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Unlocking the potential
of sustainable fisheries and aquaculture
in Africa, the Caribbean and the Pacific

ANALYSIS AND DESIGN REPORT

The seabob value chain in Guyana

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Abbreviations and acronyms

AFAC	Artisanal Fisheries Advisory Committee
BDS	business development services
BRD	bycatch reduction devices
CARICOM	Caribbean Community and Common Market
CARIFORUM	Caribbean Forum
CCCFP	Caribbean Community Common Fisheries Policy
CCTV	Closed-circuit television video monitoring
CI	Conservation International
CLME	Caribbean Large Marine Ecosystem
CPUE	catch per unit effort
CRFM	Caribbean Regional Fishery Mechanism
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
EC	European Commission
ETP species	Endangered, threatened, protected species
FD	Fisheries Department
FMP	fisheries management plan
FTE	full-time equivalent
GEF	Global Environment Facility
GATOSP	Guyana Association of Trawler Owners and Seafood Processors
GNFO	Guyana National Fisherfolk Organisation
Go-Invest	Guyana Office for Investment
GYD	Guyanese Dollar
MSC	Marine Stewardship Council
Mt	Metric tons
TED	turtle exclusion device
UNDP	United Nations Development Programme
VCA4D	Value Chain Analysis for Development

Executive summary

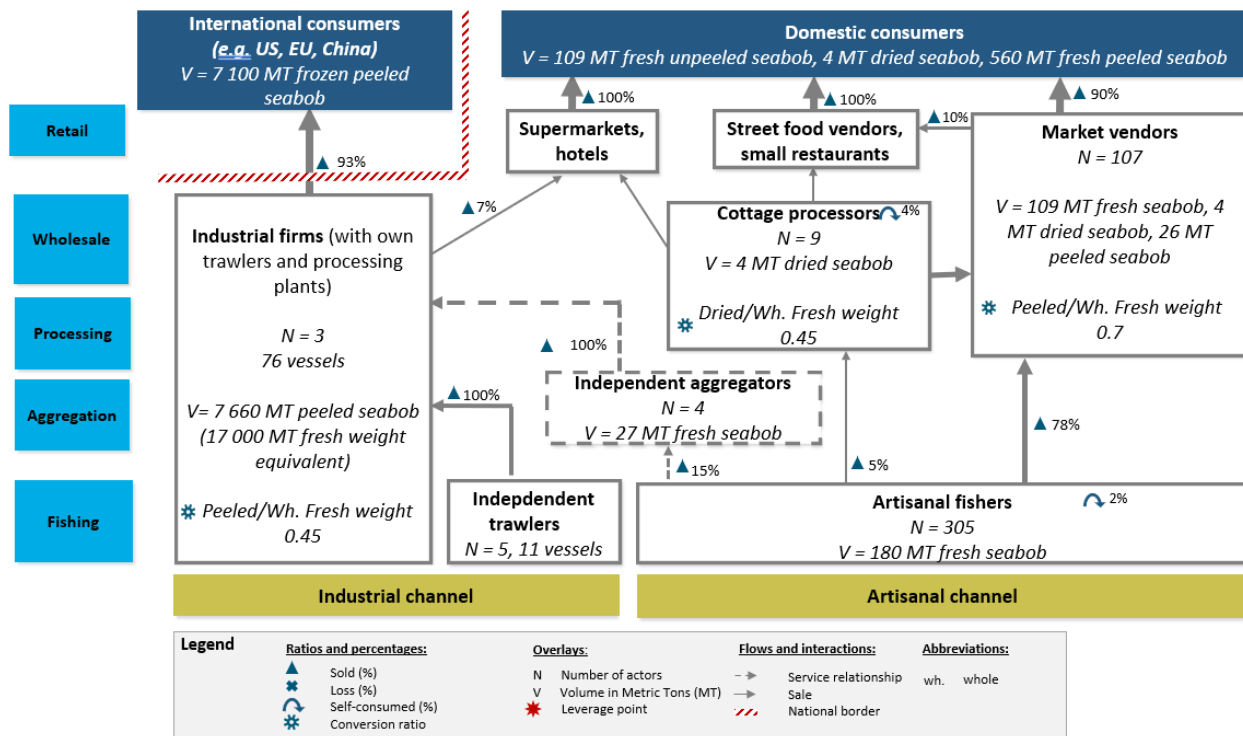
FISH4ACP is an initiative of the Organization of African, Caribbean and Pacific States (OACPS) to support sustainable fisheries and aquaculture development. The five-year value chain (VC) development programme (2020–2025) is implemented by the Food and Agriculture Organization of the United Nations (FAO) with funding from the European Union (EU) and the Germany's Federal Ministry for Economic Cooperation and Development (BMZ).

The seabob value chain in Guyana is one of 12 value chains competitively selected from over 70 proposals worldwide for support from the FISH4ACP programme. This report presents the outputs of design work completed during 2021 and early 2022 to complete a functional analysis of the VC, assess its sustainability and resilience, develop an upgrading strategy to which the FISH4ACP programme will contribute, and plan for full implementation from mid-2022.

The **FISH4ACP methodology** used to carry out this study is an approach based on FAO's Sustainable Food Value Chain (SFVC) and Agrinatura's Value Chain Analysis for Development (VCA4D) methodologies. It has four main components: functional analysis; sustainability assessment; upgrading strategy development; and implementation planning (actions and investments). The approach is highly participatory, involving value chain stakeholders from the public and private sector from the outset in order to ensure national ownership of all four components, thereby increasing the likelihood of success of the project interventions.

The **functional analysis** enabled the preparation of the VC map presented below. There are two channels in the value chain (VC). The largest is the industrial channel, which accounts for almost all (99 percent) of total seabob catch in Guyana and is export-oriented. During 2015–2020, three industrial seabob firms in Guyana produced around 7 600 MT of peeled seabob per year (17 000 MT fresh, whole weight equivalent), of which about 93 percent was exported to the US and European Union markets, and 7 percent sold to supermarkets, hotels and restaurants on the domestic market. The artisanal channel accounts for merely 1 percent of total seabob catch (or around 180 MT per year, in fresh, whole weight equivalent) and focuses on supplying the domestic market with fresh unpeeled seabob, fresh peeled seabob, and dried seabob.

Total seabob catch has been decreasing since 2017, driven by a decline of the industrial catch. The industrial firms attribute their drop of catch to a reduction of their fishing efforts due to increase in sargassum and inability to find and capture seabob, possibly due to decreasing stock. Challenges to fishing efforts were further exacerbated by COVID-19 pandemic. The reasons for fluctuating and declining catch are not well-studied implying a critical need to conduct studies to investigate the problem, identify the root causes and take proper actions to ensure the sustainability of the seabob stock.



In the **industrial channel**, the industrial firms and independent trawlers are organized under the Guyana Association of Trawler Owners and Seafood Processors (GATOSP). Pritipaul Singh Investments (PSI), Noble House Seafoods (NHS), and Gopie Investments Inc. (GII) are the three lead firms in the chain. Their operations are vertically integrated and include wild shrimp and fish capture, primary processing, and exports of frozen peeled shrimp. The three firms own a total 76 trawlers and have their private docks and landing sites. NHS and GII contract an additional eleven vessels from five independent trawler owners and only invested in wild fishery. PSI is investing wild fishery, focusing on seabob but also covering tuna and other fish species. The industrial seabob fleet uses steel hulled trawlers (20m in length and gross tonnage of approximately 100 mt) with twin otter nets (10-16 m long). All nets are fitted with turtle excluder devices (TED) and bycatch reduction devices (BRD) in compliance of the Marine Stewardship Council (MSC) certification.

The **artisanal channel** is composed of four actor types: (i) 305 Chinese seine fishers who capture and sell fresh seabob, (ii) approximately four aggregators who buy the shrimp to sell to the industrial processors, (iii) approximately nine cottage processors who dry shrimp, and (iv) approximately 107 market vendors who sell fresh (peeled and unpeeled) and dried seabob to end-consumers, street food vendors and small restaurants.

The **artisanal fishers** are predominantly men who use multiple gear types to target multiple species such as whitebelly shrimp, finfish, and prawns. Among different gear types, the Chinese seine, used by around 300 vessels, is the only one used by artisanal fishers to catch

seabob (WWF, 2019; Kalicharan and Oxenford, 2020). Being a passive, fixed gear, the operation of Chinese seines is heavily dependent upon tidal flow in the river mouths and estuaries. The vessels engaged in Chinese seine fishing are wooden flat-bottomed boats powered by paddle, sail, or small outboard engine.

Prior to 2019, there were about four **aggregators** who bought approximately 15 percent of the seabob shrimp catch, estimated at 27 tons per year, from artisanal fishers to sell to the industrial processing firms. Since MSC certification in 2019, independent aggregators are no longer allowed to supply seabob to industrial companies due to traceability issues.

Almost 9 MT/year, or five percent of artisanal catch, of seabob is bought by about nine **cottage processors**. These are mostly small female owned businesses who dry seabob to sell locally to market vendors, street food vendors, and small restaurants. The major inputs they use are salt, wood and coconut shells. The cottage processors hire part time female workers who clean seabob and then spread it on the floor to dry.

Nearly 80 percent of artisanal seabob catch, or 150 MT of seabob in fresh equivalent weight, is sold in the local market by around 107 **market vendors**. Market vendors sell different seabob products - including unpeeled fresh seabob, peeled fresh seabob, and dried seabob - to consumers and other buyers such as street food vendors and restaurants. They source fresh seabob from fishers and dried seabob from cottage processors. The majority (>70 percent) of the fresh seabob procured by market vendors is sold unpeeled, while around 25 percent is further processed (cleaned and peeled) before being sold. Most vendors are female business owners, work year-round and employ other family members and hired workers to help with the transport, cleaning and peeling of seabob. Most vendors do not have cold storage which forces them to procure the shrimp in small volumes to avoid spoilage.

Considering the large number and central role of artisanal Chinese seine fishers and market vendors in the artisanal channel, they are the core actors with the most potential as a leverage point, especially for improving the sustainability of fishing practices, improving product quality, and enhancing women's participation in the VC. In the industrial channel, the three industrial firms are the leverage point for VC improvement interventions.

In terms of **end-markets**, two different marketing strategies are envisioned for the industrial and artisanal channels. Given that the US and European Union are currently the two most important export markets for Guyanese seabob and that market demand remains strong, these markets will continue to be the main **export target markets for Guyanese seabob industry** in the future. However, stringent market requirements such as MSC certification and small amount of seabob captured by artisanal fishers imply that these export markets are not the target markets for the artisanal channel, at least in the near future (next 10-15 years). For the **artisanal channel, the domestic market offers considerable potential**. The consumer surveys suggest that there is untapped demand for seabob in Guyana, as

consumers sometimes cannot find seabob products on the market when looking for them. Although seabob unavailability, or unreliability of supply, is largely due to the declining catch (as mentioned above), various value-adding opportunities exist for artisanal actors (including fishers, processors, market vendors) to better tap into the unmet domestic demand. Potential options include increasing and improving the quality of cleaning, peeling and storing seabob to provide consumers with higher-quality and thus, higher-value products and to enter higher-value markets such as supermarkets and hospitality (hotels, restaurants). **For both export and domestic markets**, more in-depth market studies are necessary to validate the market potential and opportunities as identified in this VC report, and to identify the opportunities that this report may have overlooked due to data unavailability and resource and time constraints.

Considering **physical inputs and support services**, while these services are fully integrated into the operation of industrial firms (e.g., the firms directly source fuel from foreign suppliers, and have wells that supply the water used in processing and preserving seabob), artisanal actors buy inputs from local suppliers, who often times are the fishermen's cooperative societies managing wharfs. The provision of inputs by local suppliers, however, is both insufficient and inefficient. Financial and non-financial support services (e.g., extension, boat repair and maintenance) are rarely used by VC actors due to high costs and/or unavailability.

The seabob VC actors operate in an **enabling environment** consisting of various societal elements (i.e., institutional, organizational, socio-cultural and infrastructural elements) and natural elements. While relevant **fisheries management policies and management plans** already exist, their implementation is weak. This is largely due to the lack of staff/offices and technical and financial capacity of Fisheries Department (FD) coupled with limited incentives and capacity of VC actors (particularly the artisanal ones) to comply with regulations and the dysfunction of **organizations** that are essential to support effective compliance and stakeholder engagement (e.g., fishermen cooperatives, Artisanal Fisheries Advisory Committee (AFAC)). The dysfunction of fishermen cooperatives and AFAC, in turn, is mainly attributed to **poor management and governance** of the cooperatives, which undermine members' trust in the cooperatives. The **natural environment** is generally supportive of the VC operations. However, the increase of sargassum seaweed since 2011 is reported to have changed the availability and distribution of fisheries resources and caused difficulties for fishers to access seabob resources. Additionally, climate change, mainly characterized by changing rainfall, may affect the abundance and recruitment of seabob, which in turn affects fishing operations, particularly artisanal Chinese seine fishers who rely on tides to capture seabob. More research is needed to understand the impacts of these natural elements on seabob resources in particular and the broader ecosystems in general.

