
Research Article

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# Economic feasibility of establishing a farm to raise commercial shrimp in Basrah - Southern Iraq

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**ABSTRACT:**

For the first time in Iraq, an economic feasibility study is being conducted for establishing a shrimp farm in Basra - southern Iraq. The expected results were according to the situation in terms of prices and costs. Through a culture density of 80 larvae / $m^2$ with a survival rate of 50%, the productivity of one acre was evaluated with no more than 1000 kg of shrimp / 0.25 hectare, and the amount of feed consumed was one ton during the annual crop (six months, i.e. from April to October), and the marketing value of each acre was not Less than 8 million Iraqi dinars (32 million hectares of production), considering the price of one kilo of shrimp is 8 thousand dinars, and the weight of one shrimp reaches 10 grams during. After calculating the costs of establishing the farm (one hectare) for the first year, 20 million, while in the second year it needed only 10 million. The sole dependence on the catch of shrimp to meet the juvenile provision of Metapenaeusaffinis and Penaeussemisulcatus juvenile shrimp, and perhaps freshwater shrimp can benefit from Macrobrachiumnipponense found in marine and river waters.

**KEYWORDS:**

Aquaculture, feasibility study, investment, shrimp.

## INTRODUCTION

Shrimp form a large group of crustaceans ranging in size from a few millimeters to about 35 cm long (FAO, 1981). They are valuable food organisms that are highly exploited in southern Iraq, shrimp is a very important export commodity (Enin, 1998; Chemonics, 2002).The demand for shrimp is a growing population exponentially. These include depleting the stock with increased fishing effort. About the available information on the quantities of fish caught, the quantities of shrimp caught have reached *Metapenaeusaffinis* in Kuwait between 370-710 tons during the period from 1983 to 1985 and in Iraq, the amount of catch reached 50 tons from the marshes during 1985 and a daily average of 1000 kg (Salman *et al.,* 1990; Mathews *et al.,* 1987). The production of it in the western Gulf of Thailand amounted to 763 tons (Vibhasiri, 1988). Shrimp *M. affinis* abounds in Iraq in the Shatt al-Arab, the marshes, Shatt al-Basra, and Khor al-Zubayr. In Kuwait, this species appears in saltwater. Many researchers have studied the aspects of life and the areas of its presence. Mathews *et al.* (1987) indicated its presence in Kuwait on the coasts of John Kuwait and Boubyan The juvenile stage appears in the spring and autumn in the Al-Raksa area and the coasts of Kuwait Bay. The individuals of this species multiply twice a year in the spring and autumn. It is more likely that in the fall, the juvenile eggs that were laid in the spring and vice versa. As for its life cycle in Iraq, it is much simpler, as the juveniles appear once a year. During the autumn season, the large shrimp migrate at the beginning of January and February to the waters of the Arabian Gulf. Perhaps the flooding of the Shatt al-Arab during the spring may prevent the appearance of juveniles of shrimp of this type in the Iraqi internal waters, and these shrimp do not ripen or lay eggs in fresh water.

It is considered of commercial importance in Kuwait, as it is the second most important type of shrimp in Kuwaiti waters, where the percentage of its contribution to commercial fishing comes after the *Penaeussemisulcatus* shrimp, as well as for its economic value (Al-Ghunaim, 2006). An intense fishing effort can cause a problem in shrimp catches through the loss of some species, and the possible extinction of some other organisms. Some fishing methods used by artisans and industrial fishing vessels may lead to habitat destruction. Shrimp farming is an important global sector of aquaculture in certain parts of the world (Yakubu andOnunkwo, 2006), the front lines of the industry are Asian countries especially China, Thailand, Taiwan, Indonesia, Philippines, Japan and Vietnam. According to FAO (1999), Asia produces 78% of the world's total shrimp aquaculture production, which amounted to 737.80 metric tons in 1997. In the Western Hemisphere, 21% of the world's farmed shrimp come from Ecuador, Brazil, Mexico and Puerto Rico. Although the private sector is the main player in these countries, the industry enjoys a tremendous degree of support from their governments. Penaeid shrimp is one of the leading cultured species, but its cultivation in freshwater has developed significantly in Asian countries such as Taiwan, Thailand, Vietnam, and China. The global production of freshwater shrimp was estimated at 35,000 tons in 1993 (MSU, 2007), with the potential to achieve significant progress in shrimp farming if the methods used for its cultivation are adopted.

