CONTRIBUTION 5.6

Outlook and Key Considerations for Sustainable Commercial Aquaculture Development in CARICOM

Samia Sarkis, Yvette DieiOuadi, and Eric Wade

SubRegional Office of Latin America and the Caribbean, Barbados,
Email: ssarkis@livingreefs.org, Yvette.DieiOuadi@fao.org

Abstract

The most recent study led by FAO and facilitated by the Caribbean Regional Fisheries Mechanism CRFM was conducted in 2022, which provided a synopsis of the aquaculture sector in the Caribbean Community (CARICOM) member countries, the challenges in expanding and diversifying the sector, and actions-oriented recommendations. With an overwhelming response rate, this very informative study reported that the majority of aquaculture production is concentrated in Jamaica, Belize, Haiti and Guyana. The total production for CARICOM countries was 3 402 metric tons in 2020 (FishStatJ, 2022), valued at 13 305 000 USD. Almost ¾ of the aquaculture production in the CARICOM countries focused on freshwater species (70%) in 2020; brackish aquaculture accounts for approximately ¼ of total aquaculture production (26 %) and marine aquaculture operations for less than 5 percent of total production. This sector is therefore at its infancy.

Key validated findings of this study were the lack of infrastructure, available technology, level of appropriate skill set, and investment, considered main limitations in obtaining reliable seed supply, affordable feed supply and in developing aquaculture in CARICOM. Additional challenges faced by Small Island Developing States SIDS included limited expertise, high production costs, poor seed supplies, and extreme and destructive weather events. Furthermore, access to financial resources is a challenge for this relatively new industry in the Caribbean. Four key points were identified as the way forward by CARICOM countries: 1. Reducing the reliance of CARICOM countries on imported seed and feed supplies, 2. Diversifying aquaculture production in line with environmental sustainability, 3. The need for a regulatory aquaculture framework, and 4. Increase investments in aquaculture. This complements a regional review of the sector in Latin America and the Caribbean, which study suggested that the industry required better governance, the adoption of adequate technologies and best practices,as well as increased efforts for environmental sustainability, and foresight to deal with climate and market changes. One promising approach to promote sustainable commercial aquaculture in CARICOM developed following this FAO/CRFM study is the recently launched Digital Aquaculture Library in 2023. This comprehensive online platform serves as a registry for regulators, managers, aquaculturists, and funding agencies in the Caribbean region. It facilitates the exchange of valuable information among CARICOM countries and other Caribbean states, enabling stakeholders to share insights, best practices, and lessons learned. The Digital Aquaculture Library also helps CARICOM countries gain knowledge from successful aquaculture practices in other regions and apply it to their own contexts. It also facilitates training programs and the transfer of technical know-how to develop human resources and technical capacity. The library

provides access to educational materials, workshops, and expert guidance, empowering aquaculturists to enhance their skills and contribute to sustainable development. Additionally, it connects funding agencies with aquaculture projects, attracting investments and promoting collaboration between the private and public sectors. The platform encourages regional collaboration and resource pooling to build necessary infrastructure, such as shared facilities, research centres, and technology transfer hubs. Overall, the Digital Aquaculture Library represents an essential tool for CARICOM member states to overcome challenges and barriers, promote sustainable aquaculture, and drive growth in the region, ultimately contributing to the development of a resilient and thriving aquaculture industry in the Caribbean.

KEYWORDS: aquaculture, information exchange, digital library, collaboration, CARICOM

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1. INTRODUCTION

Aquaculture in the Caribbean Community (CARICOM) member states is not well developed, amounting to approximately 5% of the region's total fish production (FAO, 2019). This is of concern to the region, as aquaculture is believed to be important to food security of CARICOM states, especially in the light of increasing climate change and potential consequences on small scale fisheries (Townhill et al., 2019).

It is recognised that environmental and physical characteristics of countries limit the scope to expand sustainable aquaculture for many CARICOM countries (UNCTAD, 2021). These include land availability suitable to aquaculture operations- such as hatchery for seed supply, sanitary and processing facilities –, freshwater supply for land-based systems and processing, and available coastal areas. Freshwater supply is limited by the permeability of coral rock in many of the islands resulting in low, if any, freshwater source; this coupled with high rates of evaporation make semi-intensive pond culture economically difficult, and explains in great part, the trend for land-based shallow tanks aquaponics systems (Wurmann et al., 2021).

