Technical, economics and environmental analysis of semi-intensive shrimp (Litopenaeus vannamei) farming in Sonora, Sinaloa and Nayarit states, at the east coast of the Gulf of California, México

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ABSTRACT
In Mexico shrimp pond aquaculture is the main activity and contributes with 45.0% of the total fisheries volume and 74.3% of gross profit generated by the national products, being Sonora, Sinaloa and Nayarit in the east coast of the Gulf of California the states generating around 70% of region gross profit. The main species cultivated is the white shrimp Litopenaeus vannamei, and for this reason academic and government sector devoted much attention in this species, however, still researching on economic feasibility is scarce and needed. In this paper, the technical, economics, production and environment parameters of 80 semi-intensive commercial in these states are analyzed and discussed. The results showed the main external constraints affecting short and long run farm performance. The overall observations pointed out that there is an increase on yield and income when shrimp farms invest in higher quality inputs such as equipment and technology for more efficiency in using water, use of certified post-larvae and better design of farm facility. Nevertheless, further research is needed to adjust shrimp production strategies to specific farm requirement by investing in premium quality inputs. Furthermore, the most serious threat from shrimp aquaculture is the potential effect on water quality and the infrastructure associated, that having more serious effects on the environment, particularly in the coastal wetlands. The economic and the environment care must be driven to lead a more sustainable scenario.

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1. Introduction

From 2006 to 2008 the world shrimp farms produced about 3 million metric tons yearly, with prices around US$ 4000 per ton. Nearly 80% of this production came from Asian countries (mainly China and Thailand), while Latin America contributed with slightly more than 15% of the total production, placing Mexico as the sixth largest producer worldwide (FAO, 2009).

Development of coastal aquaculture, particularly shrimp farming, has generated debate in recent years for social and environmental costs and benefits. Rapid expansion of shrimp farming in countries of Latin America and Asia has focused attention on the need for better and effective management strategies required to enhance the positive contributions from this industry to economic growth and poverty alleviation in coastal areas communities, while controlling negative environmental and social impacts that may accompany poorly planned and regulated developments (World Bank et al., 2002).

The competition among shrimp producing countries around the world, and the rapid advances in technology and the increase in market demand, suggest that the shrimp industry at global level and in Mexico in particular, needs to take appropriate measures to maintain its viability. This can be achieved by making better use of