An **assessment of the economic performance of the VC** revealed all VC actors are making profit (with positive returns on sales – RoS), but revenues have declined compared to previous years due to declining catch; and artisanal actors, particularly cottage processors

and market vendors, have significantly lower profitability levels (three times less) than industrial firms. Industrial firms, artisanal fishers, and market vendors generate most of the employment in the VC; but the wages for market vending workers (as well as cottage processing workers) are below national minimum wages. There is a low level of indirect value added due to the underdeveloped support service provision, particularly in the artisanal channel. Domestic consumer evaluation of seabob shrimp is positive as compared to other shrimp products, but seabob (and shrimp in general) is less preferred than meat and fish.

Analysis of the social performance of the VC showed unequal income among VC actors and workers, especially between men and women. There was also unequal division of roles between men and women, a limited number of women holding decision making positions and women had limited access to assets (such as land, houses) and fishing licenses. There is an absence of formal employment agreements (contracts) and wages for workers are low, especially in the artisanal channel. Additionally, there is a lack of formality in the artisanal channel (from licensing and logbook filling and reporting by fishers, to monitoring of landings and retail markets), which poses significant challenges to the effective collection and management of data on catch and by-catch as well as fisheries management in general. Access to financial services by both male and female actors was limited in artisanal channel of the VC.

In assessing the environmental sustainability of the VC, it was found that the seabob fishery is at risk of overfishing, as implied through declining catch in the past years despite generally unchanged fishing efforts. Bycatch from both the artisanal and industrial fishery may be having an adverse impact on vulnerable species and the wider ecosystem. Data on seabob catch and bycatch landings are incomplete, especially for the artisanal channel. This implies the need for additional capacity building for the Fisheries Department (FD) as well as industrial and artisanal fishers on the collection and processing of catch and bycatch data to generate a better understanding of the reasons for declining seabob catch and the impacts of fishing on bycatch species and the ecosystem to inform policy and decision making.

When considering **resilience**, the VC performs extremely poorly. The lack of resilience in the VC are mainly due to the lack of technical and financial resources of all the VC actors in the artisanal channel, coupled with their lack of trust in cooperatives and other forms of groups and collaboration, and the unfavourable conditions in the support service provision (e.g., lack of ice supply) and the enabling environment (e.g., degraded wharfs due to poor management). In the industrial channel, there is a heavy reliance on a single species (seabob) and a few end-markets (United States of America, European Union). These factors contribute to and/or result in the absence of any stocks/inventories of VC products (and thus, low redundancy), the low level of diversity in terms of markets and products, the limited connectivity with input and output markets, and the limited capabilities of VC actors to improve their practices/processes or to prepare for future shocks.

Considering the VC and shifting from analytical complexity to strategic simplicity, an analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the VC is provided below.

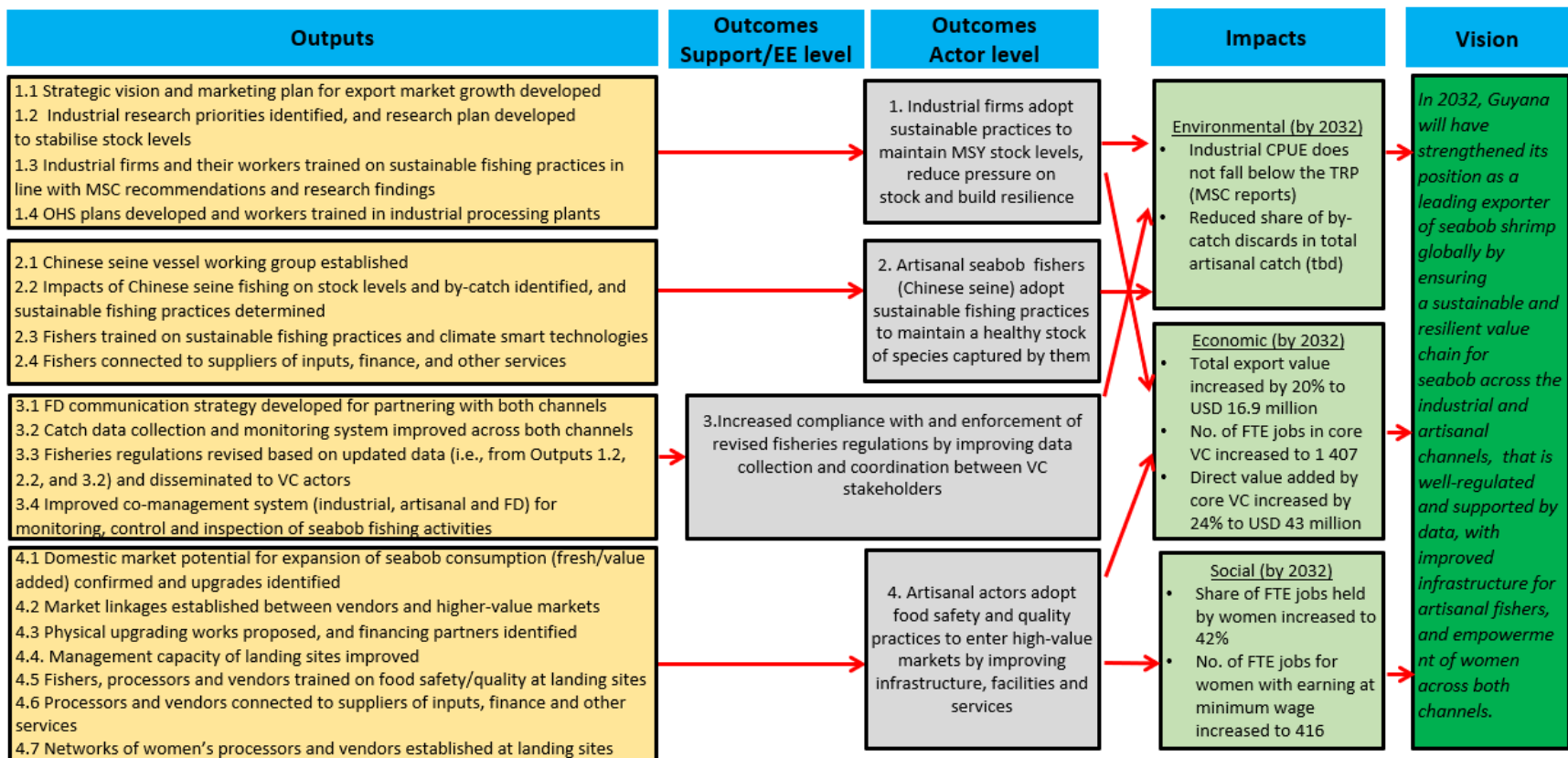
Strengths (internal)	Weaknesses (internal)
<p style="text-align: center;">Industrial channel</p> <ul style="list-style-type: none"> • Well organised and regulated export sector led by three vertically integrated companies who have demonstrated commitment to sustainable practices through MSC certification • Good representation through GATOSP and Seabob Working Group • Leading global exporter of seabob shrimp • Highly efficient processes (20 minutes from catch to freezing) • Employment creation for nearly 800 people (hired jobs) per year on average, of which nearly 40% women hired for processing work; salary above minimum wage; low staff turnover (almost 50% of workers employed for 10+ years) • Sufficient pool of skilled and unskilled labour for future expansion <p style="text-align: center;">Artisanal channel</p> <ul style="list-style-type: none"> • Contributes to national food security • Creates employment for 840 people (jobs) per year on average, including family labour and hired workers. Fishing makes up nearly 60% of the jobs. <p style="text-align: center;">Cross-cutting</p> <ul style="list-style-type: none"> • Fisheries Department (FD) committed to improve fisheries management policies (e.g. implementation review of Guyana Fisheries Management Plan 2013–2020 and Guyana Seabob Management Plan 2015–2020; new plans for both under development; collaboration with WWF to develop Artisanal Fisheries Management Plan 2019–2024) 	<p style="text-align: center;">Industrial channel</p> <ul style="list-style-type: none"> • No collective strategy/vision for industry to grow exports in next 5-10 years • No research activities to assess stock decline • Captains lack skills and incentives in data collection and reporting • No gender-targeted efforts and wage gaps for women workers • Concerns regarding labour conditions (lack of formalised long-term contracts, long working hours) <p style="text-align: center;">Artisanal channel</p> <ul style="list-style-type: none"> • Fishery is open and no monitoring of by-catch • Sustainability concerns regarding use of Chinese seine nets (high by-catch discards, including juveniles) • Concerns regarding labour conditions (lack of formalised contracts) • Weak horizontal coordination with low participation and trust in cooperatives • Poor infrastructure for landing, processing and marketing fish, exacerbated by poor wharf management, compromises food safety and quality and wharf security • Input costs are high (high cost for ice; limited electricity access) • Inadequate extension services and finance service provision (only 8% of artisanal fishers receive training) • Education levels are low which impacts on data collection (65% of artisanal fishers having primary education only) • Limited engagement in policy-making • Low levels of licensing (approximately 50% of total artisanal vessels, including both Chinese seine (which catch seabob) and non-Chinese seine vessels) • Low adoption of improved technologies/practices leading to low levels of value addition, limited product safety and quality, and low profitability especially for processors and vendors

	<ul style="list-style-type: none"> • Low access nationwide to technology (mobile phones & internet) and high cost • Gender norms limit women’s participation <p style="text-align: center;">Cross-cutting</p> <ul style="list-style-type: none"> • Low levels of coordination across two channels potentially hampers fishery management efforts • Inadequate data management systems make the monitoring of catch and bycatch challenging • FD does not have sufficient representation (offices, tools and staff) to adequately monitor activities and capture data
<p style="text-align: center;">Opportunities (external)</p> <p style="text-align: center;">Industrial channel</p> <ul style="list-style-type: none"> • Demand for seabob shrimp in the United States of America and the European Union as Guyana’s first and second-largest export markets remains strong (no perceived limits to growth) • Potential to strengthen sustainability brand <p style="text-align: center;">Artisanal channel</p> <ul style="list-style-type: none"> • Strong domestic demand: Guyana has one of the highest levels of domestic seafood consumption in CARICOM countries. Consumer survey found that three-quarters of the surveyed households consume seabob with average family consumption of 5.4 kg/year. • Demand for safe, clean, fresh finfish and shrimp (including seabob) increasing with retail outlets changing (supermarkets and restaurants); tourism and oil and gas sector developing 	<p style="text-align: center;">Threats (external)</p> <p style="text-align: center;">Industrial channel</p> <ul style="list-style-type: none"> • Declining catch trend, which implies declining stock abundance, threatens long-term profitability • Increased competition from India in US market, India, China and Belize in regional markets • Cheaper imports available for farmed shrimp compared to wild catch • MSC certification potentially under threat longer-term if pressure on stock continues and impacts on ETP species are not adequately monitored • Reports that new MSC standard under development will cover social issues – companies are under-prepared to respond <p style="text-align: center;">Artisanal channel</p> <ul style="list-style-type: none"> • No data on associated species and undocumented by-catch threatens the sustainability of the fishery. <p style="text-align: center;">Cross-cutting</p> <ul style="list-style-type: none"> • Impacts from climate change and offshore drilling on fish stock are unclear • Causes of increased sargassam seaweed blooms unknown

Informed by the SWOT analysis, the sustainability assessments, the VC map, and stakeholder interests as reflected during consultations, an overall objective for the upgrading strategy is developed with stakeholders in the form of **a vision statement** as follows:

"In 2032, Guyana will have strengthened its position as a leading exporter of seabob shrimp globally by ensuring a sustainable and resilient value chain for seabob across the industrial and artisanal channels, that is well-regulated and supported by data, with improved infrastructure for artisanal fishers and empowerment of women across both channels."

The vision and upgrading strategy to achieve the vision is summarised in the Theory of Change (ToC) diagram below. The ToC covers the whole upgrading strategy (whose implementation may go beyond the scope of FISH4ACP project) rather than being specific to the FISH4ACP project.



The **Theory of Change** to achieve the above vision is based on an integrated approach to working with the industrial and artisanal channels to increase adoption of sustainable fishing practices, while at the same time building the capacity of the Fisheries Department (FD) to revise policies and regulations based on sound scientific evidence, data collection and improved coordination with and provision of services (e.g., training, extension) to value chain actors. This in turn, will increase compliance with, and enforcement of these regulations. The upgrading strategy proposed would have no impact on, or incentives to increase seabob catches, and as such, does not envisage any increase in average annual total catch volume or additional pressure on seabob stock levels. Indeed, pressure on stock levels should decrease through the adoption of sustainable fishing practices across both channels (e.g. reduced no. of days at sea, reduced by-catch discards, improved monitoring of ETP species etc.).

