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Economic Cooperation**

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**Aquasilviculture: An Environmentally Friendly  
Mariculture System Towards Food Security and  
Response to Climate Change**

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Ministry of Agriculture and Rural Development of Viet Nam (MARD)

Department of International Cooperation

# **Aquasilviculture: An Environmentally Friendly Mariculture system towards Food Security and Response to Climate Change**

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# Introduction

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- A case study was conducted in a current aquasilviculture model at Ngoc Hien district, Ca Mau province, Viet Nam.
- Ca Mau province has the largest area for aquasilviculture in Viet Nam. This aquasilviculture system is unique in Viet Nam for the production of certified organic shrimp.

# Introduction

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- The aquasilviculture model has been introduced as an environmentally–friendly mariculture system to adopt to climate change.
- This case study conducted a cost-benefit analysis of economic returns, livelihood and food security issues, usage of natural resources, and low carbon agricultural practices.

# Aquasilviculture system

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- Thirteen households living within the project were selected for interviews in *May 2015*.
- Farm sizes varied from 3.1 to 5.5 ha and water surface areas ranged from 1.1 to 2.4 ha. Mangrove forest area represented around 40% of the farm area.

# Aquasilviculture system



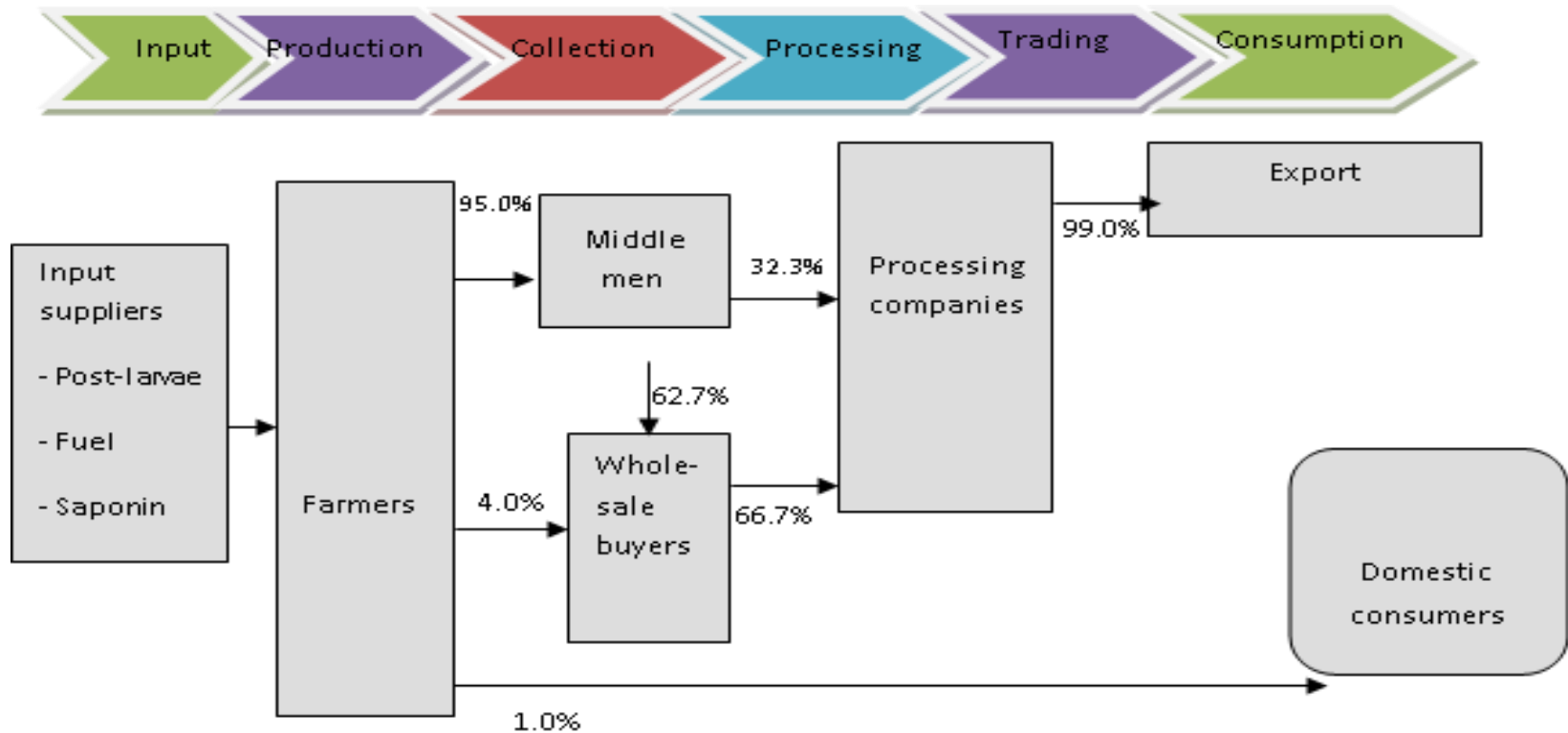
- Each farm had three components including: (1) mangrove forest area, (2) water surface area for aquaculture, (3) the remaining land for other trees and crops (3).
- Farms were surrounded by a larger outer canal of more than 1.2 m in depth and 6.0 m in width.

