain and high temperature. As a result, approximately 140,000 ha of lands are affected by drought every year, including 50,000 ha of land now unusable (Vietnam News, 2005).

Photo by Huỳnh Tho

Despite of severe climate, over 80 percent of population of the region still live in rural areas and continue depend on the natural resources (Statistical Yearbook, 2004). Industries of the region are less developed. North Central region and South Central region take part only 2.7% and 4.2% of industrial production of Vietnam respectively (GSO, 2005). Services are also less developed so a large part of population is



still in poverty. ADB Vietnam (2004) issued that North Central region was the poorest region of Vietnam, and the poverty index of this region was 42%, compared with the national average of 29%. North Central region accounts for 18% of Vietnam poverty (World Bank, 2005), while its population is only 12.9% of total population (*Statistical Yearbook, 2004*). South Central region living standards are little higher than the North but still lower than the national average. Since the socioeconomic reform started in 1985, the central government of Vietnam, local governments and residents of the region have been seeking ways to reduce poverty and foster industrialization and modernization process but most of them failed. One of the remarkable failures is the Oil Refinery project in Quảng Ngãi province. Many researchers said that the central government had made a wrong decision because the project is infeasible. Moreover, even if the project is successful, poor residents will not have benefits from it because oil refinery is not a labor-intensive industry to absorb many local workers.

### **2. Shrimp farming on sand is considered as a strategic plan to reduce poverty.**

According to UICN (2003, p.13), despite of high rate of return, shrimp cultivation can't be expanded due to limited land resources and environment issues. Most of potential wetland, which is suitable for shrimp farming, is transformed into shrimp ponds. If inland shrimp farming continues to expand, the invaluable mangrove forest will disappear forever. The only way to increase shrimp farming areas is cultivation shrimp on sandy soil, which is abundance in the Coastal Central region. The total sandy land area in the Central region is approximately 100,000 hectares including Quảng Bình (39,000), Phú Yên (14,000), Quảng Trị (13,000) and Quảng Ngãi (10,000). However, the sandy land area suitable for shrimp cultivation is only 15,000 hectares including Quảng Bình (4,500), Quảng Trị (4000), Quảng Ngãi (4000), Ninh Thuận (1,500), and Thừa Thiên Huế (600). According to researchers of UICN, there are many benefits of developing shrimp aquaculture on sand such as fully exploitation of unproductive land, job creation, increasing production cycle compared to wetland shrimp farming, small investment, reducing risks of diseases which is prevalent in wetland shrimp cultivation, and unloading the pressure of inshore fishing. Moreover, it can create jobs in auxiliary industries in the chain of production aquaculture products such as feed industry for the inputs and processing factories for the outputs of shrimp cultivation. They considered shrimp farming on sand is the key role to reduce poverty.

### **3. The success of a trial model**

In 2000, the first trial for tiger shrimp cultivation on sand using liquid insulating materials from plastic sheets funded and assisted by the Institute of Fisheries Economics and Planning, achieved some initial successes in Ninh Thuận province. Average yields per crop in Ninh Thuận reached six tons per hectare. Then, the new model was applied in almost every province in the region and also achieved successes. For example, in the Thừa Thiên Huế some profits making farms gained as much as VND 20-30 million/hectare/crop (US\$ 1,290-1,935/hectare/crop). In Ninh Thuận, the lowest recorded profit was 20 (US\$ 1,290/ha/crop) while the average profit is 50-60 (US\$ 3,225-3,870/ha/crop), and the highest profit was 80-100 (US\$ 5,160-6,451/ha/crop) (UICN, 2003, p.20).

After the success of these trials, many provinces consider shrimp cultivation on sandy soil is the main point in

economic development strategy of these provinces. However, UICN (2003) also found that the new model was suitable for semi-intensive or intensive modes of shrimp cultivation but most farmers, who are still poor, were not yet ready in terms of infrastructure, technologies and finance to take up the new model. Even the first small-scale trial has met with lack of freshwater sources and canal systems. Besides, none of the shrimp farms has waste processing ponds so waste water is drained directly to the fields and/or the sea (p.20-24).