In addition, physical changes due to global climate change, create uncertainty as to the future of the aquaculture sector. Increasing sea surface temperatures and frequency of harmful algal blooms and unprecedented influxes of pelagic sargassum are seen to negatively affect Caribbean coastal ecosystems since 2011 (FAO 2021). These compounded with predicted intensification of hurricane activity can impact mariculture infrastructure (Monnereau and Oxenford, 2017). All of the above points to the need of increasing resilience of this sector through technological modifications and/or diversification of aquaculture systems to address floods, seawater surface temperature increase, and ocean acidification.

CARICOM countries strive to address limitations and resilience issues as well as expand the sector, but often cite the lack of available in-country technology as a major stumbling block (Wurmann et al., 2021). Greater networking and sharing of knowledge and best practices among the Latin America and Caribbean countries has been identified by the Caribbean Regional Fisheries Mechanism (CRFM) as pivotal for the development of the aquaculture sector in CARICOM states. An easy access comprehensive data platform was suggested as a first step to the pooling of knowledge resources and achieve continuity in exchange of information. This compounded with the fact that aquaculture production is most often aggregated with fisheries production and poorly reported in national budgets, called for a review of the current aquaculture operations, and of the expertise available in the CARICOM.

This new FAO funded initiative aims for an up-to-date assessment of aquaculture practices and knowledge from the financial, technological, and research domains, and in so doing develop a regional digital inventory of experts and publications. The goal of the project was to unify regional aquaculture knowledge and contribute to increased information exchange within the region to implement solutions at the country level for the sustainable expansion of aquaculture.

2. METHODS

The project can be divided into a three-phase process:

I. Data-gathering of current (2021) aquaculture knowledge hubs, practitioners, experts, and publications in the CARICOM region.
II. Development of the Digital CARICOM aquaculture library.
III. Assessment of country challenges and outlooks for expanding and diversifying sustainable aquaculture

I. Data-gathering:

Information was gathered on aquaculture production, active farms, and resource people as follows. 1) Aquaculture production presented in this document was collected from primary and secondary sources. Direct correspondence and interviews with senior government officials, mandated to regulate aquaculture, practitioners, researchers, and financers in the CARICOM countries was the primary source of information. Data was standardised by a short questionnaire, open to both government and practitioner representatives, distributed among the 15 CARICOM member states; dominant type and species cultured in each country, their contribution to Gross Domestic Product (GDP), food security, the country's challenges, and species of interest for future operations were assessed. All information received was validated by senior government officials of each country. Published statistics by FAO provided the secondary source (FishStatJ, 2022). 2) A list of active aquaculture operations, key individuals in the public and private sector, and institutions was compiled per country through professional networks of the authors, FAO Subregional Office of the Caribbean (FAO SLC), CRFM, and direct correspondence with country stakeholders. 3) All publications on aquaculture research, techniques, policies and other relevant reports published in the past 20 years were compiled from: a) published documents from regional working groups (e.g. CRFM Aquaculture Working Group), international agencies (FAO, World Bank, International Cooperation and Development Fund), local government departments, NGOs and academic institutions, b) online reports from hands-on practitioners, c) proceedings from regional workshops and conferences, d) voluntary national reviews, and e) training manuals. Documents older than 20 years were not included, unless contents were still considered useful and applicable to current aquaculture activities and have not been technologically updated. Interviews with selected experts were conducted to confirm current knowledge on aquaculture techniques, expand the list of available documents and access relevant reports.

II. Development of the Digital CARICOM Aquaculture Library

Data for the Digital CARICOM Aquaculture library were divided into 1) a registry of individuals and institutions, and 2) an online database of publications in aquaculture research, techniques, and other operating procedures relevant to the Region. Development of the library was conducted with the assistance of the FAO Information and knowledge management Team (NFISI) in view of creating a sustainable online presence beyond the scope of the current project.

The registry was built upon a Microsoft Excel template populated with contact details of individuals and hubs with their consent. This aquaculture inventory was transformed and uploaded onto a web platform by FAO NFISI. The list of documents was published into a dedicated CARICOM page in the existing Aquatic Science and Fisheries Abstract website (ASFA), by FAO NFISI. A process to update the digital library yearly and sustain its value

through current and accurate information to sustain was developed with the collaboration of CARICOM country representatives, CRFM and FAO NFISI.

