

# Aquaculture and Tourism Combination for the Caribbean – Strategic Report

## 1 – Introduction

Future development of marine resources exploitation will require the adequate combination of activities, such as fish production, transportation, tourism, etc. In order to allow an increase in the output from marine fisheries resources, it is necessary to develop aquaculture production, as a way for assuring the long-term sustainability.

The proposed combination of aquaculture and tourism allows developing both production and revenue generation from tourist activities. This would also allow a multi-use of the space (MUS), easing the restrictions that could arise from spatial competition. It would however necessitate more specific regulations since it would combine two different economic activities. From the technological point of view the requirements to achieve the integration of activities would not be high, facilitating the implementation and pilot operations.

The initiative would present an alternative to supply the aquaculture fish sector with sustainable products, and in terms of tourism, it would provide an innovative activity, as well as supplying products for the gastronomic and catering sectors in the region. Tourism is already an important source of employment and income generation in the Caribbean. According to statistics published by the World Travel & Tourism Council<sup>1</sup>, in 2014, the tourism sector accounted for 692 000 direct jobs in the Caribbean (4% of total employment), and is expected to reach 879 000 jobs (4.5% of total employment) by 2025. If indirect jobs are included, the tourism sector and connected activities, accounted for 13% of total employment in 2014 (2 231 500 jobs) and is expected to reach 14.4% by 2015. The development of aquaculture would strengthen the creation of jobs, while allowing the development of an additional economic activity to reduce the vulnerability and market fluctuations due to seasonal arrival of tourists. Nevertheless, this proposed intervention is still vulnerable to the extreme weather events in the region (namely hurricanes), for which possible impact and prevention measures should be assessed. The weather conditions would affect not only the inflow of tourists, but also, could result in damage to facilities. Depending on the locations, safeguarding measures should be foreseen.

## 2 – Products

The proposed combination is aquaculture production facilities open to tourists, offering visits to the facilities as well as gastronomic services. Based on some experiences in the region, some possible options would be:

- Fish farming where recreational fishing is offered to tourists, as well as restaurant services where tourist can be served their own catch. These “fish and eat” or “fish and pay” activities are already developed in many countries for inland fish farms, where tourists fish their own fish from pens and then it is cooked on site.
- Aquaculture and aquaponic production combined (this would most likely require onshore facilities), where tourists can consume fish and vegetables from the farm. A combination with the first alternative is also possible. Similar experiences are taking place in Antigua & Barbuda.
- Seaweed culture with tourists touring production and supplying drinks and snacks made from seaweed. Similar initiatives are taking place in Saint Kitts & Nevis and Saint Lucia.
- Ornamental fish production linked to marine reserves or aquariums. Fish observation, as well as education on production techniques, interactive visits, aquariums, snorkelling and diving would be the main attractions.

As part of the attraction, awareness campaigns on the importance of resource preservation, wildlife and indigenous species, as well as the local marine habitats and ecosystems could be implemented. The establishment of facilities at sea could create some behavioural change on fish resources, with the possibility that fish might concentrate in the surrounding areas. While beneficial for endemic species, one of the risks could be associated to the creation of a positive environment for invasive species, which is already a problem in the Caribbean region (i.e. lionfish). To cope with this risk, an alternative activity for tourists could be included such as underwater fishing of invasive species, should it be necessary.

## 3 – Market Analysis

The market for the proposed combination includes the market for fishery products and tourism.

Aquaculture has a wide scope for increase as supplier of fishery products in the mid and long term, given the growing demand and the state of resources. According to the OECD-FAO Agricultural Outlook<sup>2</sup> projections for the fisheries sector, by 2024 fisheries production worldwide will have grown 19% from the levels reached in 2012-2014. This growth will be driven mainly by a 38% increase in aquaculture production. Per capita consumption of fish in 2024 is estimated to reach 21.5 kg, a 9% increase from the base year estimates for the projection. Some of the key factors to determine the variations in growth rates in aquaculture will be land and water availability, and technological improvements. In addition, the constraints related to availability and quality of water, competition for production locations and need for investments on infrastructure are among the causes of the slowdown in growth rates of aquaculture production. A multi-use of space approach could present a solution to the competition for spatial use.

In the case of ornamental fish, it has been a market with continuous growth at a global level, with a recent slowdown due to the international context, and with a leading role of Asian exporters. The main markets are developed nations, mainly the US, Japan, and some European countries<sup>3</sup>. This makes this market vulnerable to the economic performance of these nations. Given the proximity to the US market, this becomes a competitive advantage in terms of logistics and transportation. In 2014, the ornamental fish exports were almost USD 321 million, of which non-freshwater fish represented nearly 24% of exports<sup>4</sup>. Caribbean countries played a marginal role in trade, but this also presents the opportunity for further increase.

