

Marine aquaculture in Cuba: What to do for its development in the current historical context?

Abstract

Cuba is an archipelago, its largest island has 5746 km of coastline and its insular platform has a surface similar to its arable area. However, marine culture is not a branch of aquaculture that has been definitively established. Fish farming in cages is considered a productive alternative, which alleviates the capture of marine waters and opens up unimaginable development prospects. Attempts at its initiation and development have been hampered by many factors; some objective and others subjective. This work allows to make an approach to these reasons, and to assess the existing possibilities to direct the marine culture in the right direction.

Keywords: marine culture, floating cages, Cuba

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Introduction

The promotion of oyster farms in the 1960s (in the context of marine aquaculture) was probably one of the first actions undertaken by the nascent Cuban fishing industry, although not the only one. Its results rose to 3,740 tons in 1970¹ (between harvesting and cultivation); but its production gradually fell to barely 600 tons per year from 1977,¹ and these production levels have been maintained to this day. Productions before 1959 were 500 tons per year in a stable manner, only by harvesting.¹

For the culture of sponges, efforts were made, on a pilot or experimental scale, with variable success. Historically, this resource prevailed before fishing for fish and lobster; but it has never been undertaken in the years since the triumph of the revolution on a commercial scale.

At the end of the last century there were attempts to negotiate with Greek investors who proposed starting crops with fishing in Pinar Del Río; but this expectation was diluted without any significance. Also that year, studies were carried out with the mullet (*Mugil* sp) by the Marine Research Center (MRC) of the University of Havana,^{2,3} but it didn't go away either. The Fisheries Research Center (FRC) carried out successful experiments in 1975 on the artificial spawning of the "patao" (*Epinephelus plumieri*) and the "caballerote" (*Lutjanus griseus*), both species from our coastal waters. Nor did they continue.

In the late 1970s and early 1980s, research aimed at understanding the biology and reproductive cycle of *penaeid* shrimp species from Cuban waters gained strength.⁴ Simultaneously, an experimental breeding station was created, where the procedures and technology for the breeding of the *Penaeus* species began to be fine-tuned. *schmitti*, (present in Cuban waters), which in the end demonstrated high resistance to diseases that plagued shrimp farms around the world, using imported species. Nowadays, shrimp farming is the most advanced, although it has found a production limit.

At the end of the last century, a prospective study was also carried out in the province of Pinar del Río, locating favorable areas for the construction of shrimp farms with Italian and Spanish investors.¹ Several areas in different municipalities were evaluated in detail; but it was decided to carry out a more precise evaluation and diagnosis in the area adjacent to La Coloma (18 km south of the city of Pinar del Río). Like other attempts, it too was abandoned.

¹The author of this work was a counterpart to the investors.

In the 1990s, floating cage culture tests for *Dicentrarchus labrax* seabass began in the Arroyos de Mantua area,² (Pinar del Río province), offering good results. Prior to this, the maintenance of larvae of this species sent from Spain was carried out in a specialized center in Mariel.^{3,5} This experience of fattening in floating cages was carried out with a Spanish businessman with two cages, but for various reasons it was not continued.

In 2011, a project between Cuba and Norway began with the objective of using Cuban and Norwegian experience and technology to establish sustainable marine aquaculture activities in Cuba. The project: "Development of a sustainable marine aquaculture in Cuba" with a duration of five years, between (FRC) and the Institute of Marine Research of Norway (MRN), with financing from the Norwegian Agency for Development Cooperation (NORAD).⁶

During a careful evaluation process by Cuban and Norwegian experts, the cobia (*Rachycentron canadum*) was chosen as the species to work on in this project.⁷ This species is considered one of the most important for marine fish farming in tropical waters. It is robust, grows quickly, and adult fish can weigh more than 50 kg and reach a length of two meters.

For testing, cobia fingerlings from Ecuador were imported. During culture it was possible to harvest the first cobia when the fish reached an average weight of 3 to 4 kilos.