III. Assessment of country challenges and outlooks

The countries' perspectives were obtained through stakeholder engagement enabled in a joint FAO/CRFM meeting with representatives from the public and private sector. The 'Fourth meeting of the CRFM working group to promote sustainable aquaculture' (June 27, 2022) hosted by CRFM provided the opportunity to discuss potential solutions and pooling of resources for the development of the sector. Discussions were based on information obtained during the data-gathering phase (phase I). Further research led to recommendations published in two project reports, available from the FAO Subregional office of the Latin America and Caribbean (FAO SLC).

3. RESULTS

All 15 member states of the Caribbean Community (CARICOM) were included in the project, and these are: Antigua and Barbuda, the Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago. Associate members were excluded.

The most recent FAO statistics indicate peak aquaculture production in 2017 and a downward trend since 2018, with total production by CARICOM countries at 3 402 metric tons in 2020, (FishStatJ, 2022) and valued at 13 305 000 USD (FishStatJ, 2022) (Figure 1). Saint Vincent and the Grenadines is the only CARICOM country showing recent growth in this sector and reported a ten-fold increase in aquaculture production in 2020.

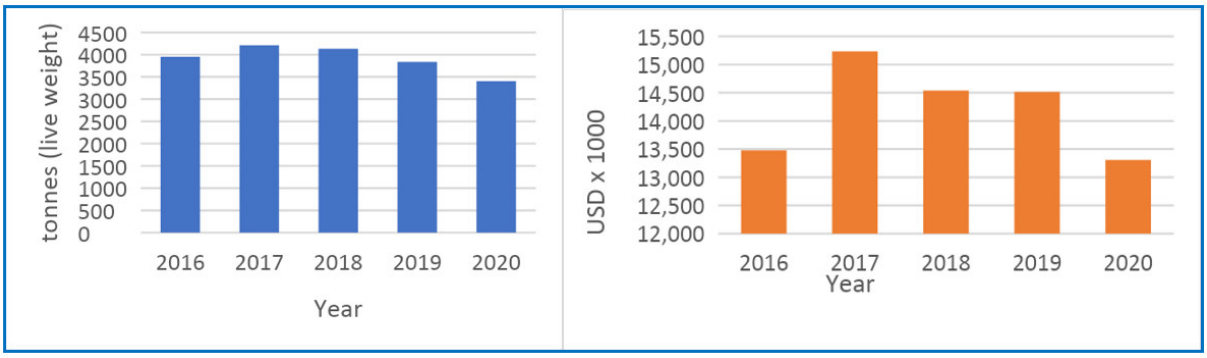

Figure 1. Aquaculture production (tonnes of live weight) and value (USD x 1000) for CARICOM countries between 2016 and 2020 (FishStatJ, 2022)

Much of the aquaculture production comes from four countries: Jamaica, Belize, Haiti and Guyana (FishStatJ, 2022). Wide variation in production is seen among CARICOM countries, attributed in part to geographical differences and in-country human and physical resources. Aquaculture production by country ranges from 1 560 to 2 metric tons by Haiti and Saint Kitts and Nevis respectively. The remaining top 3 producers, Jamaica, Belize, and Guyana report between 100 and 1 000 metric tons (Table 1). Aquaculture value is >1 million USD for 5 of the 15 member countries, Jamaica, Haiti, Belize, and Saint Lucia. Montserrat is the only CARICOM country with no aquaculture sector, and Dominica reports 0 commercial production (FishstatJ, 2022).

Table 1. Aquaculture production (metric tons) and associated value (USD) for CARICOM countries (FishStatJ, 2022)

Year	**Production (metric tons)**		**Aquaculture value (USD 1 000)**	
Country	**2020**	**2019**	**2020**	**2019**
Antigua and Barbuda	20	20	159.3	159.3
Bahamas	6	6	121	121
Barbados	25.5	25.5	256.3	256.3
Belize	565	565	2 160	2 160
Dominica	0	0	0	0
Grenada	22.5	22.5	59.6	59.6
Guyana	137.6	243	1 024.3	1 650.7
Haiti	1 560	1560	3 092.5	3 092.5
Jamaica	917.6	1151.5	4 229.5	5 323
Montserrat	No data	No data	No data	No data
Saint Kitts and Nevis	2	2	12.6	12.8
Saint Lucia	91.9	119.7	1 903	1 007.9
Saint Vincent and the Grenadines	13.1	0.24	36.3	0.67
Suriname	37	69.5	232.8	416.5
Trinidad and Tobago	4.2	54	18.4	255.60

Response to the 2022 questionnaire as part of this study was high, with 11 out of the 15 countries submitting data; nine of which report active aquaculture operations. Countries report that most of the aquaculture production is based on freshwater species (70%), followed by brackish (25%) and the remaining 5% on marine species; this aligns with their reliance on pond culture as the dominant system, followed by aquaponics, and to a lesser extent coastal marine systems (FAO, 2021).

