

Current Status of Shrimp Farming and Diseases in Cambodia

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Abstract

The farming of penaeid shrimps in Cambodia began in 1989 and has significantly expanded since 1991. Shrimp cultivation has been carried out in the four coastal provinces, i.e. Kampot, Kep, Preah Sihanouk Ville, and Koh Kong. Black tiger shrimp (*Penaeus monodon*) and whiteleg shrimp (*P. vannamei*) are the main species being cultured extensively and intensively in brackishwater ponds in Kampot, Kep, and Preah Sihanouk Ville, and Koh Kong, respectively. Extensive shrimp ponds were constructed close to the mangrove areas with some containing mangroves within the pond and stocking density ranging from 5,000 to 20,000 postlarvae/ha. However, the productivity remains low at > 100 kg/ ha/ year. On the contrary, intensive culture has a stocking density ranging from 300,000 to 500,000 postlarvae/ha. While high cost of investment for farm establishment, pond construction and farm operation are required, productions of newly established farms have reached 7 to 8 metric tons (MT) /ha per crop.

The occurrence of white spot disease, monodon baculovirus disease, and yellow head disease was first reported in 1999 among cultured *P. monodon* in Koh Kong province causing a number of farmers to stop the intensive cultivation of black tiger shrimp. To date, only a small proportion of shrimp farmers have ventured into extensive shrimp farming with approximately 10 ha of shrimp areas currently in operation. To mitigate the negative impacts of shrimp diseases and promote the expansion of the shrimp industry in Cambodia, development of a national reporting system for aquatic animal diseases; capacity building for detection, monitoring and disease surveillance; creation of National Guidelines On Good Shrimp Aquaculture Practices; establishment of sub-research centers and concomitant funding support for marine aquaculture development and extension services; establishment of local shrimp hatcheries and provision of hands-on trainings for farmers; and strengthening collaborations among provincial officers, researchers and farmers' network should be accordingly instituted.

Introduction

Cambodia is located in Southeast Asia between latitudes 10° and 15° N and longitudes 102° and 108° E, and has a mainland area of 181,035 km² extending approximately 580 km from east to west and 450 km from north to south. It has a total population of over 15 million people in 2015 with a population growth rate of 2.4% per annum which is reported to be the highest in Asia. The south and south-west of the country constitute a 443 km long coast at the Gulf of Thailand, characterized by sizable mangrove marshes, peninsulas, sandy beaches, and

headlands and bays. There are four coastal provinces, located along this coastline namely Kep, Kampot, Preah Sihanouk Ville, and Koh Kong provinces. There are 69 islands, including the four large islands of Koh Kong, Koh Rong, Koh Sanlem, and Koh Thmey, and a number of small islands which are located near shore. The other three main islands namely Koh Tang, Koh Pring and Koh Polowai are located further offshore. The Exclusive Economic Zone (EEZ) covers approximately 55,000 km and is relatively shallow with a depth of about 50 m. The fisheries sector in Cambodia plays an important role in its national economy as it

employs approximately 4 million or 30% of its population contributing 10 to 12% of the Gross Domestic Product. Importance is also high in the aspect of food security as Cambodians obtain 70% of animal protein from fisheries products. Increasing fisheries production through marine aquaculture has been the major goal in the next few years as production from marine capture fisheries remains broadly flat in recent years. The increase in marine aquaculture production is also expected to result in the suppression and reduction of excessive pressure on the coastal fisheries resources and will therefore facilitate the resource recovery. It has been recognized that development of aquaculture in Cambodia should be achieved in conjunction with the conservation of coastal fisheries environment. The priority areas identified in The Strategic Planning Framework for Fisheries (SPFF 2010 – 2019) adopted by the Fisheries Administration includes improving livelihoods for poor population through sustainable utilization of fisheries resources, reduction of post-harvest losses in captured fisheries products, revisions of policy, plans and legislations pertaining to fisheries activities, improving the condition of fishing grounds, stock enhancement of fisheries resources, and promotion of resources management through a participatory approach.

International assistance for the development of the marine fisheries sector in Cambodia has been apparently limited, except in some aspects like conservation of coastal fisheries resources. On the contrary, the inland fisheries sector has received assistance from various countries. With respect to the marine aquaculture sector in which less technical development has been observed, aquaculture operators primarily depend on fingerlings captured from the wild and imported from neighboring countries. This is due to the fact that domestic hatcheries have not yet been established in Cambodia except for a recently opened Marine Aquaculture Research and Development Center that is not yet fully operational. The collection of wild seeds for aquaculture farming has resulted in the acceleration of pressure on the natural fisheries resources. In addition, inadvertent outbreaks of diseases in cultured fish and shrimps whose seeds or fingerlings originated from the wild

likewise hinder the development of the marine aquaculture sector despite the promotion of marine aquaculture being identified as a priority area in the fisheries sector of Cambodia (Viseth and Pengbun, 2005).

Current status of shrimp farming

Shrimp farming in Cambodia began in 1989 and has significantly expanded since 1991. The shrimp farming activity has been carried out along the coastline of Cambodia, i.e. in the four coastal provinces namely Kampot, Kep, Preah Sihanouk Ville, and Koh Kong. Two main species of penaeid shrimps have been popularly cultured, i.e. black tiger shrimp (*Penaeus monodon*) and whiteleg shrimp (*P. vannamei*). Moreover, two types of culture system, i.e. extensive and intensive, have been practiced in these farms over the past several years (Hav and Leap, 2005).

