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National intersectoral links with Caribbean artisanal fisheries and aquaculture: considerations and cases

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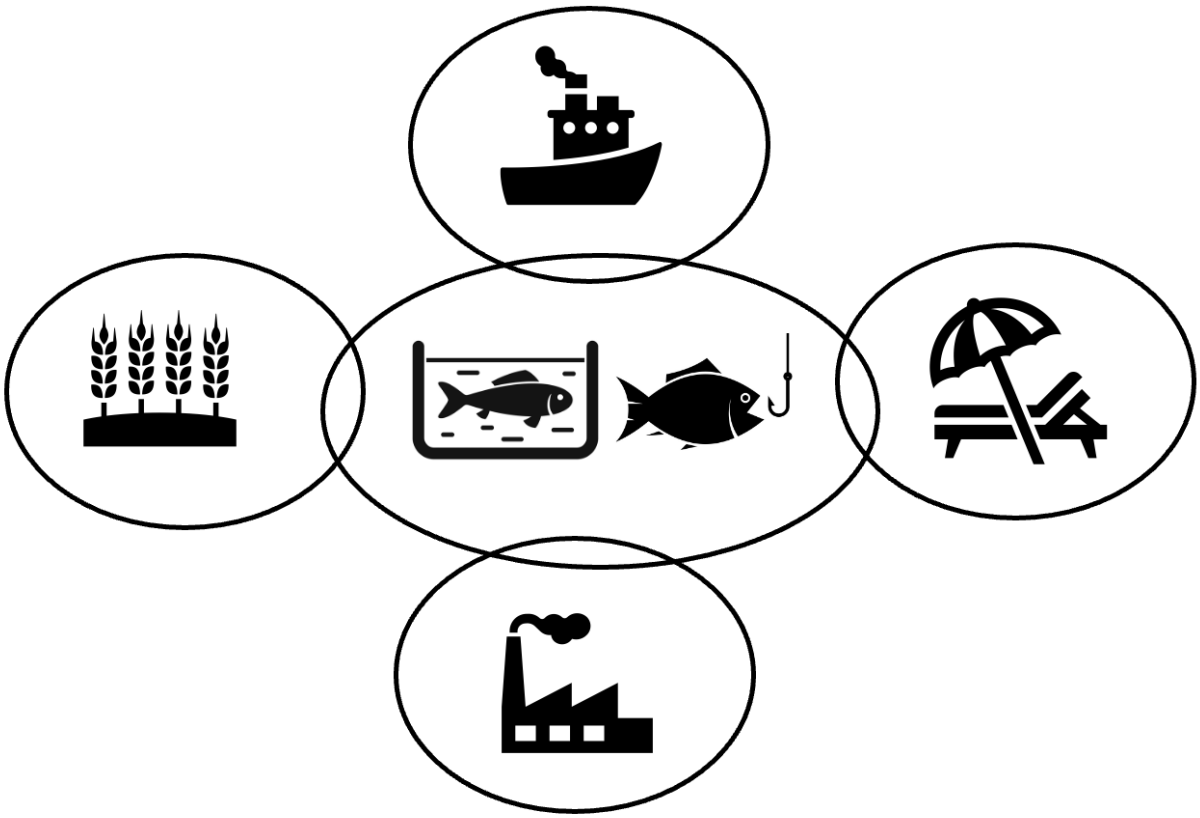

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PART ONE — CONSIDERATIONS: CONCEPTUAL FRAMING

Part One of this edited report sets out the conceptual framing for the cases in Part Two following a brief introduction and explaining the overall approach. This provides considerations for how to best describe the situations in the two cases and communicate the national intersectoral links. The main aim is to move further towards ways of thinking of SSF and SSA in the blue economy or in integrated approaches to sustainable development, however labelled, to better prepare and position them for beneficial links with other sectors rather than assume impending conflict.

1 Introduction

In a region where fisheries are predominantly small-scale, and where marine and freshwater aquaculture is fairly underdeveloped, the declaration in 2017 by the 72nd General Assembly of the United Nations of 2022 as the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022) was welcomed. Central to celebrating IYAFA 2022 are the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines).

Thus the 17th Session of the Western Central Atlantic Fishery Commission (WECAFC) in 2019 recommended that IYAFA 2022 be used to link the highly distributed activities of WECAFC members and partners to showcase the progress made in implementing the SSF Guidelines in a coordinated way. This would enhance the visibility of the WECAFC area SSF and highlight fisherfolk at regional and global scales.

As a response to this Commission recommendation, a WECAFC Coordination Committee for the IYAFA activities in the region was established in 2020. In 2021 the Committee mobilized a grant from the European Union, a IYAFA Supporter, to assist its coordination efforts via the project GCP/SLC/219/EC *Support to the secretariat of WECAFC for effective implementation of priority actions of the Programme of Work agreed at the 17th Session of the Commission*.

The Centre for Resource Management and Environmental Studies (CERMES) of the regional University of the West Indies (UWI) has long been active in WECAFC and in implementing the SSF Guidelines. CERMES welcomed the opportunity to contribute further via IYAFA 2022 with special attention to two areas of recent applied research: gender mainstreaming (including youth) and national intersectoral links.

This brief CERMES Technical Report articulates some considerations to stimulate discussion on national intersectoral links (NIL) during IYAFA 2022. Such attention is needed in an ecosystem approach to fisheries (EAF). intersectoral links become even more prominent recently given the worldwide interest in advancing blue and green economies (Clegg and others 2020). Determining how SSF fit into, contribute towards and benefit from blue and green economy initiatives is critically important at the national level (McConney and Compton 2020) for a region of small island developing states (SIDS) such as the Caribbean. Fisherfolk, their households, their livelihoods and their organizations are at the core of the interactions.

This NIL contribution to IYAFA 2022 is intended to be useful for engaging stakeholders to get a better understanding of SSF intersectoral links, and their weaknesses or opportunities. The next sections set out the approach used and concept of intersectoral links followed by a summary analysis of considerations in selected economic sectors. The governance elements of national intersectoral coordination follow along with thoughts on the way forward. References and two NIL case studies, from Guyana and St Vincent and the Grenadines, round off the report.

2 Approach

This report is neither an academic publication nor a policy perspective or brief for advocacy. However, it has elements of both analysis and evidence-based advocacy. Its creation followed a participatory workflow (Figure 1). that engaged WECAFC IYAFA 2022 Champions. A draft report on NIL concepts and findings was written from desk study and used as the basis for discussion in an introductory regional webinar held on 21 April 2022 (Figure 2).

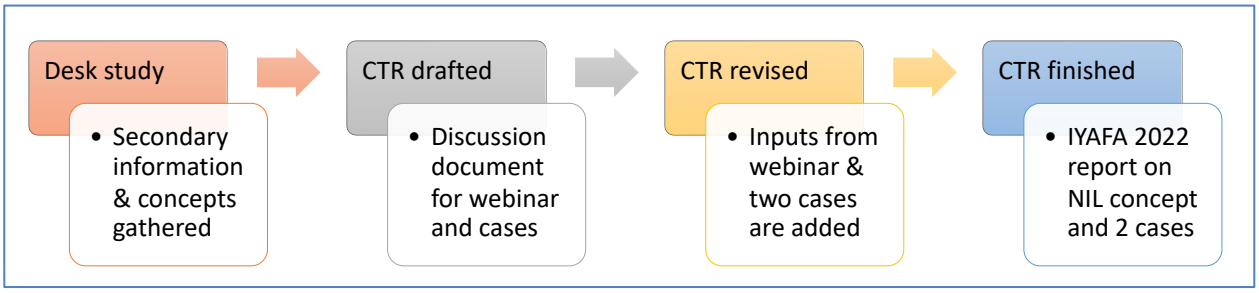

Figure 1. Participatory production process for this CERMES Technical Report (CTR)

Figure 2. Webinar announcement

After the webinar some participants helped to validate and expand the information which was then finalized into the current publication. We acknowledge and deeply appreciate all whose knowledge and views have contributed to the report. In particular, as editors, we appreciate the dedication of the WECAFC IYAFA 2022 Champions who led the two NIL case studies in this volume. The IYAFA Champions were nominated and selected based on their contribution to SSF and SSA in various categories of work throughout their careers in the WECAFC region. They took the NIL concepts and applied them to cases in the two countries in order to provide a more tangible demonstration of how fisherfolk and aquaculturists can think about livelihoods especially in the context of the blue economy. In order to do so we agreed on some terms used.

'Artisanal' is used to denote small-scale fisheries and aquaculture activities that are low in technology and often household enterprises, although either subsistence or commercial. There is no need to define them precisely as characteristics vary by location. IYAFA communications often use the terms together — e.g., artisanal and small-scale — as reinforcing but redundant.

'Small-scale' is not defined by us or in the SSF Guidelines for the above reason of situation specific variation. Because it has become prevalent in international literature we use the term small-scale more than artisanal in this report, understanding that they can be interchangeable.

'Fisheries' in this report means inshore or offshore marine capture fisheries. Inland freshwater capture fisheries are less prevalent in most of the countries and their economic links often resemble those of freshwater aquaculture. 'Aquaculture' in this report means marine and freshwater aquatic culture of plants and animals, including aquaponics.

The countries in this report are those of the Caribbean Regional Fisheries Mechanism (CRFM) which has similar geographic scope to the Caribbean Community (CARICOM). However, we do not have full geographic coverage in this report. Resource and language constraints hindered a wider scope. Flagging gaps in information and knowledge is acceptable and desirable in such an exploratory report. The case chapters do not tell the whole stories of the cases as that would take even an academic researcher considerable time and effort whereas the authors had only a couple of weeks in which to gather and share information amongst their many other duties. We hope that some readers, especially SSF and SSA leaders, take up the challenge to fill in gaps.

The next section on intersectoral links is the heart of the report. It sets out both inward and outward links by sector to artisanal fisheries and aquaculture in the region. In a series of summary tables examples of such links are identified along with associated weaknesses and opportunities. These are necessarily rather generic. We did not construct case studies. Many are fuzzy insofar as having numerous conditions, caveats and possible variations as well as further links to other related weaknesses and opportunities. Thus, there will be exceptions to the links described and more considerations than those presented. Nevertheless, despite the disclaimers, it is likely that readers will find some value in examining these intersectoral links.

3 Intersectoral links

Fisheries and aquaculture value chains are often shown as simple and sequential linear stages with aspects such as livelihoods diversification highlighted by stage (Figure 3).

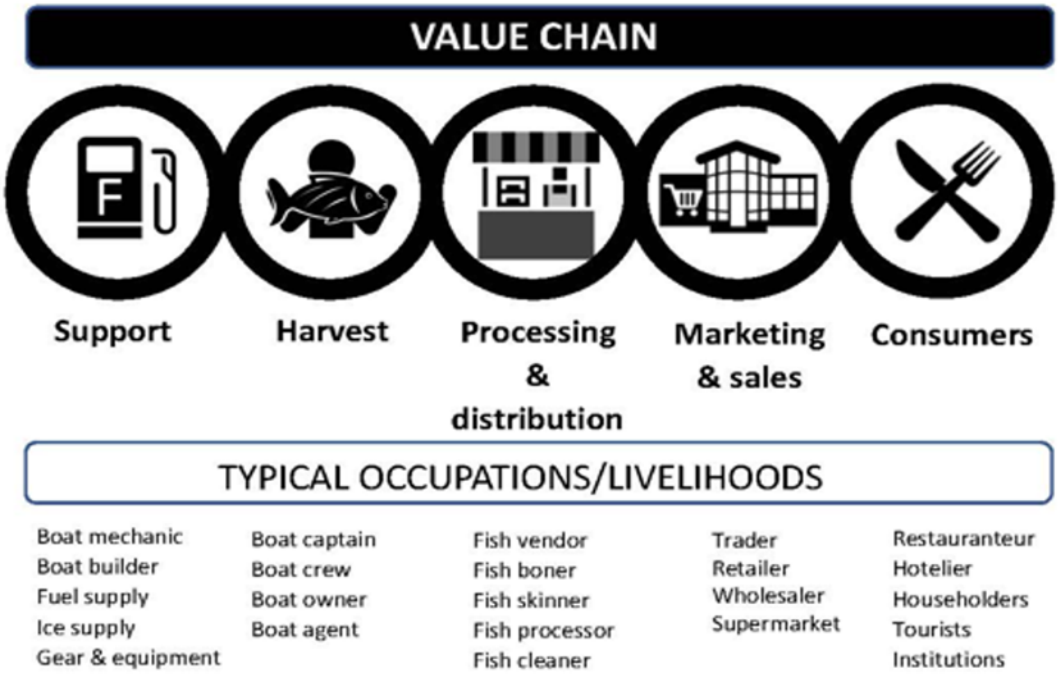

Figure 3. Generic fisheries value chain in the Caribbean showing typical livelihoods at each stage (Source: GIFT 2018)

Yet most value chains are actually complex networks (Mahon and McConney 2013). They may depict fisheries as networks of various types of transactions, product pathways and sites of exchange, even incorporating social dimensions such as gender (Figure 4). Although more links are identified, such value chain images usually omit intersectoral interactions unless they are direct transactions e.g. fish vendors to tourism buyers. The indirect links are thus explained mainly in this context. A firm can have numerous inputs of different types from various sector sources as well as outputs to other sectors. Inputs and outputs can sometimes be quantified e.g. as costs and earnings.

The fisheries value chain may also simply be used as the basis for illustrating non-market links. Side-branches are governing interactions with other parts of the social-ecological system featuring other socio-economic sectors, non-fisheries governance arrangements and additional types of relationships shown at several points (Figure 5). The figure does not explicitly include positive or negative feedback loops, but be aware that they exist. The most obvious is the feedback loop from each stage to the ecosystem via waste management practices, whether none, good or bad. There are many other types of feedback within and between chains and sectors.

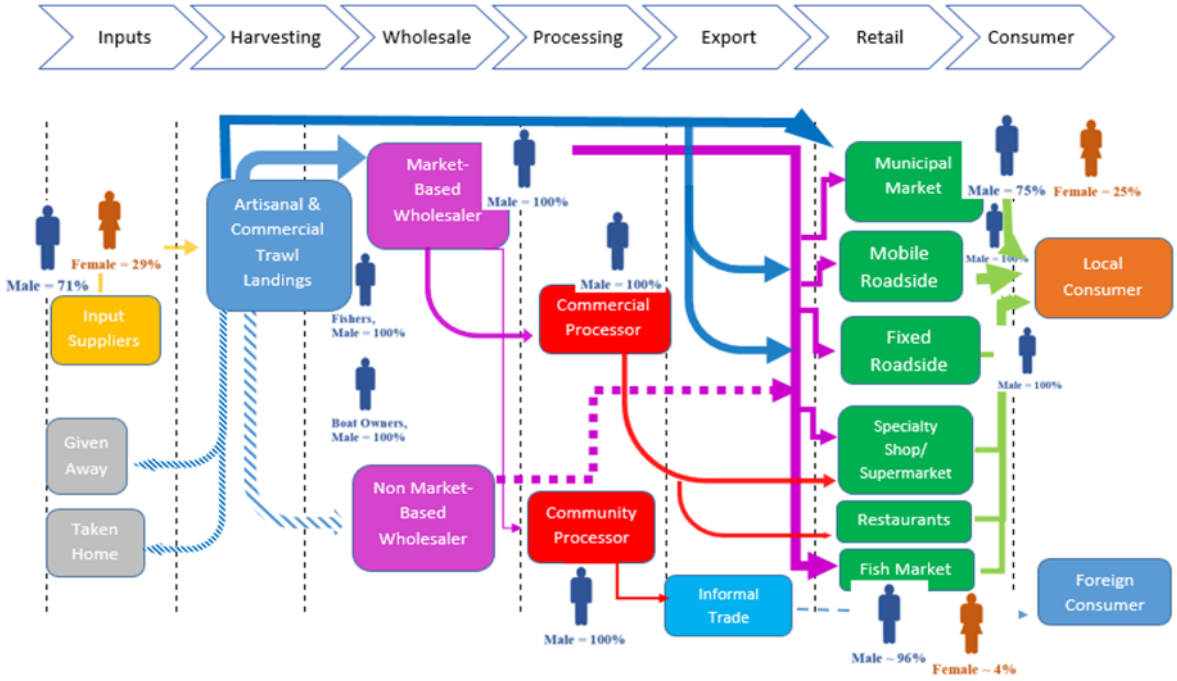

Figure 4. Participation by gender of primary actors along the shrimp bycatch value chain in Trinidad (Source: Hutchinson et al 2018)

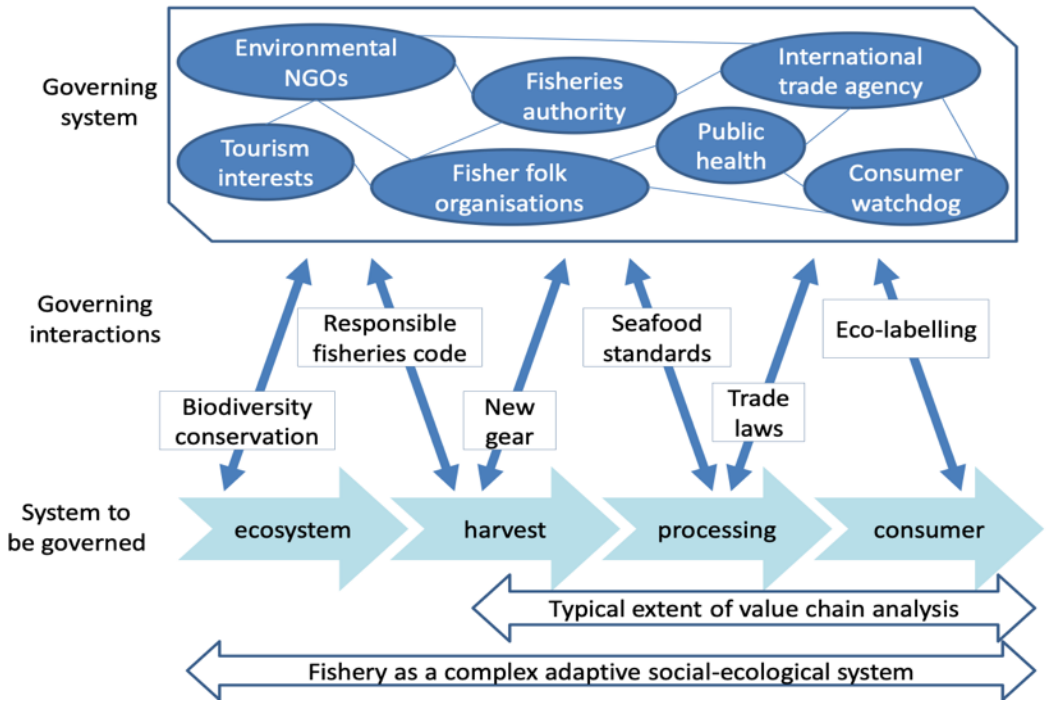

Figure 5. Network governance perspective on the fisheries value chain (Source: McConney 2012)

Links can be characterised in many different ways depending on the purpose of the analysis. For example, to inform institutional and governance action, they may be shown as assisting or resisting, enabling or constraining, weaknesses or opportunities. This is our approach, but our links are highly simplified and not quantified. We use weakness and opportunity to stimulate discussion. In the section on national intersectoral coordination we examine how links can be addressed in a governance arrangement.

From the perspective of an artisanal fishery or aquaculture value chain or a small-scale enterprise there are inward links from an input sector and outward links to an output sector. The input and output sectors can be the same or different. The links can be positive and assisting (as opportunities) or negative and resisting (as weaknesses). See Figure 6.