Artisanal fishers will also be supported to adopt climate smart technologies to increase their resilience (learning and adaptation) while reducing their carbon emissions and dependency on non-renewable fuels. Changes to the business model of the downstream (processing and market vendor) segment of the artisanal value chain will be incentivised through training on improved seabob handling practices (e.g., processing, storage) and food safety and quality, coupled with infrastructure upgrades at strategic wharfs and landing sites and facilitating linkages to emerging higher value retail outlets such as supermarkets, hotels and restaurants. Women dominate the market vendor (retailing) and processing segments of the chain, where profitability levels are the lowest of all actors in the value chain. Upgrades to the business model of market vendors and processors will generate sufficient additional income to increase the number of FTE employment opportunities for woman and increase wages paid to female employees.

The proposed upgrading strategy consists of **four key elements (outcomes)**, which aim to holistically improve the (economic, social, and environmental) sustainability performance of the seabob VC, as below.

- **Industrial firms adopt sustainable practices to maintain MSY stock levels, reduce pressure on ecosystem and build resilience**

This outcome draws on the strengths and willingness of the industrial channel to maintain MSC certification over the next ten years, but encourages actors to look beyond certification alone, and adopt changes in fishing practices as recommended by research studies (including regular stock assessments) conducted to investigate the root causes associated with stock decline. The aim is to stabilise stock levels by not increasing total catch over the next 10 years, while at the same time increasing export market value for the industrial channel as a whole by developing a strategic vision for the export industry and associated marketing plan targeting the United States of America and European Union markets as the

main outlets for seabob exports (>70 percent annually to the United States of America in 2015–2020; 20 percent destined for European Union in 2020). While the business model does not change, changes in fishing practices may involve potentially reducing the number of days spent fishing each year, while increasing CPUE, in order to allow for increased catch of bigger sized shrimp, which in turn will generate greater export value in the United States of America and European Union markets based on higher prices paid for bigger sizes.

As a means to strengthen the behavioural resilience domains of participation and inclusion and learning and adaptation, industrial processing companies will take a proactive approach towards preparing for the inclusion of social issues (e.g. labour conditions, gender equality) that will likely become part of the revised MSC standard in the future. One way to initiate this process, will involve a comprehensive review of occupational health and safety standards (OHS) currently in place in seabob processing firms, and the development of an industry-wide set of OHS standards that can be adopted and implemented by management across the three firms. These industry standards will also take into account gender-specific OHS needs, given that almost 40% of all employees working in processing factories are women. Consideration should also be given to issues related to women’s economic empowerment, given that in industrial firms, women workers are mainly engaged in processing and get paid considerably lower salaries (1.5 times less) than male workers who are hired for fishing and supervision/management roles.

To further increase the behavioural resilience domains of learning and adaptation through increasing adoption of innovative technologies and reducing reliance on non-renewable energy sources, the feasibility of industrial firms investing in renewable energy sources (e.g. solar power) and sourcing at least part of their energy requirements from renewable sources will be investigated. Adoption of renewable energy will be encouraged to the extent possible during the lifetime of the upgrading strategy.

- **Artisanal seabob fishers (Chinese seine) adopt sustainable fishing practices to maintain a healthy stock of species captured by them**

Through research, grants/loans and other supporting outputs (such as trainings, business plan development support, and linking to finance and other service providers), artisanal fishers will be incentivized to shift to more sustainable and resilient practices for catching seabob and other finfish. A Chinese seine vessel working group (across different regions) will be established to improve coordination of artisanal seabob fishers and as a means for both the FISH4ACP project and Fisheries Department to better target this sub-set of artisanal fishers, improve two-way communication and better understand the specific challenges they face. Their adoption of climate smart technologies will also be facilitated by linking fishers to service providers and financing/matching grants for technologies that generate lower emission (e.g. fuel-efficient technologies such as use of 4-stroke engines, use of sails etc). The business case for changing engines/adopting fuel-efficient technologies will be evidenced through a decrease in the operating costs for artisanal fishers associated with fuel

consumption of traditional 2-stroke engines (currently 30 percent of total costs for artisanal fishers).

- **Increased compliance with and enforcement of revised fisheries regulations by improving data collection and coordination between VC stakeholders**

Declining seabob stock is a significant threat to the value chain and could jeopardize MSC certification and artisanal fisher livelihoods in the longer-term. One of the greatest challenges facing the Fisheries Department is the inadequate data collection and monitoring system across both channels to assess stock levels, catch and by-catch data, and revise fisheries regulations in a timely manner based on the data collected. Environmental monitoring of ETP species also needs to be improved based on MSC conditions (MSC 2019, 2020, 2021). By developing a communication strategy for the Fisheries Department, the importance of providing regular feedback to VC actors on data collection and analysis will be addressed, as well as communicating the importance of/incentives for complying with licensing¹ regulations for the artisanal channel, where around 85% all Chinese seine vessels are licensed in 2021² (Consultation with Fisheries Department, April 2022). A functioning stakeholder grievance mechanism will also be established within the FD, to improve the responsiveness of government to the needs of the actors, and provide artisanal fishers in particular, with an anonymous outlet to report their grievances.³

These measures are the first step towards building trust between the Fisheries Department and VC actors (artisanal actors in particular) and creating the social capital required to effectively implement a participatory approach to data collection, monitoring and inspection. A range of pilot approaches⁴ can then be trialled to improve data collection and monitoring across both channels. Fisheries regulations will then be revised based on updated data coming from stock assessments from both channels and improved catch and by-catch data collection, including the monitoring of ETP species. The revision of fisheries regulations will build on recommendations/conditions from MSC reports as well as broader/more effective consultations with VC stakeholders and/or their representative bodies. In turn, the compliance with fisheries regulations will be increased through improved service provision

¹ A key incentive for licensing and submission of accurate catch data that needs to be explained clearly to artisanal fishers is the requirement for vessels to be licensed to be considered under the disaster risk management plan for the oil and gas sector under preparation by the Fisheries Department. Only those vessels that are licensed will be able to seek compensation proportionate to the scale of their fisheries operations in the event of a disaster such as an oil spill. As such, failure to comply with licensing regulations exposes vessel owners to additional risks.

² Note that for all artisanal vessels, including Chinese seine and non-Chinese seine vessels, licensed vessels account for only around 50% of all vessels.

³ For example, this may involve reporting poor/corrupt management of cooperatives, damage to fishing gear caused by industrial trawlers etc.

⁴ For example, hiring youth to collect data in early mornings at landing sites, introducing artisanal fishers to VMS and digital data collection tools that can be used to improve real-time catch reporting, timely submission of data will be rewarded with incentives such as safety at sea training and support to purchase safety equipment or fuel-saving equipment, etc.

by the Fisheries Department (e.g., transparent communication, regular feedback on data collected, training for fishers) and enhanced mutual commitment across channels to increase the sustainability of seabob stock. While service provision by the Fisheries Department will be supported by capacity building, technical assistance, and support to use digital tools that can make Department's operations more efficient, enhanced commitment by industrial and artisanal actors will be stimulated through more effective communication with Fisheries Department and increased coordination between VC actors thanks to strengthening/revitalizing their representative bodies such as the SWG and the Artisanal Fisheries Advisory Committee.

- **Artisanal actors adopt food safety and quality practices to enter high-value markets by improving infrastructure, facilities and services**

Market vendors and cottage processors are the least profitable segment of the value chain (returns on sales of 12 percent and 13 percent respectively) and these VC functions are largely carried out by women. Therefore, additional attention will be paid to gender constraints and opportunities allowing the increased participation of women and increased share of direct value captured by women. To this end, a study will firstly be conducted to verify the potential for expansion of domestic seabob consumption in higher value outlets including supermarkets, hotels and restaurants as a result of the growth of the oil and gas and tourism sectors in Guyana. By providing training on improved seabob handling practices (e.g., food safety and quality, improved drying and storing techniques), coupled with infrastructure upgrades at strategic wharfs and landing sites (mainly Medowbank in Region 4 and Rosignol in Region 5), women processors and vendors will be linked to higher value customers as well as necessary service providers (e.g. suppliers of solar dryers, ice and ice boxes) to increase their incomes from higher value sales of fresh seabob. Their representation and voice in decision-making regarding the management of landing sites will also be improved by forming a network of women vendors and processors, subject to their interest.

The table below shows the **potential economic, social and environmental impacts expected thanks to the upgrading strategy**. Direct value-added of the VC would increase to USD 39 million by 2025 and USD 43 million by 2032 (12 percent and 24 percent increase respectively compared to baseline 2015–2020). Number of FTE jobs in core VC increased to 1 425 by 2025 and 2032 (1.5 percent increase compared to baseline 2015–2020). In addition to economic improvements, the share of FTE jobs for women would also increase to 43 percent by 2025 and 2032 (3 percent increase in relative terms compared to baseline 2015–2020), and the number of FTE jobs for women with earning not below national minimum wage increased to 421 by 2025 and 2032 (29 percent increase compared to baseline 2015–2020). In terms of environmental aspects, it is expected that industrial catch per unit effort (CPUE) does not fall below the trigger level CPUE in any quarter, the by-catch discard levels

of Chinese seine fishers would be reduced, and all industrial vessels maintain 100 percent adoption of Bycatch Reduction Devices (BRDs) and Turtle Excluder Devices (TEDs).

Item	Baseline (2015–2020)	2025	2032
Economic indicators			
Total export value (USD/year)	14 049 594	15 454 554	16 859 513
Number of FTE jobs (including family labour)	1 406	1 425	1 425
Total value of net wages (USD/year)	3 398 464	3 426 598	3 426 598
Direct value added by core VC (USD/year)	34 720 786	38 937 003	43 158 271
Social indicators			
Share of FTE jobs captured by women	41.1%	42.5%	42.5%
Number of FTE jobs for women with earning not below national minimum wage	327	421	421
Environmental indicators			
Industrial CPUE does not fall below the TRP level in any quarter	Yes	Yes	Yes
Number of artisanal fishers using environmentally friendly practices	0	30	60
Number of industrial firms using some forms of renewable energy	0	1	1
Share of by-catch in total catch by artisanal fishers	A study will be done to establish baseline	Tbd following baseline	Tbd following baseline

The upgrading strategy will also the increase resilience of the VC. Improved availability and quality of the inputs and services required for proper handling, processing, and storage of fresh and dried seabob will enable processors and market vendors to maintain higher levels of stock of fresh and processed seabob, which will act as a buffer to some extent against shocks (such as flood, heavy rainfall) and fluctuations in supply (due to catch variations). By adopting improved techniques (i.e., food safety and quality practices; increased cold storage), market vendors will be able to ensure better quality of fresh seabob. This will open up access to higher value domestic markets (supermarkets, hospitality, oil and gas catering sector), which will in turn lead to increased market diversification and less dependency on local markets/buyers. For the industrial channel, opportunities to diversify product offerings (e.g. frozen cooked seabob in addition to fresh) as well as increased trade to regional markets will be investigated under the marketing plan to be developed for GATOSP as a means to reduce risk and diversify market opportunities. Additionally, various

upgrading activities related to institutional strengthening, advocacy and co-management and support to groups/cooperatives of fishers and female artisanal actors will bring about stronger social linkages and networks between VC stakeholders, and thus will improve the connectivity and collaboration within the VC.

The **total budget for the upgrading strategy is just around USD 2.7 million** and summarized in the table below. **FISH4ACP will provide nearly USD 1 million towards the budget (37 percent)**, mostly in the forms of studies/technical assistance, facilitation and training.

In USD	Financing sources			Total
Type of investments	FISH4ACP	Government/Donors	Private sector	Totals by type of investments
Equipment	104 000	100 000	386 000	590 000
Facilitation	260 000		12 000	272 000
Infrastructure	70 000	1 230 000		1 300 000
Studies / Technical assistance	373 000			373 000
Training	192 000			192 000
Totals by funding source	999 000	1 330 000	398 000	2 727 000

1. Introduction

1.1. Background and objective

This report was developed under the FISH4ACP programme, an initiative of the Organization of African, Caribbean and Pacific States (OACPS) to support sustainable fisheries and aquaculture development. FISH4ACP is a value chain (VC) development programme implemented by the Food and Agriculture Organization of the United Nations (FAO) with funding from the European Union (EU). Adopting a holistic approach to sustainability, FISH4ACP seeks to promote investments into fisheries and aquaculture value chains with the goal of stimulating inclusive growth, poverty reduction and improving food and nutrition security, while at the same time ensuring the sustainability of marine and aquatic resources. FISH4ACP aims to achieve the sustainable value chain development through five outcomes:

1. Improved stakeholder understanding of the value chain and participative development of a value chain upgrading strategy
2. Increased micro, small and medium-sized enterprises (MSMEs) economic performance.
3. Improved inclusiveness and social sustainability throughout the value chain.
4. Enhanced management of natural resources and consideration for climate change; and
5. Facilitated MSMEs access to finance and investment.

FISH4ACP is a five-year programme (2020–2024) implemented in 12 countries Africa, the Caribbean, and the Pacific (ACP). Twelve value chains (one per country) were competitively selected from over 75 proposals for programme implementation⁵. The first year of the programme is devoted to conducting value chain assessments and the development of value chain upgrading strategies. These upgrading strategies will be implemented in years 2-5 of the programme. This report on the seabob (*Xiphopenaeus kroyeri*) value chain was developed in this context and presents an outcome of the work conducted in the first year of the FISH4ACP Programme in Guyana.