# Aquasilviculture system

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- No feed, chemicals or antibiotics were used in this system
- After 4 months from the first socking, the biggest shrimp and mud crab were initially harvested.
- The harvested shrimps were usually bigger than shrimp produced from intensive ponds (15-20 pieces make a kg).

# Results



**Fig. 2 Value chain for non-certified and certified organic shrimps**



# Results

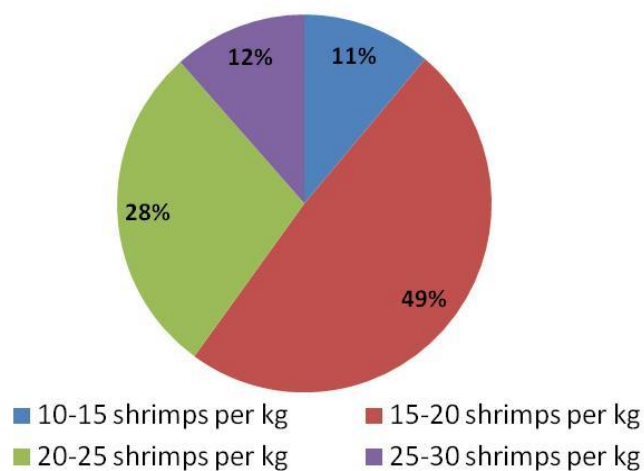


Fig. 3 Ratio among 4 size classes of black tiger shrimp

## Yield of black tiger shrimp, survival rate, total income and income per hectare

Parameters	Mean $\pm$ STDEV
Yield of black tiger shrimp (kg/ha/year)	213 $\pm$ 104
Survival rate of black tiger shrimp (%)	1.9 $\pm$ 1.1
Total income (USD/household/year)	7,026 $\pm$ 2,278
<b>Income per hectare (USD/ha/year)</b>	<b>4,115<math>\pm</math>1,761</b>

# Results

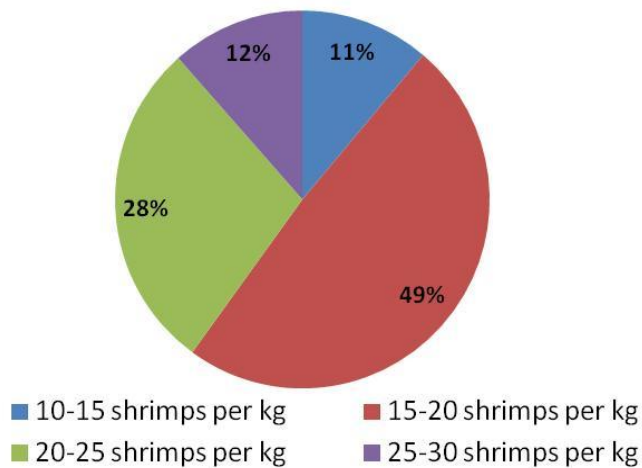


Fig. 3 Ratio among 4 size classes of black tiger shrimp

## Total cost per hectare, total profit and profit per hectare

Parameters	Mean $\pm$ STDEV
Total cost per ha (USD)	1,702 $\pm$ 487
Total profit (USD/year)	4,072 $\pm$ 2,020
<b>Profit per ha (USD/ha/year)</b>	<b>2,414<math>\pm</math>1,458</b>

# Implication for low carbon agriculture, biodiversity conservation, water saving, and forest regeneration

Each aquasilviculture farm contained around 1.6 ha of mangrove area. Therefore, each aquasilviculture farm could absorb approximately 219 tons CO<sub>2</sub> and the value of carbon sequestration comes up to USD246 per year.