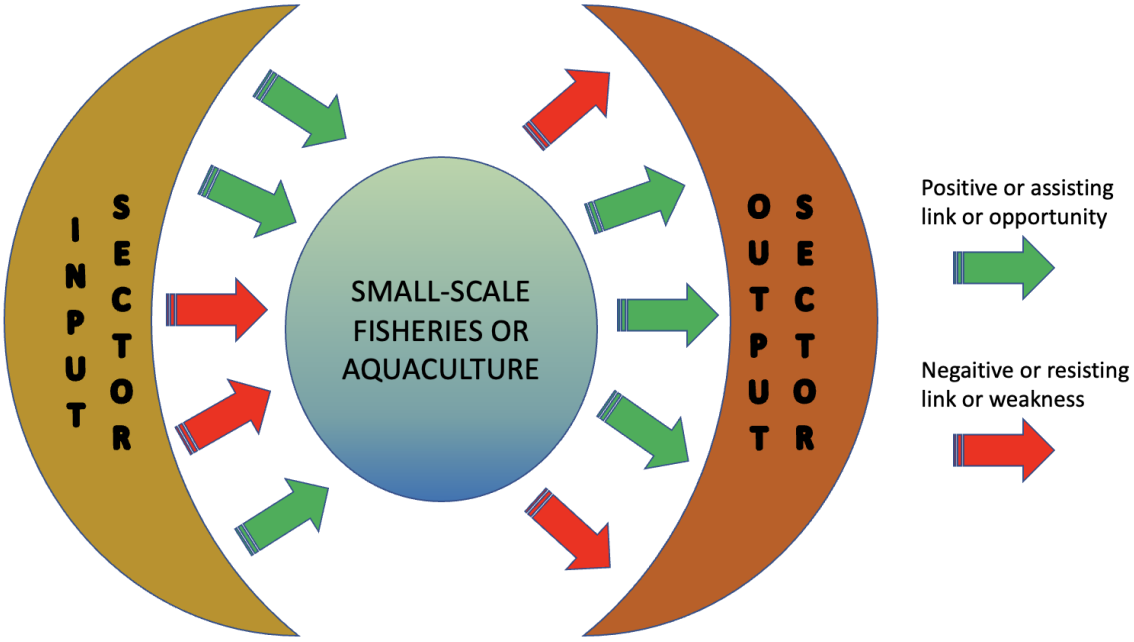

Figure 6. An input-output perspective on positive and negative intersectoral links

An input-output diagram may convey the inaccurate impression that intersectoral links are static rather than dynamic. Many research methods provide only a snapshot of the situation which can be limiting for understanding what is happening even if there is also supplementary background or contextual information. Another way of depicting links is to show and compare their situation before and after an event or intervention has occurred (Figure 7). This method focuses more on trends. If there is a series of such situations in which perturbations disturb relationships, then an impression of system adaptive capacity and resilience can be obtained by seeing if and how the links change each time. Do they help to return the system to essentially the same structure and functions as before, or does the system change in fundamental ways?

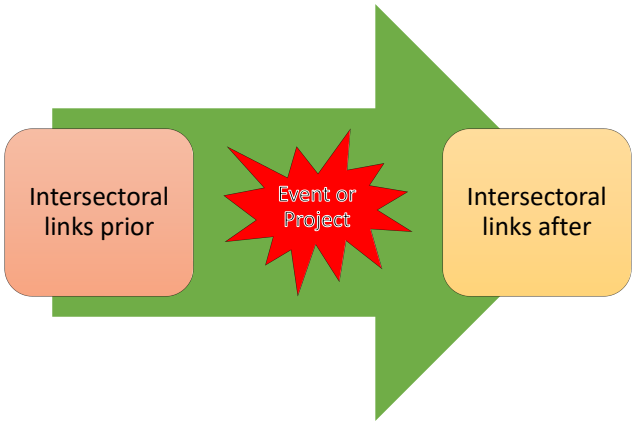

Figure 7. Intersectoral links change over time especially after events and interventions

Sometimes it may not be desirable to have a resilient system if the relationships are mostly disadvantageous. For example, some fisherfolk perceive increasing forces of marginalisation impacting them and the need to totally transform the fisheries social-ecological system within which they feel powerless. A method that can shed light on the positive and negative factors is a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis (Figure 8). Many weaknesses and threats can signal a need for transformation. That is revolutionary, not evolutionary, change.

Figure 8. A SWOT analysis can show the positive and negative relationships with several sectors

The SWOT analysis can show that there may be many links with several sectors, creating very complex and dynamic situations. In such cases a change or perturbation in one sector can have a ripple or domino effect that results in impacts all over and far away from their source. This is the case in most economies. Figure 9 shows in a simplified way how the two IYAFA industries and tourism with other hospitality services can interact to help drive the blue economy. They need to work together through coordinated intersectoral mechanism for this to be successful. We have used the national level as the boundary of our social-ecological system. However, external links also have important influences at national and local levels, especially in the small

open economies of SIDS. For example, the prices and other features of fuel and most goods that are internationally traded will be at least partially beyond national control. These influences can be positive or negative, and act upon a particular sector or an entire economy.

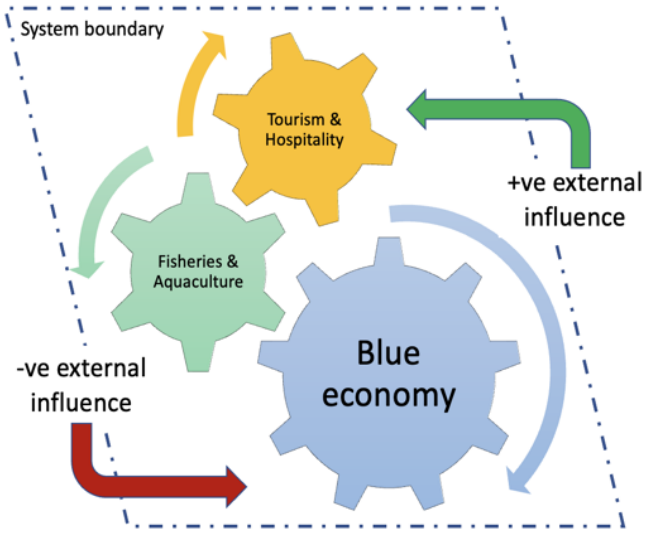

Figure 9. Sectors coordinated to work together in a blue economy are subjected to positive and negative external influences

Although ours is a national level look at sector links we (along with policy-makers, planners and managers) must also pay attention to scale effects. This means that national patterns can impact smaller-scale links such as at the community, household and individual levels. There can also be scaling-up effects where local level patterns of sector links become important at the national level when they are shared by many people or over a significant spatial area. A seasonal calendar of livelihoods is one useful tool for examining patterns over time. Figure 10 shows a seasonal calendar with livelihoods in three sectors.

Livelihood mix by economic sector	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Sector A (e.g. aquaculture, 2 crops)												
Sector B (e.g. sea fishery, seasonal)												
Sector C (e.g. tourism, very seasonal)												
Overall income pattern (# units sum)	**16**	**14**	**14**	**16**	**16**	**12**	**10**	**6**	**6**	**8**	**16**	**18**

Key	**Monthly level of income from sector livelihood over a calendar year**				
	6 units of income		4 units of income		2 units of income

Figure 10. A seasonal calendar can reveal patterns of income at different levels over time

The table can represent one person with three livelihoods or a household with three people each having a different livelihood. The key point is that income by sector may vary over the year and by sector such that sometimes the overall income is high but it can also go very low. In extreme cases the low period[s] may push the person or household near or below the national poverty line or cause other issues. Seasonality links the sectors from the perspective of the income-affected who may be seeking more stable earnings of acceptable amounts in their livelihood strategy. If the seasonal sector pattern negatively affects well-being and is prevalent, then a national intersectoral problem may exist and require better coordination (as will be addressed later in this report).

Returning to our high-level, broad-brush view, a generic value chain that is applicable to both artisanal capture fisheries and aquaculture can be used to illustrate some general examples of positive and negative links with various other sectors at different points along a value chain (Figure 11).

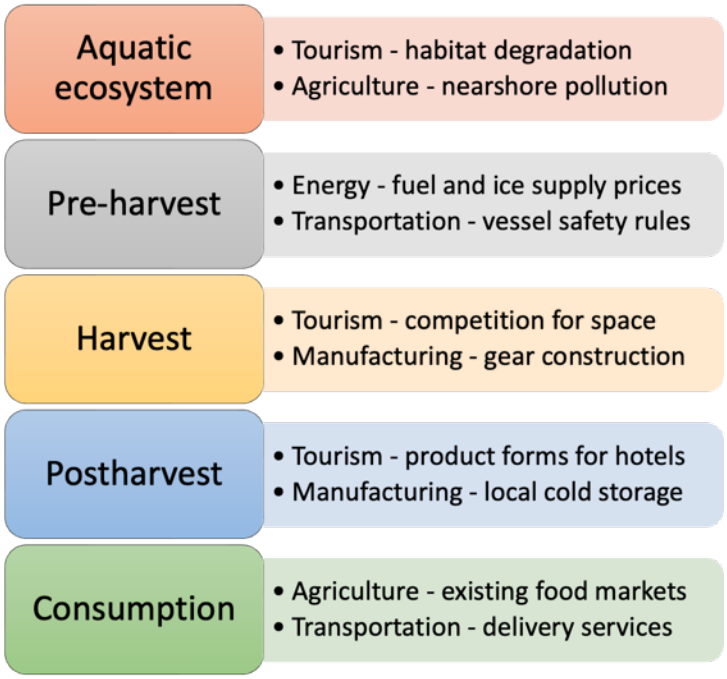

Figure 11. Examples of value chain links with other sectors at various points

We have seen that value chains and their links to several socio-economic sectors vary with the fishery, location, country and other factors. These situations can become very complex to illustrate and analyse. For the purpose of discussion, we largely generalize in order to ignore the details of the value chain stages, whether the links are input or output, how direct or not they are, and whether they are synergistic or antagonistic, among several considerations. Links between other sectors and SSF or SAA, along with their weaknesses and opportunities, are presented in the next section.

4 Sector situations

In this section, bearing in mind the several contexts for examining links described above, the situations in several socio-economic sectors are set out. As stated before, these are merely illustrative. They do not relate to a specific country or case, and may not apply in all of CRFM or CARICOM. The examples are also not comprehensive, but are intended to be sufficiently diverse to interest a cross-section of SSF and SSA stakeholders for further investigation, or to galvanize activities within the celebrations of IYAFA 2022, especially in the WECAFC region. Recall that a value chain for any sector link is taken as the ecosystem through to consumption given the importance of ecosystem approaches to several determinants of sustainability.

4.1 Agriculture

Table 1 showing links, weaknesses and opportunities summarizes some of the possible intersectoral relationships that agriculture has with SSF and SSA. We consider agriculture from large-scale plantations to small-scale holdings, including both crops and livestock. Unless necessary for the link characteristics to be clear we do not further specify the type of agriculture.

Table 1. Some agriculture sector links with artisanal fisheries and aquaculture

Links	Weaknesses	Opportunities
Status and location of SSF and SSA within agricultural policy and its institutions	SSF and SSA often of lower status and priority resulting in less resources, attention	SSF and SSA often benefit from agriculture initiatives, such as financial assistance
Agriculture marketing and other physical infrastructure	Combined use structures do not often meet specifications needed for aquatic products	Properly designed spaces can optimize a customer's food acquisition preferences
Farm effluent dispersal via waterways and aquifers	Downstream SSF and SSA subject to pollution issues	Some effluents can be useful for SSF and SSA if planned
An extension service exists for agriculture in most places	It may be thought that these extensionists can also serve SSF and SSA with little more training for these sectors	Well trained extensionists can forge stronger links between agriculture, SSF and SSA in some cases
Land and water bodies used by agriculture are in demand by aquaculture as well	Competition for space and ecosystem services can constrain both sectors	Integration for sustainable use of shared resources is a best practice and profitable
Agricultural export trade is often well established	The same approach cannot be applied to diversified SSF and SSF products as work for agriculture commodities	The same architecture can be used for aquatic product trade statistics such as price information, demand trends
ICT for agriculture is fairly well advanced, user friendly	ICT design must be based on actual demand and use, so	Greater use of ICT in aquatic sectors is urgently needed as

Links	Weaknesses	Opportunities
	not all features will apply	shown in Covid-19 period
Agro-processing is standard for some raw material inputs	Aquatic product processing can be more complex; care being necessary to design for very specific markets	Expertise in food products can be applied to aquatic items to an extent that is useful for building capacity
Small-holder contracting to scale up input production is commonplace in agriculture	Tends to be more complex in SSF with patron-client being potentially exploitative	Could work well for SSA, especially in agricultural areas where best known
Climate change and climate variability are likely to impact agriculture as well as SSF and SSA in unknown ways	An increased unpredictability affecting all of these sectors will impact livelihoods and may exacerbate vulnerability	If agriculture, SSA or SSF are climate resilient then the opportunities for livelihoods in rural places may improve

While the sectoral socio-economic links between rural agriculture, SSF and SSA are not as strong in the Caribbean as in other parts of the world (e.g., Asia) they remain important. In addition, the institutional link of public administration often putting them in the same ministry cannot be ignored as this affects power and resource allocation to sectoral initiatives.

4.2 Tourism

Table 2 showing links, weaknesses and opportunities summarizes intersectoral relationships that conventional mass tourism may have with SSF and SSA. Other tourism such as cruises, eco-tourism and specialty tourism for sports, health etc. will all have different relationships to fisheries and aquaculture. The nature of the destination also contributes a lot to the variation in links. It is very difficult to generalize across the region as the importance of tourism to the economies of the countries has a wide range, however measured. In many cases tourism represents a situation of 'internal exports' in that the client market has the features of export demands but is physically located domestically.

Table 2. Some tourism sector links with artisanal fisheries and aquaculture

Links	Weaknesses	Opportunities
Hotels and restaurants need reliable, affordable supplies of high quality fish for their local and tourist customers	Local wild caught seafood supply cannot meet demand regarding quantity, stability of supply, prices or quality.	Create partnerships between fisherfolk and buyers to aid development, or aquaculture may be able to fill the gaps.

Links	Weaknesses	Opportunities
Fisheries and tourism share coastal and marine spaces and resources (e.g. fishers, watersport operators, etc. on limited inshore reef areas)	Activities of SSF and tourism operators often tend to be incompatible, leading to user conflicts and sub-optimal achievements for all parties	Applying marine spatial planning can regulate and balance interests while promoting sustainable use of shared resources by all.
Fringing and bank reefs are often heavily used by both tourism and fisheries for livelihoods that compete for marine and coastal space	The economic power of tourism normally results in SSF being the loser in the competition for space	Some reef-based tourism (e.g. diving) can provide complementary/alternative livelihood opportunities for non-consumptive use and biodiversity conservation
Other blue economy sectors leverage the same ocean and coastal assets as SSF for economic and social development	Absence of a strong policy framework or planning for managing coastal and ocean resources, and weak enforcement or legislation, hinders blue economy	Develop a Blue Growth Coastal Master Plan, Ocean Policy and an associated Integrated Coastal Zone Management Policy (like in Grenada and other OECS)
Changes in the provision of ecosystem services due to climate, hazards, habitat loss and pollution, etc. affect all marine sectors and several are anthropogenic	Economic aims of tourism and SSF rely on having a healthy marine ecosystem and associated biodiversity, but natural processes along with human abuse prevail	While SSF is usually a weak sector, tourism is usually powerful; so an alliance can strongly benefit SSF if any action is taken to address ecosystem service loss, etc
Access rights to coastal and marine areas (e.g., beaches, nearshore), or stronger types of tenure, are required for SSF and tourism progress	Access rights of SSF are often threatened by tourism development, leading to fisherfolk displacement or violence in the worst cases	Meaningful discussions with SSF and tourism as part of coastal management and impact studies can result in developmental win-win
Extra-regional tourism and pelagic fisheries often peak in the same winter months	This overlap constrains the sequential switching from one livelihood to the other	Synergies between seafood marketing to tourism and the cultural attraction of SSF
Tourism can provide a good market for seafood and leafy green vegetables especially	The food supply standards of tourism enterprises can be more demanding than most	Aquaculture and aquaponics are potentially able to supply tourism demands fairly well
Tourism is very susceptible to local and external shocks	SSF and SSA can become vulnerable from dependence on tourism in shock periods	SSF especially can serve as a social protection livelihood if fisheries are well managed

The table has illustrated only a few of the many facets of tourism links to SSF and SSA. Tourism policies and plans are still likely to downplay the range of benefits that the industry derives from SSA and SSF beyond food supplies, and cultural marketability in some cases.

4.3 Manufacturing

Table 3 shows links, weaknesses and opportunities in intersectoral relationships that local manufacturing may have with SSF and SSA. This can be important to the extent that local manufacturing, rather than importation of goods and services, is supported by SSF and SSA. While the proportion of imported inputs may increase with the level of development of SSF and SSA it is useful on several fronts (e.g., foreign exchange retention, employment, price stability, sustainability etc.) for the most essential items to be made or assembled locally. In the Caribbean the importance of this link will vary with type of fishery or aquaculture and the structure of the national economy. As CARICOM and the OECS function as economic groups to some extent this can become a regional issue if trade is taken into account. However, under the CARICOM 25 by 2025 plan (to reduce extra-regional agri-food imports by 25%, by 2025), trade and marketing opportunities for artisanal fisheries and aquaculture development may emerge.

Table 3. Some manufacturing sector links with artisanal fisheries and aquaculture

Links	Weaknesses	Opportunities
Export of fish and fishery products by SSF or SSA usually requires packaging made to international standards (material, labeling)	SSF and SSA are unable to access export markets with local packaging due to it not meeting global standards	Opens up a new area for business that is likely to serve more than one economic sector's exports
Underutilised parts of SSF and SSA aquatic plants and animals (e.g. fish offal and skin) may be cheap inputs	Little market knowledge to value such 'waste' and its low value leads to poor handling causing spoilage. Inadequate financing for enterprise development.	Value-added products such as silage and leather have proven profitable. New areas for blue economy venture capital and equity investment to young entrepreneurs
Export markets often require high quality food products; often must meet standards going beyond food safety	Some excessively high standards are technical barriers to trade that stifle value-added products	An intra-regional protocol for sanitary and phytosanitary standards (e.g., via CARPHA and CROSQ) can counter some external constraints or barriers
Ecolabelling, especially of fish and fishery products, is becoming more prevalent	Unlikely to be profitable for lower valued items due to high certification expenses	Some countries are developing their own, valid, certification programmes more affordably
Local fishing gear and vessel construction, or aquaculture item fabrication save costs	Even if technically feasible the small market size may restrict major investment	Create economies of scale via agreements such as CSME to make manufacturing viable

Given the increasing liberalisation of world trade, the links between manufacturing, SSF and SSA have become more complicated. It may be highly advantageous to import an input if the result is an output with a higher profit and/or foreign exchange earning margin. Yet, without a strategy to optimise locally manufactured inputs, the scope for employment and innovation is reduced. A number of other variables such as the education of the workforce, demographics and financial services also intervene in shaping these links.

4.4 Transportation

Table 4 shows some links, weaknesses and opportunities that characterise intersectoral relationships between transportation and SSF plus SSA. Here we are concerned with transportation both at sea (e.g., shipping, water taxis) and on land (e.g., commercial vehicles, road network) all along the value chains. These sectors typically come under the jurisdiction of different ministries, and transportation related to SSF and SSA may be of little importance.

Table 4. Some transportation sector links with artisanal fisheries and aquaculture

Links	Weaknesses	Opportunities
Fishing vessels of several types are used to travel to and from fishing locations and to trade in seafood	Vessel design standards and construction specifications are difficult to apply to the diversity or get insurance	Diversity may favour ability to adapt or transform fishing vessels (e.g. so they are more climate-resilient)
IMO and ILO safety at sea measures for small-scale vessels becoming prevalent	Some vessels not equipped to meet expected standards and practices; no training	Fisheries authorities can offer safety training for fisherfolk to reduce risks
Proposals for regional ferry services to transport goods and people are re-emerging, and may serve seafood cargo	Perhaps not as suitable for high-priced and perishable fresh commodities as other lower value product forms	Could drastically reduce the cost of freight for the durable and lower value commodities compared to air freight
In the larger continental SIDS such as Guyana, Suriname and Belize bridges over rivers can vastly expedite transport	Improved road transport may also facilitate more or illegal imports across very porous borders, adding to IUU woes	Improved road transport may open trading opportunities to hinterland consumers and to other continental countries
Chilled or cold storage of seafood from SSF and SSA required for marketing and distribution improvements	High energy costs and poor accessibility to ice and cold chain infrastructure can be a challenge for SSF and SSA	Advances in solar-powered refrigeration and short term ice chill boxes can improve transportation options
Export of seafood and other SSF or SSA products is by air and can be expensive	High prices and restricted availability of air carriers is a barrier to intra-regional trade	Increasing the trade volumes by cooperation may reduce transportation challenges
Fishing vessels can easily be	Temptation to use fishing	Serve national emergency

repurposed for transport	vessels for illegal activities	needs e.g. after hurricane

Transportation is more often a service sought by SSF and SSA than a sector which benefits to a large extent from them. However, situations differ by country. In countries with large rural areas transportation can be a vital service that determines the feasibility of livelihoods, even if seasonally (e.g., rainy season disruptions). Although our analysis is national, transportation facilities need to be considered in trade at any level. The perishability of aquatic products can make it a significant issue in food security and food sovereignty.