FAO statistics (FishStatJ, 2022) confirm the dominance of the freshwater and diadromous fish group in 8 CARICOM member states, which accounts for 100% of total production for three countries and more than 50% of total production for five countries (Table 2). This study estimates that at least 32% of total aquaculture production is from Tilapia species, indigenous to Africa and the Middle East and introduced to the Caribbean in the 1940's; cultured *Tilapia* sp. include the Nile tilapia (*Oreochromis niloticus*), Jamaican Red (an Oreochromis hybrid), and Mozambique tilapia (*Oreochromis mossambicus*), cultured in 9 of the 11 CARICOM respondents.

Table 2. Brackish, freshwater and marine aquaculture production in CARICOM countries expressed as percentage of total reported aquaculture production in 2020 for the country (FishStatJ, 2022).

Country	Brackish		Freshwater		Marine		
	Crustaceans (%)	Freshwater and Diadromous fish (%)	Crustaceans (%)	Freshwater and Diadromous fish (%)	Aquatic plants (%)	Crustaceans (%)	Molluscs (%)
Antigua and Barbuda				50	50		
Bahamas				16.7		83.3	
Barbados			1.9	98.1			
Belize	88.5			10.6	0.9		
Dominica	0	0	0	0	0	0	0
Grenada				2.2	97.8		
Guyana	76.9	15.7		7.3			
Haiti		16.0		83.9			
Jamaica			0.3	99.6			0.1
Montserrat	NF*	NF	NF	NF	NF	NF	NF
Saint Kitts and Nevis		25		25	50		
Saint Lucia		0.5	1.1	9.1	89.2		
Saint Vincent and the Grenadines					100		
Suriname	27	13.5		59.5			
Trinidad and Tobago				100			

In fact, most of the production stems from introduced exotic species culture confirmed by the respondents; of the 14 species cultured commercially by CARICOM countries, nine have been introduced to the Region, accounting for 71% of the total production (Table 3). Other commercially cultured exotics are three finfish species (Tambaqui, red snapper and Basa), the freshwater prawn (*M. rosenbergii*) and Kappa seaweed (*Eucheuma cottonii*).

Data from respondents indicate that native species make up the remaining 29% of aquaculture production. Only two finfish species native to the CARICOM countries are currently used in aquaculture, mainly by Guyana and Suriname -the armoured catfish or cascadura (*Hoplosternum littorale*), and the Black acara or Krobia (*Ciclasoma bimmaculatum*) (Figure 2). Guyana is the only country reporting the culture of native brackish water shrimps the southern white and brown shrimps (*Litopenaeus schmitti and Farfantepenaeus subtilis*. Seaweed culture is the main mariculture form in St. Lucia and St. Vincent and the Grenadines, part of which is based on native *Gracilaria sp*., also cultured in Antigua and Belize. Belize cultures a native species of seaweed *Eucheuma isiforme*, and records of its introduction to other islands exist. The only bivalve cultured in the CARICOM in 2022 is native (mangrove oyster (C*rassostrea rhizophorae*), with the culture technology developed by and applied in Jamaica.

Table 3. Listing of top 3 species cultured by CARICOM countries; common and scientific names and status (n=11 respondents).

Category and Environment	**Common name**	**Scientific name**	**Status**	**Countries where cultured**
Finfish				
Freshwater/brackish	Nile Tilapia	*Oreochromis niloticus*	Introduced	Antigua, Bahamas, Belize, Guyana, St. Lucia
	Red Tilapia	*Oreochromis aureus x Oreochromis mossambicus*	Hybrid	Guyana
	Mozambique Tilapia	*Oreochromis mossambicus*	Introduced	Jamaica
	Tilapia	*As above but unspecified*	-	Haiti, Suriname, Trinidad and Tobago
Marine	Red snapper	*Lutjanus campechanus*	Exotic	Bahamas
Freshwater	Krobia/Black acara	*Ciclasoma bimmaculatum*	Native	Suriname
Freshwater	Cascadura/Hassar	*Hoplosternum littorale*	Native	Guyana, Suriname, Trinidad and Tobago
Freshwater	Tambaqui	*Colossoma macropomum*	Introduced	Guyana, Suriname
Freshwater/brackish	Basa	*Pangasius hypophtalmus*	Exotic	Jamaica, Haiti
Crustaceans				