### **4. The expansion of the new model**

Although there is no thoroughly investigation of impacts of the new model on environment and daily activities of local residents as well as sustainability of aquaculture industry, authorities and local people in this region continue to increase investment in on-sand shrimp cultivation and respect it an efficient way of battling poverty. Because of lack of capital, technology, and right of land using, the areas of spontaneous small-scale on-sand shrimp farming of local people are still small. According to Dung et al (2004), in 2002, the sandy soil used for shrimp aquaculture was less than 300 hectares including Ninh Thuận (200), Quảng Ngãi (60), Thừa Thiên Huế (16), Quảng Bình (14), and Quảng Trị (6).

The rapid expansion of this model is caused by foreign invested firms, which are available in technologies, capital, and supports from local authorities. On Feb. 15, 2003, the biggest ever project at that time in shrimp farming on sand was launched in Hà Tĩnh province. The investor is American Technologies Inc. (ATI), a company founded by an American overseas Vietnamese Đinh Hữu Đức. In their Website, they announced that the project used over 2,000 hectares in Thạch Hà and Cẩm Xuyên districts to build the site into an industrial complex for farming and processing aquatic breeds including a breeding center of 200 million of fish/shrimp per year, a feed production unit, a shrimp farm on sand, a processing unit, a community of eco-tourism, and an IT-E-Commerce center (ATI, 2003). The total investment for the project is VND750 billion (approximately US\$50 million) (Thanh, 2005). Shortly after the first big project was started, ATI launched a US\$66-million project in Quảng Bình province, from which 2,800 hectares of sandy soil was used for shrimp farming (Dung et al, 2004). The two ambitious projects are later criticized for its efficiency and negative impacts on the environment.

### **5. Some negative impacts on the environment**

According to World Rainforest Movement, shrimp farming is a profitable business for only a small group of people. However, they do not have to pay for the destruction of the ecosystem while tremendous costs are unwilling absorbed by local communities, who do not earn much benefits from the business (WRM, 2001). This situation is caused by the common source problems. Because the natural resources are free or cheap for them, they tend to overexploit the natural resources to the point they can't recover. For example, in the Central region, local authorities charge only VND260,000 (US\$17) per hectare of sandy soil yearly (Dung et al, 2004). If we take into account the externality costs, the revenues of shrimp farming do not compensate the total cost of production including individual costs of the firm and externality costs bearing by the society.

*a. Overexploitation of groundwater, which is the main source of water supply for ecosystem and daily activities*

Shrimp farming on sand requires a tremendous volume of water. The traditional wetland pond requires wa-

ter depth of 1 meter or less; however; in a sandy pond the water depth should be at least 1.2 meters due to the pond absorbs lots of direct solar radiation (UICN, 2003, p. 27). Saline water is available because the pond is near the sea. The challenge for the farmers is the supply of fresh water used for adjusting the salinity of the pond. According to a calculation of researchers of Ministry of Fishery, total volume of fresh water for one hectare is 50,000 cubic meters yearly. It is estimated that 800 hectares of ATI farm needs about 40 million cubic meters of fresh water per year. This volume is enough for water consumption of Hà Nôi in three months with the capacity of 450,000 cubic meters daily (Yen, 2004). In any area of the region, at least one crop of shrimp farming is in dry season that is also drought season lasts from November to May.

There is lack of surface fresh water nearby the shrimp farm so ATI has to exploit fresh water from underground aquifer. According to a report of Center for Marine Environment Survey Research and Consultant, aquifers in the Central region are of small water bearing capacity; and most of exploitable aquifers are located near mountain foot. So it is costly to deliver fresh water from the well to shrimp ponds (VEPA, 2004). ATI project uses fresh water from fresh water lenses under sandy land. In Vietnam, underground water is almost free and lack of control. However, both aquifers and lenses are characterized by small water bearing capacity so they are easily subjected to salt intrusion. If fresh water is overused in case of industrial well, salt water from the sea will intrude the underground fresh water sources. In addition, in a large-scale shrimp culture, leakage of water from the ponds and canals cause salt intrusion more severely. Underground fresh water is the main water supply for sea pink forests contributed to preventing damages from storms, flying sand and moving sand ridges. Dung et al (2004) reported that in many areas in Ninh Thuân province, sea pink forests were swept out because of lack of underground water. Deforestation triggers some adverse phenomenon such as flying sand and moving sand ridge that destroys crops and property of local people and even shrimp farm owners. Salt intrusion results in crop failures and desertification. Underground fresh water is also the only water source for agriculture and daily activities of local farmers in the dry season. Overexploitation of fresh underground water makes drought in this region severer. Sandy soil is weak in structure; therefore, if the water level in aquifer is lowered due to depletion, soil collapsing in a large area can be observed.