1.2. Methodology

In the context of the FISH4ACP Programme, FAO has joined forces with the European Commission (EC), the OACPS and Agrinatura, to develop a VC analysis and development approach based on FAO's Sustainable Food Value Chain (SFVC) and Agrinatura's Value Chain

⁵These 12 value chains are: the mahi-mahi VC in the Dominican Republic; the Atlantic seabob VC in Guyana; the oyster VC in Senegal; the farmed tilapia VC in Cote d'Ivoire; the farmed catfish VC in Nigeria; the Lake Tanganyika sardine, sprat and lates VC in United Republic of Tanzania; the farmed tilapia VC in Zimbabwe; the shrimp VC in Cameroon; the pelagics VC in Sao Tome and Principe; oyster in The Gambia, small lake pelagics in Zambia, and the purse seine tuna VC in the Marshall Islands.

Analysis for Development (VCA4D) methodologies (FAO, 2014; Agrinatura, 2017). The FISH4ACP methodology, applicable across all countries included in the project, has four main components: functional analysis, sustainability assessment, upgrading strategy development, and implementation planning (actions and investments). The approach is highly participatory, involving value chain stakeholders from the public and private sector from the outset to ensure national ownership.

The *functional analysis* looks at the current structure of the VC, the dynamics that explain how and why this structure is changing, and the capacities and incentives that drive behaviours of VC actors. It starts with the identification of end-market opportunities, as the economic performance of the VC is ultimately determined by its ability to capture value in an end-market. Based on the in-depth analysis of a wide range of primary and secondary data, the functional analysis presents a detailed VC map and systematically analyses the nature of the various VC elements across four layers, namely: (1) actors in the core VC, (2) input and service providers, (3) the societal environment, and (4) the natural environment). This analysis includes the constraints and opportunities associated with the various VC elements and their linkages. The analysis is explicitly based on understanding the behaviour of the VC actors and the governance mechanisms that create incentives or disincentives for the observed behaviour. Through this in-depth and systemic approach, the functional analysis helps to identify the binding constraints in the VC and their root causes, as well as the leverage points (points of maximum impact) that will critically inform the development of an upgrading strategy that will bring about the desired economic, social, and environmental impacts.

The *sustainability assessment* then uses a range of quantitative and qualitative indicators to measure the performance of the value chain in terms of its economic, social and environmental dimensions. This assessment includes: six economic sustainability domains (i.e., profitability, employment, value added, effects on the national economy, international competitiveness, and value for end-consumers); six social sustainability domains (i.e., inclusiveness, gender equality, food and nutrition security, decent employment social and cultural capital, and institutional strength); and seven environmental sustainability domains (i.e., climate impact, water footprint, fish stock sustainability, biodiversity and ecosystems, animal health and welfare, toxicity and pollution, and food loss and waste). The sustainability assessment identifies sustainability hotspots, which help to determine which opportunities should be pursued for upgrading, alongside government priorities and private sector ambitions.

The *upgrading strategy development*, the next step in the approach, starts with the development of a common vision based on the findings from the functional analysis and sustainability assessment. With facilitation by the project, VC stakeholders themselves develop this common vision, along with an associated set of targets for where to take the VC over a given time-period. This vision and these targets are then used to devise an upgrading strategy. This upgrading strategy aims to address the binding constraints, sustainability

hotspots and their root causes and builds on the strengths and opportunities in the VC, as identified in the functional analysis and sustainability assessment. Various upgrading options are proposed in three categories: upgraded business models (elements), upgraded governance (linkages) and upgraded enabling environment (organizations, infrastructure, institutions, socio-cultural elements). These upgrading options are either derived from global best practices adapted to the situation at hand, or represent unique solutions prepared by experts in the upgrading area. The validity of these solutions typically needs to be assessed during the early stages of the action plan implementation. A holistic approach to sustainability is included throughout this vision and strategy development process in order not to overlook any potential adverse impacts of the proposed upgrading interventions.

The *implementation planning*, as the final step in this process, translates the upgrading strategy into action and investment plans to be implemented during years two-five of the FISH4ACP project. The plans detail a sequence of activities that need to be conducted and investments that need to be made to implement the identified upgrading strategy. To ensure the sustainability of FISH4ACP's interventions, both the development of the plans (as part of this report development) and their implementation require the application of a facilitation approach, which facilitates local stakeholders' active participation and encourages stakeholders to take on their roles and to develop a sense of ownership of the development of the VC.

The Guyana seabob shrimp value chain analysis and upgrading for sustainable fisheries report draws upon secondary and primary data collection and analysis. The analysis was validated with stakeholders during a hybrid workshop (in person in Guyana and virtual) held on 18 August 2021. During the workshop the seabob shrimp stakeholders articulated their vision and upgrading strategy for the fishery. The details for the upgrading strategy and its associated activities were later discussed during a hybrid planning workshop with stakeholders held on 23 November 2021, which was then followed by various other consultations with stakeholders in early 2022 to further refine/revise the upgrading strategy.

Secondary data collection. Desk research focused on 1) analyzing data from COMTRADE, FAO, International Trade Center, the Observatory of Economic Complexity, United States National Oceanic and Atmospheric Administration and national statistical agencies; and 2) analyzing existing policy documents, academic journal articles, international and regional organizations' reports and other secondary literature related to fisheries. Due to the policy and market interest in sustainable fisheries especially as it pertains to small-scale fishers, a large secondary literature emerged focusing on the development of sustainable and inclusive fishery sector. The analysis of these documents focused on identifying actors, compiling statistical data, understanding policy environments, barriers to upgrading, and opportunities in sustainable marine fisheries development. In addition, we identified relevant international cases (e.g. Belize) for international comparisons in order to understand upgrading trajectories and draw lessons on fisheries co-management.

Primary data collection. The report draws upon primary data collected by the Value Chain Analysis (VCA) team, led by FAO international consultants and the regional partner - the University of West Indies (UWI) with their network of national consultants. Field interviews with stakeholders were conducted from January 2021 until May 2021 in Guyana in regions 3, 4, 5 and 6, as summarized in Table 1.

TABLE 1. OVERVIEW OF PRIMARY DATA COLLECTION

Type	Number of interviews conducted
Functional actor interviews (i.e. industrial firms, artisanal fishers, aggregators, cottage processors, market vendors)	29
Economic actor interviews	28
Social actor interviews	27
Environmental actor interviews	24
Key informant interviews (e.g., banks, policy-makers in the department of fisheries, environment, trade, and other relevant organizations, NGOs, supermarkets, overseas (US, Canada) buyers)	15
Expert Interviews (e.g., experts on fisheries, MSC certification and audits, and stock assessment)	1
Consumer focus group	1
Worker focus group	1
Small fisher focus group	2
Trader focus group	2
Consumer survey	196
Worker survey	70
Small fisher survey	40
Observations	3

Data limitations

- There are limited data available on seabob shrimp, market systems, actors and catch composition in Guyana. Data used in this report is based on the latest available data sets from international and local sources, as well as interviews with VC actors and other key informants.
- The artisanal fishers, cottage processors and market vendors do not keep records and do not track capture volumes and sales and operational costs data on a regular basis.
- The complicated dynamic of the COVID-19 pandemic limited access to some key participants and in person interactions with stakeholders. Despite these difficulties, field researchers managed to collect data through semi-structured interviews and field visits.
- There are sensitivities about information on gender dynamics, financial data, labor conditions and interactions between the industrial fishery, the artisanal fishery, and the government.

1.3. Brief history and overview of the value chain

Guyana shares a rich shoreline with Suriname, the Bolivarian Republic of Venezuela, Brazil, and French Guyana. The coastal plains are a vital resource worth billions of dollars to several industries including mining, fishing, and agriculture (U.S. International Trade Administration, 2019). The Atlantic coast is only about 5 percent of Guyana's land area but is the home for over 90% of its population and about 75 percent of economic activities (Economic Commission for Latin America and the Caribbean, 2011). The 459km Atlantic coastal line and the network of rivers including Courantyne, Berbice, Demerara, and Essequibo rivers provide favorable mangroves' habitat for fisheries such as finfish, prawns (*Penaeuslaticulcatus*), shrimp (*Penaeuslitopenaeusschmitti*), seabob shrimp (also known as coarse shrimp and *Xiphopenaeus kroyeri*) and whitebelly shrimp (also known as fine shrimp and *Plaemon schmitti*) (Chackalall and Dragovich, 1982; The International Trade Administration, 2019). Guyana's fisheries sector is comprised of a large fleet of industrial trawlers, a small fast growing inland aquaculture, and a large traditional small-scale artisanal fishery.

The Atlantic seabob shrimp is found only along the western Atlantic coastline (Figure 35 in Annex 1). Guyana is a leading global producer of seabob, with total catches of seabob by both industrial and artisanal fisheries fluctuating around 17 000 – 18 000 tons/year on average during 2011–2020 and consistently making up nearly all of the annual shrimp and prawn capture in Guyana⁶ (Fisheries Department data). Since 2017, there has been a decline in seabob catch volume, with the catch volume reaching its lowest point at just over 9 000 tons in 2020 (Fisheries Department data). The artisanal catch of shrimp is consumed domestically, while the industrial catch is destined for exports. Seabob shrimp is Guyana's most valuable seafood export (Ministry of Agriculture, 2019). The United States is the primary export market for Guyanese seabob shrimp.

Seabob shrimp is a decapod crustacean typically found on mud or sand substrates in both marine and brackish waters. It is a fast-growing species with a typical lifespan of 18 months. The total length of the adult specimen is only 7-14 cm long (FAO, n.d.). The shrimp is used in marinades, sauces, salads, and breaded products. For over six decades, the artisanal fishers who operate Chinese seine nets have been exploiting the shrimp in nearshore waters. Guyana's industrial trawlers have been capturing seabob offshore for almost four decades (MacDonald *et al.*, 2015; Richardson, 2019).

The artisanal fishery has exclusively focused on local market for a long time. In the 1970s and 1980s the artisanal fishery was composed of 1 171 vessels, with almost 1 000 boat owners and employed approximately 4 500 local fishers (MacDonald *et al.*, 2015; Munslow, 2019)⁷. At the time, many of the fishers were organized in cooperatives that are now no

⁶ This includes prawn, seabob, and whitebelly. See Table 50 in Annex 1.

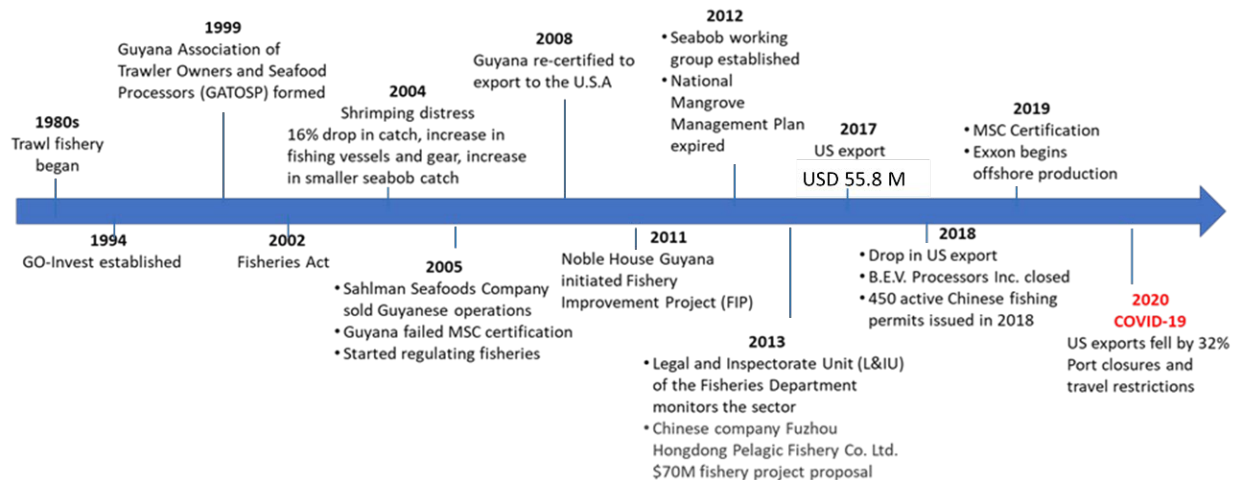
⁷ The number of vessels that exclusively focused on seabob shrimp at the time is unknown.

longer functioning. The cooperatives were responsible for collecting and reporting capture information and managing landing sites. In 1974, the government of Guyana banned the imports of seafood products, which accelerated the development of the artisanal fishery by increasing domestic demand for locally captured fresh shrimp and fish. However, up till now, the artisanal catch of seabob remains low (average 180 tons/year during 2015–2020), making up just around 1 percent of total seabob catch in Guyana (Department of Fisheries data).

