

Mariculture Development in Seychelles and other Western Indian Ocean Island States: *An Overview of Challenges and Prospects*

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Introduction

Seychelles has a relatively long history of prawn farming, which was established on Coetivy Island in 1989 by the Islands Development Company Ltd and the Seychelles Marketing Board and later taken over and managed by the latter. The farm comprised of two hatcheries and around 200 ponds and occupied an area of around 96 ha, and when in full production had a workforce of around 350 people (mainly Thai and Sri Lankan nationals). Production of *Penaeus monodon* (Black Tiger prawn) peaked at 1200 tonnes per annum in 2004, but by 2007 had declined to just under 400 tonnes (Fig. 1). Broodstock was imported from Madagascar and Mozambique. The product was held in high esteem internationally and locally (Hecht, 2009). For several reasons production at the prawn farm ceased in late 2008. Amongst others these included the high operational costs due to the location of the farm, which is situated approximately 300 km away from the inner islands and the difficulty to produce sufficient numbers of post larvae for stocking into grow-out ponds and other private sector interests. Much of the hardware of the farm has been sold, but the pond infrastructure remains available for future developments.

Pearl (oyster) farming in Seychelles was started in 1995 and continues on Praslin in the Curieuse Marine National Park. Black lipped oyster (*Pinctada margaritifera*), and the winged Oyster (*Pteria penguin*) are produced. Round pearls are mainly produced through Black lipped Oyster, while half pearls are produced by winged oyster. Nuclei are imported from Japan and Australia and implanted by foreign specialists (ITTAS 2004). Harvesting occurs two years after implantation and the size of the round pearls vary from 8 to 12mm. The nacre thickness is 1.2 ~ 1.5mm and the colour varies from black, greenish-black to grey (ITTAS, 2004). Spat collection occurs throughout the year, although October is the most productive time (ITTAS, 2004). The concession covers an area of around 19ha.

Prawn feed was and still is produced on Mahe and this feed is also exported to Madagascar and Tanzania.

The main reasons why mariculture has not developed further in Seychelles is principally because of a generally poor understanding of the sector, the reliance on the artisanal capture fishery for protein supply, the absence of a sector "champion", an uncompetitive investment environment, lack of scientific and technical capacity and the absence of a properly defined legislative and regulatory framework within which the industry can develop in a structured manner (Hecht, 2009). The problems listed above reinforce the importance of Government support if the sector is to sustain its own development.

Recent developments indicate a change in support for mariculture development in Seychelles from Government, the private sector (including tourism), civil society and NGOs (Hecht, 2009). With the sharp increase in global food and fuel prices in 2008 (IMF, 2008), which affected many small developing countries, such as Seychelles, a new strategy needed to be devised to address emerging food security concerns. Even though the emphasis was put on increasing agricultural production, mariculture was considered as one of the sectors which could potentially ensure food security and provide significant support for the socio-economic development of the country. Moreover, the decline in the tourism industry as a consequence of the global credit crunch, juxtaposed with declining tuna catches provided further impetus for Seychelles to recognise the importance of establishing new industrial sectors. For marine aquaculture to become a player in the economy of Seychelles requires a proper framework in the form of a sector development plan (Master Plan) to be put in place the necessary guidelines, a legislative and regulatory framework and investment incentives. The absence of a sector development plan can have adverse consequences. For example an oyster farming project with *Crassostrea gigas* did not materialise because the site selection process was undertaken without consulting other resource users and residents in the vicinity (Hecht, 2009). The new approach taken by Seychelles is to involve all key stakeholders in the development of the sector development plan right from its beginning (Hecht, 2009). Bryceson (2002) demonstrated the

consequences of inadequate public consultation on the development of a large scale prawn farming venture in Tanzania in 1999/2000.

Alongside a transparent process the sector development plan is adopting an Ecosystems Approach to Aquaculture (EAA). This approach has several definitions, but in the case of the sector development plan it refers to “the balance of diverse societal objectives, by taking account of the knowledge and uncertainties of the biotic, abiotic and human components of ecosystems including their interactions, flows and processes and applying an integrated approach within ecologically and operationally meaningful boundaries” (Soto *et al.*, 2008). Seychelles finds itself in the fortunate position to implement EAA because the usual industrial needs and demands that would have been present if an industry already existed are absent. Hence Seychelles has the ability to develop a sector in line with its international “green” image and this has immense marketing value.

Mariculture developments in Mauritius: Challenges and lessons to be learnt

Mauritius has a more developed mariculture sector than Seychelles, though the approach adopted during its development may have brought about many unforeseen problems (O. Venkatasami, Albion Fisheries Research Centre, pers. com.). Mariculture in Mauritius dates back to the French Colonial times when juvenile marine fin-fish were collected from the wild and placed in Barachois for fattening. Intensive commercial mariculture technology was only introduced to Mauritius during the late 1980s and early 1990s

through a mariculture programme at the Albion Fisheries Research Centre funded by Japan (Hecht & Shipton, 2007). The project developed some innovative technologies. However the general consensus is that the project could have been more productive if it had received greater support from the private sector and Government (O. Venkatasami MAIFPS, pers. com).