As for tourism, this sector is one of high relevance for the Caribbean nations. According to the Caribbean Council and the Caribbean Tourism Organization<sup>5</sup>, during the first half of 2015, 14.5 million tourists arrived to the region, and an overall increase of 5-6% in the number of arrivals was expected for 2015. This indicates a recovery of the tourist sector after being affected by the international economic context. The outlook presented by the World Tourism Organization (UNWTO) forecasts a long-term growth of 3.8% between 2010 and 2020. Revenues from the visits of tourists, according to the World Travel & Tourism Council are expected to grow at a 3.5% yearly rate between 2015 and 2025.

Therefore, the key factors driving the demand for the mentioned markets are diverse, with purchasing power of consumers being one of the most significant. In the case of fish for food, population growth is a subjacent driving factor that assures a long-term growth in demand, while the economic context and expenditure of consumers introduce volatilities in the other mentioned markets, as well as in consumer preferences in terms of food products.

#### **4 – Customers**

The market segments to which these initiatives would be aimed are mainly those of high value tourism. This segment presents two sub-divisions: high profile tourism and niche tourism. These categories refer to tourist activities that offer a high level of quality and a high or relatively unique value; and in the case of the latter, the focus is on value-added services or locations<sup>5</sup>. Niche tourism relies on a lower number of tourists, but they tend to value the quality of the services provided with higher spending will. These types of services have a high revenue per tourist, allowing a higher profitability. An early stage for nature and eco-tourism initiatives is what is classified as low-profile tourism with small numbers of tourists with low spending a visibility, which could be considered as an alternative at an early stage of the combined model proposed, as a way to position in the market. Mass tourism, given the characteristics of the facilities and the possible negative interactions with the environment (due to transportation residues and disturbances, and residue generation from visitor, for example) might not be considered as the most suitable scheme, unless it can be assured that the facilities can attend a large number of tourists without affecting production schemes and having a negative impact on the ecosystems.

If a high value and relatively low number of tourists (niche scheme) is selected and assessed as viable, it allows the consideration of locations more distant to the shore, and if the environmental impact is low, areas closer to protected areas could be selected. The specific locations must then be assessed in light of national regulations in force and the species selected for production.

The other group of customers would be seafood traders and wholesalers, either for the domestic or export markets. In addition, the restaurant and catering sector would be included as part of the potential customers. This

sector, given the development of the tourist industry is already developed, so the main challenge would be to gain presence and market share as suppliers.

## 5 – Competition

Being a combined initiative, competition would arise from the specific sectors that could partially supply the offered activities/products.

**Table 1 - Competitors to Concept**

Competitors	Key differentiators	Rating (1-10) 10 is most competitive/desirable
Sport fishing	Consolidated sector. Environmental impact relies on behaviour of consumers and the equipment and gears used. Does not offer synergies with fish production. No educational components or interaction with consumers.	6
Diving	Consolidated sector. Requires training of consumers on diving techniques. Does not offer synergies with fish production. Does not necessarily include educational components.	8
Aquariums	Consolidated sector. Requires high investments. Extraction of fish from their environment is not necessarily attractive to some consumers. Available for mass tourism, expanding the scope of consumer at lower value.	7
Ornamental fish producers	Focused on production and trade, would compete with one of the outputs. Does not aim at the tourism market segment. Consolidated for freshwater fish with existing market structures at the international level. No educational components or interaction with consumers.	5
Aquaculture/ capture fish production	Focused on production and trade, would compete with one of the outputs. Consolidated in many countries. Environmental impact is an issue depending on the produced species. Has a positive outlook in terms of long-term growth of the market. No educational components or interaction with consumers. Depending on production process and location, environmental aspects can be a differentiator.	6

## 6 – Revenue

The offered products would be aimed at a high-value market. The proposed tourist activities, which offer a relatively personalised experience aimed at a specific bracket of consumers, allows higher revenues per tourist to be obtained. From a production cost perspective, tourist activities would require investments in facilities for observation, educational and interactive material, transportation to facilities and catering sectors in the facilities. Production of fish is subject to the performance of local and international markets. The price and market development relies not only on the selected species, but also on substitute products. In most cases, prices are set by international markets, and local products can achieve some premium based on presentation, process, or singular characteristics (such as geographical origin, production process, etc.). For the case of on-site consumption the price margin will rely on the location, the competitive positioning to other restaurants and the uniqueness of the experience provided to consumers and their willingness to pay (i.e.: “fish and eat” activities). Ornamental fish reaches a high value at the retail level, allowing in many cases a spill-over throughout the value chain.