As for the industrial shrimp fishery, according to Ministry of Agriculture (2022), in the late 1950s, foreign companies established bases in Guyana to commence exploitation of the prawn stock. This fishery expanded rapidly until the late 1970s. In 1977, with the adoption of the EEZs, the fishery became a national fishery and local prawn landings dropped, which in turn forced foreign companies to close operations and sell vessels to local entities. This led to the emergence of seabob shrimp fishery in 1984, with many local vessel owners converting the trawlers to catch seabob. The industrial trawlers reduced their prawn capture efforts and redirected their trawling activity towards seabob shrimp fishing since the late 1980s. Seabob production since then has become the dominant activity of Guyana’s industrial fishery.

In 1999, the industrial trawlers organized under the Guyana Association of Trawler Owners and Seafood Processors along with few other small companies to ensure growth and to protect the species from decline (see Figure 1 for the industry timeline). However, lack of effective fisheries management and monitoring continued to be a challenge. The fisheries department have had low technical and financial capacity to collect fisheries data, monitor fishing activity and enforce registration, licencing, and quotas.

FIGURE 1. TIMELINE OF THE SEABOB SHRIMP INDUSTRY IN GUYANA



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO

In 2005, the industrial seabob fishery failed to meet the Marine Stewardship Council (MSC) certification and started experiencing a decrease in seabob capture while increasing the length of fishing trips. By 2012, the Seabob Working Group (SWG) was formed to improve the performance of the fisheries and expand exports. The industrial seabob capture volumes increased between 2001 and 2012 and reached its highest levels of nearly 25 000 tons in 2012. Industrial catch, however, has decreased afterwards and fluctuated around 17 000 tons/year on average during 2015–2020 (Fisheries Department data). The reasons for declining catch are not well-studied, and are often attributed to increasing fishing pressure, increase in sargassum, and weather patterns (rainfall) (Interviews with Department of Fisheries, GNFO and GATOSP). From 2012 to 2019 the SWG worked to improve the management and regulation of seabob capture and handling and the seabob industry achieved the MSC certification in 2019.

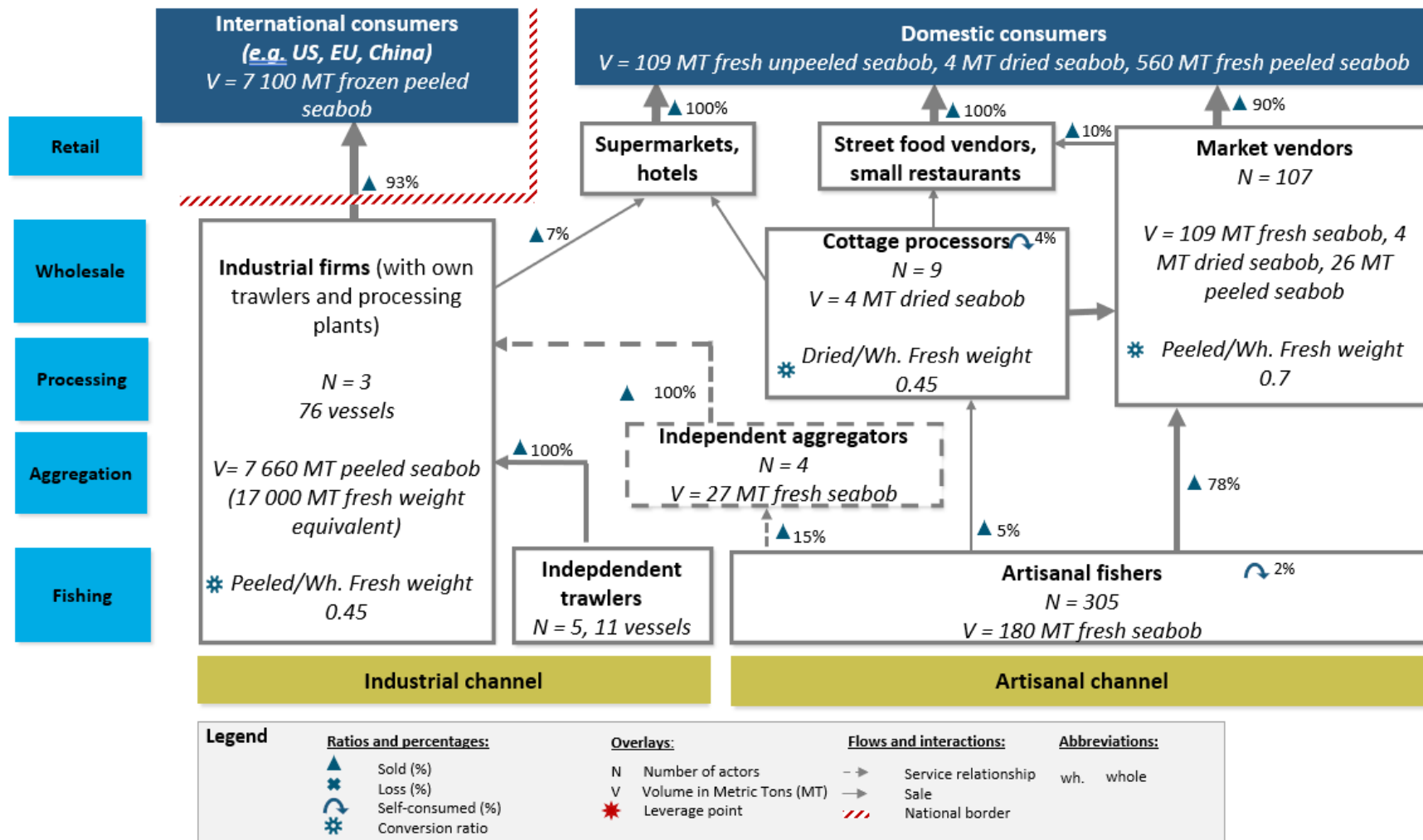
2. Functional analysis

The functional analysis examines the value chain of the Guyanese seabob shrimp by identifying the sequence of activities and actors that bring the shrimp from capture to table. This section provides the Guyanese seabob shrimp value chain map, the seabob shrimp market dynamics and delivers an analysis of the value chain ecosystem including its core participants, services, enabling environment and governance.

2.1. VC mapping

The value chain in Figure 2 outlines the main actors, activities, and product flows in Guyana. The chain has two channels, an industrial and an artisanal one. The industrial channel is relatively more organized, obtained the Marine Stewardship Council certification in 2019 and is export oriented. The artisanal channel is fragmented and focuses on supplying the local market.

FIGURE 2. THE SEABOB VALUE CHAIN MAP IN GUYANA 2015–2020

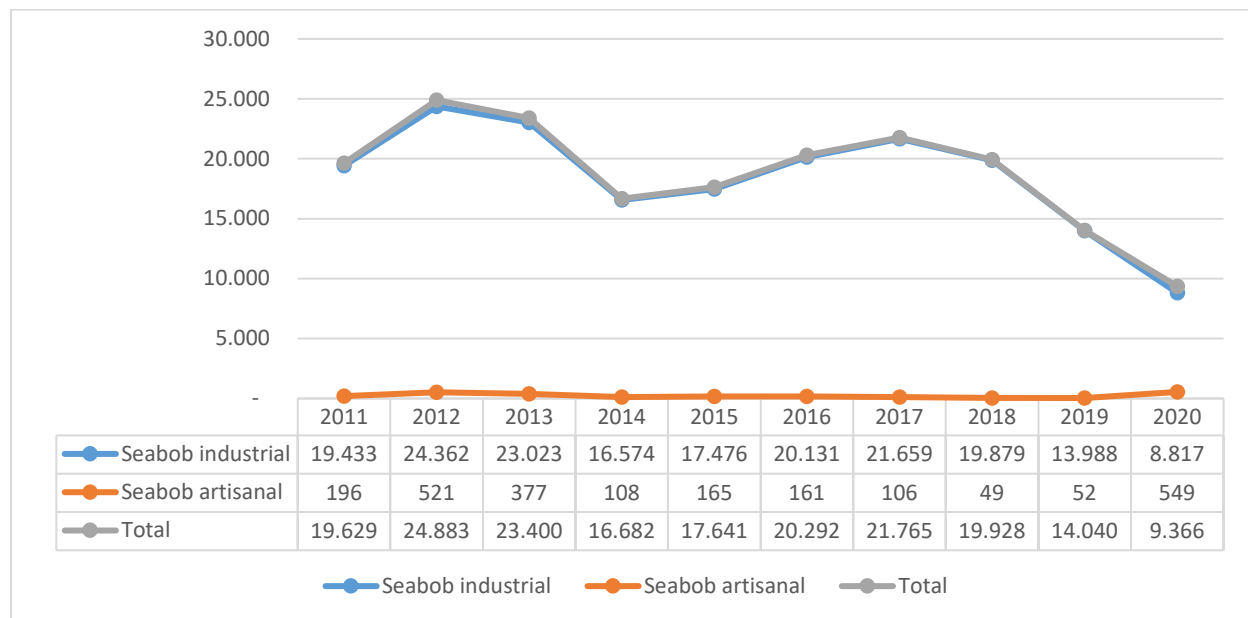


Note: (1) Production figures are based on average capture data from 2015–2020 from the Fisheries Department (FD). Averages are used to provide a picture of volume flows, address the severe fluctuations in catch and the exceptional onset of COVID -19 in 2020 which restricted fishing activities for the industrial fishers. (2) Independent aggregators are put in a dashed box because they are no longer part of the value chain from 2019 on, after the industry obtained MSC certification. (3) See Table 52 in Annex 2 for assumptions related to VC map.

Total seabob catch in the VC. Figure 3 illustrates the total seabob catch in Guyana by industrial and artisanal fishers during 2011–2020, which averaged just over 17 000 MT/year. The industrial channel consistently accounts for almost all (on average 99 percent) of total catch, while the artisanal channel merely 1 percent. Total catch has been decreasing since 2017, driven by a decline of the industrial catch. Particularly, industrial catch fell to its lowest level in 2020, at nearly 9 000 MT, making up around 94 percent of total catch. The industrial firms attribute their drop of catch to a reduction of their fishing efforts due to COVID-19, increase in sargassum and inability to find and capture seabob, possibly due to decreasing stock.

Like industrial catch, artisanal catch has also been fluctuating over the years, reaching its lowest point in 2018–2019. However, in 2020 artisanal seabob catch increased considerably to over 500 MT, which could be partially attributed to the lower level of fishing efforts by industrial firms during COVID-19 pandemic and hence, less pressure on seabob stock. The reasons for fluctuating and declining catch are not well-studied implying a critical need for to conduct studies to investigate the problem, identify the root causes and take proper actions to ensure the sustainability of the seabob stock.

FIGURE 3. TOTAL SEABOB CATCH IN GUYANA DURING 2011–2020 (IN MT)



Source: Fisheries Department of Guyana

The industrial channel. This channel is comprised of two actor types:

- Three vertically integrated firms that capture, process and export seabob, and
- Five independent trawler owners who capture seabob for the industrial firms

The industrial firms and independent trawlers are organized under the Guyana Association of Trawler Owners and Seafood Processors (GATOSP). As part of the Harvest Control Rules (HCR), the industrial channel is subject to a closed season between 6-8 weeks a year, which can occur between September and November every year. Pritipaul Singh Investments (PSI), Noble House Seafoods (NHS), and Gopie Investments Inc. (GII) are the three lead firms in the chain. Their operations are vertically integrated and include wild shrimp and fish capture, primary processing⁸, and exports of frozen peeled shrimp. The three firms own a total of 76 trawlers and have their private docks and landing sites (see Figure 4). NHS and GII contract an additional eleven vessels from five independent trawler owners and only invested in wild fishery. PSI is investing wild fishery, focusing on seabob but also cover tuna and other fish species.

FIGURE 4. INDUSTRIAL TRAWLERS AT PSI McDOOM WHARF



Source: © Perception Inc.

During 2015–2020, three industrial firms produced on average around 7 600 MT of peeled seabob per year (17 000 MT in whole fresh equivalent weight), of which about 93 percent was exported and 7 percent sold to supermarkets, hotels and restaurants on the domestic market, who source seabob from the industrial channel to target upper middle-income consumers.

The artisanal channel. This channel is composed of four actor types:

- 305 Chinese seine fishers who capture and sell fresh seabob;

⁸ Primary processing refers to peeling, freezing and packaging shrimp.

- approximately four aggregators who buy the shrimp to sell to the industrial processors;
- approximately nine cottage processors who dry shrimp; and
- approximately 107 market vendors who sell fresh (peeled and unpeeled) and dried seabob to end-consumers, street food vendors and small restaurants.

The artisanal channel uses traditional methods in the capture, processing (peeling, drying), and marketing of seabob.