4.5 Energy

Table 5 sets out links, weaknesses and opportunities that SSF and SSA have with the energy sector. These intersectoral relationships have gained more attention in the contexts of climate change mitigation and adaptation measures. The move towards renewable energy sources is accelerating even though fossil fuels remain important. There are links to both types of energy at sea (e.g. oil and gas or other marine structures) as well as on land (e.g. fish processing building design and operational costs). Energy is one of the blue economy areas of linkage.

Table 5. Some energy sector links with artisanal fisheries and aquaculture

Links	Weaknesses	Opportunities
Development of oil and gas sector and fisheries share marine and coastal spaces	Activity of SSF, SSA, oil and gas exploration, and coastal services often tend to be incompatible, leading to user conflicts and power struggles	Regulations to make interests equitable, while promoting sustainable use of shared resources and spaces by all.
Energy transition (reflected in development plans and policy-related documents) to renewable include SSF, SSA	SSF and SSA are often not integrated into the private sector implementation of national energy policies etc.	Create new partnerships to encourage RE and EE throughout the entire value chain of SSF and SSA
Retrofitting of infrastructure to use RE technologies is becoming commonplace	SSF and SSA may use lots of energy for fish processing (e.g. drying and smoking or 24/7 product lines) and pond or tank aeration so grid tied redundancy may be needed	Less sophisticated SSF and SSA energy use can more easily be supplemented or replaced by RE (e.g. solar or wind energy drying) that is becoming more efficient
Increased fuel charges impact costs of seafood	SSF harvest sector unable to pay for fuel or demand an increase the ex-vessel price of fish; impacts food security	May cause the sector to review energy use practices if it becomes uncompetitive (e.g. compared to poultry)
Fuel subsidies are among the first removed for SSF	Abuse of fuel subsidies by a few result in industry-wide restrictions reducing revenue	Subsidy remove may spark improvements in design and operation of fishing vessels

Use of oil and gas or marine RE infrastructure at sea	Space use conflicts at all stages of energy production	Some marine structures are useful for fish aggregation

Energy is an increasingly diverse cross-cutting sector that supports many others, including SSA and SSF. Fossil fuels for vessels, electricity for processing plants and waste that can be converted into energy were among the many links. Given the importance of energy to almost all sectors it needs to be considered, even if indirectly. SSF and SSA are price-takers in the energy markets with little influence upon this input which can make or break profitability. The links of dependence underscore the critical need for intersectoral dialogue, negotiations and decisions in order to attain nationally, not just sectorally, optimal outcomes for society. In the next section we look briefly at mechanisms for this.

5 National intersectoral coordination

Having reviewed the examples of national intersectoral links with SSF and SSA, along with their weaknesses and opportunities, it should be clear that coordination among sectors is warranted. intersectoral coordination is multi-faceted and can be complex as sectors may have competing or conflicting interests. It should be a priority in the pursuit of national development aspirations as well as the achievement of the globally agreed Sustainable Development Goals (SDGs), among many other international targets. However, the successful and sustainable functioning of national intersectoral coordination mechanisms (NICs) has been challenging countries in the Wider Caribbean Region for a long time. In this penultimate section we briefly review the recent investigation of NICs and the guidelines for their success. This draws heavily on the applied research of Compton and others (2020) which readers should consult for a thorough examination. This technical report can be downloaded from the CERMES website.

The research on NICs was done under the UNDP/GEF Project on *Catalysing Implementation of the Strategic Action Programme (SAP) for the Sustainable Management of shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems* (CLME+ Project). The establishment of NICs is identified in the CLME+ SAP as a target at the national level for implementing ecosystem-based management (EBM) and an ecosystem approach to fisheries (EAF) for shared living marine resources in CLME+. Although the CLME+ Project was specifically focused on transboundary marine governance, the need to engage national level governance was evident. The NIC guidelines on good practices that favour success are intended for all NIC stakeholders. These stakeholders range from ordinary members of the public to policy-makers. This guidance is relevant to national SSF and SSA, and especially the fisherfolk and aquaculture farmer organisations that represent their industries nationally.

In the CLME+ region NICs may include Fisheries Advisory Committees (FAC), Ocean Governance Committees (OGC), sustainable development commissions, integrated coastal management institutions, climate change bodies and others for intersectoral coordination. These may have greater or lesser roles in aquatic (marine to freshwater) matters depending upon many factors that are constantly changing to determine their mandate, scope, priorities,

membership, etc. NICs must be adaptable and resilient in order to be sustainable under very dynamic conditions while maintaining their core function of intersectoral coordination. Our mental image of a NIC is often a group of sector representatives sitting around a boardroom style table offering policy advice or actually making executive policy decisions depending on their legal or administrative mandate or terms of reference (Figure 12). A closed committee format is common, but there are other, more open, governance arrangements that better engage civil society and secondary stakeholders. Thus, structure and function vary widely.

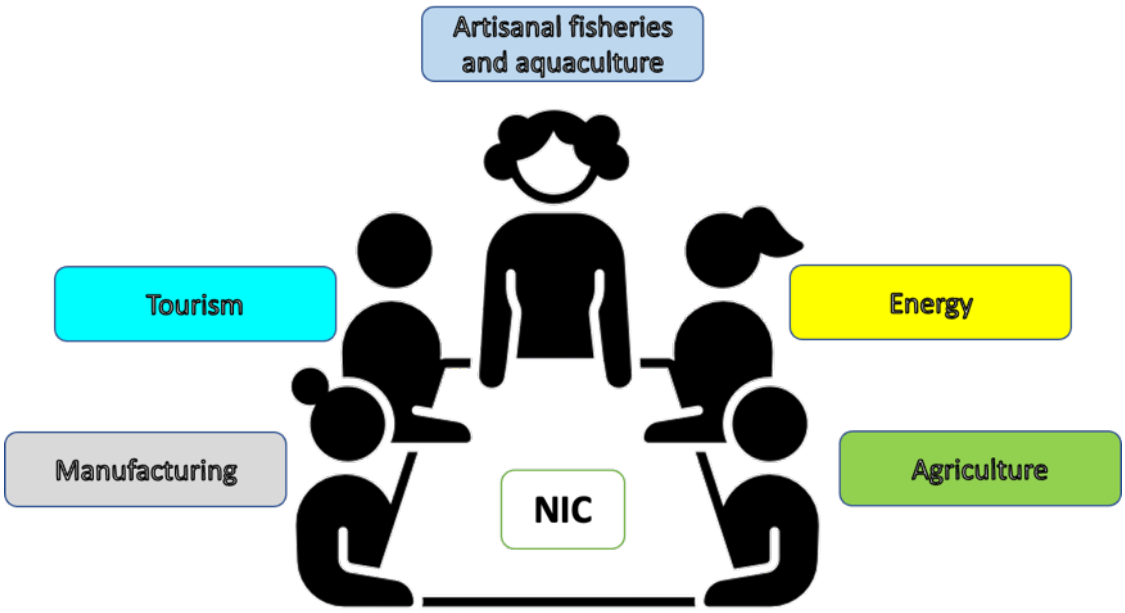

Figure 12. What many people envisage a NIC to look like

As noted earlier, the need for NICs is not only for large projects such as CLME+, but more for broader national aims such as achieving the SDGs or blue economy. This calls for NICs to address both the social and ecological parts of resource use systems such as SSF and SSA. NICs operate within the national policy cycle(s). A policy cycle may be tied to a specific sector such as those identified in this report. However, it may also take on an entire intersectoral aquatic issue such as pollution or climate change. A properly functioning NIC carries out its mandate within its assigned stages in a policy cycle while demonstrating good governance in practice. Policy cycles are iterative processes and NICs may handle all or some stages of a policy cycle. Their five basic stages are: (1) data and information, (2) analysis and advice, (3) decision-making (4) implementation, and (5) review and evaluation (Figure 13).

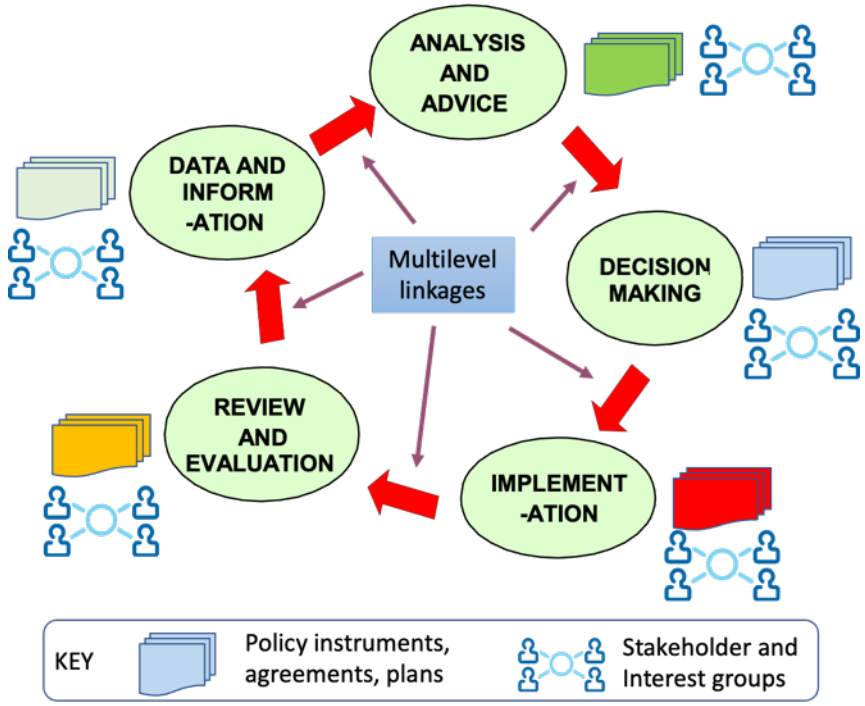

Figure 13. The stages and NIC stakeholders in a basic policy cycle

Given the region's diversity, it is unlikely that a single model would be useful for all types of NICs and governance arrangements in the region. But any NIC should be an example of good and effective governance implemented within nested, multi-level policy cycles that can span several issues and economic sectors. A well designed and led NIC, based upon the principles of good governance would have, among other things:

- A comprehensive inclusion of stakeholders
- A supportive environment that creates opportunities for stakeholder participation
- The means to encourages individuals to become its champions and leaders
- An endorsement politically, administratively and legally with clear mandates
- A well-established reviewing processes for evaluating effectiveness and enhancing growth through adaptation
- National multi-level integration of the sectors that it covers
- The ability to facilitate bilateral linkages between national and regional government processes
- A scope and mandate that can address specific tasks in the policy domain

Much more can be said about NICs, but Compton and others (2020) recommend ten good practices as guidelines for successful NICs:

1. Promote and practice the principles of good governance as fundamental to NICs
2. Ensure the availability and use of up-to-date and non-conflicting legislation
3. Innovatively reduce the operational costs of meetings and communicating
4. Mobilise champions and leaders to give a NIC new energy and direction

5. Develop internal solution-based conflict management mechanisms
6. Guiding policy influence by effectively mapping and managing networks
7. Include multiple stakeholder groups directly or through sub-structures
8. Understand the hidden power dynamics associated with NIC stakeholders
9. Increase private sector participation for economic links and policy influence
10. Document processes for transparency, accountability, institutional memory

For artisanal fisherfolk and fish farmers the challenge in IYAFA 2022 and beyond is how to have a voice in a successful NIC in order to engage and influence the intersectoral policy domain. Having operational national organisations with the leadership required for collective decision-making and action will be key (Blackman and Almerigi 2017; Pena and Simmons 2021).

intersectoral coordination is multifaceted. The existing and potential linkages are essential for strengthening the capacity and functioning of fisherfolk enterprises and organisations, and for improving understanding of the supporting mechanisms that facilitate the equitable contribution of women and youth. Promoting and sustaining SSF and SSA inter-sectoral policies, plans and initiatives must be underpinned by effective organisation leadership taking gender and youth int account (Pena et al. 2021a and 2021b).

6 Conclusion and next steps

In conclusion, this brief CERMES Technical Report, on the occasion of IYAFA 2022, sets out areas of national intersectoral linkage that often impact SSF and SSA in the Caribbean. The intersectoral situations can be complex with a dense network of actors and interactions. The patterns of interactions and their outcomes can be positive or negative for the aquatic resource users and their livelihoods. People and organisations in SSF and SSA often navigate the complexity instinctively, without systematic analysis of weaknesses and opportunities. State authorities and civil society stakeholders may do the same. We have attempted to show how even simple analysis can inform the preferred pathways towards resilience and recovery, the WECAFC overarching theme for IYAFA 2022. We aim to stimulate further interest in how intersectoral links can become more explicit aspects of SSF and SSA policies, plans and everyday management or administration within the WECAFC region. The two case studies that follow in Part 2 of this report provide concrete examples of the situations that are of interest.

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PART TWO — CASES
(1) GUYANA
(2) ST. VINCENT AND THE GRENADINES

Part Two of this edited report offers two cases to illustrate the conceptual approach to the national intersectoral links. Each case uses aspects of the conceptual framing. The aim is primarily to describe the cases with light analysis rather than to provide deep analysis and recommendations. If fisherfolk leaders see utility in the approach, then analysis can follow.

Artisanal marine fisheries and brackish water aquaculture links in the national economy of Guyana — P Jainarine, R Gajnabi and T Phillips

Citation:
Jainarine, P, R Gajnabi, and T Phillips. 2022. Artisanal marine fisheries and brackish water aquaculture links in the national economy of Guyana. Pp 23-46 in K Blackman, S Compton, P McConney, M Pena and B Simmons. National intersectoral links with Caribbean artisanal fisheries and aquaculture: considerations and cases. Centre for Resource Management and Environmental Studies, The University of the West Indies, Cave Hill Campus, Barbados. CERMES Technical Report No. 107

Introduction

As indicated in the overall introduction to this volume (Blackman et al. 2022) the celebration of the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022) and promotion of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) have converged. The 17th Session of the Western Central Atlantic Fishery Commission (WECAFC) in 2019 recommended that IYAFA 2022 be used to link the highly distributed activities of WECAFC members and partners to showcase the progress made in implementing the SSF Guidelines in a coordinated way and highlight fisherfolk at regional and global scales.

A WECAFC Coordination Committee for IYAFA activities received a grant from the European Union, a IYAFA Supporter, to assist its coordination efforts via the project GCP/SLC/219/EC *Support to the secretariat of WECAFC for effective implementation of priority actions of the Programme of Work agreed at the 17th Session of the Commission*. With this support the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) is paying special attention gender mainstreaming (including youth) and national intersectoral links. This paper contributes by providing a case study of national intersectoral links with artisanal marine fisheries and brackish water aquaculture in Guyana.

The next section sets out the approach used. It is followed by the context and analysis of the artisanal fisheries case, then similar for aquaculture, highlighting interactions with selected economic sectors. The governance elements of national intersectoral coordination in the cases follow along with suggestions for the way forward. References are in the final section.

Methods

The methods were guided by the methodology set out in Part 1 of Blackman et al. (2022). This provides several perspectives useful for analysing the interactions of artisanal fisheries and aquaculture with other economic sectors such as agriculture, tourism, transportation, manufacturing, energy and the like, including the national intersectoral governance arrangements. Following the presentation of this document at a regional webinar on 21 April 2022, it was decided that as part of the follow-up, one of the case studies would be for Guyana, with a focus on the impact of the rapidly developing oil and gas sector on the small-scale fisheries, and on small-scale brackish water aquaculture associated with the sugar industry diversification. A team, comprising a fisherfolk organization leader with extensive knowledge of artisanal fisheries operations — Pamashwar Jainarine, a fisheries officer with knowledge of small-scale fisheries and brackish water aquaculture — Rabani Gajnabi, and a fisheries advisor — Terrence Phillips, was put together to prepare the case study. This desk study drew on existing accessible literature, their collective knowledge and experiences of the fisheries and aquaculture sub-sectors in Guyana and public information on the developments taking place in the oil and gas and tourism sectors. Of particular interest in the context of IYAFA 2022 were the

views and experiences of fisheries and aquaculture industry participants and other non-state actors rather than primarily government perspectives. The case study was discussed with the CERMES team, other key stakeholders in Guyana, and finalized for possible presentation at the upcoming conference of the Gulf and Caribbean Fisheries Institute (GCFI) in November 2022.

Overview of artisanal marine fisheries and brackish water aquaculture

In Guyana, coastal and marine fisheries make a significant contribution to food security, employment, foreign exchange earnings, and the development of rural and coastal communities. In official records the fisheries sector accounts annually for about 2% of gross domestic product (GDP). The subsector experienced rapid growth both in numbers of fishers and volume of landings until 1994, but since then the levels seemed to have “plateaued”, and production is now between 25,000 to 30,000 tonnes (Figure 1). The sector is a major source of protein, with an estimated annual per capita consumption of about 35 kg (Fisheries Department 2021). The artisanal fisheries subsector (used here synonymously with small-scale) is an important source of food and nutrition for both rural and urban Guyanese. Artisanal fishing is done mainly by Guyanese and is a significant source of employment and export earnings. There are over 5,000 fishers and 1,000 boat owners, utilizing approximately 1,300 vessels in the subsector ranging in size from 6-18m, and propelled by sails, outboard or inboard engines (Fisheries Department 2021).

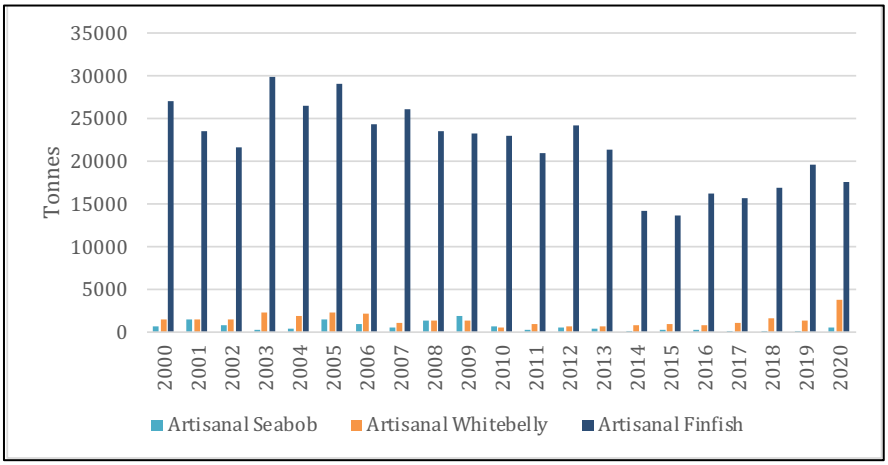

Figure 1. Landings of finfish, whitebelly shrimp and seabob by the artisanal fleet 2000-2020 (Source: Fisheries Department, 2021)

Gillnet/driftnet fishing for such species as gray snapper, trout and gillbacker is practiced in coastal areas and beyond. Fyke nets (Chinese seine) are used to catch whitebelly shrimp, seabob and finfish in estuaries. Other gear types include cadell lines for catching catfishes and sharks in the estuaries, and pin seines for catching species, such as queriman, snook, bangamary on coastal mud banks. Fyke net and pin net fisheries use small mesh size since the target species are smaller sized shrimp and fish. There are about seven main fishing complexes along the coast which are functioning at varying levels. These were built with assistance from

the Government of Canada through the Canadian International Development Agency (six) and the European Union (one) about three decades ago. Each site was equipped for docking, ice-making, accessing fuel and market areas for the selling of seafood and fishing requisites. There are also other informal landing sites along the coastline (CANARI 2020).