Modern cage culture is restricted to a single farm (Ferme Marine de Mahebourg - FMM) in the Mahebourg Lagoon in the south-east of Mauritius. The farm produces Red drum (*Sciaenops ocellatus*) in 20 circular cages. The farm has been in operation since 2001, when several other species such as Goldline seabream /Natal Stumpnose (*Rhabdosargus sarba*) were being produced on a trial basis. Inadequate public participation during the early planning and development phase of the farm has hampered its development (Jerry Khee Choy, FMM, pers. com). The Mauritius Mariculture Sector Development Plan which was developed five years after the development of the farm emphasises the importance of public engagement during the farm planning phase. There is some degree of freshwater tilapia and ornamental fish farming in Mauritius but this is not part of the focus of this paper. In 2008 Mauritius produced some 175 tonnes of Red Drum (FAO 2010).

There is no doubt that Mauritius has great potential to expand the mariculture sector from where it is at present. The current goal of the fisheries authorities is to revise the Master Plan such that it will better cater for the actual needs and demands of the sector.

The status and challenges for mariculture development in the Comoros

Although mariculture is non-existent in the Comoros the country has some potential that could be developed in future (UNEP, 2006; Hecht and Shipton, 2007). In particular the lagoons on the south west part of Moheli (20-30m deep) provide some very suitable sites for cage culture (Hecht and Shipton, 2007). Other culture organisms that could be considered for these lagoons include soft corals, pearl culture, sponge culture and sea cucumber ranching

However the development of a commercial mariculture sector in the Comoros is a long way off and would require an intense effort by Government to attract foreign investors and would have to be preceded by a more in depth assessment of opportunities.

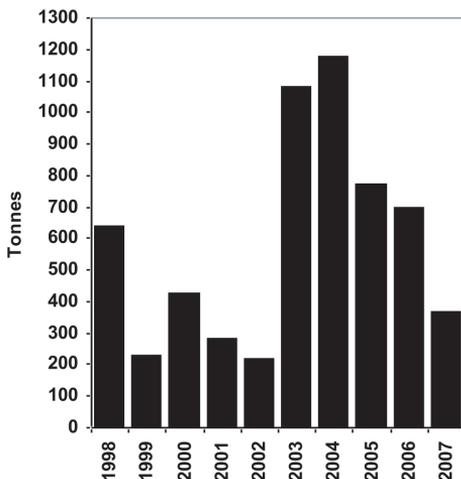


Figure. 1. Seychelles prawn production (1998 to 2007)

The Status and Challenges for Mariculture Development in Madagascar

With the notable exception of the commercial penaeid prawn industry, mariculture in Madagascar can at best be described as being in its infancy (Hecht and Shipton, 2007). There has been significant input by development agencies such as JICA of Japan to develop technologies for the farming of seaweed, Spirulina, Artemia and brackish water tilapia but none of these have been successfully taken up by the private sector for commercial application. However, Madagascar was ranked fourth in Africa in terms of total aquaculture production with an output of over 11,200 tonnes in 2008 (FAO, 2010). Prawns were the largest contributor to mariculture production with 6750 tonnes (valued at US\$ 33,750 million), followed by seaweeds (1500 tonnes dry weight valued at US\$ 203 million).

Since 2007 the prawn farming industry in Madagascar has been guided by the Shrimp Aquaculture Master Plan (Hecht and Shipton, 2007). Strategies in the document include protocols to promote sustainable small-scale commercial and family based prawn culture, and the identification of appropriate culture and biosecurity technologies and protocols. With a coastline of more than 4,800 km Madagascar has significant opportunities for mariculture development

Although Madagascar has made significant progress in the past it still has many hurdles to overcome. The sector development plan needs to be reviewed and updated where appropriate and sustainable farming practices incorporated to ensure the best approach towards developing the mariculture sector. Furthermore, enhanced Government support to private investors will be a key factor in its future development (Hecht & Shipton, 2007).

Reunion and Mayotte

Reunion and Mayotte Island are overseas territories of France. Both have been aggressive in developing aquaculture over the past two decades (ARDA, 2008). These developments have been largely due to the initiatives taken by the "l'Association Réunionnaise de Développement de l'Aquaculture" (ARDA) and AQUAMAY (the Mayotte Aquaculture Development Association) with support from IFREMER. As elsewhere, the undersupply of fish from the local fishery was the main driver of aquaculture development there (ARDA, 1999).

Marine finfish mariculture in Reunion started in 1999 with two species, viz. red drum (*Sciaenops ocellatus*) and Goldline seabream (*Rhabdosargus sarba*). There are several farms that produced red drum on a commercial basis in 2008 (ARDA, 2008). In 2006 production in Reunion amounted to 55 tonnes of red drum and one tonne of cobia (*Rachycentron canadum*) (ARDA, 2008), while in Mayotte some 130 tonnes of Red Drum were produced in addition to some experimental quantities of cobia and Goldline seabream (FAO 2010).

Initiatives by ARDA and AQUAMAY are ongoing to develop new and appropriate technologies for the advancement of offshore cage culture and to sustain the confidence of private sector investors.

Acknowledgements

I should like to convey my gratitude to Professor Tom Hecht (Rhodes University, South Africa) who led the Scoping Survey in Seychelles and provided very useful information which was used to write this paper. I am grateful to the International Foundation for Science and the Western Indian Ocean Marine Science Association for providing financial support to attend the Mariculture Workshop in Zanzibar and the subsequent selection of this contribution for publication. I am also grateful to the scientific staff at the Albion Fisheries Research Centre in Mauritius for their valuable comments and information. Finally thanks to V. Lucas and N. Bristol from the Seychelles Fishing Authority for their time and help to review this paper.

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