Artisanal fishers. The fishers in this channel run a year-round fishery that is not well-regulated and is informal. All fishers are family run operations and have been in the profession for generations. The artisanal fishery currently consists of approximately 5 000 small-scale fishers (of which around 1 000 are boat owners) who operate 1 315 vessels ranging from 6 – 18 meters with either paddle, sail or (outboard or inboard) engines (WWF, 2019). The artisanal fishers use multiple gear types⁹ to target multiple species such as whitebelly shrimp, finfish, and prawns. During 2015–2020, seabob accounted for only about 1-2 percent of total catch by artisanal fishers. Among different gear types, the Chinese seine, used by around 300 vessels, is the only one used by artisanal fishers to catch seabob (WWF, 2019; Kalicharan and Oxenford, 2020); and thus, the VC map only include the Chinese seine fishers (rather than artisanal fishers in general). Chinese seine fishers also captures other fish species such as whitebelly shrimp and finfish; however the share of seabob in the total catch of this group of fishers is estimated to be higher than that of all artisanal fishers, at around 10 percent as opposed to just around 1 percent for all artisanal fishers (Economic actor interviews with artisanal fishers, 2021).

Aggregators. Prior to 2019, there were about four aggregators who bought approximately 15 percent of the seabob shrimp catch, estimated at 27 tons per year, from artisanal fishers to sell to the industrial processing firms. The aggregators load their trucks with the seabob shrimp, which is placed on ice for transport to the industrial processors. A typical aggregator often hires one or two male casual workers to help with the loading, and transport of the shrimp. Since MSC certification in 2019, independent aggregators are no longer allowed to supply seabob to industrial companies due to traceability issues¹⁰. However, since the VC map presents the situation during 2015–2020, independent aggregators are included in this map as well as in subsequent analysis.

Cottage processors. Almost 9 MT/year, or five percent of artisanal catch, of seabob is bought by about nine cottage processors. These are mostly small female owned businesses who dry seabob to sell locally to market vendors, street food vendors, and small restaurants.

⁹ There are 5 main gear types used by artisanal fishers, namely: gill nets, Chinese seines, traps, caddells and handlines (Kalicharan and Oxenford, 2020).

¹⁰ It should be noted that although aggregators no longer buy seabob from the artisanal channel to supply to industrial processors, they still operate as aggregators of finfish and other shrimp species (e.g. whitebelly), and are unlikely to suffer significant economic losses from the loss of seabob traded, given the small volumes of seabob they procure from the artisanal channel.

The major inputs they use are salt, wood and coconut shells. The cottage processors hire part time female workers who clean seabob and then spread it on the floor to dry. Dried shrimp is around 45 percent of the weight of fresh seabob. Once dried, the seabob products are mainly sold to market vendors and a small percentage is sold to food vendors and restaurants.

Market vendors/wholesalers. Nearly 80 percent of artisanal seabob catch, or 150 MT of seabob in whole fresh equivalent weight, is sold in the local market by around 107 market vendors. Market vendors sell different seabob products - including unpeeled fresh seabob, peeled fresh seabob, and dried seabob --to consumers and other buyers such as street food vendors and restaurants. They source fresh seabob from fishers and dried seabob from cottage processors. The majority (>70 percent) of the fresh seabob procured by market vendors is sold unpeeled, while around 25 percent is further processed (cleaned and peeled) before being sold. Most vendors are female business owners, work year-round and employ other family members to help with the transport, cleaning and peeling of seabob. The major inputs they use are water, ice, and plastic bags. Clean water, ice and storage are not always available at the market. Most vendors do not have cold storage which forces them to procure the shrimp in small volumes to avoid spoilage. At the end of the market day, the vendors either sell leftover shrimp door to door¹¹ or dry it at home.

2.2. End-market analysis

As discussed above, the industrial channel in the Guyana seabob VC targets export markets, while the artisanal one serves domestic demand. This section, hence, will explore the demand, structure and drivers of international and domestic markets in order to outline potential market opportunities for Guyanese seabob.

2.2.1. Dynamics of global shrimp market

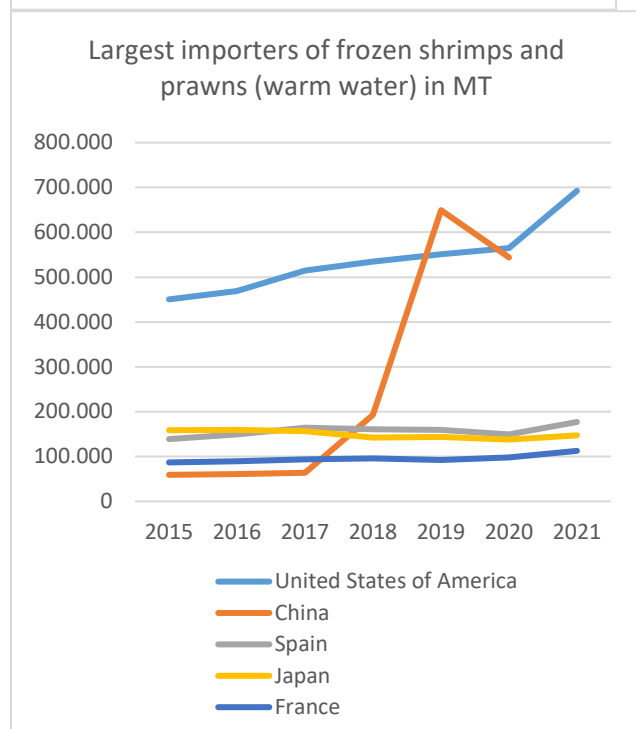
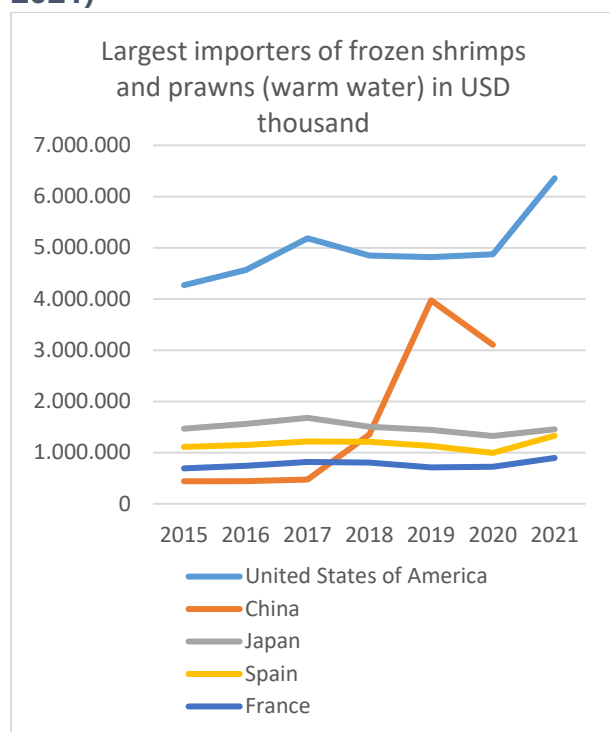
Strong and increasing global demand for shrimp, including seabob shrimp. There is a growing appetite for all shrimp products globally, especially in the United States of America (USA), Europe and China. Shrimp is the most significant commodity in global fish trading by value (Leung and Engle, 2008). It accounts for about 15 percent of the total fish trade, at approximately USD 28 billion per year (FAO, 2020). Frozen warm water shrimp, which includes the seabob species, is the most prevalent type traded.

¹¹ Door-to-door is a canvassing sales technique in which the sales person walks from the door of one house to the door of another to sell their product.

Asian and South American countries are the lead suppliers of warm water shrimps and prawns. Figure 5 below provide an overview of the largest warm water shrimp and prawn importers in the world from 2015–2021.¹²

¹² Global trade data does not break down the shrimp market by specific species.

FIGURE 5. LEAD IMPORTERS OF WARM WATER SHRIMPS AND PRAWNS IN THE WORLD (2015-2021)



Note: Product HS code used in search 030617 - Frozen shrimps and prawns, even smoked, whether in shell or not, including shrimps and prawns in shell, cooked by steaming or by boiling in water (excluding cold-water shrimps and prawns)

Source: ITC Trade Map database (retrieved in December 2021 and March 2022).

For warm water shrimp, the United States of America is the largest importing market by value at about USD 6.4 billion for nearly 700 000 MT in 2021. China's imports has drastically increased since 2017, reaching USD 3 billion for over 500 000 MT in 2020, or 7 times higher than 2015 in terms of import value. Japan, Spain and France are also large importers of warm water shrimp. Consumers in these leading markets like to use small shrimp for popular foods such as popcorn shrimp and as an ingredient in sauces, salads, marinades, and other dishes. The demand for warm water shrimp slightly decreased in 2020 in all leading markets except for the USA, which was mainly due to the impacts of COVID-19 pandemic which disrupted the supply chain as many exporting and importing countries were under lockdowns (EUMOFA, 2021a). However, market demand quickly recovered in 2021 and started to increase again, indicating the global strong and stable demand for warm water shrimp.

Competition between different types of shrimp and more stringent buyer requirements. Atlantic seabob is a small white shrimp that has a delicate texture and can be substituted by other types of shrimp. Since the early 2000s, a boom in farm-raised shrimp increased supply by a staggering 190% between 2000 to 2007 compared to only 13% increase of wild capture (Mine *et al.*, 2016). Suppliers of farmed shrimp¹³ such as the Indian BMR Seafood Group are increasingly adopting the Aquaculture Stewardship Council certification and can provide buyers with good quality and stable supply of shrimp.

Seafood fraud problems make it difficult to distinguish between farmed and wild shrimp. For example, at least 30% of farmed shrimp in the United States is mislabeled by species or type (Howard, 2014). Mislabeled and sustainability concerns are accelerating the adoption of traceability and block chain platforms from buyers in the United States and Europe (Pers. Comm. with oversea buyers in 2021). Increasing activism and awareness regarding social and environmental violations, in both wild and farmed shrimp, is causing buyers to conduct social and environmental audits to ensure that their supply chains are ethical (Clark, 2019). These dynamics are also driving investments in product innovation such as synthetic and vegetable based shrimp products to replace wild and farmed shrimp (The Economist, 2020).

2.2.2. Guyana's shrimp exports

According to data from ITC Trade Map database (accessed in March 2022), in 2020, Guyana exported over 3 200 MT of frozen warm water shrimps and prawns¹⁴ at the value of over USD 19 million, which made up 0.1 percent of world exports of this product and 0.7 percent of Guyana total exports in terms of value in that year. Despite this negligible share in the global warmwater shrimp market, Guyana is a large global exporter of seabob species which represents about 90 percent of Guyana's shrimp and prawn¹⁵ annual capture during 2011–

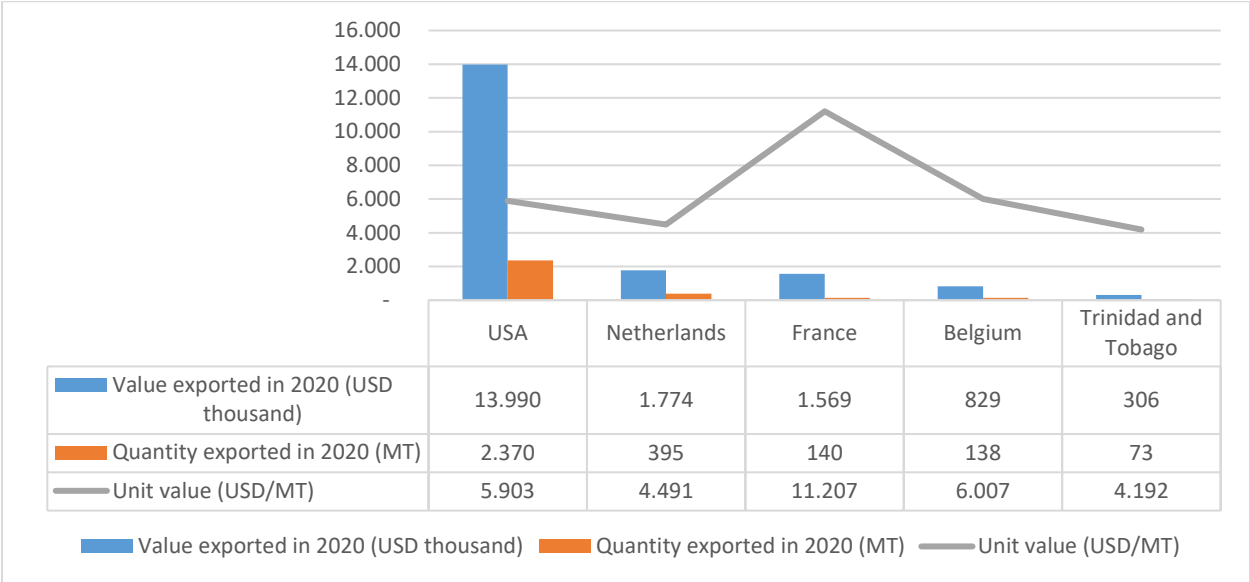
¹³ This includes the farmed small shrimp of 70-90 count per pound, 90-110 count per pound and other counts similar to the frozen peeled seabob shrimp.

¹⁴ Product HS code: 030617 Frozen shrimps and prawns, even smoked, whether in shell or not, including shrimps and prawns in shell, cooked by steaming or by boiling in water (excluding cold-water shrimps and prawns).