The aquasilviculture system mostly based on natural conditions.



# Implication on livelihoods and food security

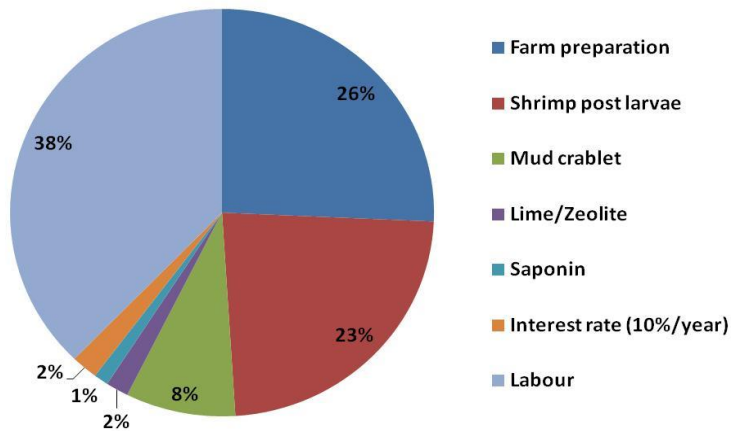


Fig. 5 Cost structure in 2014 for aquasilviculture

- Although land area in this study has been known to have low pH and salty soil; pineapple, mango, dragon fruit, and coconut trees, some vegetables have been raised in this area.

# Implication on livelihoods and food security

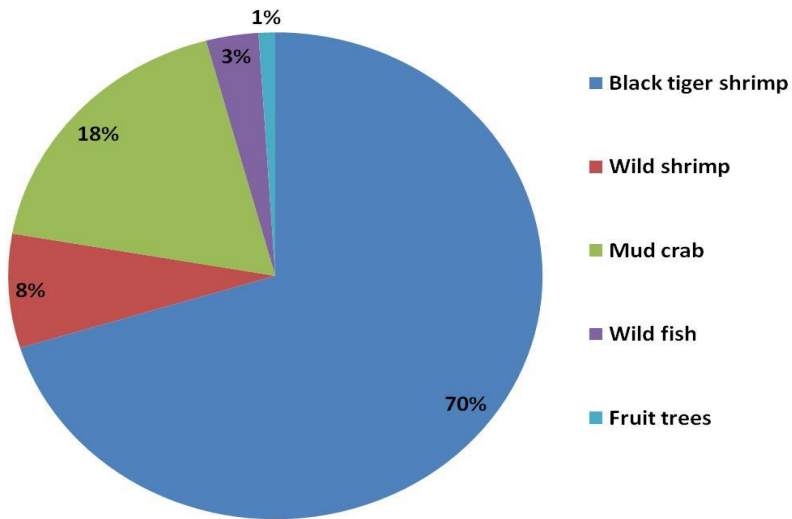


Fig. 6 Diversified income structure of aquasilviculture in 2014

- The farmers living in the study area have a diversified source of income – from black tiger shrimp, wild shrimp, mud crab, wild fish and fruit trees.
- Moreover, chicken, duck and fresh water fish have been raised as well.

# Recommendations

- (1) Further studies on suitable methods to improve survival rate and harvesting technique, reduce the risk of disease, and use effectively leisured labor;
- (2) Policy for adoption of national strategies for the practice of Climate Smart Agriculture, within the context of national strategies for agriculture, food security and response to Climate Change;
- (3) Development of systems that encourage all people, the involvement of business in the ways that bring benefits to the people whose livelihoods are most affected by Climate Change;

# Recommendations

- (4) Engaging government, organizations, the private sector and agri-businesses (large and small) and stakeholder partnerships for Climate-Smart Investments in agriculture and food systems, including supply chains;
- (5) Building capacity and technology sharing for stakeholders to promote and expand the application of environmental-friendly and climate-smart agriculture practices.

**Thank you for your attention!**