The 2015 Atlantic offshore oil discoveries initiated an economic boom for Guyana, with the nation being on the brink of becoming the world's 25th largest oil reserve holders and the 2nd largest in South America[1]. However, artisanal fishers are concerned about the negative impacts of oil and gas exploration and exploitation on their fishing activities and livelihoods, if all the necessary safeguards for protection of the marine environment are not put in place. In recent years fisherfolk have seen a significant decline in their fish catch which they associate with the rapidly increasing offshore oil and gas operations[2].

The government of Guyana has stated that it is setting up a framework for development that will be sustained through the investment of oil funds into education, health, infrastructure and the non-oil sectors[3]. The oil boom may pose challenges as well as provide opportunities for the sustainable development of the fisheries sector, especially the small-scale fisheries sub-sector. However, this will require strengthening the intersectoral links within the national economy. In this case, the focus will be on strengthening the links with the small-scale fisheries sub-sector and the oil and gas and related sectors. It is also useful to consider the related sub-sector of aquaculture which, along with artisanal fisheries, is also undertaken along a sizeable section of the coastline (Figure 2).

Figure 2. Areas of coastal communities that depend heavily on artisanal fisheries and aquaculture for their livelihoods (Source: https://guynode.com/blog/2019/08/01/shapefile-of-guyanas-villages/)

[1] https://www.gyeiti.org/oil-gas
[2] https://www.kaieteurnewsonline.com/2021/11/22/declining-fish-catch-triggers-worry-among-local-fishermen
[3] https://guyanachronicle.com/2022/04/26/four-fold-path-to-transformation

Traditional brackish water aquaculture has been practiced in the swamps along the Atlantic Coast of the Corentyne area since the late 1970s. Much of this was along the Corentyne coast from Seawell to No. 49 Villages. Most of the farms were established on lands situated north of the sea defense dams, with some others on the southern side of the dams. This type of farming involves constructing an embankment around the pond, which are fitted with self-acting and manual boxes to trap water with post larvae shrimps and finfish during spring tides into the ponds. Farmers therefore utilized an extensive polyculture system among the existing sluices and dams from the sea defense structures which control the exchange of water at high tide[4].

At present, there are 69 active farms, with 1,820 acres under production. Approximately 600 people are directly and indirectly employed in the farming operations, undertaking such tasks as maintenance of farm structures, harvesting, processing, marketing, etc. Total shrimp and fish production in 2021 was 112 tonnes (R. Gajnabi, pers. comm.). Over the years, there has been increasing demand for brackish water shrimp and finfish species both by the Guyanese diaspora in the USA and locally**.** Consequently, this type of aquaculture has become a lucrative venture for the traditional operators as well as offering livelihood opportunities to workers affected by the closure of the sugar producing operations in the Corentyne area. However, expansion of this type of aquaculture farming along the Corentyne poses some challenges, since most of the activities are being done in the mangroves and close to the sea defense structures.

As a result of the challenges and the need to sustain the livelihoods of the traditional brackish water aquaculture farmers and create opportunities for affected sugar workers in the Corentyne, Berbice area, a project has been developed and approved by the Government of Guyana titled “Improvement of Brackish Water Shrimp Farming on the Corentyne Coast of Guyana”. The success of this project may be dependent on the effective diversification of the sugar industry, strengthening links within the agriculture sector and developing links with the rapidly developing oil and gas sector and tourism operations along the seashore. Many intersectoral links require coordination with some level of multi-stakeholder organization, which we now outline.

The Guyana National Fisherfolk Organisation (GNFO) was formed on 20 August 2008 under the Friendly Societies Act of the Cooperative Republic of Guyana. The organisation was inactive until 2021, when representatives of Meadowbank Fishermen’s Co-operative in Georgetown, Charity and Lima Fishermen’s Co-operative, Rosignol Fishermen’s Co-operative, 3-Door Fishermen’s Co-operative, Albion Fishermen Group and Upper Corentyne Fishermen’s Co-operative resuscitated the entity, following a period of consultation, and elected a new Executive Committee. The GNFO’s role (CANARI 2021) is to:

- provide education, training, institutional strengthening and awareness for its members
- advocate at local, national and regional levels the interest of members
- be involved in the conservation and management of fisheries resources
- mobilise resources for members
- provide facilities for processing and marketing of members’ products
- foster affiliation to Caribbean fisherfolk organizations

[4] https://www.devnet.org.gy/sdnp/nds/chapter13.html

Regarding aquaculture, the East Berbice/Corentyne Aquaculture Association was registered as a friendly society in 2015. Its main objective is to bring members together to tackle issues affecting aquaculture farmers in region 6. Over the years, the management of the Association was encouraged to transition into a cooperative society in order to better attract and mobilize resources from donor agencies. After deliberation among members, the East Berbice/ Corentyne Cooperative Society Limited (EBCCSL) was officially formed in February 2022 (R. Gajnabi, pers. comm.).

Marine artisanal fishery

Background with oil and gas

From 2015, oil companies, such as Exxon Mobil Corp, Hess Corp and CNOOC Ltd., operating off Guyana's coast have found more than 10 billion barrels of recoverable oil and gas, a tenth of the world's conventional discoveries (Figure 3).

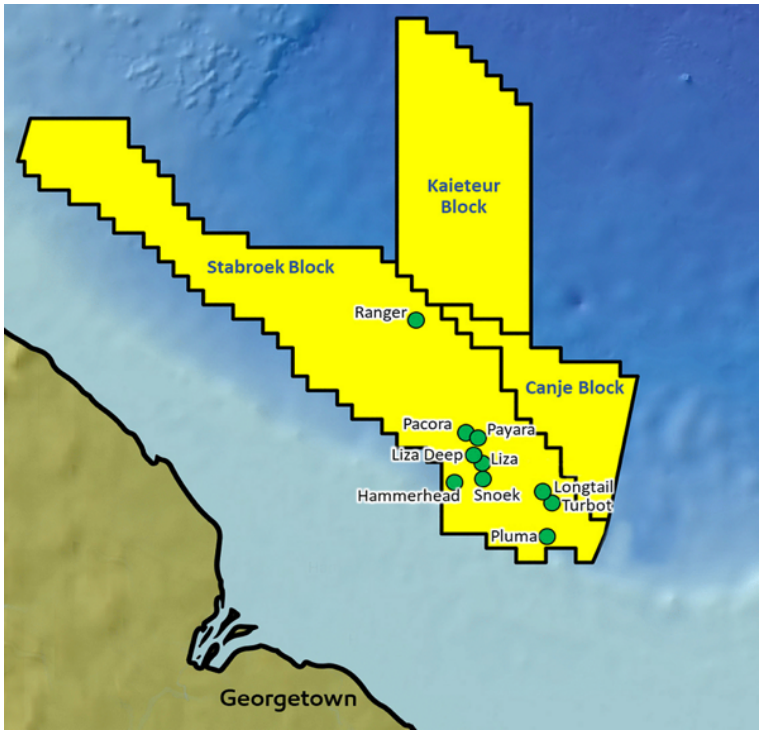

Figure 3. Map shows in yellow the various oil blocks in the EEZ (Source: https://www.google.com/imgres?imgurl=https%3A%2F%2F)

A consortium of these companies expects to produce 1 million barrels of oil and gas per day by the end of the decade[5].The World Bank has estimated that export revenues from these initial

[5] https://www.reuters.com/business/energy/offshore-discoveries-turn-tiny-guyana-into-oil-hotspot-2022-02-16

discoveries could generate around US$72.8. billion (at US$54/barrel) and that Guyana government revenues could reach around US$45.4 billion over the life span of these operations. Oil and gas will become major drivers for the economy if managed in a sustainable manner, and transparent management can bring about benefits to all citizens and encourage downstream investment and development[6].

Artisanal fisherfolk recognize that untold riches are expected to flow into the nation's treasury, paving the way for the development of the key sectors in the economy. However, they are concerned about the potential closure of the fishing industry if all the necessary safeguards and protection of the marine environment are not put in place. At environmental impact assessment (EIA) meetings with the Guyana government's Environmental Protection Agency (EPA) and Exxon Mobil Guyana representatives, fisherfolk have expressed concerns about the harmful impacts of oil and gas exploration and extraction on the marine environment, such as:

- use of harmful chemicals in drilling
- discharge of toxic waters during drilling
- flaring (disposing of natural gas by burning)
- threat of introducing invasive species via ballast waters from foreign tankers
- oil spills
- inadequate insurance by Exxon to cover oil spills

They perceive threats to Guyana's rich coastal and marine ecosystem due to pollution caused by oil and gas operations. They have also advocated for the establishment of a fund to compensate fisherfolk, if they cannot work because of an oil spill (P. Jainarine, pers. comm.) or related reasons (Figure 4).

Figure 4. Vessels docked at a small-scale fishery landing site # 66 Corentyne due to low catches (Source: R. Gajnabi)

[6] https://www.gyeiti.org/oil-gas

Kaieteur News editorial "*Declining fish catch*" of 28 November 2021, noted that fisherfolk and their families were very concerned about the significantly lower fish catch that they were experiencing, while fishing in Guyana's waters[7]. The newspaper had previously reported on 22 November 2021 "*Declining fish catch triggers worry among local fishermen – many blame Exxon offshore operations; predict death of industry in five years*"[8]. Besides the negative impact on the fisherfolk and their families, the editorial also noted that low catches would also impact on the many retailers who make a living from buying and utilizing the fish landed, such as local markets, fish shops, corner shops, and street side vendors as well as bustling subculture of cleaners, porters, and much smaller self-helpers gathered around the wharves to squeeze out "a little something" from the daily fishing catch. Small-scale fishers, being acutely aware of the multiplier effect of their livelihoods and intersectoral linkages, have received much media attention (Figure 5).

Figure 5. Affected fishermen standing in front of their moored vessels (Orlando Charles Photo) (Source:https://www.stabroeknews.com/2022/01/11/news/guyana/liliendaal-fishers-lament-low-catches/)

Stabroek News, on 11 January 2022, in their report "*Liliendaal fishers lament low catches*", noted that the presence of oil industry vessels in areas that were once profitable fishing grounds has forced local fisherfolk to seek out new grounds resulting in extremely low catches and high overhead expenses[9]. This has resulted in boats being laid at the foreshore with some having "For Sale" signs, others undergoing maintenance, while the ice boxes of a few remained filled

[7] https://www.kaieteurnewsonline.com/2021/11/28/declining-fish-catch
[8] https://www.kaieteurnewsonline.com/2021/11/22/declining-fish-catch-triggers-worry-among-local-fishermen/
[9] https://www.stabroeknews.com/2022/01/11/news/guyana/liliendaal-fishers-lament-low-catches

with ice due to low catches. In response to queries from the newspaper, Exxon Mobil Guyana's Head of Media and Communications informed the newspaper that they had not heard of the claims, but the company had not prohibited any fisherfolk from carrying out their operations. Exxon Mobil Guyana's representative further indicated that with the planned laying of the fibre optic cable, from their offshore facilities to onshore cable landing stations in Georgetown and Ogle, in the coming weeks they had worked with the Ministry of Agriculture's Fisheries Department and compensated fisherfolk who were likely to be affected. In response to the concerns expressed by fishers about low catches, the Minister of Agriculture said that a FAO study had found that climate change instead of oil exploration was the major reason for a reduction in fish catch in Guyana[10]. However, the study has not yet been released to the fisherfolk.

Artisanal gillnet fishery value chain

The artisanal gillnet fishery is a major component of the overall artisanal fishery of Guyana, involving approximately 836 fishing vessels and 5000 fisherfolk with a significant volume of the fish caught (e.g. grey snapper, sea trout) and exported (Fisheries Department 2021). In 2020, the COVID-19 pandemic severely disrupted the export arm of the value chain. Exports go through industrial fish processing operations to such countries as the USA, Canada, Grenada and Jamaica. The disruption resulted in more fish being sold locally in coastal Guyana, but with a loss in earnings to the fishers involved. Figure 6 is a schematic of value chain transactions.

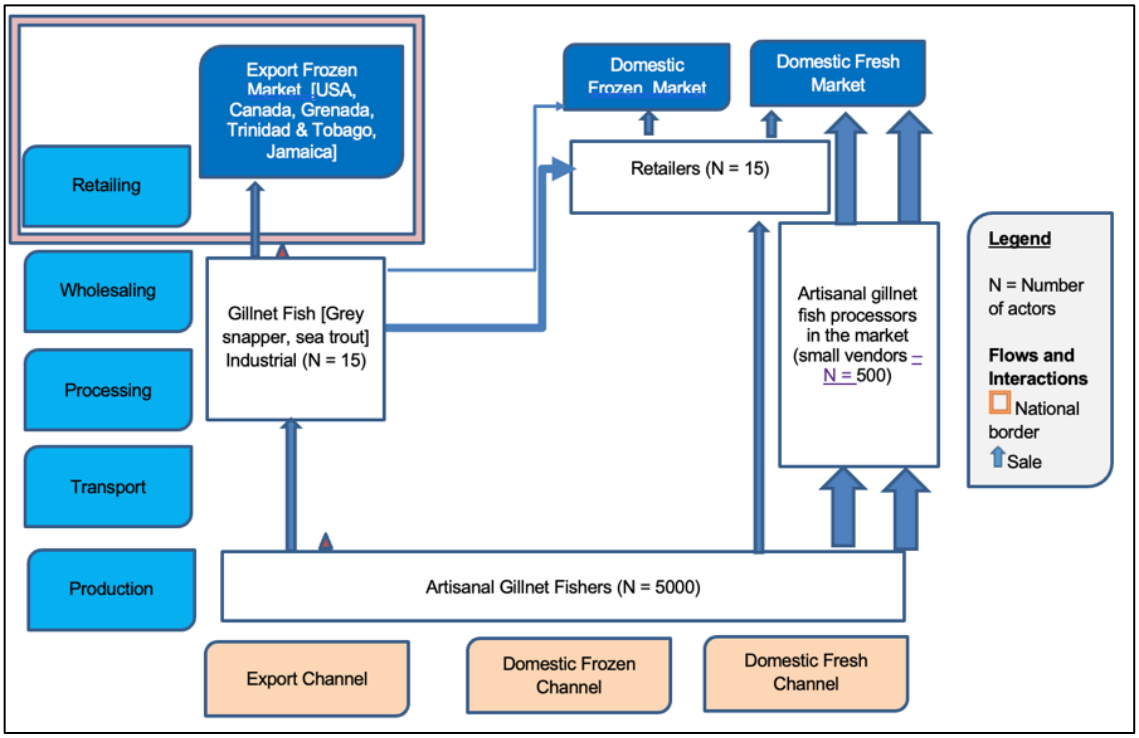

Figure 6. Artisanal gillnet fishery value chain (Modified from Hutchinson and Girvan (2021))

[10] https://demerarawaves.com/2022/05/20/oil-industry-not-responsible-for-low-fish-catch-fao-study/

Governance within the social-ecological system is also relevant in determining the dynamics of sectoral and intersectoral links. Figure 7 depicts a simplified schematic of the value chain as the system to be governed, with governing interactions linking it to the governing system of agencies and institutions. The components and interactions can all change over time and with circumstances such as COVID-19 or trade patterns, but Mahon and McConney (2013) argue that the changing situation is better shown as a network than a linear chain to convey the complexities that arise.

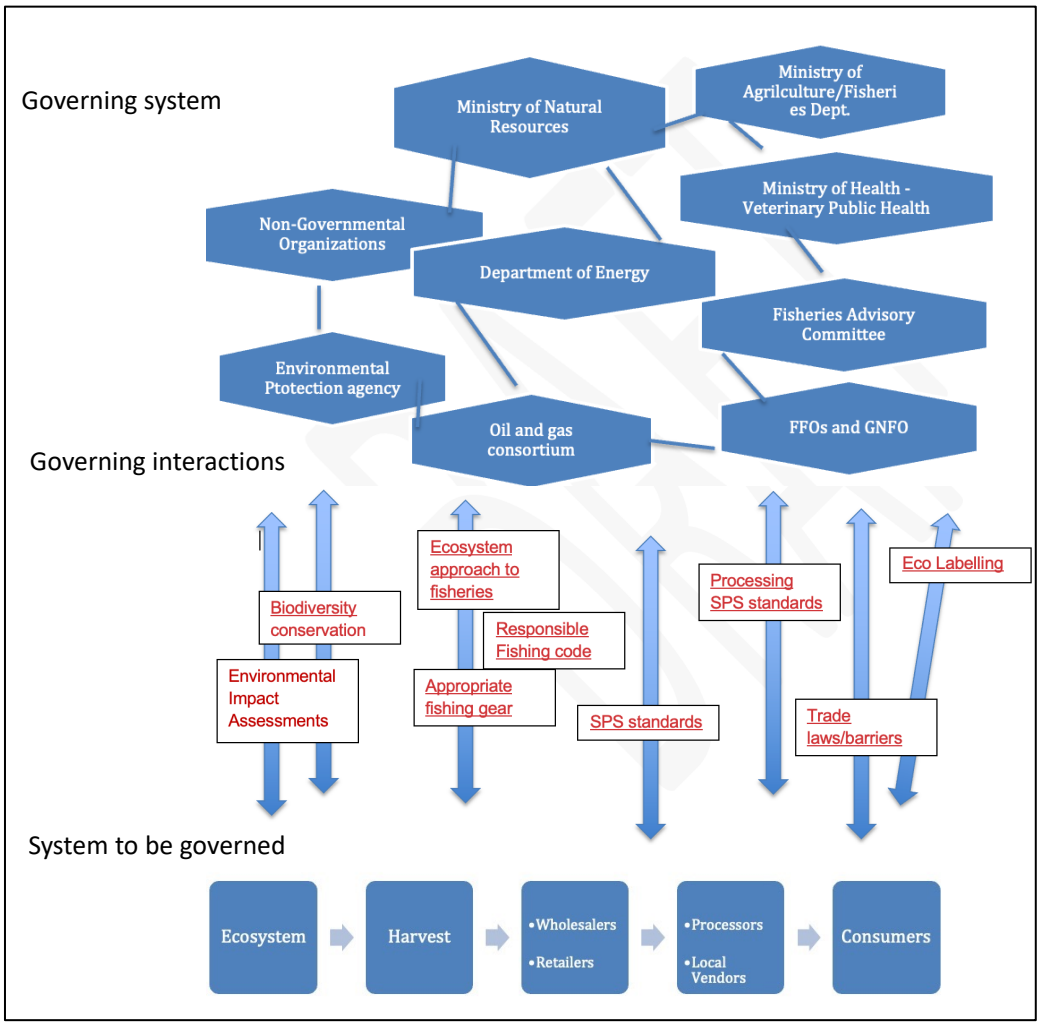

Figure 7. Network governance perspective on artisanal gillnet fisheries value chain (Modified from McConney 2012)

From 2015, with the coming on stream of oil and gas exploitation, public sector entities like the Ministry of Natural Resources (responsible for developing petroleum agreements and enforcing them); Department of Energy (responsible for the management of the oil and gas sector); Guyana Revenue Authority (responsible for collecting taxes from oil and gas companies); and Environmental Protection Agency (mandated to conserve, manage, protect and improve

environment) have become significant players in Guyana's EEZ[11]. Also, environmental NGOs and individual environmentalists have been paying more attention to the oil and gas activities in the marine space, expressing concern about the adequacy of EIAs and the likely impact of flaring and oil spills on the environment. As noted previously, fisherfolk struggling with falling catches have expressed concern in the media about the likely impact of oil and gas exploration and exploitation on the fisheries resources in Guyana's EEZ and on their livelihoods from the short to long term. The mass communication media, although not an economic sector, is playing an important role in mediating interactions. This role may not be neutral.

With the oil and gas sector becoming a dominant sector in the national economy, the dynamics of the governance systems and interactions in the coastal and marine space is undergoing significant change, which can either negatively impact on the sustainable development of the artisanal fisheries sector or provide new ways in which to demonstrate desirable sustainability within a blue economy (Clegg et al. 2020). Figure 8 shows a sample of the types of interactions along the value chain.