Considering the location and management legislation, tariffs associated with spatial use, internalisation of environmental impact through taxes on production levels linked to the impact on the environment, and aquaculture production licences and fees could be expected. On the other hand, tourism is a promoted activity in many countries and with this initiative could benefit from public promotion programmes (grants, subsidies, tax exonerations, etc.). Similar considerations can be applied for aquaculture production supported by national aquaculture development plans.

The combination of aquaculture and tourism would probably require a high level of investment, although an association scheme between aquaculture producers and tourist operators could be designed.

## 7 – Strategic Roadmap

Being a combination of two pre-existing activities, the technological innovation requirements should be relatively low, while the biggest challenges should arise from logistics and spatial configuration. Once the layout is set and the location selected, the assessment of the market potential through surveys and focus groups would be key to assess the viability. The selected location will also determine the possible species, given the regulations in force in

the different countries in terms of spatial use and the possibility to introduce foreign species, or production with endemic ones. Once the market potential is determined, a projected economic evaluation should be carried out, as well as an environmental impact evaluation. Subsequent to the feasibility study, the facilities can then be installed. Once operational, actual cost and revenue information can be collected, in order to validate and adjust projections.

**Table 2 – 5 year Strategic Roadmap**

2016	2017	2018	2019	2020
TRL 5	TRL 6	TRL 7	TRL 8 – TRL 9	TRL 9
Design of combined facilities. Assessment of possible geographic locations. Selection of species. Assessment of vulnerability to climatic conditions. Surveys to assess potential markets. Promotion of initiative among tourist operators to assess market viability.	Economic and environmental assessment. Preparation of business plans. Estimation of costs and prices. Projection cash flows. Outline of regulations in light of environmental requirements and foreseen impact.	Installation of facilities. Collection of baseline information for environmental impact assessment. Collection of installation and initial operations costs. Promotion with tourist operators and fish traders.	Operations of the facilities and follow up. Collection of costs information. Validation of the projected cash flows.	Review and validation of results. Evaluation studies (economical and environmental).
H2020 funding	IADB/EU funding	Angel investors		
IRL 2	IRL 3 - IRL 4	IRL - 5		

## 8 – Conclusion

The previous analysis assesses the primary strategy to combine two activities that have different levels of consolidation in the Caribbean region, but could have strong synergies. Aquaculture is a growing activity with strong perspectives for supplying fish in the mid and long-term, both for human consumption and with ornamental purposes, as detailed in the previous section, which has reached an uneven development in the region. On the other hand, tourism is a consolidated activity in the Caribbean, attracting a wide range of consumers with different preferences and purchasing power. The proposed combination aims to combine aquaculture production and tourism, allowing an increased awareness of tourists on the production process, the importance of environmental preservation, promotion of indigenous species, provision of educational tools and generally widening the alternatives offered to tourists. The targeted consumer would most likely be an educated population with a relatively high purchasing power and conscious of environmental preservation issues. Through an adequate environmental impact assessment and compliance with national and international regulation, the environmental impact is expected to be low, allowing also the production of other products destined for the food markets. By widening the offering of tourist attractions and production of fish, a good opportunity for employment and income generation is provided, as well as reduction on the pressure on fish stocks and the marine ecosystems.

## 9 – References

1. Travel & Tourism, Economic Impact 2015 – Caribbean; World Travel & Tourism Council.
2. OECD/Food and Agriculture Organization of the United Nations (2015), OECD-FAO Agricultural Outlook 2015, OECD Publishing, Paris. – Commodity Snapshots, fish section.
3. Montecini, Pierluigi; The Ornamental Fish Trade - Production and Commerce of Ornamental Fish: technical-managerial and legislative aspects; GLOBEFISH Research Programme, Vol. 102. Rome, FAO.
4. GTIS; Global Trade Atlas.
5. [www.caribbean-council.org](http://www.caribbean-council.org); [www.caribbean-council.org/wp-content/uploads/2016/01/Business-of-Tourism-Dec30-A-year-of-recovery-and-new-challenges.pdf](http://www.caribbean-council.org/wp-content/uploads/2016/01/Business-of-Tourism-Dec30-A-year-of-recovery-and-new-challenges.pdf).
6. ECORYS; Study in support of policy measures for maritime and coastal tourism at EU level.

### Other sources of information

- Aquaculture and Tourism Combination for the Caribbean Basin Justification Report.

- FAO Fisheries and Aquaculture Department, Statistics and Information Service FishStatJ: Universal software for fishery statistical time series.
- Horizon 2020 – Work Programme 2016-2017, General Annexes