Marine/brackish/ freshwater	Pacific white shrimp/white leg shrimp	*Litopenaeus vannamei*	Exotic	Belize
Brackish	Southern white shrimp/brackish water shrimp	*Litopenaeus schmitti*	Native	Guyana
	Southern brown shrimp/brackish water shrimp	*Farfantepenaeus subtilis*	Native	Guyana
Marine	Marine shrimp	*Procamberus alleri*	exotic	Haiti
Freshwater	Freshwater prawn	*Macrobrachium rosenbergii*	exotic	Antigua, Bahamas?, Jamaica, St. Lucia,
Seaweed				
Marine	Elkhorn seamoss	*Kappyphycus alvarezii, synonym Euchema cottonii*	Exotic	St Vincent and the Grenadines
			Introduced *	St Lucia
Marine	Euchema seaweed	*Euchema Isiforme (Belize strain)*	Native	Belize
Marine	Seamoss/red algae/GT	*Gracilaria domingensis*	Native	Antigua, Belize, St Vincent and the Grenadines
Bivalves				
Marine	Mangrove oyster	*Crassostrea rhizophorae*	Native	Jamaica

**E. cottonii* was introduced to St. Lucia from Venezuela

The contribution of aquaculture to both GDP and food security is reflected in country responses, with only two countries reporting aquaculture activities with no contribution. As expected, Tilapia culture is the main contributor to both GDP and food security in 36% and 54% of CARICOM member states respectively (Fig. 2). Other exotic species contributing to GDP in at least 27 % of countries are exotic strains of *Euchema* species seaweed and the Pacific whiteleg shrimp. Native finfish, shrimp and seaweed *Gracilaria* and *Euchema* species contribute to the GDP of at least 36% of CARICOM countries. Some CARICOM member states report aquaculture contribution to food security only. Exotic species contribute to food security in 73% of CARICOM respondents, while the remaining 27% of countries report native finfish and southern brown and white shrimps as top contributors to food security (Fig. 2).

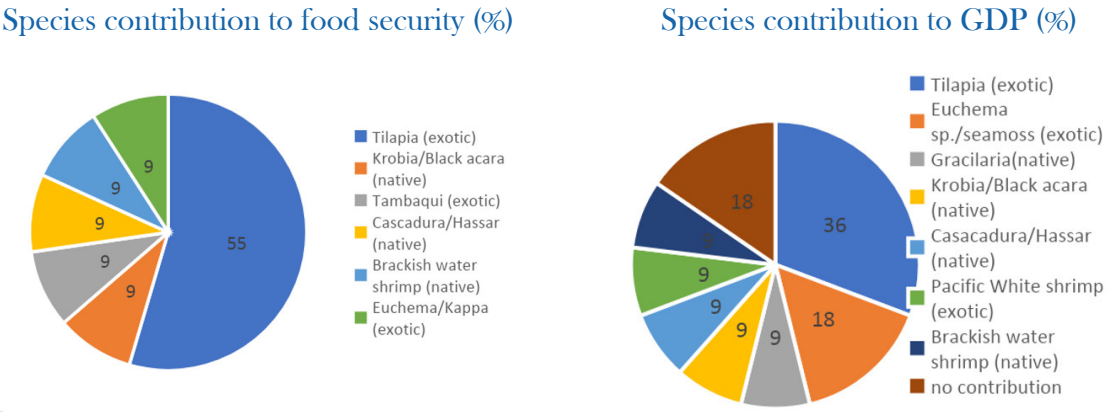

Figure 2. Aquaculture species contribution to the economy and as a domestic food source reported by CARICOM countries. Left: Contribution to GDP. Right: Contribution to food security (n=11 respondents).

Aquaculture production in the CARICOM is predominantly conducted by the private sector. There are few government departments with culture facilities enabling production at any culture stage; five countries report such government support. Of the 24 commercial aquaculture operations reported by CARICOM countries, only one is a commercial *Tilapia* fingerling production by a government-operated facility (Belize), and seven are commercial operations as government/private partnerships (Haiti, Guyana, Jamaica, St. Lucia).