*b. Pollution of groundwater and seashore*

Most, if not all, reported on-sand shrimp farms have discharged wastewater from the ponds onto the surrounding land and/or directly into the sea. Also according to researchers of Ministry of Fishery, each hectare of shrimp farm discharges 8 tons of solid waste and thousands of cubic meters of waste water (Vietnam Agenda 21, 2005). ATI shrimp farm will discharge 6,400 tons of solid waste each year if it operates in full capacity in 800 hectares of shrimp pond. In some cases, if shrimp ponds are infected, the untreated wastewater discharged from the ponds to the environment will spread disease to surrounding ponds and water supply systems.

*c. Financial losses of the ambitious projects*

Shrimp aquaculture is characterized by very high levels of risk, exposing poor farmers to financial ruin if harvests fail. Even some well-prepared projects have been in stagnant initial phase. According to Thanh (2005), zone 1 of shrimp farm of ATI in Hà Tinh province has been operated in 100% capacity, zone 2 has been in half of its capacity, and ponds of zone 3 are still unfilled with water.

Ms. Trương Thị Hạnh, deputy director of Rural and Development Bank of Quảng Trị province said that the loan of VND20 billion for the project is overdue, and she wondered if they would have ability to pay the debt. ATI also has not paid many local construction companies on many contracts of the project yet.

*d. Negative impacts on local residents*

In Vietnam, shrimp farming appears to have an important role in poverty reduction and livelihood improvement for some households. However, it is also criticized for increasing the gap between the rich and the poor. If the harvests fail, the poor have no choice but have to sell their land to the rich and become landless. Even if they can keep their land, they can not continue to cultivate shrimp because of lack of capital. They can not find a job in nearby shrimp farm because shrimp farming is a capital intensive industry, therefore, it absorbs little labor force. Failures of ATI project leads to many negative impacts on the local residents. Many people are unemployed while the sand and underground water are saline. In the past, it took at least one generation to convert a saline sandy land into an arable field. However, after only one year of operation, the shrimp farming on sand project has converted a paddy field into a saline sandy desert. Without preventive forest, properties of local residents and shrimp farms will be destroyed in yearly storm season.

## II. CONCLUSIONS AND RECOMMENDATIONS

### 1. Conclusions

The Central region is recognized as one of the poorest regions of Vietnam because of lack of natural resources, suffering many natural disasters and poor economic infrastructure. Over 80 per cent of population still live in the rural areas and depend on poor natural resources, typically infertile sandy soil for making living. Central government and local authorities have strived to find sustainable solutions for reducing poverty and fostering socio-economic development of the region but most of the big ambitious projects have failed. In seeking for a way to improve the living standard, shrimp cultivation on sand is considered as a key role in poverty reducing strategy of the region. Despite the small trial farms are proved to be successful, the first industrial scale on-sand shrimp cultivation in Hà Tinh province is failure, poses many negative effects on environment, local banking systems, enterprises, and poor residents. The new model of aquaculture seems to be inappropriate for the sensitive ecosystem of the Coastal Central region. A new strategy for reducing poverty must be put in sustainable development context.

### 2. Recommendations

To ensure sustainability of the socioeconomic development, the Central region needs a long-term oriented strategy. This master plan for socioeconomic development of the region requires the close cooperation of central agencies such as Ministry of Agriculture and Rural Development, Ministry of Science, Ministry of Natural Resources and the Environment, Ministry of Planning and Investment, Ministry of Finance, Administration of Tourism, and local authorities, intellectuals and researchers, as well as local residents. Shrimp cultivation on sand is still potential; however, a small- scale on-sand shrimp farm with suitable technologies, especially waste treatment processing, is better for environment than a large-scale one. Canals supply fresh water from surface sources such as dams and lakes should be constructed in order to reduce exploitation of underground water. Moreover, it should be ensured that the business is not harmful for re-

serve and protection forests as well as traditional agriculture nearby. We should stop making profits at the expense of environment before it is too late.