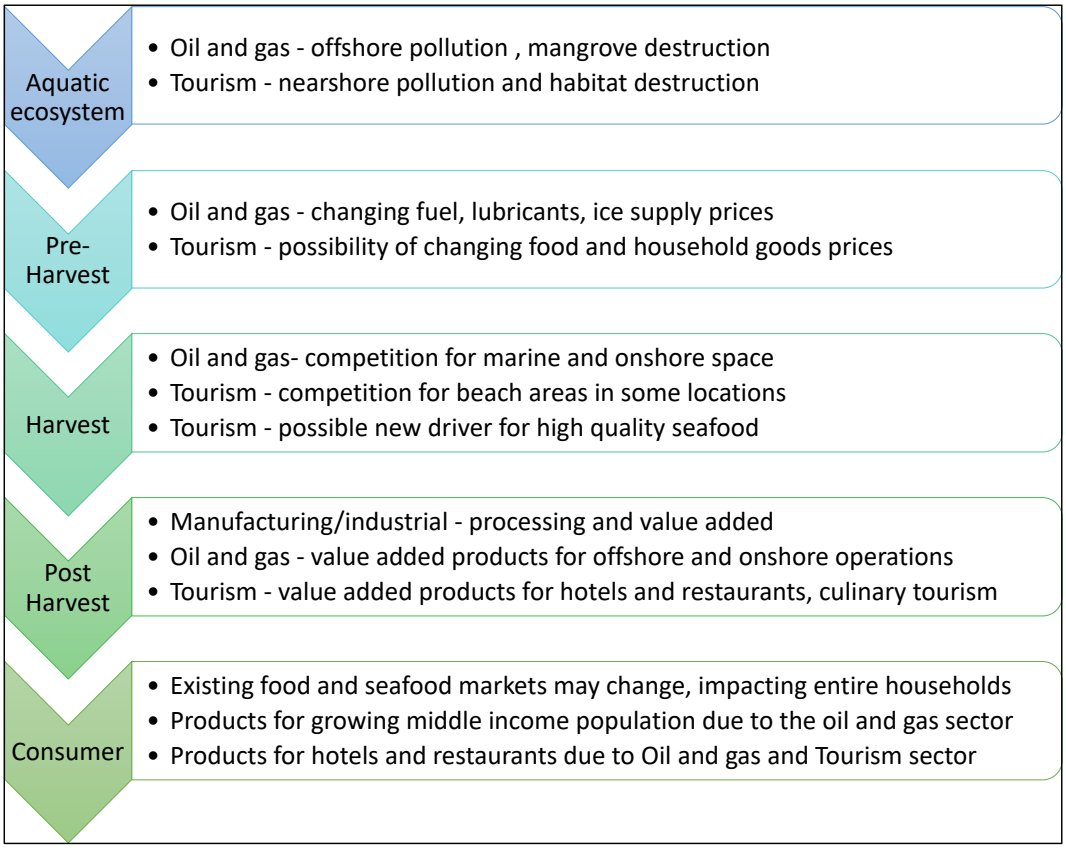

Figure 8. Some artisanal fishery value chain links with oil and gas and tourism sectors

Examining these in more detail, the links within the artisanal fishery value chain and with the oil and gas and tourism sectors can have both negative and positive consequences of which fisherfolk must be aware for selecting different responses. Development of the oil and gas

[11] https://www.gyeiti.org/oil-gas

sector can lead to offshore as well as nearshore pollution and destruction of mangroves with the establishment of nearshore service infrastructure and operations. There can also be competition for space on the seashore and riverbanks among the various sectors. On the other hand, the rapidly developing oil and gas sector with the establishment of offshore and coastal facilities and an influx of skilled and unskilled workers can open up markets for value added fish and fish products. In like manner, the development of hotels and restaurants to service the oil and gas and tourism sectors offers opportunities for value added fish and fish products. However, this would require policy interventions to facilitate the use of local agriculture and fisheries products as part of the agreements with operators in the oil and gas and tourism sectors, while raising issues such as consistent supply and quality. The authors' preliminary analysis of perceived strengths, weaknesses, opportunities and threats (SWOT) is shown in Table 1.

Table 1. SWOT analysis for artisanal fishery and links with oil and gas and tourism sectors

Strengths	Weaknesses
… of links to oil and gas sector • Strengthened GNFO engaged in advocacy and policy influence about concerns related to the likely impact of oil and gas development on the environment and their livelihoods • Fisherfolk taking the lead on ecosystem stewardship and advocating for protection of the environment as well as for social protection • Traditional knowledge which can be used in EIAs and stock assessments **… of links to oil and gas and tourism sectors** • Artisanal/Industrial fisheries processing relationship could be utilized in developing high quality value added products for potential markets linked to developing the oil and gas and tourism sectors	**… of links to oil and gas sector** • Uncertainty about the health of the environment, living marine resources and likely impacts of oil and gas exploration and exploitation on sustainable artisanal fisheries development • Inadequate awareness of any oil spill strategy and action plan for Guyana's coastal and marine space • Inadequate capacity to play a significant role in dealing with oil spills and other threats to the coastal and marine environment • Inadequate knowledge as to whether local content legislation supports utilization of local agriculture/fisheries produce in oil and gas and related sectors • Inadequate knowledge of or access to shock responsive social protection arrangements for the small-scale fisheries sector should a major oil spill or other hazardous event occur **… of links to oil and gas and tourism sectors** • Deteriorating onshore artisanal fishery infrastructure could hinder opportunities to access potential markets • Inadequate Hazard Analysis Critical Control Point (HACCP) arrangements could affect the production of high-quality seafood for potential markets in the two sectors

Strengths	Weaknesses
	• Inadequate capacity along the artisanal fishery value chain to make use of the upcoming opportunities for utilization of fish and fish products in the oil and gas and tourism sectors • Inadequate access to investment capital could hinder development of livelihood opportunities along the value chain • Uncertainty of getting Suriname fishing licenses for Corentyne fishers could affect the supply of fish to meet expanding demand due to developments in the two sectors • Inadequate linkages with the developing oil and gas and tourism sectors to access information on likely opportunities for artisanal fisheries development • Inadequate awareness of oil and gas and tourism development strategies and plans
Opportunities	**Threats**
… from links to oil and gas sector • Government commitment to utilizing funds derived from the oil and gas sector in developing education, health, infrastructure and the non-oil sectors. • Government support for sustainable development of artisanal fishery could lead to the provision of onshore infrastructure; capacity building along the value chain; access to capital • Improved infrastructure (e.g. new bridges over Demerara and Corentyne rivers) could facilitate marketing and trade of fish and fish products nationally and with neighbouring countries **… from links to oil and gas and tourism sectors** • Increased demand for value added artisanal fish and fish products driven by developing oil and gas and tourism sectors • Improved prices for fish and fish products in the national market • Creation of employment and livelihood opportunities along the artisanal fisheries value chain due to market demand in the	**… from links to oil and gas sector** • Oil and gas sector pollution and habitat destruction caused by use of harmful chemicals, discharge of toxic waters, flaring natural gas, introduction of invasive species in ballast waters from foreign tankers, oil spills could negatively impact on the environment and living coastal and marine resources • Low recovery and rehabilitation due to inadequate insurance by oil companies to cover oil spills could significantly impact on sustainable artisanal fisheries development and livelihoods **… from links to oil and gas and tourism sectors** • Ongoing demand for prime areas along the seashore and estuarine banks by oil and gas and tourism operators may create conflicts for marine and coastal space among fisherfolk, oil and gas operators and tourism operators • Demand for some types of seafood may aggravate non-compliance with conservation measures and weaken management plans

Strengths	Weaknesses
developing oil and gas and tourism sectors	• Inadequate Sanitary and Phytosanitary arrangements could hinder access to potential markets for fish and fish products in the oil and gas and tourism sectors • Existing Fisheries Advisory Committee (FAC) not equipped to deal with the powerful influence of the oil and gas and tourism actors in the coastal and marine space

In Guyana, coastal and marine fisheries, including the artisanal fishery, make a significant contribution to food security, employment, foreign exchange earnings, and the development of rural and coastal communities. With Government's commitment to utilizing funds derived from the oil and gas sector in developing education, health, infrastructure and the non-oil sectors, the contribution of the artisanal fishery to national and rural development, including the creation of employment and livelihood opportunities, could be enhanced through improvements to better serve existing markets as well as utilize the opportunities for market expansion linked to the rapidly developing oil and gas and tourism sectors. However, for this to materialize, attention would have to be paid to putting in place adequate safeguards to protect the marine environment and living resources; improving onshore infrastructure; addressing policy and capacity gaps along the artisanal fisheries value chain; and putting in place strategies and plans to deal with hazardous events as well as providing social protection for fisherfolk and their families.

In summary, the artisanal fishery is well developed, with many boatowners being members of the primary fisherfolk groups that comprise the GNFO, a strong and recognized national and regional advocate and policy influencer for sustainable small-scale fisheries development. However, for the fishery to meaningfully benefit from the potential opportunities being afforded by the developing oil and gas and tourism sectors, issues related to ensuring a sustainable fish supply, adequate onshore infrastructure and quality assurance along the value chain would have to be addressed through Government policy, adequate fisheries management and financial and technical support. A key player in this area would be a strengthened Fisheries Advisory Committee (FAC), with an appropriate Terms of Reference and representation from the key sectors impacting on the coastal and marine space, in order to generate information and provide advice to safeguard the environment and living marine resources, manage potential intersectoral conflicts, and take a more ecosystem ecosystem-based management approach to development in the coastal and marine space. We return to these points in a later section on national intersectoral coordination.

Brackish water aquaculture

Background with sugar industry

Aquaculture has been practiced for many years using mostly low-input culture methods in brackish water and freshwater ponds employing cachama, tilapia, and whiteleg shrimp as the major species being farmed. Aquaculture production was almost 700 tonnes in 2017, consisting of the three said major species plus a few native species[12]. Small-scale aquaculture in Guyana was overlooked for several years, with limited investment in inland aquaculture to farm fish species to reduce the reliance and stress on the capture fisheries. Little or no investment was made in brackish water shrimp farming along the Corentyne coast, resulting in many challenges for the operators there.

According to a press release by an ILO Information and Communication Officer on an International Labour Organization (ILO) funded Study of the socio-economic impact of the closure of GUYSUCO sugar estates on sugar workers, at the time of the 2016 – 2017 closing of the Wales, East Demerara, Rose Hall (Berbice) and Skeldon (Berbice) sugar estates, the Guyana Sugar Corporation (GUYSUCO) was the largest employer in the country with a staff of 16,000 employees plus around 160,000 other people (one fifth of the population) indirectly dependent on its operations[13]. A Demerara Waves article of November 30, 2017 indicated that 800 workers at Rose Hall, Canje (Berbice); 1,800 at Skeldon (Berbice) and 1,500 at East Demerara would be laid off before the end of the year[14].

Brackish water shrimp aquaculture value chain

With the closure of the GUYSUCO estates in Berbice (Region 6), many of the laid-off workers resorted to occupying lands and also working lands with existing shrimp farmers. Subsequent investigations and consultations led to the discovery that this form of aquaculture was providing many of the laid-off GUYSUCO workers with employment. As such, while the government is looking into the re-opening of some of the sugar estates and diversification of the sugar industry, a project was initiated to improve the livelihood of brackish water culture farmers and laid-off sugar workers as well as sustaining/improving the economy of rural communities (R.Gajnabi, pers. comm.). The Fish Site reported in October 2021 that aquaculture will become an economic powerhouse in Guyana, disclosing that aquaculture production for 2019 was 246 tonnes. With government interventions it is expected that this amount will increase significantly[15]. The possible impacts of climate change and variability add uncertainty (Figure 9).

[12] https://www.fao.org/fishery/en/facp/guy
[13] https://guyana.un.org/en/132610-guyana-launches-study-socio-economic-impact-closure-guysuco-sugar-estates-workers
[14] https://demerarawaves.com/2017/11/30/thousands-of-sugar-workers-being-laid-off-unions-demand-compensation/).
[15] https://thefishsite.com/country/gy

Figure 9. Mitigating the adverse effects of climate change by reinforcing sea defense structures (Source: R. Gajnabi, 2022)

The brackish water shrimp aquaculture value chain (Figure 10) is likely to have a very dynamic trajectory under the changing conditions of sugar industry diversification.

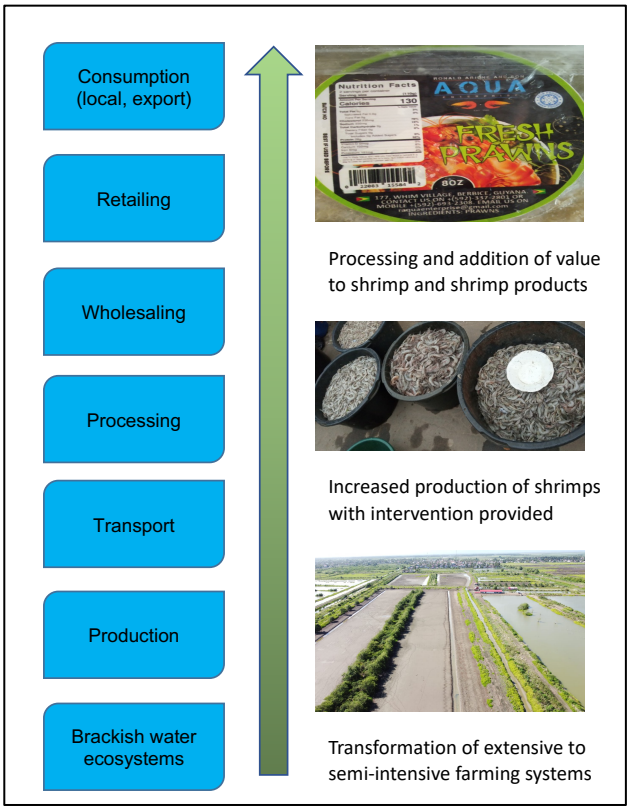

Figure 10. Images of brackish water shrimp aquaculture value chain (Courtesy R. Gajnabi)

A preliminary SWOT analysis (Table 2) is provided to illustrate uncertainties in intersectoral links that need to be considered by the several actors involved, but especially the small-scale shrimp farmers.

Table 2. SWOT of brackish water aquaculture links with GUYSUCO / sugar industry diversification

Strengths	Weaknesses
• Farmers organized in a cooperative society for advocacy and facilitating capacity development • Farmers registered with the Fisheries Department • Farmers knowledgeable about extensive brackish water culture of shrimp, finfish • Farmers use knowledge and experience to address climate change issues and develop resilient farming systems • Significant history of accessing diaspora and rural community markets • Cottage industry developing around processing of shrimp and finfish from brackish water aquaculture	• Insufficient production to satisfy increasing demand by diaspora and opportunities for expanding into local coastal tourism market • Inadequate capacity to put in place HACCP and environmental monitoring arrangements to facilitate quality assurance for expanding market and trade opportunities • Inadequate labor to facilitate expansion of aquaculture farms • Inadequate access to land tenure and investment capital by small-scale brackish water aquaculture farmers • Non-cohesiveness among cooperative members
Opportunities	**Threats**
• Government committed to re-opening sugar estates as well as diversification of the sugar industry and creating alternate employment and other opportunities for laid off workers in nearby communities • Access to a broader labor pool with brackish water aquaculture being viewed as part of the diversification strategy • Possible access to investment capital and farming equipment through diversification actions by Government and GUYSUCO • Satydeow Sawh Aquaculture Station, in collaboration with knowledgeable brackish water aquaculture farmers, capable of undertaking research and development of semi-intensive brackish water culture techniques • Cottage industries capable of adding value to brackish water culture of shrimp and fish products for export and expanding local tourism markets e.g., #63 Corentyne coastal beach development	• Inadequate knowledge of GUYSUCO's estate re-opening and diversification strategy and action plan • Potential destruction of sea defenses and drainage and irrigation canals due to expansion of brackish water farms • Agro-chemical pollution from agriculture, including sugar estates, and its impact on nearshore shrimp and fish nurseries • Inadequate of shrimp larvae and juvenile fish from nearshore nursery areas due to destruction of mangroves, etc, • Climate change impacts like rising sea levels affecting sea defense structures and drainage and irrigation systems, and unseasonal rainfall resulting in fluctuating salinity levels affecting availability of shrimp larvae and juvenile fish • Significant cost for establishing SPS and environmental monitoring systems • Brackish water aquaculture farmers and their Cooperative not adequately involved in the regional and other local

Strengths	Weaknesses
• Government and donor agencies providing funding for projects to facilitate diversification of the sugar industry in Region 6 Berbice	government arrangements for coordination and development • Illegal entry of fresh shrimp from Suriname creating competition for locally produced shrimp and finfish.

From the 1970s, traditional brackish water shrimp farmers have focused on providing shrimp and fish products to mainly niche markets for the diaspora in the USA and Canada, and in neighbouring communities. With the development of brackish water aquaculture being identified as a key element in the diversification of the sugar industry, it could enhance its role in rural development in Berbice, including the creation of alternate employment and providing livelihood opportunities along the value chain. However, for this to occur there would need to be more information readily available on the strategy and plan for the reopening of sugar estates and diversification of the sugar industry, including the resources that would be made available to address the capacity and other gaps in the brackish water aquaculture value chain and enabling environment, in order to meet market demand for value added brackish water shrimp and finfish by the diaspora, rural communities and possibly in the expanding local coastal tourism operations. Particular attention would need to be paid to protecting the nearshore environment, in terms of its role as shrimp and finfish nurseries and in sea defence.

With Berbice being a key agriculture area in Guyana, the approach to developing brackish water aquaculture would need to be integrated with overall rural and agriculture development, including diversification of the sugar industry. The East Berbice/ Corentyne Cooperative Society Limited (EBCCSL) can play a key role in promoting an integrated approach to sustainable brackish water aquaculture development through advocacy and seeking to become part of any mechanism(s) in Berbice that facilitate such action.

National intersectoral coordination

The case studies have illustrated just a few of the many complex interactions between the energy and fishing industries as well as the sugar and aquaculture industries that both can include links with tourism, transport, manufacturing and other sectors. In all countries there is a need for intersectoral coordination (Compton et al. 2020), and this final section briefly examines the arrangements in place or possible for achieving the linkages that favour or can be used to pursue the success of artisanal fisheries and aquaculture in Guyana.

The Fisheries Act (2003) gives the Minister the authority to appoint a Fisheries Advisory Committee (FAC) to advise on the management and development of fisheries, with the aim of ensuring the optimum utilization of the fisheries resources of the fisheries waters of Guyana for the benefit of the people of Guyana. Other than the Chief Fisheries Officer, the Act leaves it to the Minister to decide on the other members of the Committee who he/she may consider capable of advising him/her on the management and development of fisheries. According to the Fisheries Act (2003), the functions of the Committee are to advise the Minister on fisheries

management and development; any aspect of a fisheries plan; any proposal under the Act for subregional or regional cooperation with respect to fisheries, fisheries agreements, joint ventures or development projects in the fisheries sector; and any other matters as may be referred to the FAC by the Minister.

The FAC, which was dormant for about four years from 2011, was resuscitated in 2015. At the same time the Guyana National Fisherfolk Organization (GNFO) was launched. Both organizations' roles and functions include advocating for the development of SSF and representing SSF at various levels and forums. A critical difference between them is that, as in other countries (McConney and Compton 2020), the FAC has a broader state-linked policy mandate to advise what is in the interest of the society and economy as a whole. The GNFO, however, can function much more as an interest and pressure group to advocate specifically for its fisherfolk members to the exclusion of other economic actors if it so chooses.

Unfortunately, both bodies collapsed for want of guidance and supervision from their oversight agencies. In 2021, both organizations were resuscitated, again. The FAC members and agency representatives were drawn from various organizations such as: the EPA, GNFO, Trawlers Association, Permanent Secretary and legal department of the Ministry of Agriculture, Chief Fisheries Officer, Coast Guard, Maritime Administration Department (MARAD), Aquaculture Association, World Wildlife Fund – Guianas and Police, among others (Figure 11). The GNFO group comprises representatives from seven major landing sites along Guyana's coastline.

Figure 11. Composition of the Guyana Fisheries Advisory Committee (FAC)

The GNFO landing site organizations used to hold their respective monthly statutory meetings where issues in the fishing sector were discussed, and the way forward suggested and acted upon, until there was the sudden collapse of the FAC due to non-attendance by some members. However, the GNFO continues to function, and is willing to resume engagement, even though they have their fair share of challenges as well (P. Jainarine, pers. comm.).