¹⁵ This includes prawn, seabob, and whitebelly.

2019 (calculated based on Fisheries Department data, see Table 50 in Annex 1). Guyana's warm water shrimp exports, therefore, is primarily made up of seabob. The United States of America is the leading export destination for Guyana's seabob shrimp (see Figure 6). Catch volumes, however, have been deteriorating since 2017 causing Guyana's total shrimp export value to decline to USD 19 million in 2020, or a 20% reduction compared to 2016 (ITC Trade Map database, retrieved in March 2022).

FIGURE 6. TOP 5 DESTINATIONS FOR SHRIMP EXPORTS FROM GUYANA IN 2020



Note: (1) The product HS code used to search is 030617 Frozen shrimps and prawns, even smoked, whether in shell or not, including shrimps and prawns in shell, cooked by steaming or by boiling in water (excluding cold-water shrimps and prawns). (2) Seabob comprises almost all of Guyana's exports of the product HS 030617.

Source: ITC Trade Map database (retrieved in March 2022), triangulated with the data on seabob exports provided by Guyana Department of Fisheries, 2021.

All the seabob exported from Guyana come from the industrial channel. Industrial seabob shrimp is peeled and block frozen in large, mechanized processing plants (see Figure 7). Seabob is graded into different categories, with the highest quality chosen for export markets (mainly the the United States of America and the European Union). Buyers in export market sell the shrimp as frozen uncooked and cooked under their brand.

FIGURE 7. INDUSTRIAL SEABOB PROCESSING IN GUYANA



Source: ©FAO/Dawn Maison

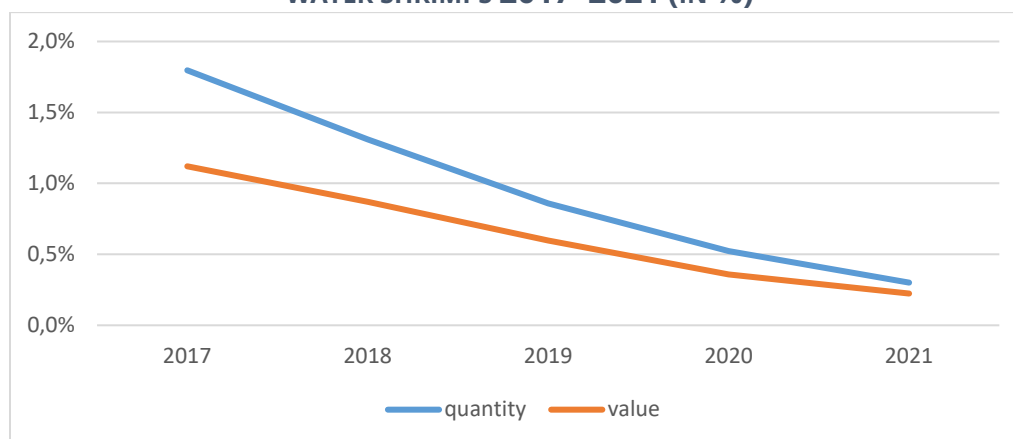
2.2.2.1. Export to the United States of America market

The United States of America is the primary market for Guyana's warm water shrimps¹⁶ (most of which is seabob), importing over 2 300 tonnes (valued at nearly USD 14 million) in 2020, and accounting for over 70% of Guyana's exports of warm water shrimps both in terms of quantity and value in that year (ITC Trade Map database, retrieved in March 2022). In 2020, Guyana's exports of warm water shrimps (mainly seabob) to the United States of America have declined by 24% in terms of value and 28% in terms of volume compared to that in 2016 (Ibid.). The decline in seabob capture (as mentioned above) coupled with trading challenges (reduced demand) in the wake of the COVID-19 pandemic contributed to the drop in exports to the United States of America (Interviews with Guyanese seabob industrial firms and GATOSP and in 2021 and 2022).

India is the top exporter of warm water shrimp to the United States of America, with a market share of over 40 percent in 2020 (ITC Trade Map data, retrieved in April 2022). Other main competitors in the United States of America market include Indonesia, Ecuador, and Mexico (Ibid.). On average, Guyanese shrimps (mainly seabob) account for just 1% and 0.6% of annual United States of America imports during 2017–2020 in terms of quantity and value respectively, and their share on the US market has been declining since 2017 (Figure 8), primarily due to the declining in seabob catch in Guyana (as mentioned above).

¹⁶ Product HS code 030617

FIGURE 8. SHARE OF GUYANA IN THE UNITED STATES OF AMERICA IMPORTS OF FROZEN WARM WATER SHRIMPS 2017-2021 (IN %)



Source: UN Comtrade data (retrieved in April 2022, using the product HS code 030617)

During the COVID-19 pandemic, closures and mobility restrictions in the United States has reduced demand from upstream buyers such as restaurants and food service. The pandemic also affected consumer food choices in retail outlets who opted to buy foods that are easier to prepare.

Demand per capita for shrimp in the United States increased by about five percent to five pounds in 2017 and is projected to continue growing. A large deficit on seafood and especially shrimp will continue to make the United States a target market for exporters including Guyana (NOAA, 2020, 2019). A recent California Sea Grant study revealed that American consumers are willing to pay premium prices for sustainable seafood. However, when it comes to shrimp, they prefer to buy cheaper shrimp options and appear to be price sensitive. Researchers believe that this might be due to the lack of relevant information on the product labels (Leitzell, 2018). In 2019, consumer research identified that over 48% of American consumers need to know more information about shrimp such as freshness, quality, species, cooking methods, nutrition and food safety to make purchasing decisions (White, 2019).

Table 2 provides a summary of trends in shrimp sales by market segment in the United States which helps in developing a more targeted buyer strategy for Guyana’s seabob shrimp.

TABLE 2. SHRIMP SALES IN THE UNITED STATES OF AMERICA BY MARKET SEGMENT 2019/2020

Retail Sales of shrimp	415 million pounds
Food service	Almost 300 million pounds, up 8%, between 2019-2020
Smaller commercial independent restaurants with one to two locations	127 million pounds of shrimp sold by distributors
Small micro-chains with three to 19 restaurants	38.4 million pounds of shrimp mostly driven by bar and grill, casual and family dining.

Source: Chase, 2020

2.2.2.2. Exports to the European Union market

The Netherlands is the second largest export market for Guyanese seabob shrimp (after the United States of America, followed by France and Belgium, accounting for about 9 percent, 8 percent and 4 percent respectively of Guyana's exports of warm water shrimps in terms of value in 2020 (also see figure 6). Nobel House Seafoods company in Guyana is a major driver of increasing exports to the Netherlands. The company is a subsidiary of the Dutch seafood multinational Heiploeg and is a major force behind the industry upgrading and receiving the MSC certification in 2019. This was a timely improvement of the Guyanese seabob industry, given that the requirement for sustainability certifications (such as MSC, Friends of the Sea) is increasingly prevalent on the EU market and that for wild caught shrimp, the achievement of such certification would soon become a requirement to enter the EU market (CBI, 2019).

2.2.2.3. Regional market

Trinidad and Tobago and Jamaica, are the main markets in the Caribbean for Guyanese frozen warm water shrimps, together accounting for around 3% of Guyana's exports of the products both in terms of volume and value in 2020 (approximately 100 tonnes over USD 600 000) (ITC Trade map database, retrieved in April 2022). Other markets for Guyanese warm water shrimp in the region include Barbados and Suriname. Like the main markets in the United States of America and the European Union, Guyana exports of warm water shrimp to the regional market in 2020 decreased as compared to the 2016 levels, primarily due to the decline of seabob capture in Guyana.

Although Guyana is one of the top exporters of shrimps and prawns to other Caribbean countries, especially Jamaica and Trinidad and Tobago, the country is facing stiff competition from farmed shrimp exports. According to Chatham House (2020) and OEC (2020) data, prior to 2010, 30-40% of shrimp in Jamaica came from Guyana and imports from China and India were negligible. By 2018, Chinese and Indian frozen shrimps and prawns accounted for 40% and 20% of Jamaican imports respectively, while Guyana's share decreased to 17%.

2.2.3. Domestic market

Guyana's per capita consumption of fish and shrimps is the highest in CARICOM countries, which was at about 54 kg in 2008 (Guyana marine fisheries management plan 2023–2020), but has now declined to around 35 kg per person (draft Guyana marine fisheries management plan 2022–2027). The decline in consumption can be attributed to a reduction in catch. Fresh shrimp is the most popular form of shrimp consumed. Dried shrimp is also locally available and does not require refrigeration and is supplied by artisanal processors.

Based on the data from the survey with 196 consumers conducted in 2021, the current total domestic consumption of seabob in Guyana, in whole fresh weight equivalent¹⁷, is about 1 300 tonnes per year (see Table 53 in Annex 3 for the estimation). Seabob products consumed on domestic markets include fresh peeled seabob (most popular product as indicated by the surveyed consumers), followed by fresh unpeeled seabob, frozen peeled seabob, and dried seabob (see Figure 9). Table 3 shows consumer evaluation of different seabob product types, with fresh peeled seabob and fresh unpeeled seabob receiving the most positive ranking, while dried seabob is the least preferred product type.

FIGURE 9. UNPEELED, PEELED AND DRIED SEABOB IN GUYANA

Whole unpeeled seabob



Source: ©Heiploeg Group

Peeled seabob



Source: ©FAO/Dawn Maison

Dried seabob



Source: ©FAO/Mark Ram

TABLE 3. CONSUMER EVALUATION OF DIFFERENT SEABOB PRODUCT TYPES

Product type	1 (very negative)	2 (negative)	3 (neutral)	4 (positive)	5 (very positive)
Fresh unpeeled				X 35.4%	X 38.1%
Fresh peeled					X 61.6%
Dried unpeeled	X 39.7%				
Dried peeled	X 24.5%	X 32.7%			
Frozen peeled	X 32.2%		X 26.7%		

Note: The table shows the most frequent responses of consumers when asked to evaluate different seabob product types based on criteria including price, health benefits, convenience for food preparation/purchase, quality, taste, and seabob as part of popular dishes. The percentages show the share of each respective response in total number of responses.

The consumer survey shows that end-consumers most often buy seabob from market vendors in local markets or fish landing sites (around three-quarters of the surveyed consumers indicated so), but transaction amounts are estimated to be small due to the small

¹⁷ Taking into consideration the conversion rates: Industrial conversion rate of peeled:whole fresh seabob (mechanically peeled) is 0.45. Artisanal conversion rate of peeled:whole fresh seabob (manually peeled) is 0.7. Artisanal conversion rate of dried:whole fresh seabob is 0.45.

amount of supply (catch) by artisanal fishers. On the other hand, while only one-quarter of the surveyed consumers indicated to buy seabob from supermarkets and restaurants, the amount of seabob sold through these retail channels (which are industrially peeled) is estimated to be high (making up around 70 percent of total seabob domestic consumption, in whole equivalent weight). This is due to the relatively high industrial seabob catch (as compared to artisanal catch) and the relatively stronger purchasing power of restaurants (including hotels) and consumers who make purchases at supermarkets and eat out at restaurants (as compared to consumers buying from local markets).

From the survey, over 40 percent of the surveyed consumers who visit restaurants order seabob dishes. This suggests that seabob meals is popular at restaurants, and that the restaurant and hospitality segment is a potential higher value market for domestic seabob. Furthermore, the domestic demand for seabob shrimp is expected to increase as the country develops the oil and gas sector which will increase the number of foreign workers and shrimp consumers. In addition, the Guyana Office for Investment (Go-Invest) facilitated around GYD 277 billion investment in the tourism sector. As Guyana develops its tourism, demand for seabob is expected to increase especially at hotels and restaurants. More in-depth market studies are needed to verify and quantify these potential increases in the domestic demand for seabob in Guyana.

Over 80 percent of the surveyed consumers indicated preference for domestic seabob over imported one. However, about 66 percent of surveyed consumers cannot find seabob in the local market especially between March and April. Most consumers in the survey believe that the availability of fresh seabob shrimp has decreased over the last five years. This coincides with lower catches over the same period. These findings suggest that there is a market gap for fresh seabob in Guyana to meet consumer demand. Currently, this gap might be covered by frozen shrimp and/ or by substituting seabob shrimp with other types of shrimp such as whitebelly. Additionally, consumers prefer fresh seabob but also value convenience (prefer cleaned and ready to cook shrimp). This suggests that value-adding activities such as cleaning and peeling seabob can help artisanal suppliers to better capture the opportunities on domestic market.

As for seabob waste, just around six percent of the surveyed consumers indicated to throw away seabob, but this is done very rarely and in small quantities, mostly when seabob has too low quality or appear spoiled.