In response to the willingness of countries to expand and diversify, respondents identified a total of 14 species as species of interest; six of which are lower trophic level species (or unfed), with minimal environmental impact; eight species are native (Fig. 3). Technology is developed for ten of the species of interest and applied in other parts of the Caribbean region; five of which are native and include the mangrove oyster (*Crassostrea rhizophorae*), queen conch (*Aliger gigas*), spiny lobster (*Panularis argus*), and native *Euchema isiforme* and *Gracilaria* seamoss, with active operations in Jamaica, Puerto Rico, British Virgin Islands, Antigua, Belize, St. Lucia and St. Vincent and the Grenadines. Of the exotic species of interest, the freshwater prawn, Pacific white shrimp, Basa and seaweed are currently commercially cultured in the Caribbean and by CARICOM countries. Additional data on the technology for all species of interest was summarised in a 16-page brief available from the FAO SubRegional Office for the Caribbean and Latin America (Barbados).

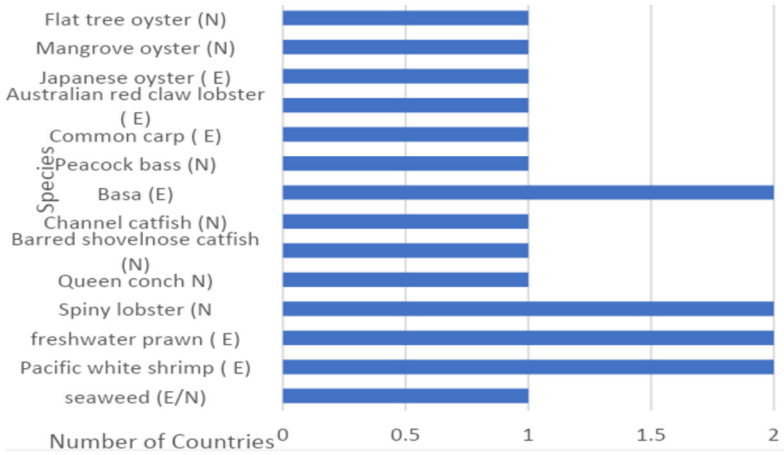

Figure 3. Species of interest to CARICOM countries for the development of the aquaculture sector (n=11 respondents).

CARICOM respondents identified the following top four limiting factors in expanding and/or diversifying by order of importance: 1) Investment and reliable seed supply, 2) human resources (lack of appropriate skill set and staff) and 3) available technical knowledge.

Additional constraints and limitations were expressed by the 11 respondents. One of the most important is the need for legislative and regulatory development and enactment; despite the increasing inclusion of aquaculture in national plans, the aquaculture sector remains a secondary part of the capture fisheries division and is often a sub-section of fisheries legislations/regulations. The countries recognise that a clear legislative and regulatory system, disaggregated from the capture fisheries sector is needed for the aquaculture sector to advance and thrive. This would address zoning, licensing, statutory instruments for monitoring and fish health management, government support for research and development, lack of aquaculture regulation act, and protection against larceny. Secondly, environment and physical capacity is flagged as an ongoing constraint- mainly related to land and freshwater availability limiting sanitary and processing facilities, and hatchery for seed supply. Lastly, operational challenges in decreasing the reliance on imported supplies, such as high-quality feed and in gaining new information/training is expressed by CARICOM countries- most notably for skilled staff in fish nutrition, breeding and larval culture, disease identification and new species production.

All 15 CARICOM countries engaged in gathering data for the digital aquaculture library. The final product consists of: 1) A registry of individuals and institutions with a total of 60 entries. Field expertise and contact details are given for regulators, managers, businessmen, financers and practitioners of CARICOM, and academic experts for the Caribbean Region. It can be accessed on the WECFAC website https://www.fao.org/wecafc/data/digital-aquaculture-library/en/. 2) A list of 86 publications available in Open ASFA in a dedicated CARICOM page. It is accessible to all with digital copies of each publication downloadable as pdf files https://www.fao.org/fishery/en/openasfa?page=1&q=%22CARICOM%22.