Experimental experiments have also been conducted on the performance of culture, reproduction, and the production of hatchery seed for freshwater shrimps in progress at the Marine Science Center –the University of Basra through letters, and dissertations made for this purpose by Al-Maliky (2009; 2015) on the cultivation and propagation of shrimp *M. affinis* and *Macrobrachiunnipponense* respectively, while this paper discusses the basic proposed method of semi-intensive monoculture, and propagation of fresh, and brackish water shrimp in the waters of southern Iraq, especially in the north of Basra. The two species,

*Penaeussemisulcatus* and *M. affinis* constitute the largest and most important part of commercial shrimp fishing in the Northwestern Arabian Gulf region. The first type prevails whenever we head south, and the second type prevails whenever we head north towards Iraqi internal waters. The specie*M. affinis* extends its spread to the internal waters in the Shatt the Arabs and the marshes, where they are hunted and displayed in the markets. It is also indicated that there are two herds of the species, one of which came from the reserves of the Iraqi internal waters and the other from the coastal mud bottoms of the northern Arabian Gulf. It has two breeding seasons, one in the spring and the intervention of large individuals in the fishing nets in the fall and the other in the fall and the intervention of its members in the fishing nets in the spring (Ali, 1997). The presence of the eastern shrimp *M. nipponense* in our local waters since 2003 Al-Maliky (2013).

The current study aims to shed light on the shrimp project and its economic importance, using previous studies within the spatial reality of a valid environment and local shrimp species with good marketing value.

## Materials and methods

Several areas (marine water that includes the sea coast and the Akhwar area, downstream water that includes the area along the Shatt al-Arab from Abu al-Khasib to FAO, freshwater and includes the Basra marshes, the Tigris River in the North of Basrah, and the Basra Canal) to be the first nucleus for the establishment of a shrimp farm in Basra - Iraq. Each area is distinguished according to its location, and the amount of fodder required until reaching the production stage was determined based on (New, 1987). The density of the proposed culture for use within the Basra airspace is 80 larva/$m^2$ local shrimp for a period of six months, the length of the rearing period from April to October, until production.

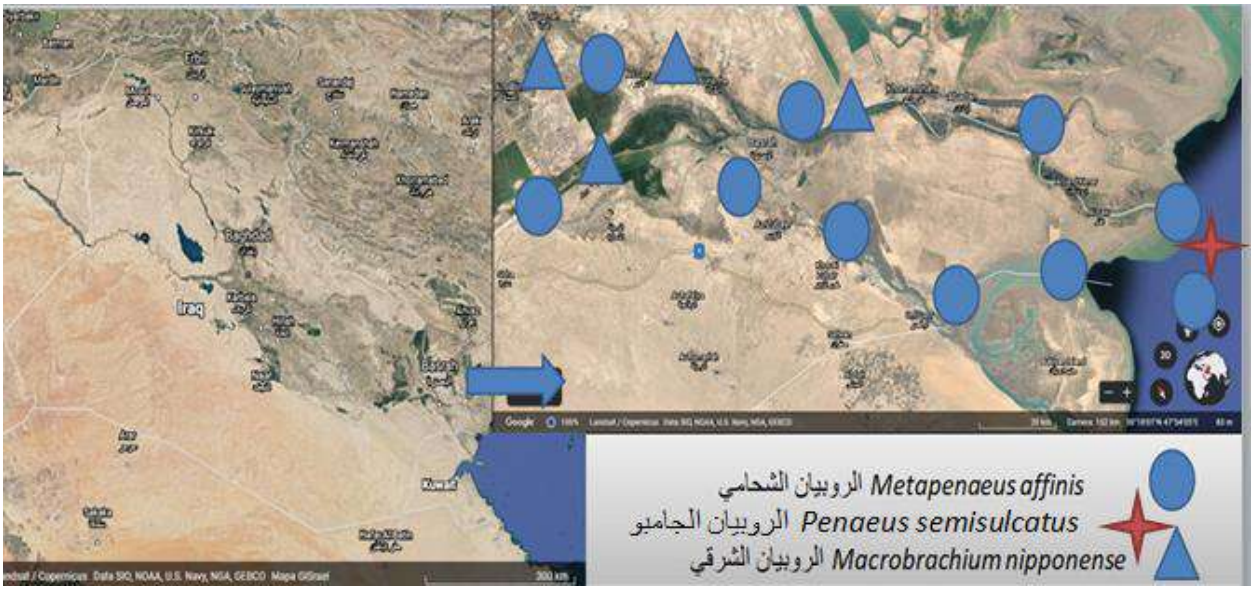


Figure 1. Distribution map of the most important shrimp species *P. semisulcatus*, *M.affinis* and *M.nipponense* in Basra waters.