Extensive shrimp farming system has been mostly practiced by farmers in Kampot and Preah Sihanouk Ville provinces. In general, shrimp ponds were constructed close to the mangrove areas with some ponds containing mangroves within the pond. The average size of these ponds ranges from 5-10 ha. These extensive shrimp farms depend mainly on natural food propagated in the pond and tidal water replenishment. It requires a low cost investment for pond construction, preparation and farm operation. In addition, the use of commercial feeds, water aeration, and control of predators for one full cycle of shrimp cultivation or until harvesting are not required. Shrimp's stocking density usually ranged from 5,000 to 20,000 larvae/ha; however, productivity remains low at less than 100 kg/ha per year.

On the contrary, intensive cultivation of shrimps has been mainly practiced in Koh Kong province. Intensive shrimp farming system was first introduced by a Thai shrimp farmer and businessman. It requires high cost of investment for farm establishment, pond construction and farm operation. Shrimps need to be fed with pellet or formulated diet and water aeration and regular water exchange

are required. The main species being cultured intensively in this area is *P. monodon* at stocking density ranging from 300,000 to 500,000 postlarvae/ha. Notably, productions of the newly established farms have reached 7-8 MT/ha per crop.

Current status of shrimp diseases

The occurrence of white spot disease (WSD), monodon baculovirus disease, and yellow head disease caused respectively by white spot syndrome virus (WSSV), monodon baculovirus (MBV), and yellow head virus (YHV) was first reported in 1999 among cultured *P. monodon* in Koh Kong province causing a number of farmers to stop the intensive cultivation of black tiger shrimp. Levels II and III diagnostic procedures have been used to identify the above shrimp viruses, although polymerase chain reaction (PCR) method is the only Level III diagnostic procedure currently available to detect WSSV in shrimp (Table 1) (Racy, 2004). The Fish Health Laboratory of the Fisheries Administration (FHL-FA) has started to develop capability in virology, especially on virus isolation using

the cell culture technique. A surveillance was conducted by FAIEX II/JICA project from 18 to 22 June 2015 in the four coastal provinces of Cambodia namely Kep, Kampot, Preah Sihanouk Ville, and Koh Kong. The result of the survey revealed that most of the farmers had actually experienced outbreaks or shrimp mortalities particularly encountered during the first 35 days of culture from 2011 until 2013. Moreover, farmers noted that affected shrimps (*P. monodon*) have empty gut, loose and pale shells, and swam on the water surface. The outbreak was speculated to be due to acute hepatopancreatic necrosis disease (AHPND), however, diagnostic tests have not been carried out to ascertain the etiology of the disease. Aside from this, farmers also experienced serious outbreaks of WSD. Because of these unwarranted disease outbreaks that led to serious economic losses, since 2014, most of the shrimp farmers shifted to grouper and sea bass culture. To date, only a small proportion of shrimp farmers have ventured into extensive shrimp farming with approximately 10 ha of shrimp areas currently in operation.

Table 1. List of government, private, and university-based Fish Health Laboratories and their level of diagnostic capability.

Name of Laboratory	Level of Diagnosis	Address Location
Department of Fisheries	<i>Level II</i>	#186 Preah Norodom Blvd, Sangkat Tonle Bassac, Khan Chamcarmon, Phnom Penh Cambodia, P.O Box582 Tel.:855 23 215 470
	(1) Bacteriology	
	(2) Mycology	
	(3) Parasitology	
Faculty of Fishery Royal University of Agriculture	<i>Level II</i>	Royal University of Agriculture, Chamkar Daung, Phnom Penh, Cambodia Tel.:855 12 887 864
	(1) Bacteriology	
	(2) Mycology	
	(3) Parasitology	
Pasteur Institute	<i>Levels II and III</i>	Monivong Blvd, Khan Toul Kork, Phnom Penh, Cambodia Tel.:855 12 814 276
	(1) Bacteriology	
	(2) Mycology	
	(3) Parasitology	
	(4) Histopathology	
	(5) Virology	
(6) Immunology		

Economic impact

A review of shrimp farming showed that the intensive shrimp farming in Koh Kong province increased up to 1,000 ha in 1995 but eventually started to decline with the onset of WSD outbreaks. This viral disease of shrimp has by far been identified as the most serious threat faced by the shrimp farmers in Cambodia causing economic losses of approximately USD 14.5 million per year (Touch Seang Tana, 2002). From 2002 until 2015, pertinent data on shrimp farming in Cambodia were scarce.

Way forward

In terms of technical development, the marine aquaculture sector in Cambodia has not relatively reached the level of inland aquaculture. Shrimp farmers still depend on postlarvae captured from the wild and imported from neighboring countries resulting in the acceleration of pressure to the natural fishery resources and inadvertent introduction of transboundary pathogens leading to inevitable occurrences of disease epizootics (Lang, 2015). Diseases have persistently remained as a major constraint besetting the shrimp industry of Cambodia. To mitigate the negative impact of shrimp diseases and promote the expansion of the country's shrimp industry, strategies aimed at sustainability should be implemented including the (a) development of a national reporting systems for aquatic animal diseases, especially shrimp diseases; (b) capacity building on shrimp diseases, procedures for monitoring and disease surveillance; (c) creation of national guidelines on *Good Aquaculture Practice* (GAP) in shrimp farming; (d) establishment of sub-research center for marine aquaculture development and extension services in all coastal provinces that have potential for marine aquaculture development, particularly shrimp farming and concomitant funding support for research; (e) establishment of local hatcheries in all coastal provinces, i.e. *Seed Production Decentralization* which is a key point in reducing time and distance of transportation, and ease in the provision of seeds to local farmers and provision of hands-on trainings for farmers; and (f) strengthening collaborations among provincial officers, researchers and farmers' network.

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