To make the FAC more effective, the fisherfolk have identified some challenges that would need to be addressed, as follows:

- The FAC and GNFO are made up of members from across the country, who have their own professional tasks and occupations to pursue, so time to attend meetings is a major set-back for members
- Political influence and inadequate knowledge are problems since some appointees are not aware of the fisheries situation while others are, and there are often power dynamics at play
- In light of the rapidly developing offshore oil and gas sector, the TOR of the FAC should be revised, and its membership adjusted to facilitate a more ecosystem-based approach

With a renewed focus on aquaculture development, including brackish water aquaculture, the sub-sector should be adequately addressed and represented on the FAC. Also, in the case of brackish water aquaculture development in Region 6, Berbice, the brackish water fish farmers and their cooperative, should seek to better engage with regional governance arrangements, such as the Regional Development Council and other local governance bodies, as well as GUYSUCO's Board of Directors.

In the view mainly of the fisherfolk leaders (P. Jainarine, pers. comm.), the way forward for the FAC would require:

1. Appointment of more members and representatives with knowledge of fisheries
2. Appointment of members who are willing to sacrifice more of their personal time to attend to their respective organizations' interests on and outside the FAC
3. Provision of stipends to compensate members for loss of income for the periods of work on FAC business

As intersectoral links develop and dissolve it will be important to ensure that the improved terms and conditions of the FAC membership remain and the composition reflects that required for an ecosystem approach to fisheries. This includes implementation of the SSF Guidelines and the related protocol to the Caribbean Community Common Fisheries Policy (CCCFP).

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Cases of national intersectoral links in artisanal fisheries and aquaculture of St Vincent and the Grenadines — C Romeo and W Harry

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Introduction

As indicated in the overall introduction to this volume (Blackman et al. 2022) the celebration of the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022) and promotion of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) have converged. The 17th Session of the Western Central Atlantic Fishery Commission (WECAFC) in 2019 recommended that IYAFA 2022 be used to link the highly distributed activities of WECAFC members and partners to showcase the progress made in implementing the SSF Guidelines in a coordinated way and highlight fisherfolk at regional and global scales.

A WECAFC Coordination Committee for IYAFA activities received a grant from the European Union, a IYAFA Supporter, to assist its coordination efforts via the project GCP/SLC/219/EC *Support to the secretariat of WECAFC for effective implementation of priority actions of the Programme of Work agreed at the 17th Session of the Commission*. With this support the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) is paying special attention gender mainstreaming (including youth) and national intersectoral links. This paper provides a case study of some national intersectoral links in the artisanal fisheries and aquaculture in St. Vincent and the Grenadines (SVG).

St. Vincent and the Grenadines has a domestic small-scale fishing industry that strives to supply seafood demands for local and export markets. The development of the fishing industry within the country leads to intersectoral linkages with sectors such as tourism, transport, and manufacturing. The network of links among the sectors contributes to shaping the fishing industry. This case study illustrates the potential impact of the Port Modernization project proposed for Rose Place in Kingstown displacing the Rose Place fishing community, the Fleet Expansion program, and the Grenadines Seamoss Farming mariculture initiative. The study also highlights the national intersectoral coordination through the Fisheries Advisory Committee (FAC) and how it can continue to fulfill its role in supporting fisheries governance in St. Vincent and the Grenadines. The brief cases of national intersectoral linkages and governance provide preliminary information on the functioning of artisanal fisheries and aquaculture, highlighting areas of satisfactory development and for improvement, as well as opportunities for further progress.

The next section sets out the approach used. It is followed by the context and analysis of the artisanal fisheries case, then similar for aquaculture, highlighting interactions with selected economic sectors. The governance elements of national intersectoral coordination in the cases follow. References are in the final section.

Methods

The approach draws on Part 1 of the CERMES Technical Report on “National intersectoral links with Caribbean artisanal fisheries and aquaculture: some considerations” (Blackman et al.

2022). Following the presentation of the draft report as a discussion document at a regional webinar on 21 April 2022 it was decided that, as follow-up, case studies from St. Vincent and the Grenadines would be used to illustrate intersectoral linkages. The cases would focus on small-scale fisheries, specifically the port modernisation project and national fleet expansion programme, and on seamoss farming in the Grenadines. A team, comprising the national fisherfolk leader — Winsbert Harry, an independent consultant — Clonesha Romeo, and a marine scientist — Maren Headley as reviewer, was established to prepare the study with support from CERMES.

The case study was prepared mainly through desktop research plus informal interviews with key informants between 16 May and 10 June 2022. The informants included Senior Fisheries Officer Kris Issacs and Fisheries Extension Officer Ernie Bracken from Fisheries Division; seamoss farmers Philius Ollivierre from Mayreau; Junior Stephens from Canouan; and Kathlyn Weekes and Sandra Hutchinson from Union Island. Seamoss contacts included SeamossBoss Canouan; S&S Sea Moss Gel; Jadesha Kreationz Mayreau Explorers Multipurpose Cooperative Society Limited; and Audwin Andrews of Sustainable Grenadines Inc. The case study was discussed with the CERMES team and finalized for possible presentation at the upcoming conference of the Gulf and Caribbean Fisheries Institute (GCFI) in November 2022.

Overview of artisanal fisheries and aquaculture

The St. Vincent and the Grenadines domestic fisheries sector comprises artisanal (synonymous with small-scale) fisheries and aquaculture. Being a small island developing state dependent on tourism and agriculture as an income generator has focused interest on the development of the blue economy (Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry & Labour 2022). Artisanal fishing comprises both commercial and subsistence fishing within small fishing communities, and the sector depends on these fishers to sustain the fishing industry postharvest value chains. This fishing industry engages in inshore pelagic, oceanic pelagic, shelf and deep slope demersal fisheries mainly using open fishing vessels (CRFM 2022) such as pirogue with outboard engines (Figure 1). Gear use includes spearfishing, trolling, handlines, longlines, beach seine, other nets, and fish pots/traps. Fishers may harvest several species on one trip from more than one fishery or gear type.

Figure 14: Pirogue vessels used by fishers in St. Vincent and the Grenadines

Fisheries development is essential to the livelihoods of fisherfolk along the fisheries value chain to sustain families and the economy. There is a marine multi-use zoning plan (Coastal Master and Marine Spatial Plan 2021) for the Grenadines that includes mariculture zones, conservation zones, nearshore fishing and offshore fishing zones, low impact/ecotourism zone, transportation zone, and general use zones that was developed in partnership with Sustainable Grenadines Inc.. Mainland St. Vincent does not have distinctive fishing zones but has marine conservation areas which restrict fishing. The main fish landing sites on mainland St. Vincent are Kingstown, Owia, Calliaqua, Clare Valley, and Barrouallie. Bequia, Canouan, Mayreau and Union Island are landing sites in the Grenadines (Figure 2). The landings are recorded at these sites as well as the sales to fish vendors, local consumers and retailers.

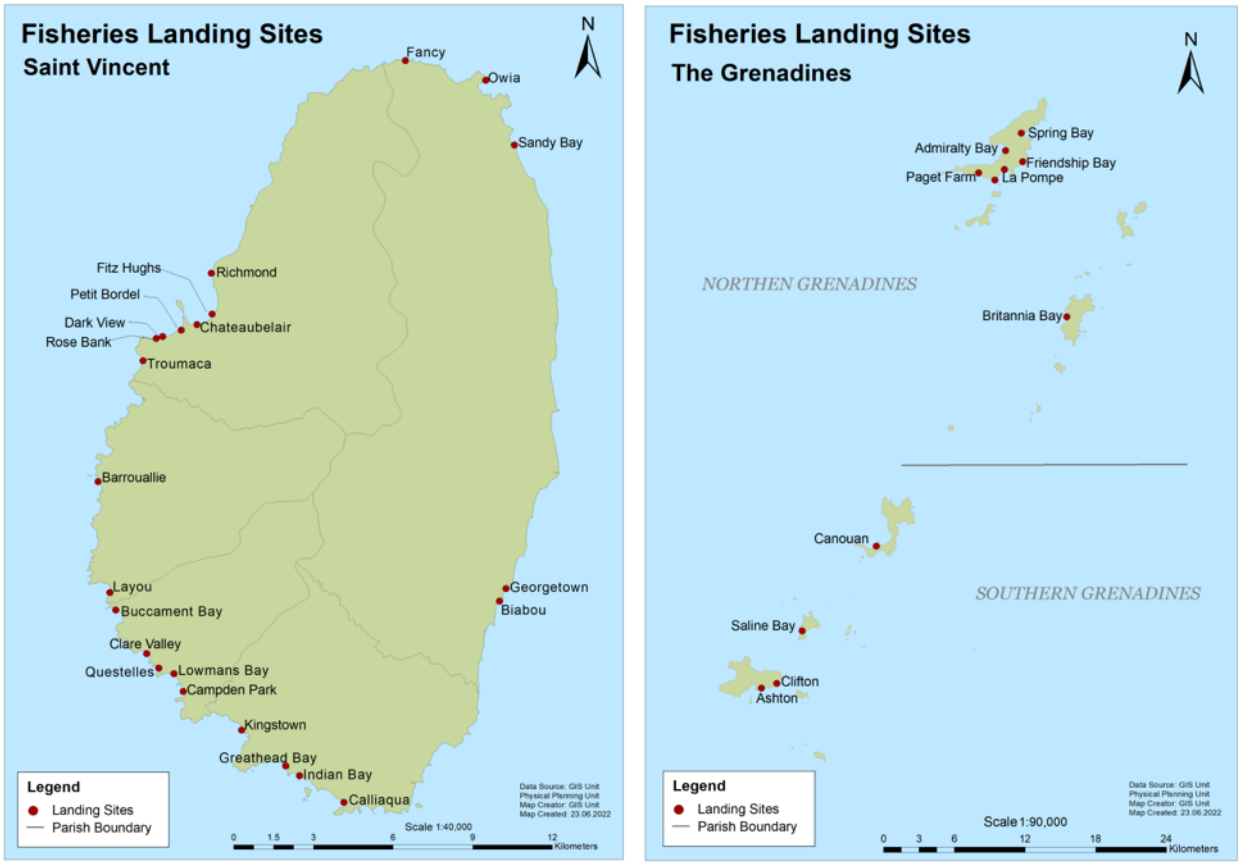

Figure 15: Saint Vincent and the Grenadines fish landing sites

There were over 900 registered fishers and 1142 registered fishing vessels in 2019 (Fisheries Division 2019). However, some of these vessels may have been out of use for several years due to damage with repairs needed. The fisherfolk in postharvest include fish vendors, fish processors and fisher cleaners. In developing the fisheries sector there has been an expansion in the export market due to the increase in commercial fish processing establishments such as Rainforest Seafood SVG Ltd, Bequia Seafood Co Ltd, Union Island Seafood Ltd, Villamar, and Ocean Marine Shipping Co. Ltd. Seafood landed and marketed in 2021 was recorded as 2,738,001 lbs (1,241,936 kg) with export of 1,162,299 lbs (527,210) kg). These companies

export seafood such as tuna, marlin, lobster and conch to regional and international markets. As shown in Figure 3, most of the seafood exported (58%) was conch, followed by yellowfin tuna (29%).

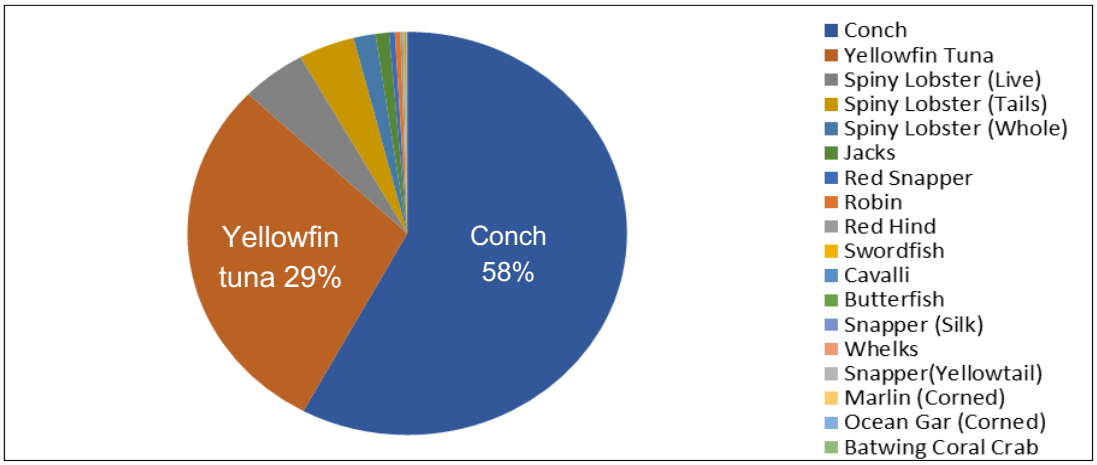

Figure 16: Seafood exported for the period January to December 2021 for the Fisheries Centres (Source: SVG National Fisheries Report 2022)

The export market enhances foreign exchange earnings by the fishing industry. Fisherfolk must improve their quality of fisheries products to achieve the standards required to make use of the export opportunities.

Fisheries governance

The fisheries sector in St. Vincent and the Grenadines is governed by the legislation and policies that regulate the industry. These legally binding and non-binding instruments are meant to ensure that fishers utilize the marine environment without overexploitation, and coastal ecosystems are sustainably managed. Table 1 highlights the polices, laws, and plans that govern the fisheries sector in St. Vincent and the Grenadines.

Table 6: Polices, Laws and Plans that have governed fisheries in St. Vincent and the Grenadines

Laws	**Polices**
• Central Water and Sewerage Authority Act (1978) • Beach Protection Act (1981) • Fisheries Act (1986) • Aboriginal Subsistence Whaling Regulations (1986) • Fisheries Regulations (1987) • Maritime Areas Act (1983) Act No. 15 of (1993) • Mustique Conservation Act (1989) • Town and Country Planning Act (1992) • Marine Parks Act, 1997 (No. 9 of 1977)	• National Ocean Policy and Strategic Action Plan, 2018 • National Fisheries and Aquaculture Policy, 2019 • Policy Framework & Strategic Plan for Agricultural Development 2012-2018
	Plans
	• National Environmental Management Strategy and Action Plan 2004-2006

• Tobago Cays Marine Parks Act (1999) • Fish Processing Regulations (2001) • High Seas Fishing Act (2001) • National Parks Act (2002) • High Seas Fishing Regulations (2003) • Fisheries (Fish and Fish Products) Regulations (2006) • Cooperative Societies Act (2012) • Fisheries (Amendment) Regulations (2016) • Fisheries (Amendment) Regulations (2017) • Fisheries (Prevention of Illegal, Unreported and Unregulated Fishing) Regulations (2017) • Fisheries (Amendment) Regulations (2019)	• Draft Plan for Managing the marine fisheries of Saint Vincent and the Grenadines, 2005 (Draft) • Tobago Cays Management Plan 2007-2009 • National Parks and Protected Area System Plan 2010 -2014 • National Economic and Social Development Plan 2013-2025 • National Biodiversity Strategic Action Plan 2015 – 2020 • National Sargassum Management Plan (2018) • National Plan of Action to Prevent, Deter and Eliminate IUU Fishing 2018-2022 • National Adaptation Plan (2019) • North Atlantic Swordfish Management Plan, Saint Vincent and the Grenadines (2021) • Shark Management Plan, Saint Vincent and the Grenadines (2022)

The development of the fisheries sector and the livelihoods of fisherfolk within small-scale fisheries in St. Vincent and the Grenadines is executed through a variety of projects that build the blue economy. These projects assist artisanal fisherfolk and aquaculturists by building livelihoods and organisational capacity, enabling marine sustainability, prolonging the health of the oceans, and reducing impacts that can degrade marine habitats. Table 2 lists some projects conducted within the country that contribute to sustaining small-scale fisheries and aquaculture.

Table 7: Projects within the fisheries sector in St. Vincent and the Grenadines

Project	Project Synopsis
National Projects	
FAO TCP/STV/3602 - Strengthening fisheries legislation in Saint Vincent and the Grenadines focus: IUU fishing [no date available]	To strengthen Saint Vincent and the Grenadines' fisheries legislative framework to effectively discharge international obligations as a coastal, flag, port and market state under various international instruments and strengthen the capacity of our national agencies in compliance with these agreements.
Building a Sustainable Future through the Seamoss Industry in St. Vincent and the Grenadines [no date available]	To determine the most suitable locations for the establishment of Seamoss farming sites within the marine space of Saint Vincent and the Grenadines. To apply best available information to design a licensing system which addresses elements including the number of

Project	Project Synopsis
	licenses to be issued annually, the specifications of farms, maximum number of farms allowed per farmer/group, rotation of licensing, traceability, quality control such as HACCP and other certification schemes etc.
Conserving Biodiversity and Reducing Land Degradation using a Ridge to Reef Approach – R2R GEF6 [2020-2024]	To conserve biodiversity and reduce land degradation using a Ridge-to-Reef approach inclusive of strengthened institutional framework for protected areas, biodiversity conservation and effective management of new and existing protected areas.
SVG Coastal and Marine Ecosystems Management Strengthening Project – GEF7 [2022]	To strengthen ecosystem-based adaptation management of coastal and marine ecosystems of Saint Vincent and the Grenadines through a multi-pronged approach.
Regional Projects	
Coral Restoration for Resilient Ecosystems and Sustainable Livelihoods in Saint Vincent and the Grenadines – CLEAR[16] [2021 – 2023]	To develop coral restoration activities with national government agencies and communities to provide tangible socio-economic and ecological benefits to local communities and coastal ecosystems respectively.
Developing Organisational Capacity for Ecosystem Stewardship and Livelihoods in Caribbean Small-Scale Fisheries (Stewardfish) [2018 - 2021]	To ensure better engagement of government and non-governmental stakeholders in the sustainable management of living marine resources
Climate Change Adaptation in the Eastern Caribbean Fisheries Sector (CC4 Fish) [2017-2020]	To increase resilience and reduce vulnerability to climate change impacts in the Eastern Caribbean Fisheries Sector, through introduction of adaptation measures in fisheries management and capacity building of fisherfolk and aquaculturists.

[16] https://www.clearcaribbean.org/our-work/current/

Project	Project Synopsis
Project for Strengthening Sustainable Use and Management of Coastal Fisheries Resources in the CARICOM Countries (CoastFish) [2020-2024]	To provide a co-management approach to environmental conservation, coastal resource management and marine resource enhancement
FAO GCP/INT/313/SWE - Support for the implementation of the PSMA and related instruments to combat IUU fishing [no date available]	To improve implementation of international instruments, such as the 2009 FAO Agreement on Port State Measures (PSMA) and complementary international instruments to combat illegal, unreported, and unregulated fishing
Strengthening resilience capabilities in the Fisheries Sector through sustainable capture fisheries and value-added products – Fisheries ACP EU BioDiversity Project [no date available]	To improve the livelihoods of fisherfolk, and other stakeholders in the fishing industry inclusive of increased employment opportunities and earning capacity. Also, to improve the capacity of the Fisheries Division to use Global Information System (GIS) technology in the development of mitigation and potential adaptation measures, to assist with sustainable fisheries management planning and the implementation of key frameworks, action plans and programmes in support of coastal and resource management.
Caribbean Region Oceanscape *Project* (CROP) [2017-	To ensure the sustainability of the use of oceanic resources in the development of the blue economy.
Building Resilience in the Eastern Caribbean through Reduction in Marine Litter Project (ReMLIT) [2019-2022]	This component of the project demonstrates cost effective, environmentally sustainable wastewater treatment technologies to improve coastal water quality in two (2) fishing communities on mainland Saint Vincent
Sustainable management of shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+ Project) [2015-2020]	To strengthen and integrate fisheries management and the protection of the marine environment through a comprehensive roadmap towards sustainable living marine resources management and strengthened and consolidated regional cooperation.