## Results and discussion

Shrimp farming is under pressure to increase its production to meet the growing food demand of a growing population. In the Philippines, aquaculture has seen this shift from milkfish to shrimp, at a marketable price. This intensification has led to negative and positive impacts that have raised a range of environmental and socio-economic problems. A review of the environmental, social and economic challenges facing the shrimp farming industry, faces using the preferred reporting elements for systematic reviews and meta-analyses. Examination and evaluation of the impacts of shrimp farming on the environment, such as the management of shrimp farms, marine pollution, disease outbreaks, socio-economic impacts and climate change. Presence of viral diseases, causing approximate losses to the industry of 40,080 metric tons in 1997, and 51,000 metric tons in 2014. Recommended strategies and policy changes were considered to improve shrimp farming, including disease management, and adoption of good farming practices Water, appropriate environmental monitoring, sustainable practices at the farm level (Macusi*et al.* 2022).

The economic feasibility study for a shrimp farm requires the following:

1- Those in charge of the study: must be experienced, specialized, and have a proven track record of working in the field of shrimp breeding and breeding.

2- Project size: the larger the farm area, the greater the economic return from the farm

3 - Credibility: The management and technicians of the farm must deal with their customers with all transparency and credibility so that the farm is a face for the largest number of farmers, beneficiaries, consumers, and others.

4 - Location: The more ideal the farm's location was, the more successful it would be and the more economical it would be, as it was close to water sources and drainage channels, close to the road and transportation network, and easy to reach by all beneficiaries. The area will be safer and far from the city center and balanced between the amount of water loss through evaporation and what is added to it from the source of water sources and rain.

5- Source of shrimp broodstock and larvae: It is preferable to obtain shrimp broodstock and their larvae easily and at the most appropriate prices.

6- Shrimp diet and food: One of the most important ingredients for the success of the shrimp farm is the provision of high-quality, high-quality food at an affordable price.

Per capita seafood consumption is expected to continue to increase by 1.5 kg per year by 2025 (Diana, 2009).

While to determine the expected return from the project and start it (Fig. 3), the following information must be collected:

1- Knowing the price of one kilogram of shrimp in the market now and expected in the coming years, locally and globally.

2- Is there a need for a certain species of shrimp or other new types?

3- The consumer's appetite for this farmed shrimp.

4- The cheapest and best materials used in the project.

5- Knowing the price of the land, water sources, and soil quality.

6- The quality and cost of shrimp food.

7- Prices of tools used on the farm, including nets, and utensils for transport.

8- Estimating the cost of building ponds in the cheapest way.

9- How to transport shrimp from the farm to the place of marketing.

10- The number of manpower, experience, and cost.

Crustaceans contribute to a large part of the aquaculture production and value among the aquatic species for which they were developed (FAO,2008). In recent years, shrimp has become the most valuable aquaculture species in the world,

And its production increased from less than 75,000 metric tons in 1980 to more than 5.7 million metric tons in 2020 (FAO, 2020).

**Table 1. Shows a comparison of the two species of local shrimp proposed to be farmed in Basra Governorate.**

| Species | Length (cm) | Environmental | Fertility percentage | Sex ratio M:F |
|---|---|---|---|---|
| *P. semisulcatus* | 18 - 23 | Salt water with sandy, muddy and sandy loam bottoms | 356255 | 2: 1 |
| *M. affinis* | 15- 22 | Salt, estuary and freshwater with muddy, and sandy mud bottoms | 137500 | 1.0: 1.14 |
| *M. nipponense* | 7-10 | Fresh and brackish water with muddy, and sandy mud bottoms | 1540 | 1.0: 1.36 |

Source: Al-Maliky (2013).

Experimental results were extracted from studies on two species of shrimp *M.affinis* and *M. nipponense*. Also, Al-Maliky (2016) study confirmed the acceptability of river shrimp*M. nipponense* when testing the consumer's acceptance of its sensory characteristics.