Blue skies, white sand, friendliness of local people, stability of socio-political environment and beautiful mountainous typography are attractive features for coastal eco-tourism. Eco-tourism can make more profits than shrimp farming if Vietnam has a proper strategy on environment conservation programs. The region will lag behind other regions if people still depend on agriculture for living. The region is abundant in unskilled labors and most of them are partly unemployed. So the appropriate industries and services should be labor- intensive ones. Besides, education and training are the steady steps to build a skilled labor force. ■

## References

- ADB Vietnam (2004). *Viet Nam's Central Region at the Heart of ADB's Poverty reduction Strategy*. June 2004 from [www.adb.org/Documents/Periodicals/VRM/jun\\_2004.pdf](http://www.adb.org/Documents/Periodicals/VRM/jun_2004.pdf)
- ATI (2003). *Lauching the biggest fishery project in Ha Tinh: more 20,000 jobs*. February 17, 2003 from <http://www.ativietnam.com/news/english/news/index.asp?sequence=4087&.this=51>
- Dung, H.T. & Hoi, N.C. (2004). *Nuoi tom tren cat o mien trung-mot viec lam can than trong*: on-sand shrimp farming in the Central region-a risky business, from hyperlink <http://www.mofi.gov.vn/ifep/index.asp?progid=3&section=50000&oid=62>
- General Statistical Office (GSO), (2005). *Industrial products classified by regions*. Retrieved September 26, 2005, from hyperlink <http://www.gso.gov.vn/default.aspx?tabid=391&idmid=3&ItemID=1178>
- IUCN-The World Conservation Union Environment Economics Programme for Vietnam (2003). *Expanding Shrimp Aquaculture on Sandy Land in Vietnam: Challenges and Opportunities*, from [www.tradeknowledgenetwork.net/pdf/tkn\\_shrimp\\_vietnam.pdf](http://www.tradeknowledgenetwork.net/pdf/tkn_shrimp_vietnam.pdf)
- State of the Environment Vietnam (SOE, 2001). Inland Water, from hyperlink "[http://rrcap.unep.org/reports/soe/vietnam/issues/pressure/inland\\_water.htm](http://rrcap.unep.org/reports/soe/vietnam/issues/pressure/inland_water.htm)"
- Statistical Year Book (2004). Statistical Public House, 2005.
- Thanh, Van (2005). *Du an nuoi tom tren cat o mien trung-Khi tam nhin chi qua khung cua hep*: An on-sand shrimp farming in the Central region-the view through narrow window, from hyperlink "[http://www.vtv.vn/vi-vn/chinhtrixa\\_hoi/td/2005/9/65888.vtv](http://www.vtv.vn/vi-vn/chinhtrixa_hoi/td/2005/9/65888.vtv)"
- Vietnam News (2005). Environmental protection plays a key role in natural development. June 8, 2005, from <http://vietnamnews.vnanet.vn/showarticle.php?num=02COM080605>
- VOV (2005). Vietnam looks to improve fishing sector, from hyperlink "[http://www.org.vn/2005\\_05\\_12/english/kinhte1.htm](http://www.org.vn/2005_05_12/english/kinhte1.htm)" [www.vov.org.vn/2005\\_05\\_12/english/kinhte1.htm](http://www.vov.org.vn/2005_05_12/english/kinhte1.htm)
- Vietnam Economic News (2005). The Fishery: Ninh Thuan's Spearhead Industry, Friday, October 12, 2005, from [http://www.ven.org.vn/view\\_news.php?id=2672](http://www.ven.org.vn/view_news.php?id=2672)
- VEPA (2004). Vietnam Environment Protection Agency. Country Report on Land-based Pollution in Vietnam, from [www.nea.gov.vn/Sukien\\_Noibat/TLmoi/Bien-Datlien/English/report1-20.pdf](http://www.nea.gov.vn/Sukien_Noibat/TLmoi/Bien-Datlien/English/report1-20.pdf)
- WRM (2001). Focus on mangrove and shrimp farming. World Rainforest Movement. Issue Number 51-October 2001, from hyperlink "<http://www.wrm.org.uy/bulletin/51.htm>"
- Yen, Ha (2004). *Bao dong nguy co o nham tu nhung ao nuoi tom tren cat*: Pollution alerts from shrimp pond on sand. Viet Nam Net, Issue on June 5, 2004, from hyperlink "<http://vietnamnet.vn/kinhte/2004/06/158226>" <http://vietnamnet.vn/kinhte/2004/06/158226>



Photo by Huynh Tho