Project	Project Synopsis
Unleashing the Blue Economy of the Eastern Caribbean (*UBEEC*) [2022 – 2027]	To stimulate economic recovery in Saint Vincent and the Grenadines through strengthening marine and coastal resilience, and improving competitiveness of the economies in three (3) critical and interconnected sectors/areas: tourism, fisheries and aquaculture, and waste management
UNJP/SLC/218/UNJ Harnessing Blue Economy Finance for SIDS recovery and Sustainable Development [2020-2022]	To develop financing strategies in the Blue Economy and creating an enabling framework for sustainable development through measures including: the identification of policy and regulation gaps, a methodology to identify key Blue Economy opportunities, and the definition of specific financing mechanisms for Blue Economy initiatives to achieve resilient growth

Throughout the list one can discern intersectoral links between fisheries and sectors such as tourism, transport, etc. whether they are specifically labelled blue economy initiatives or not.

National intersectoral links

National intersectoral links in artisanal and aquaculture in St Vincent and the Grenadines arise from fisheries value chains. The fisheries value chain is a linear representation of the value adding fisheries livelihoods in the country (Figure 4). This can show intersectoral links from fisheries to other economic sectors and their governance along the value chain stages.

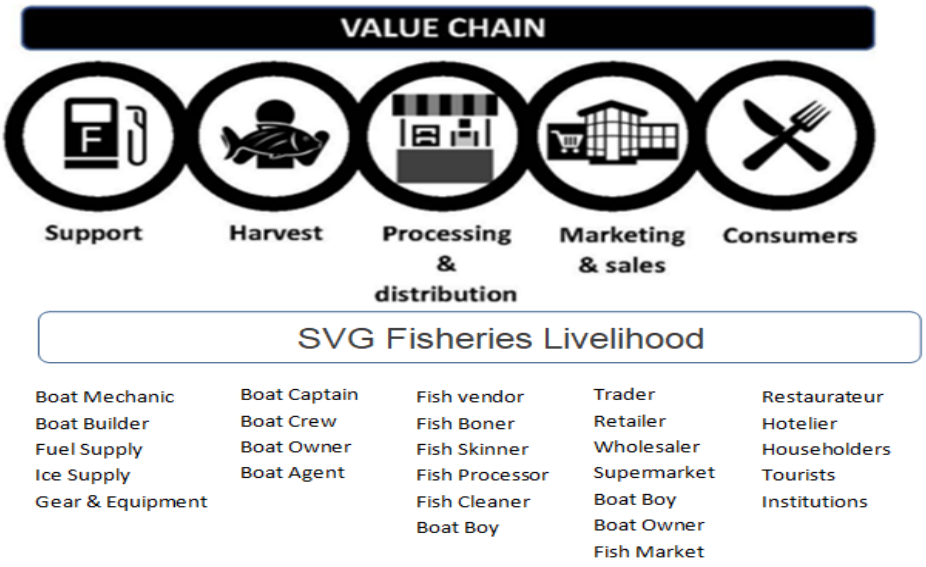

Figure 17: Fisheries value chain such as in St Vincent and the Grenadines

Intersectoral links can be represented in the non-market interactions among the sectors and within the governance of the fisheries sector. The governing policies and regulations in Table 1 contribute to the management of the fishing industry, limiting harm to the environment and consumers. The governing system and the linkages are highlighted in Figure 5. The governing policies assist in the maintenance of fisherfolk livelihoods and the continued development of the sector in St. Vincent and the Grenadines.

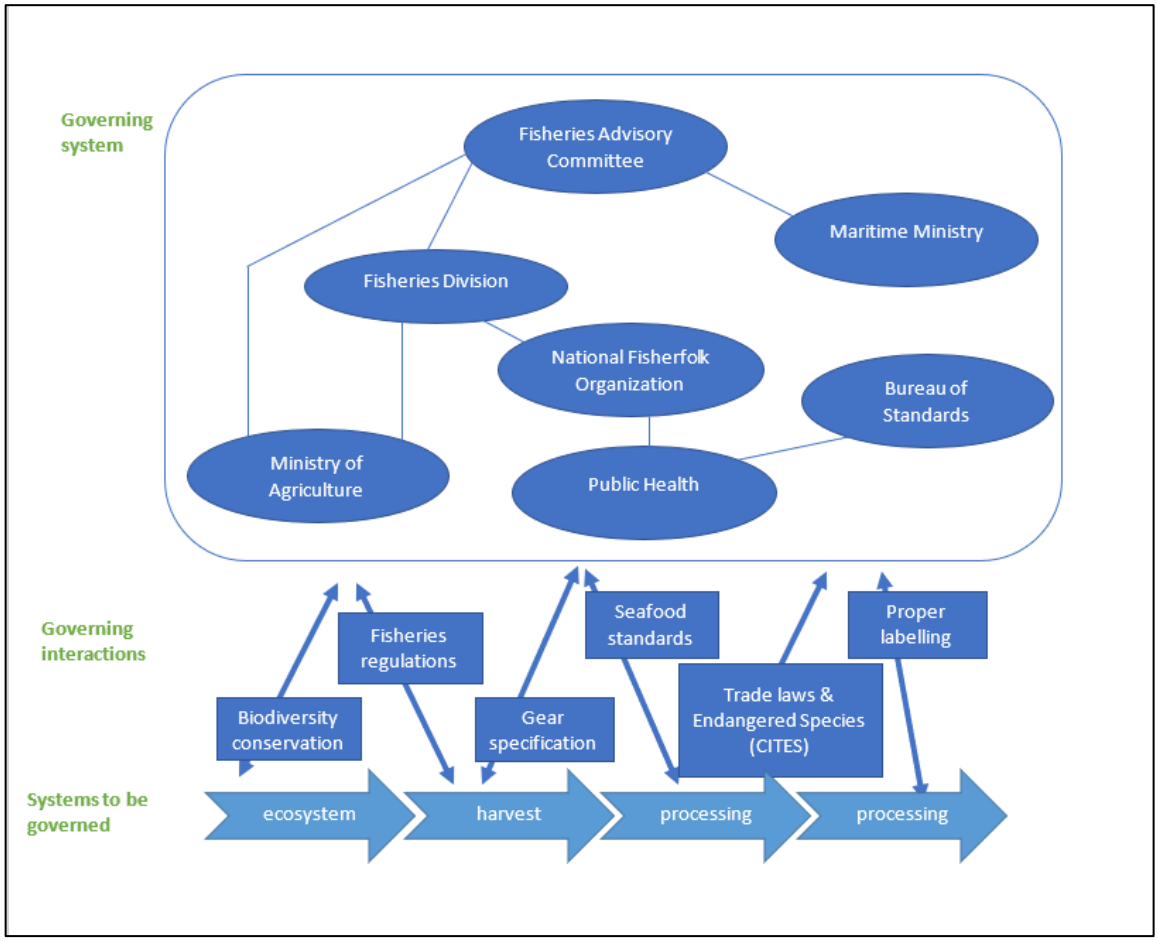

Figure 18: Network governance of the fisheries value chain similar to that found in St. Vincent and the Grenadines (modified from McConney 2012)

Fisherfolk face livelihood challenges due to the impacts of climate change and societal issues. These issues can place a burden on fisherfolk and disrupt the functioning of families. This can be problematic when the person in the industry is the only or main income earner in the family.

Key informants said that most fisherfolk households consist of one or two income-earners with the fisherfolk being the main earner within the household. Fisherfolk are at times forced to seek supplementary livelihoods to maintain the household especially when the fishing season is low, such as when certain pelagic fish species migrate. Some fishers work as part-time plumbers, carpenters, masons, or food and small goods vendors to improve the household finances.

From January to July the fishing blooms with an abundance of species that allow fisherfolk the opportunity to earn throughout the high season. However, from August to November the fishing season is low and many fisherfolk are short of income. It is costly to go fishing within the low season if the expense of a daily fishing trip outweighs the sales that might occur. However, during December the sale of fish increases due to the return of migratory fish species. Fishers venture out to sea during the low season with the hope of harvesting a good catch in a time of scarcity but most often return to shore with little or nothing. The household must depend on the additional income generated by non-fishery livelihoods during the low season. Figure 6 is a hypothetical seasonal calendar of possible patterns of income level fluctuation over time.

Livelihod mix by economic sector	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Single Unit Household												
Two Unit Household												
Three Unit Household												
Four Unit Household												
Overall income pattern (# units sum)	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**7**	**7**	**7**	**7**	**10**

Key	Monthly level of income from sector livelihood over a calender year							
	4 units of income		3 units of income		2 units of income		1 unit of income	

Figure 19: Hypothetical seasonal calendar of patterns of income at different levels over time

Small-scale fisheries cases

Many national intersectoral links can be observed in fishing industry activities. These links can be identified in the national development projects. This section sets out two fisheries cases that illustrate some of the links as well as the challenges faced by fisherfolk in sectoral interactions.

Rose Place Community and Port Development

National development projects can disrupt fishing communities. This is the plight of the Rose Place fishing community that is in the process of being displaced due to the Port Modernization project. We ask, will eventual benefits to fisheries and other sectors exceed the immediate costs to fisherfolk? To which sectors will benefits accrue at the expense of fisherfolk? These critical questions are being considered by the fishing community.

Rose Place is located at the southern end of the country's capital, Kingstown. It is an established coastal fishing community, and a hub for fisherfolk given its proximity to the Kingstown fish market, the only landing site within the capital of Kingstown (Figure 7). The community has traditionally been a fishing site with around 150 fisherfolk, many of whom reside elsewhere but still operate their fishing activities from the village. Some fisherfolk are boat owners, but a large proportion comprises crew members. Fishing activity at Rose Place contributes significantly to the Kingstown fishing industry and fish market. Residents generally also assist with the mooring of boats or engage in subsistence fishing and sell the excess to

restaurants. Other fishing-related activities include maintenance of the pirogues and boat engine repairs (Bernard et al., 2009).

Figure 20: Rose Place beach used by fishers to harbour and haul out fishing vessels (Photo credit: Winsbert Harry)

The coastal community is also an area where fishers bond and support each other through the difficulties and challenges faced at sea and in the fishing industry. Fisherfolk of this community have established the Goodwill Fisherman's Cooperative Society Limited that is located within Rose Place. The cooperative represents the fisherfolk of the community and those that operate at Rose Place. It is one of the more active primary fisherfolk organisations in the country.

A modern seaport was deemed vital for the development of St. Vincent and the Grenadines as the airport had been recently upgraded. With financing from a range of sources, including UK Caribbean Infrastructure Partnership Fund (UKCIF) and the Caribbean Development Bank, St. Vincent and the Grenadines embarked on its EC$600 million Kingstown Port Modernization Project. The project aims to develop an upgraded port facility in the capital (Figure 8) that provides climate resilient infrastructure for economic activity on the island, facilitating trade and improving work safety and border security. The project development includes a New Primary Cargo Port in Kingstown, a New Intra-Regional Cargo Terminal, Kingstown, a New Inter-Island Ferry Terminal, Kingstown, and road improvement works in Kingstown (Figure 9) (St. Vincent Port Authority 2019).

The expansion of the port will cause physical and economic displacement of the Rose Place community, fisherfolk and vendors from the community and along the seawall in Kingstown within proximity to Rose Place (St. Vincent Port Authority 2019). The port modernization project is preparing for the initial construction phase. To facilitate the development of the port, some residents of Rose Place fishing community have been relocated to Lowmans Leewards (National Broadcasting SVG 2022). The relocation was intended to assist the residents whose housing would be disrupted by the project. The project is estimated to affect 156 fishers, 30 vendors and 52 boats, of which six boat owners and about 30 fishermen reside in Rose Place. The other fisherfolk reside in different communities but operate within Rose Place. Kingstown fish market is the landing site for Kingstown. As such, the Rose Place fisherfolk land and store

their catch at the Kingstown fish market, and the Rose Place fish vendors use the Kingstown market to sell their fish. When the catch is small the fishermen sell the fish from Rose Place.

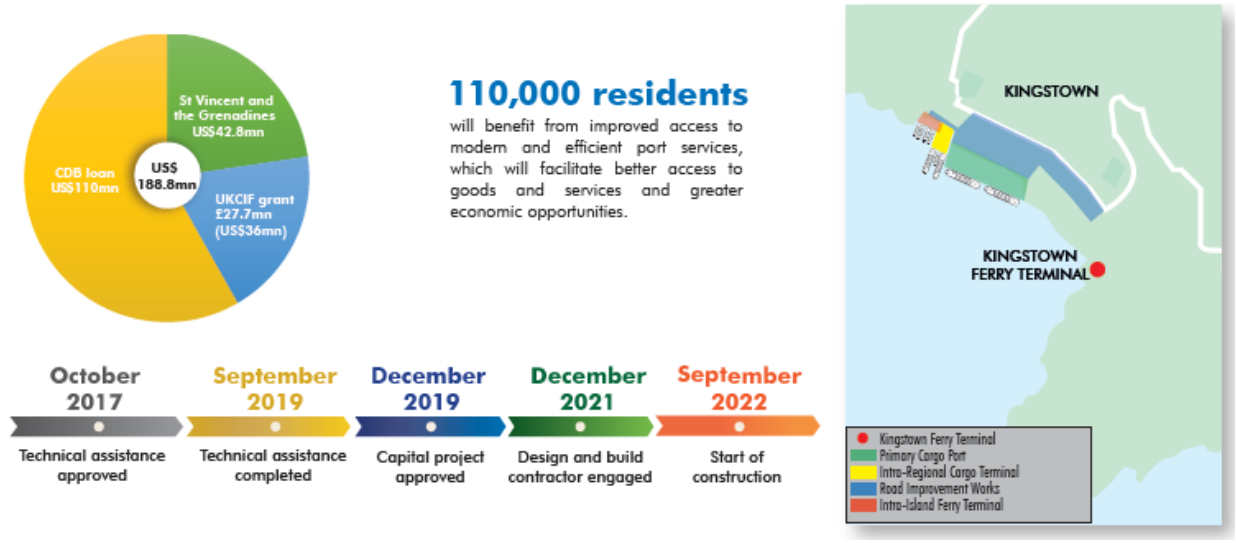

Figure 21: Planning stages of the Kingstown Port Modernization Project (Source: UKCIF project profile 2021)

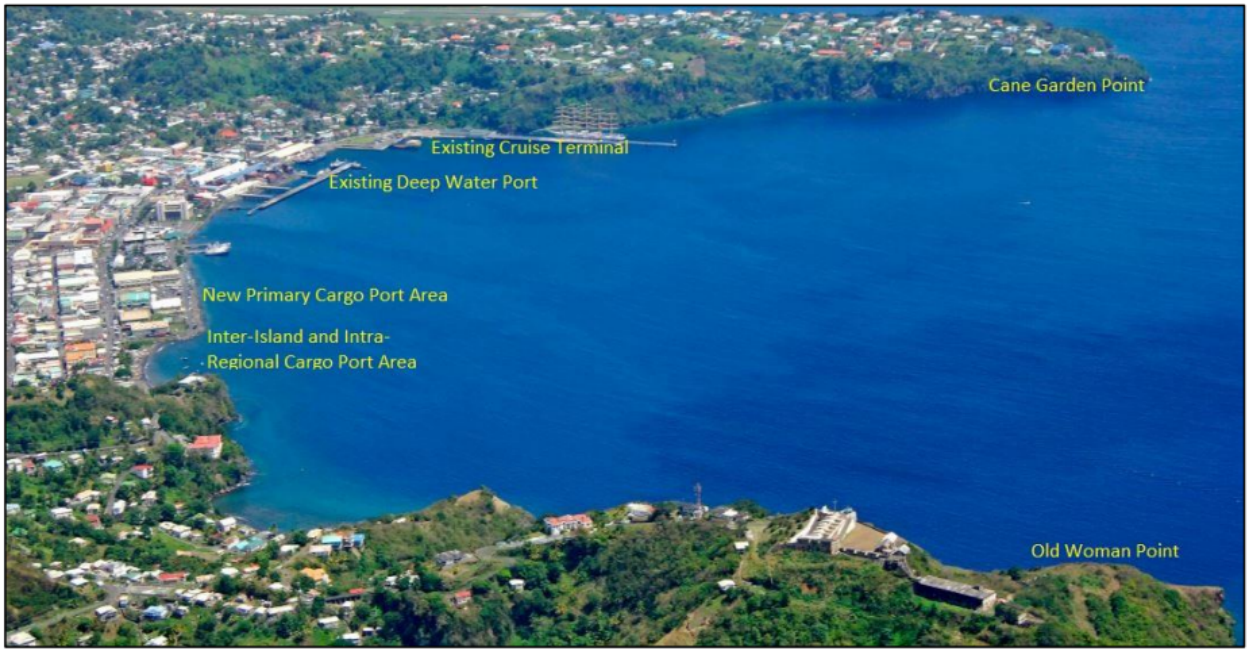

Figure 9: Port Development for Kingstown Port Modernization Project (Source: St. Vincent Port Authority 2019)

The port modernization project will not impact the Kingstown Fish Market. However, fishing activities cannot continue at Rose Place during the port construction, as the area is developed for modern port facilities and used to build floating rafts that store piles during construction (St. Vincent Times 2022). Due to this, there is a compensation package[17] for fishers and boat owners affected by the port development and the negotiation for a proposed landing site is on-going. The compensation package is said to provide boat owners with EC$13,000 for vessel improvement, EC$400 allowance to move from Rose Place and EC$2400 for crew allowance and shed allowance based on its value (St. Vincent Times 2022). At the time of the preparation of this report, of the 35 fishermen operating from Rose Place, 16 have signed the agreement to move and two have already been paid the compensation (St. Vincent Times 2022).

The authors' preliminary analysis of perceived strengths, weaknesses, opportunities and threats (SWOT) of the Kingstown Port Modernization Project regarding its impact on the livelihoods of fisherfolk is shown in Table 3. This leads to the consideration of the intersectoral links involved.

Table 8: SWOT analysis of the Kingstown Port Modernization Project from authors' perspective

STRENGTHS	***WEAKNESSES***
• Facilitates the docking of new fleet and the landing of fish from these vessels • Fish and fish products can be exported from the cargo dock at the modern port • An established Goodwill Fisherman's Cooperative Society Ltd. to negotiate and voice concerns of fisherfolk	• Lack of fisherfolk/fishery involvement in modernization project to provide for the impact of the project on fishers. • Potential disruption in SSF fishing activities and livelihoods, such as beach seine capturing jacks and robins, vending, and a reduced supply of fresh fish to the neighbouring community.[18]
OPPORTUNITIES	***THREATS***
• Development of livelihoods through facilities for the docking of large fishing vessels apart of the fleet expansion program	• Fisherfolk displacement and disruption of income for fishers of the community, due to the use of the Rose Place beach for the port modernization project • Increase cost in fuel prices, as fishers would have to travel longer distances • Security concerns for vessels, gears and fishing equipment, as some fishers would not be able to reside in the same area or community where the vessels are docked.

[17] Given the sensitivity of the matter and the political atmosphere, obtaining details about the compensation package was challenging. Information was disseminated mainly from news media and political sources. It was at times incompatible and perhaps unreliable.

[18] The situation regarding the relocation of fisherfolk from Rose Place remains fluid. As at June 6, https://www.iwnsvg.com/2022/06/06/rose-place-fishing-base-can-continue-alongside-new-port-cummings/

	• It reduces the ability for fisherfolk in the pre-harvest and post-harvest activities to obtain a livelihood in their traditional area.

This section explores more specifically the intersectoral linkages for fisheries, regarding the port modernization project, by focusing on the transportation sector. Table 4 shows the authors' views on links, weaknesses and opportunities that characterize intersectoral relationships between transportation via seaport and small-scale fisheries based on the port modernization.

Table 9: Intersectoral linkages for transportation and fisheries

Links	Weaknesses	Opportunities
Before intervention		
Docking facility exists in Kingstown for fishing vessels	Space not available for all fisherfolk	Government should provide adequate space for fisherfolk to trade. Housing has been relocated to Lowmans Bay. However, at July15 the situation remains fluid regarding where fisherfolk will operate.
All key stakeholders should participate in planning and designing infrastructure that could affect communities.	Concerns that fisherfolk were marginalised and not included in decisions about their livelihoods.	Apply more participatory approaches to decision making in a timely manner.
After intervention (at construction phase and beyond)		
Modernisation of the port requires acquiring land to ensuring adequate space.	Potential to disrupt income of fishers and fishing activities from nearby fishing community of Rose Place if fishers are displaced from a main landing site and community.	Compromise through building the port around the Rose Place community without displacing them while also improving infrastructure and services for fisherfolk.[19]
The new port will require additional facilities and staff for its operation.	Construction period will be a long process.	Development of livelihoods through facilities for docking larger local fishing vessels.