Penaeid shrimp is the most preferred crustacean in aquaculture, as evidenced by the massive expansion of the land area devoted to shrimp culture (Vo, 2003;Martinez-Cordova and Martinez-Porchas, 2006).

Globally, about 9.4 million metric tons (metric tons) of farmed crustaceans were produced in 2020. Of these, 5.7 million metric tons were from Penaeusvannamei (Pacific white shrimp) and Penaeusmonodon (black tiger shrimp) (FAO, 2020).

**Table 2. Feasibility form for establishing a shrimp farm in Basrah.**

| Subject | Monthly cost (Dinar Iraqi) | Annual cost per hectare (Dinar Iraqi) |
|---|---|---|
| Larvae (200.000 l/0.25 hectare) | 1500.000 | 7000000 |
| Feed price (4 tons) | 500.000 /pond | 2000000 |
| Guard fees | 250000 | 3000000 |
| Follow-up and transportation fees | 85000 | 1000000 |
| Basins rent | 250000 | 3000000 |
| Preparation of larval ponds | 1000000 | 1000000 |
| Preparing adolescent pools | 3000000 | 3000000 |
| Work Supplies | 3000000 | 3000000 |
| Total | | 23000000 |

**Table 3.The feasibility result for each pond (200,000 larvae/0.25 hactare) for shrimp farming is as follows.**

| Subject | price per kilogram- weight (Dinar Iraqi) | annual value (Dinar Iraqi) |
|---|---|---|
| Marketing weight (10 g) | 1000 kg/0.25 hactare | 8 million/dunum |
| Farm costs | | 23million |
| The productivity of a 0.25 hactare is 1000 kg | 8000 | 8000000 |
| Hectare productivity | 8000 | 32000000 |
| Profits for the first production year | | 9000000 |
| Profits for the second production year | | 20000000 |
| Third production year | | 20000000 |
| Total | | 49000000 |

Population growth and increasing per capita consumption suggest that farmed seafood products will gradually become more important as an additional food source, and that aquaculture will play a vital role as natural fish stocks continue to decline (Diana, 2009; Bene*et al.* 2016).

These results are speculative and encouragement that requires going into their application to be a starting point for improving them, leading to the success of establishing the first shrimp farm in Iraq with economic feasibility. Shrimp farming in its primitive stages in Iraq, in recent times due to the wide success in shrimp farming in the world, now the Iraqi private sector has begun to search for investment projects, including shrimp farming. However, limited knowledge of shrimp farming technology hindered the realization of this dream. With the adoption of the methods and procedures used to determine the economic feasibility of shrimp farming contained in this paper, shrimp farming in our Iraqi waters will make progress by providing employment opportunities, improving protein consumption, helping to alleviate poverty, enhancing the rural livelihoods of our people and contributing to our revenues from foreign exchange.

Water management became difficult as a result of the culture intensification, which led to uncontrolled feed wastes, and the release of effluents into the marine environment, which affected the diversity of the phytoplankton, the spawning grounds, and the nursery habitats, as well as of the seagrass and mangrove ecosystems (Primavera, 2006).

As a proposal for shrimp farming in Basra, which is always exposed to a sudden rise in the levels of salinity in the Shatt al-Arab waters, we know that shrimp *M. affinis*can be cultured in the water of high salinity (seawater salinity is 34 parts per million) and once its larvae and juveniles enter the waters of the Basra marshes, which have little water salinity less than 5ppm, while eastern shrimp *M. nipponense*live at salinity levels less than 1 to more than 20 ppm. This feature of the two local species enables them to live and grow in the Shatt al-Arab water environment, especially within fish farms, and thus we can solve the problem of salinity and its impact on the production of those farms.*M. affinis* is a marine living and part of its life lives in fresh water, while *M. nipponense* lives all its life in freshwater and tolerates high salinity of water. Marketing volumes in fresh water are good in full or after peeling.

## Conclusions

Practical experiments proved the growth of *M. affinis*and *M. nipponense* in freshwater ponds. Environmental conditions in Basra are more suitable for shrimp farming. Which requires many serious and purposeful attempts to benefit economically from the types of fresh water shrimp because of their ease of control, low costs and direct proximity to the farmer and the local consumer.

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