Subsequently, a project was developed for the production of cobia fingerlings for fattening in floating cages in the sea, and subsequent marketing.

As a result of this cooperation, in 2014 and 2015, 5.17 tons of Cobia were produced from imported fingerlings, which were fattened in cages located in the Bay of Pigs, harvesting individuals weighing between 2.86 and 3 kg in 257 culture days, and a survival of 74%.⁶ The project was not further developed because it lacked the drive to promote it.

Challenges

In Cuba as in other places, the access to marine ingredients such as lipids and protein for the production of diets, is an important limiting factor for the sustainable growth of fish farming.⁷ Cuba does not have large marine populations that are suitable as ingredients for diets, and

²The author took part as a specialist.

³The author of this work followed the acclimatization process.

the use of alternative animal or plant ingredients is a condition for future production growth. The importation of feed is expensive and there are limitations for its acquisition in large quantities. According to Alvarez -Lajonchere,⁸ “there are criteria that object to marine aquaculture in Cuba, which is not mentioned with respect to the intensive culture of fish in fresh water or shrimp in ponds.” It should be noted that, in economic terms of efficiency and profitability, the average value of freshwater fish (1.49 USD/kg) is 2.5 times lower than that of marine fish species, (3.89 USD /kg) (9), not to mention that the most accepted marine species in the market have higher prices. This justifies the importation of all prepared foods and, even so, the profits exceed USD 1.00/kg produced.⁸

Notwithstanding the foregoing, the decision not to correspond to the total importation of feed, forces the creation of local feed through own resources, which are acceptable in its components for an efficient growth of the fish.^{7,9} Cuba has a good supply of arable soils for the production of grasses and legumes. Another advantage is that some provinces, such as Pinar del Río, have Industrial Fishing Enterprise, which generates large amounts of waste in their manufacturing activities, which can be recycled in the production of feed for feeding fish mariculture. They are viable solutions, which can be applied locally in state shelf fishing establishments.

An alternative for the growth of hybrid tilapia in cages in marine waters has been carried out in some countries,¹⁰ due to the fact that the species resists normal salinities in the Cuban coasts. An unavoidable advantage is that the spat can be purchased in the nursery stations dedicated to its reproduction (three stations in Pinar del Río, one of them in San Luis). In this way, (until the necessary development in the production of properly marine fingerlings is achieved), the construction of complex facilities for the artificial reproduction of these species is saved. It is an experience that should be tested.

The annual tropical cyclones that could hit Cuba represent a particular challenge in relation to the location of farms.^{6,8} After a review of relevant factors such as depth, wind and wave conditions, current patterns, oxygen saturation, as well as structures (cages designed to withstand inclement weather), they can provide sufficient security elements to undertake cultivation.¹⁰

There are specialists willing to face the challenge; the infrastructure exists to carry out these intentions. Nature is ideal for its implementation and development. Asking what these “previous frustrations” are due to in attempts to start and carry out marine culture does not solve any problem. The important thing is to listen to an old Chinese proverb that says: “Every great path begins with one step.” Nothing is finished unless the beginning is tried, nobody reaches the end of something, if they do not take that crucial first step and continue consistently with the will to achieve the proposed objective. The will has to prevail before the ignorance of not understanding the transcendental importance of the dialectical evolution of progress. We need, above all, active participants who detect the contradictions, and address them with the spirit of resolving them, because it is the contradictions that allow us to give impetus to new real conditions for development.

To climb to higher levels of progress in all orders, you just have to discover the contradictions, analyze them, discuss them, solve them and apply the solutions for the good of all.

The President of the Republic of Cuba and First Secretary of the Central Committee of the PCC, (Miguel Diaz Canel Bermudez) in his words at the 13th International University Congress 2022 expressed:

“Science and innovation are fundamental pillars of our government management in all areas, in all State agencies, in all companies and at all levels, from the community to the presidency of the republic”

Whether this becomes a reality depends on the political will of the State.

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Conflicts of interest

The author declares that there are no conflicts of interests.

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