The sustainability of the digital CARICOM aquaculture library is secured through a collaboration between CRFM, FAO and CARICOM country representatives. Changes in commercial aquaculture operations with respect to production type and contact details are gathered yearly by country representatives; all CARICOM data is compiled by CRFM and transferred to FAO for updating the online platform. New publications are noted by appointed regional representatives and sent with full citations to FAO for upload to ASFA. In this way, the aquaculture inventory is accurately maintained beyond the scope of this project.

4. DISCUSSION

Traditionally, Caribbean communities (CARICOM and other Caribbean states) have been focused on fishing, rather than aquaculture. To enable this activity, CARICOM countries and the Caribbean Region have turned to well-tested, easily adapted and applied culture systems, with end products contributing to livelihood, social and economic development in a realistic time frame. This results in the domination of introduced exotic species in aquaculture production by the Region and raises the following concerns:

- Use of land-based systems in countries with limited land and freshwater supply,
- Import of juveniles which raises biosecurity and economic sustainability issues,
- Increased likelihood of negative impact on natural populations, as seen in the case of the red claw crayfish in Jamaica (Pienkowski et al., 2015), and
- Potential *Euchema* seaweed invasion of coral reefs observed in other parts of the world (Conklin and Smith, 2005).

The lack of knowledge and skills for the culture of native species coupled with cultural preferences in food consumption which excludes several lower trophic species, contributed to the reliance on exotic species. However, this study points to available regional technology for several species and provides a tool in information sharing and training through the digital aquaculture library. In addition, despite the increasing inclusion of the aquaculture sector in national plans and strategies related to the fisheries sector, Blue economy and sustainable development, the aquaculture sector remains a secondary part of the capture fisheries division and is often a subsection of fisheries legislations/regulations. The countries recognise that a clear legislative and regulatory system, disaggregated from the capture fisheries sector is needed for the aquaculture sector to advance and thrive.

CARICOM member states aiming to expand and diversify the sector should consider focusing on:

1. traditionally consumed mariculture species with well tested and known Caribbean technologies, such as the mangrove oyster, *Crassostrea rhizophorae* and south American rock mussel, *Perna perna* , Queen conch, *Aliger gigas*, (Davis and Cassar, 2020), and the spiny lobster, *Panularis argus*; Integrated Multi-trophic aquaculture (IMTA) is an ecosystem-based approach suitable to a multi-species mariculture system; sea cucumber and West Indian top shell are two species with high export potential which can be satisfied by aquaculture and alleviate existing high fishing pressure; offshore high technology culture for Cobia and snapper species is a large scale production system for domestic and export product with techniques tested in the Caribbean Region (Benetti and Welch, 2010); triploid oyster culture for *Crassostrea gigas* applied at large scale in other parts of the world is a proposed alternative to commercial scale aquaculture for an exotic bivalve (CRFM, 2022).

2. the provision of an aquaculture legislative and regulatory framework- country representatives feel that Aquaculture should be included in existing national programmes for all member countries and a new legislation for a dedicated Aquaculture Act with specific regulatory measures and standards should be a priority. This will lead to various forms of government support (subsidies, research and development, training, demonstration centres), the standardisation of production techniques—thus minimising environmental impacts through best practice– zoning and licensing of aquaculture operations addressing multi-conflict uses, and the development of statutory instruments, such as environmental monitoring and fish health management.

3. Invest and train to establish a reliable local production of feed, fingerling and seed and reduce production costs. High capital costs are the limiting factor, which can be addressed by pooling resources and establishing main feed and seed production centres for the CARICOM countries,

4. Develop and strengthen partnerships (private-private or public-private) and reflect the importance of aquaculture in improved reporting of statistics in the national budget.

The Digital aquaculture library is a tool which can prove valuable in kick starting and/or implementing several of these recommendations, by providing easy access to experts and information. Both new and existing operations can benefit by reaching out to the library's regional aquaculturists who have current knowledge for new species, and by downloading technical guides for assistance in trouble shooting or improving country technology from the one-stop CARICOM reference listing. Proposals are facilitated at the country or regional scale by reaching out to the library's regional organisations, such as the CARICOM Public Sector Organisation (CSPO) to 1) develop regional proposals for financing of new aquaculture facilities, 2) obtain assistance in strengthening statistical reporting, and 3) identify and promote

export opportunities and member-to-member exchanges. Considerations and outcomes of this study contribute to support the development of suitable aquaculture infrastructure for the region; they enable new national and regional partnerships to expand the scale of current operations and address the economic stumbling blocks for the expansion and diversification of the aquaculture sector in the CARICOM.

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