1. Introduction

Indian farmed shrimp production increased from about 30 000 tonnes in 1990 to around 115 000 tonnes during 2002–2003. This development underwent rapid growth between 1990 and 1995, when it reached 97 500 tonnes. The area under culture, which was 65 000 ha in 1990, expanded to about 152 000 ha in 2002–2003. The coastal State of Andhra Pradesh witnessed the maximum growth in shrimp farming, followed by Tamil Nadu. In the wake of this development, the sector also generated a large demand for shrimp postlarvae (PL), which could not be served from the hatcheries existing at that time in the country. The importation of PL from other Asian countries and poor management of the broodstock, the hatcheries and also the farms led to the outbreak of White Spot Syndrome Virus (WSSV) in 1994. The virus spread very rapidly, and the economic losses caused by mortalities were estimated at over US$ 200 million during 1999–2000.

Since 1994, WSSV has continuously affected the shrimp farms, and the lack of action plans to combat the disease has led to cross-contamination of farms in proximity. Many of the farmers in Andhra Pradesh with smallholdings of between 1 and 1.5 ha do not have the means to identify or manage the disease. This led to successive crop failures and economic hardships. The lack of alternative forms of aquaculture to utilize the shrimp ponds has further aggravated the problem.

India currently has approximately 154 000 ha of brackishwater land being used for shrimp culture. In 2004 Indian brackishwater shrimp production was 112 780 tonnes. Although India has significant potential for aquaculture development, of the 1 190 900 ha of land available for shrimp aquaculture, the current area under culture is about 155 000 ha and the average productivity is less than 0.75 tonnes/ha/yr (Table 1).

1.1 SHRIMP HATCHERY DEVELOPMENT IN INDIA

The number of shrimp hatcheries in India has increased rapidly since the late 1980s. There are now approximately 300 hatcheries, mostly in Andhra Pradesh State, with an average production capacity of 33 million postlarvae (PL) per year (see Table 2 and Figure 1). The total production of PL in India has increased with this hatchery development to approximately 10 billion per year in 2002–2003, requiring up to an estimated 200 000 broodstock per year (see Figure 2). This document will review the

TABLE 1
Analysis of shrimp culture potential, usage, and production in the maritime states in India

Maritime State	Potential area available (ha)	Area under culture (ha)	Production (tonnes)	Productivity (tonnes/ha/yr)
Andhra Pradesh	150 000	69 640	53 124	0.76
West Bengal	405 000	49 925	29 714	0.60
Orissa	31 600	12 116	12 390	1.02
Kerala	65 000	14 029	6 461	0.46
Tamil Nadu & Pondicherry	56 800	3 214	6 070	1.91
Karnataka	8 000	3 085	1 830	0.59
Gujarat	376 000	1 013	1 510	1.49
Goa	18 500	963	700	0.73
Maharashtra	80 000	615	981	1.60
Total	1 190 900	154 600	112 780	0.73

current state of the Indian shrimp hatchery sector and provide guidance and protocols for improving the productivity, health management, biosecurity and sustainability of the industry.

TABLE 2
Number and production capacity of shrimp hatcheries in India by State

State	*Penaeus monodon*		*Macrobrachium* sp.		Total	
	Number	Capacity (x 10^6)	Number	Capacity (x 10^6)	Number	Capacity (x 10^6)
Andhra Pradesh	148	7 882	43	1 453	191	9 335
West Bengal	2	100	9	66	11	166
Orissa	13	455	2	20	15	475
Kerala	22	484	7	53	29	537
Tamil Nadu & Pondicherry	73	2 863	8	215	81	3 078
Karnataka	13	301	0	0	13	301
Gujarat	2	45	0	0	2	45
Goa	1	20	0	0	1	20
Maharashtra	6	325	2	20	8	345
Total	280	12 475	71	1 827	351	14 302

FIGURE 1
Development of shrimp hatcheries in India

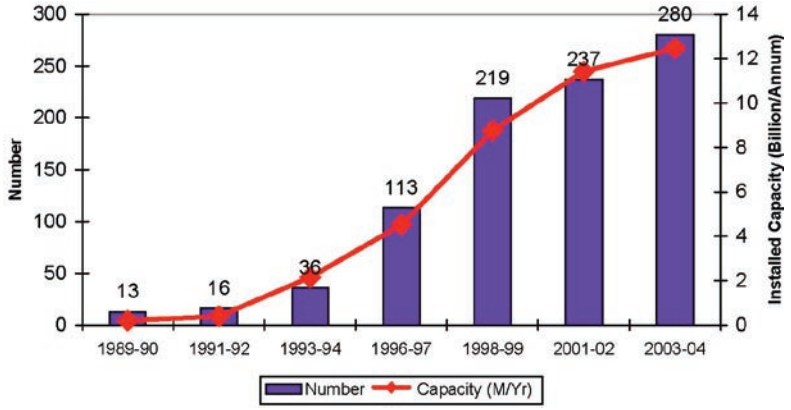

FIGURE 2
Shrimp production, seed production and broodstock requirements for India