[19] Housing was provided at the relocated location but at the time of writing the negotiation of where the fishers would ply their trade from was still ongoing.

National Fleet Expansion Programme

The Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, Industry and Labour, in collaboration with the Kingstown Cooperative Credit Union Ltd (KCCU), Fish Exporters; Bequia Seafoods Ltd, Rainforest Seafoods Ltd, Agriculture Input Warehouse Ltd, Union Seafoods Ltd & Ocean Marine Shipping Agencies Ltd, has embarked on the New Fleet Expansion Program. This program seeks to establish a new fleet of fishing vessels to enhance the fisheries sector in the country. The new vessels would enable fishers to remain at sea longer with adequate storage for equipped iceboxes and ice to maintain the quality of the catch. In some cases, the large fishing vessels would contain of an ice machine.

The fleet expansion program involves a revolving loan scheme of USD$1.5 million for boat owners and fishers to enhance the industry. The agreement with the government provided fisherfolk with a 100% duty free concession on the importation of all boats and engines within a period of 5 years, technical support and training on safety at sea, as well as fish handling and processing and marketing, and 100% cash purchase loan with an 8% interest rate on the loan from KCCU. The fleet expansion programme is still in its early stages whereby several fishers have applied for loans[20]. Table 5 is an author and respondent SWOT analysis of the fleet expansion situation.

Table 10: SWOT analysis of the fleet expansion situation as perceived by author

STRENGTHS	***WEAKNESSES***
• New fleet of vessels enable fishers to spend longer time at sea • Fishers can access more fish and fish for oceanic pelagic/deep sea fishing capturing species such large tunas and marlins that they are unable to fish for, due to their small vessels. • Boosts the economy and enhances the export market. • Builds the capacity of the fishing industry through the shift from artisanal to commercial fishing.	• Current vessels are not equipped to cool the fish catch while at sea. • Capacity of fisherfolk to operate and maintain long liners may be a challenge as they are accustomed to using pirogues. • Getting persons to buy into working on trawlers, captains, deck workers, etc. • Limited fisherfolk capacity and limited technical capacity in fisheries authority to conduct fisheries assessments to guide management • Additional capital expense needed to assist fishers and stakeholders to get involved • Ability of fisherfolk/boat owners to repay loans in the long-term given that fishing is seasonal

[20] Video message from Minister on Fisherman's Day 2022

	• Some fishers or stakeholders are unable to fund the capital expense for vessel upgrade.
OPPORTUNITIES	***THREATS***
• Ability to fish on high seas, capturing species like tuna and marlin • Lucrative opportunity to export fish to US and EU markets • Improvement of application of Sanitary and Phystosanitary Measures to meet export standards • Provides the opportunity for fishers to obtain longliner fishing vessels that contain ice holds or ice-making machines.	• Climate change and climate variability • Increased costs associated with equipment and materials for larger vessels (from overseas markets) • Fisherfolk default on loans due to inability to repay • Limited technical expertise and support when investing in new larger vessels

Intersectoral linkages

This section explores more specifically the intersectoral linkages for fisheries regarding fleet expansion by focusing on the transport sector.

Transportation

The transportation sector is essential in small-scale fisheries through the movement of goods and services within the fisheries industry. Often, SSF incur high costs in fuel as many persons travel to and from sites to access the cold storage facilities at Kingstown Fish Market. This can affect the livelihoods of people in SSF and the profitability of fish when landed. Table 6 shows links, weaknesses and opportunities that characterize intersectoral relationships between transportation and small-scale fisheries.

Table 11: Linkage in sea transportation and artisanal fisheries perceived by author

Links	**Weaknesses**	**Opportunities**
Before intervention		
Vessels travel from harvest site to Kingstown fish market to trade seafood	Daily fuels costs and attaining requisite safety at sea specifications or equipment could potentially be a challenge for some fishers.	A fleet expansion project to diversify the industry's fleet can transform the sector by changing the daily operations and fishing technology

Links	Weaknesses	Opportunities
Cold storage facility is required to ensure the quality of daily catches are preserved	With no cold storage facilities on board, fishers are faced with the daily expense of fuel to maintain fishing trips and to store fish caught between trips	Increased cold storage at other landing sites or use of solar-powered ice machines across the island can address these challenges
Export of seafood products is done by sea and air but export via air can be expensive.	High costs due to weight of goods to be exported makes it challenging to export by current air carriers	Increasing trade volumes by cooperation may reduce transportation challenges.
After intervention (fleet expansion)		
Fleet expansion of fishing vessels can increase the time fishers spent at sea (at least 4 weeks at sea) and the quantity and type of fish caught	Some fishers are hesitant about spending prolonged periods at sea. There is also the potential to disrupt families or relationship by spending longer times at sea.	Fishing business can be expanded as a family business venture (increasing production) to include women and youth, e.g. by supporting administrative work.
Climate-related events, have resulted in loss of productive assets – boats, vessels, fishing gear/technology.	Vessel owners may not able to acquire insurance for vessel repair and damage of the larger vessels.	Application of an affordable parametric insurance scheme for fisherfolk in St. Vincent and the Grenadines (similar to Grenada and St. Lucia).
New fleet would be expected to follow IMO and ILO safety at sea measures.	These international measures may be challenging for small vessels to comply with fully	Fisheries Authority to offer training in boat maintenance and repairs of the new and larger vessels anticipated.
Docking facilities are required for large vessels.	Currently no area exists for lots of larger vessels to dock	The port modernization project will improve docking facilities, allowing space for some of the new vessels.

Aquaculture case

Overview of seamoss farming

The aquaculture industry in St Vincent and the Grenadines is on the verge of development through seamoss (e.g., *Gracilaria* spp.) farming in the Grenadines. The coastal communities in the Grenadines islands of Union Island, Canouan and Mayreau have been conducting seamoss

farming since the early 2000s at a small scale for local consumption on the islands and the mainland St. Vincent. However, the seamoss farming industry has grown with more persons in the Grenadines engaging in seamoss farming and exporting the dried seamoss to international markets. In 2021, a quantity of 11,145 lbs (5,055 kg) of dried seamoss was exported to regional and international markets (Figure 10).

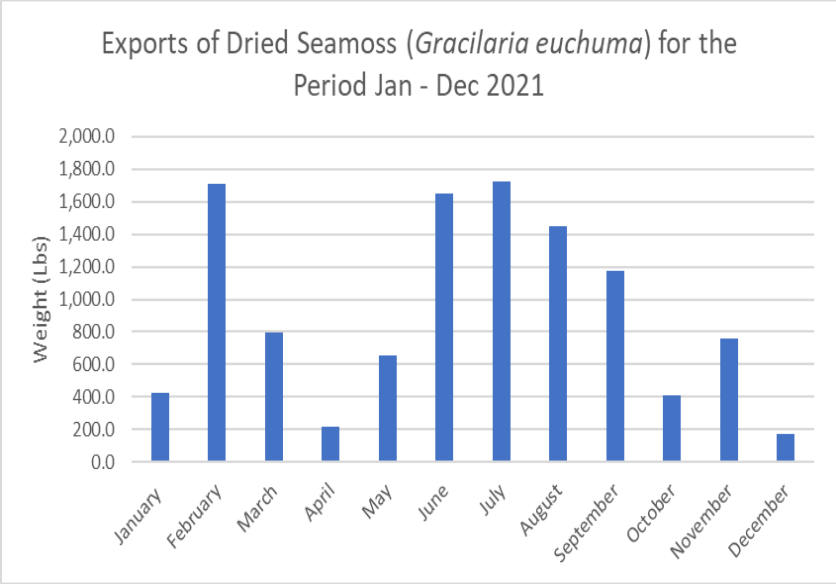

Figure 10: Exports of Dried Seamoss (Gracilaria euchuma) for the Period January to December 2021 (Source: SVG Fisheries National Report 2022)

Although the seamoss industry is small, it has expanded to bottled seamoss drinks, seamoss gels, and soaps in addition to the already packaged dried seamoss that are marketed locally and exported to the region and international markets. Figures 11, 12 and 13 highlight samples of dried seamoss and seamoss products prepared for local and export markets.

Figure 11: Dried seamoss processed and packed for export by SeaMoss Boss located on the Grenadines Island of Canouan

Figure 12: Locally processed and packed seamoss gel for market (Photo credit: S&S Seamoss Gel)

Figure 13: Locally made seamoss soap (Photo credit: Jadesha Kreationz)

To enhance the seamoss industry and improve livelihood of coastal communities, the government of St. Vincent and the Grenadines in collaboration with The Nature Conservancy, Sustainable Grenadines, and the Global Environment Facility Small Grant Fund have earmarked coastal zones for seamoss farming across the Grenadines in Union Island, Mayreau and Canouan. These zones allow existing seamoss farms (Figure 14) and potential seamoss farmers to expand the industry to supply the growing demand for seamoss.

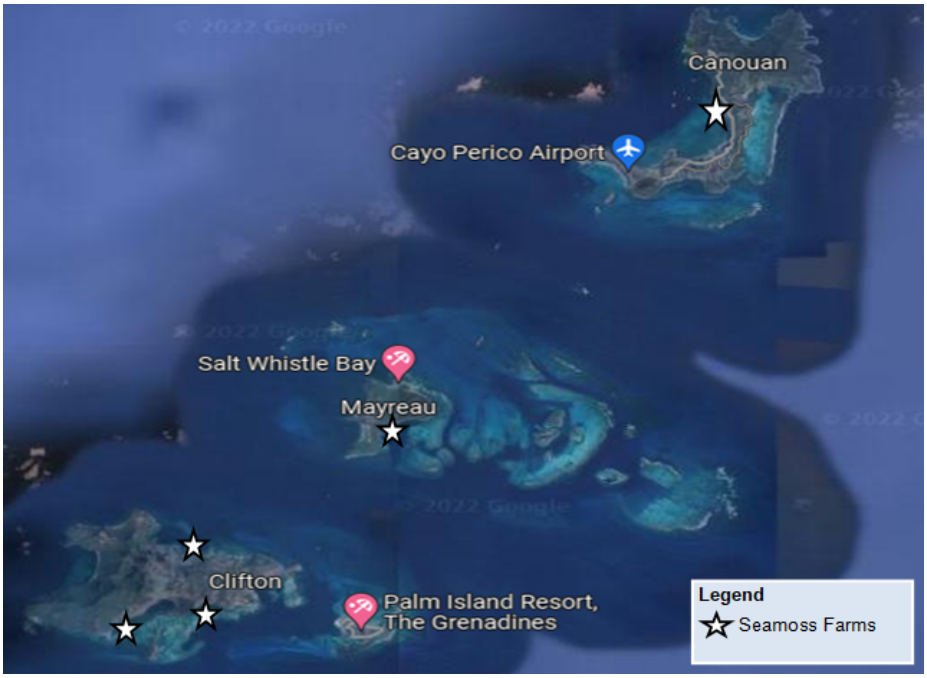

Figure 14: Existing location of seamoss farms in the Southern Grenadines (Source: Google Image)

Table 7 is a SWOT analysis of the seamoss farming situation in the Grenadines compiled by the authors and informants.

Table 12: SWOT analysis of seamoss farming situation in the Grenadines as perceived by author

STRENGTHS	***WEAKNESSES***
• Employment generation for people in the Grenadines • Sustainable income generating activity • High involvement of women in the seamoss farming (as an alternative livelihood) • Years of experience growing seamoss • Production time (seamoss takes 6 weeks) to harvest • Support from the Sustainable Grenadines Inc to help with management • Low level capital input for seamoss processing • Caribbean conditions suit the propagating, cultivating and harvesting of seamoss	• Nutrient analysis has not yet been performed on seamoss products • Existing structure or drying space is too small for large quantities of seamoss • Little to no equipment to produce high volumes of value-added products • Lack of security or law enforcement assistance to protect raw material from theft from beach users • No cooperative or support exists for seamoss farmers

• Site selection (Ashton, U. I) • Expansive market as seamoss is exported to the region: St Maarten, BVI, Barbados, Trinidad, Turks and Caicos and internationally: Canada, US, England, Philippines.	
OPPORTUNITIES	***THREATS***
• Tourist season brings new customers every year • Proximity to other markets • Product development • Available funding opportunities to expand drying and processing of seamoss	• Climate change and climate variability • Increasing influx of sargassum impacts the supply of seamoss • Strict international standards to be met for export of products • Increasing costs of packaging materials from overseas vendors • High costs of materials to expand area • High costs for shipping and customs related to importing packaging and labels but also for exporting seamoss • Surge breaks off seamoss from seamoss farm, carrying it to shore

Intersectoral linkages

In this section, we explore more specifically the inter-sectoral linkages for seamoss farming (mariculture) focusing on two sectors: tourism and manufacturing.

Tourism

The tourism sector overlaps with fisheries and mariculture as these sectors interact within the same marine space, which provides mutual benefits through its services and products. The fisheries industry provides a necessary niche market for the tourism industry through seafood, especially seasonal species such as conch and lobsters being available to hotels, restaurants and yachts. The Grenadines play a pivotal role in the fisheries and tourism interactions as the Grenadines depend on tourism as a livelihood through the marine space. Seamoss is mainly cultivated in the Grenadines and provides an experience for both locals and tourists through the products prepared from the seamoss.

The growth of seamoss farming in the Grenadines is an avenue where aquaculture links with tourism, through a market of seamoss products available to tourists, restaurants and hotels. Hotels and restaurants purchase seamoss products from local seamoss processed for guests and tourists that visit. The Mayreau Multi-purpose Centre, through assistance from Sustainable Grenadines and Global Environment Fund small grant funding, has contributed to developing

the seamoss industry on the island. Seamoss gel, seamoss drinks, seamoss ice cream, seamoss cake, and seamoss rum punch can be found in the Grenadines for sale especially during the tourism season. Figure 15 highlights a few seamoss products processed by Mayreau Explorers Seamoss Project. Table 8 examines links between tourism and seamoss mariculture.

Seamoss Rum Punch

Seamoss Fruit Punch, Ginger Mauby, and Orange Drinks

Seamoss cake

Seamoss Gel

Figure 15: Seamoss products processed by Mayreau Explorers Seamoss Project

Table 13: Links between seamoss mariculture and tourism perceived by author

Links	Weaknesses	Opportunities
Seamoss farmers and processors provide consumption and non-consumption products to hotels, restaurants and tourists.	Lack of infrastructure or facility prevents farmers from drying seamoss at scale.	Creating partnerships for new seamoss products with long(er) shelf life to increase tourism sales.
Changes to the ecosystem (e.g. influx of sargassum seaweed) and climate affect tourism and mariculture.	Economic gains of seamoss farming and tourism rely on a healthy ecosystem.	Mariculture is a relatively new sector, compared to tourism, which is a mainstay for the Grenadines. An alliance between the two sectors can address challenges.
Tourism is susceptible to local and external shocks, making seamoss farming also vulnerable.	Sale of seamoss products relies heavily on tourist seasons. The sales can be affected by dependence on tourism and shocks (e.g. COVID-19 pandemic).	Seamoss farming is a complementary/alternative and sustainable source of income.

Manufacturing

The processing of seamoss in the Grenadines is dependent on the manufacturing sector, through packaging and maintaining the standard of products for export to the international market as small-scale aquaculture continues within the country through seamoss farming. Table 9 shows links, weaknesses, strengths, threats, and opportunities in intersectoral relationships that local manufacturing may have with mariculture. The linkage provides an opportunity to process seafood and to increase the value chain, by creating products like salted fish, packaged lobster, conch, dried and canned products, packaged seamoss gel, and dried seamoss, thus turning seafood into various value-added products for local supermarkets and for export.

Table 14: Links between seamoss mariculture and manufacturing perceived by author

Links	Weaknesses	Opportunities
Export of products by Grenadines seamoss farmers require packaging for the international market.	Access only to local packaging materials. Shipping and customs fees to import packages and labels can be costly for processors.	Processing of seamoss products for export apart from the raw material increases the value of the product.
Export of seamoss products require appropriate labeling that demonstrates the quality of product.	Limited capacity and lack of financing to undertake chemical analyses that define the nutritional value of products for labels.	Bureau of Standards can work with seamoss farmers to build capacity, while the Fisheries Division facilitates training in sanitary and phytosanitary standards.
Infrastructure for drying seamoss	Lack of infrastructure to produce large volumes of seamoss products to meet demand.	Establishment of a cooperative with support of donors to build a facility that will be shared by seamoss farmers.

National intersectoral coordination

St. Vincent and the Grenadines has approximately eight coastal and marine resource related national intersectoral committees with the Fisheries Advisory Committee being the main NIC for fisherfolk to participate in decision making. Another key and new NIC is the National Ocean Coordination Committee (CANARI 2020).

Fisheries Advisory Committee

The St. Vincent and the Grenadines' Fisheries Advisory Committee was established in March 2021 and convened its first meeting in April under the StewardFish Project. The committee is composed of the Ministry of Agriculture, Fisheries Division, St. Vincent (specifically the Minister, Permanent Secretary and Chief Fisheries Officer) and a representative from the Grenadines Maritime Administration, SVG Coast Guard, the Royal St. Vincent and the Grenadines Police Force, Tobago Cays Marine Park, fisherfolk representatives from Kingstown, Calliaqua, Clare Valley, Barrouallie, and Union Island. According to Section 5, Fisheries Regulations, 1987, the role of the FAC is "To advise Minister on fisheries management as it relates to fisheries planning, amendment of legislation, coordination of policies, projects and joint ventures or proposals for access agreements within the fisheries sector" (CANARI 2020).

During its first meeting the FAC discussed issues affecting the fisheries sector, development of the fisheries industry, and challenges faced by fisherfolk. The committee appointed the Permanent Secretary as Chairperson and Chief Fisheries Officer as Secretary. However, since the COVID-19 pandemic and the eruption of the La Soufriere volcano which occurred a week after the first FAC meeting there has not been another FAC session to date. This is concerning as the FAC meetings are venues used to discuss challenges faced by fisherfolk in the three case studies highlighted. Table 10 lists some challenges faced by the FAC and possible areas for improvement.

Table 15 Challenges and possible area of improvement for SVG's Fisheries Advisory Committee

CHALLENGES	IMPROVEMENT
• Few of the fisherfolk on the committee are not a part of a Primary Fisherfolk Organisation • When fisherfolks raise concerns or give suggestion and it is not reflected at meetings or briefings beyond the initial discussions. The fisherfolk are of the option that their views and experiences are not taken into consideration • Attendance/meeting participation results in loss of income for fisherfolk and hinders their engagement	• Political influence to revive the committee e.g., Minister of Agriculture to make a motion for another meeting of the committee to be held. • Increase transparency, representativeness, and inclusiveness ensuring participation of the national fisherfolk association which can represent the voice of its members (fisherfolk) • Provision of an 'honorarium' for members of the board, including fisherfolk • Ability to adapt so as to function in times of emergency (e.g., online meetings)

National Ocean Coordination Committee

Established in 2019, the National Ocean Coordination Committee[21] has a broader intersectoral ocean policy mandate than the FAC with its member drawn from state agencies private sector, NGOs and CSOs that have responsibility for maritime affairs and marine resource management. It has the potential to address intersectoral links more comprehensively than the FAC but is a more recent institution with a diverse membership in which the voice and influence of the fishing industry is likely to be less prominent. The St. Vincent and the Grenadines' national ocean policy and the coastal and marine spatial plan, if fully endorsed and implemented, will provide intersectoral guiding principles for the way forward.

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[21] Committee comprises: Ministry of Finance, Economic Planning, Sustainable Development and Information Technology; • Maritime Administration; • Ministry of Foreign Affairs, Commerce and Trade; • Attorney General's Chambers; • Fisheries Division; • Ministry of Health, Wellness and the Environment; • Customs and Excise Division; • Port Authority; • Coast Guard; • Physical Planning Unit; • National Parks; • SVG National Trust; • Barrouallie Fisheries Development Cooperative Society Ltd.; • SusGren; • SVG Hotel and Tourism Association;

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