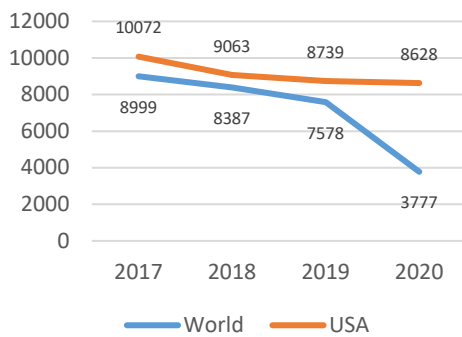
2.2.4. Prices

On export markets

Figure 10 and Figure 11 below display the changes in the import prices of warm water shrimps during 2017–2020 in the world as well as in the United States of America market and selected European Union markets. Prices started declining in 2017 in both US and European

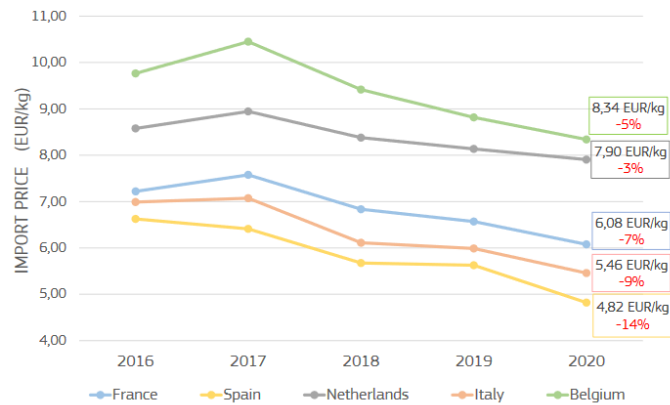
Union markets, primarily driven by the value drop of warm water shrimps from Ecuador (a leading global suppliers) and then exacerbated by COVID-19 shutdowns and supply chain problems in 2020 (EUMOFA, 2021a).

FIGURE 10. IMPORT PRICE OF WARM WATER SHRIMP - WORLD AVERAGE AND ON THE UNITED STATES OF AMERICA MARKET (USD/TONNE)



Source: ITC Trade Map data base, retrieved in May 2022, using HS code 030617.

FIGURE 11. IMPORT PRICES OF WARM WATER SHRIMPS IN SELECTED EUROPEAN UNION MARKETS (EUR/KG)



Source: EUMOFA (2021a), Chart 47 p.69
 Note: The percentages denote variations 2019/2020

The average export price of Guyana’s wild catch seabob, across all export markets, is about USD 5 840 per tonne in 2020 (ITC Trade map, retrieved in May 2022), which is lower than the average import prices of warm water shrimps in the United States of America and the European Union markets (albeit higher than global average). As the United States of America and the European Union are the main export destinations of Guyanese seabob, this relatively low price represent a competitive advantage of Guyanese seabob which can be branded as sustainably caught shrimps (thanks to MSC certification) that are relatively affordable on these markets. That said, Guyana’s seabob still face intense competition from other shrimp suppliers. Shrimp (including seabob) prices are determined by many factors including type of production methods (farmed or wild), size, freshness, packaging, quality and certifications and country of origin (Reiersen, 2021). Interviews with few shrimp buyers in the United States of America revealed that they did not know of Guyana as a source for seabob, although they recognized Suriname as a supplier of the product. Additionally, other competitors include the farmed and wild caught shrimp from Southeast Asia, Latin America, and the Gulf coast of the United States of America, as well as other species including North Sea Shrimp (*C. crangon*) and Northern prawns (*P. borealis*) which are similarly sold for salad and cocktail shrimp. While wild-caught seabob are priced higher than farmed shrimps, many retailers consider seabob a cheaper alternative to the more expensive North Sea Shrimp and the uncertified Asian pink shrimp (*Farfantepenaeus spp.*) (ShrimpTails, 2019).

On domestic market

Table 4 shows the average retail prices of different seabob products on domestic market in Guyana during 2015–2020. Averages are used to obtain the prices corresponding to the estimated volumes of seabob produced/captured or procured by VC actors as shown in the VC map (Figure 2), which will inform further analysis in this report (e.g., section 3.1 on Economic analysis). In the meantime, retail prices in high and low season in a typical year are presented in Table 5 and wholesale and retail prices per year are presented in Figure 12.

TABLE 4. AVERAGE RETAIL PRICES OF SEABOB PRODUCTS ON DOMESTIC MARKETS IN GUYANA (2015–2020)

Estimated average 2015–2020 prices	GYD/kg	USD/kg
Fresh unpeeled, retail at local markets	970	4.8
Fresh peeled, retail at local markets	084	5.4
Fresh peeled, retail at supermarkets	497	12.4
Dried, retail at local markets	875	9.3

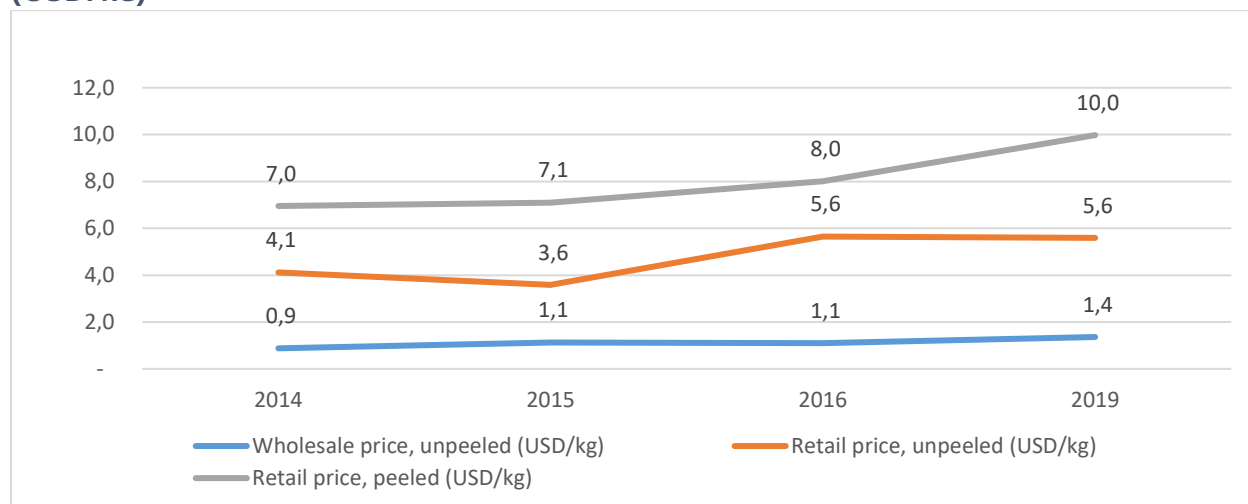
Source: Own estimates based on Fisheries Department data and Economic interviews with VC actors. The prices included in this table are weighted averages of the prices in low and high season (also considering the volumes in each season).

TABLE 5. SEABOB RETAIL PRICES IN LOW AND HIGH SEASONS IN GUYANA (2015–2020)

Product	Average retail price - market vendors selling to consumers (GDY/kg)	Average retail price - market vendors selling to consumers (USD/kg)
Fresh unpeeled seabob, high season	920	4.6
Fresh unpeeled seabob, low season	1 320	6.6
Fresh peeled seabob, high season	1 012	5.0
Fresh peeled seabob, low season	1 870	9.3
Dried seabob, high season	1 760	8.8
Dried seabob, low season	2 640	13.2

Source: Own estimates based on Fisheries Department data and Economic interviews with VC actors.

FIGURE 12. AVERAGE WHOLESALE AND RETAIL PRICES OF SEABOB PRODUCTS IN GUYANA (USD/KG)



Source: Fisheries Department data.

There are considerable fluctuations in the seabob prices between high and low season, implying the opportunities for VC actors to better take advantage of the high prices in low season through improving their practices in storing the products to maintain better quality for a longer time. The retail price of dried seabob doubles that of unpeeled seabob; but when considering the conversion rate of 0.45 (i.e., 1 kg of fresh whole seabob needed to have 0.45 kg of dried seabob), it turns out that consumers' value of dried seabob is not high and drying seabob is a rather low profit-margin activity.

The wholesale price of unpeeled seabob is significantly lower than retail prices (i.e., 4-5 times and 8-9 times lower compared to the retail prices of unpeeled and peeled seabob respectively). Additionally, while the decline in catch since 2017 (see Figure 3) seems to have been translated into the higher retail price of peeled seabob in 2019 (Figure 12), the prices of unpeeled seabob in 2019 largely stayed the same as in previous years. These indicate peeling is an activity that can add significantly more value to seabob products, as opposed to purely aggregating, storing and transporting them. It should also be noted that the high average price of retailed peeled seabob (10 USD/kg) is largely due to the high price of peeled seabob retailed at supermarkets (12.4 USD/kg), as peeled seabob retailed at local (wet) markets receive considerably lower prices (5.4 USD/kg). This price premium between local markets and supermarkets represents an opportunity for artisanal actors (e.g., market vendors) to tap into and obtain higher profits from trading seabob. For such an opportunity to be realized, it is necessary that artisanal actors are supported to improve the quality of their peeled seabob and to connect to higher-value retail outlets such as supermarkets and hospitality.

2.2.5. Conclusion: Market opportunities

Export markets. Given that the United States of America and the European Union are currently the two most important export markets for Guyanese seabob and that market demand remains strong, these markets will continue to be the main target markets for Guyanese seabob industry in the future. However, stringent market requirements such as MSC certification and small amount of seabob captured by artisanal fishers imply that these export markets are not the target markets for the artisanal channel, at least in the near future (next 10-15 years).

For industrial actors in the Guyana seabob value chain, the sustainability of seabob catch is a serious concern and threat to the viability of the industry. A potential way forward is to develop and adopt product differentiation strategies to command higher prices for Guyana's seabob shrimp while ensuring its sustainability and ethics. Key opportunities that emerge in the export ethical and sustainable market segment may include:

1. Promoting Guyana as a source of sustainable seabob, building deeper buyer relations and developing product differentiation strategies will be key to improving and/or maintaining the share of Guyanese seabob shrimp in the the United States of America and the European Union.
2. Many consumers in the United States of America are driven by price but also need information to familiarize them with seabob products. Consumer information campaigns and improved labelling can be an effective product differentiator, create consumer driven demand for Guyana's seabob shrimp and increase or maintain Guyana's seabob market share in the United States of America.

Domestic market. Guyana's domestic market has considerable potential. The consumer surveys suggest that there is untapped demand for seabob in Guyana, as consumers sometimes cannot find seabob products on the market when looking for them. Although seabob unavailability, or unreliability of supply, is largely due to the declining catch (as mentioned above), various value-adding opportunities exist for artisanal actors (including fishers, processors, market vendors) to better tap into the unmet domestic demand. Potential options include increasing and improving the quality of cleaning, peeling and storing seabob to provide consumers with higher-quality and thus, higher-value products and to enter higher-value markets such as supermarkets and hospitality (hotels, restaurants).

For both export and domestic markets, more in-depth market studies are necessary to validate the market potential and opportunities as identified in this VC report, and/or to identify the opportunities that this report may have overlooked due to data unavailability and resource/time constraints.

2.3. Analyses of the value chain elements

The Guyana seabob value chain map outlines the main activities and actors in the value chain. The VC activities and actors are divided into two channels. The industrial channel that specializes in trawl capture, processing, and exports of seabob. The artisanal channel that focuses on using Chinese seine nets to capture and sell seabob in local markets.

2.3.1. Actors in the core value chain (layer 1)

2.3.1.1. Industrial channel: Production, processing, and export

Industrial seabob firms

These industrial trawlers operate within the coastal zone of Guyana's EEZ in depths of up to 100m, approximately 15-30 nautical miles from the coast (Guyana Fisheries Department, 2021; Guyana industrial processors, 2021; Richardson, 2019)¹⁸. The industrial seabob fleet uses steel hulled trawlers (20m in length and gross tonnage of approximately 100 mt) with twin otter nets (10-16 m long). The trawlers are equipped with chains that stir up the bottom substrate causing the shrimp to jump into the nets (Project Global, 2018).

The trawl nets are pulled from outriggers suspended from the deck of the fishing vessel. The catch is hauled aboard using an electric winch which pulls weighted nets up from the sea floor. All nets are fitted with turtle excluder devices (TED) and bycatch reduction devices (BRD) in compliance of the MSC certification (see Figure 13) (Southall, Addison and Keus, 2019a). The catch is sorted from bycatch on board of the trawler before being stored in ice below decks (see Figure 14). Seabob accounts for approximately 50-55 percent of the total catch by weight, with the rest being catch of secondary (non-target) species including fish, elasmobranchs and invertebrates (MSC audit report by Southall et al., 2019, p.33, using Fisheries Department last haul data in 2018). Of the non-target bycatch species, a considerable quantity has economic value and thus is retained on board for landing (Ibid.).¹⁹

¹⁸ See Figure 37 in Annex 1 for a map showing the statistical fishing zones of Guyana, including the seabob fishing zone.

¹⁹ Detailed percentages of the bycatch that is retained or discarded are not available because whether secondary species are retained or discarded is no longer a point of consideration according to MSC protocol (Ibid.)

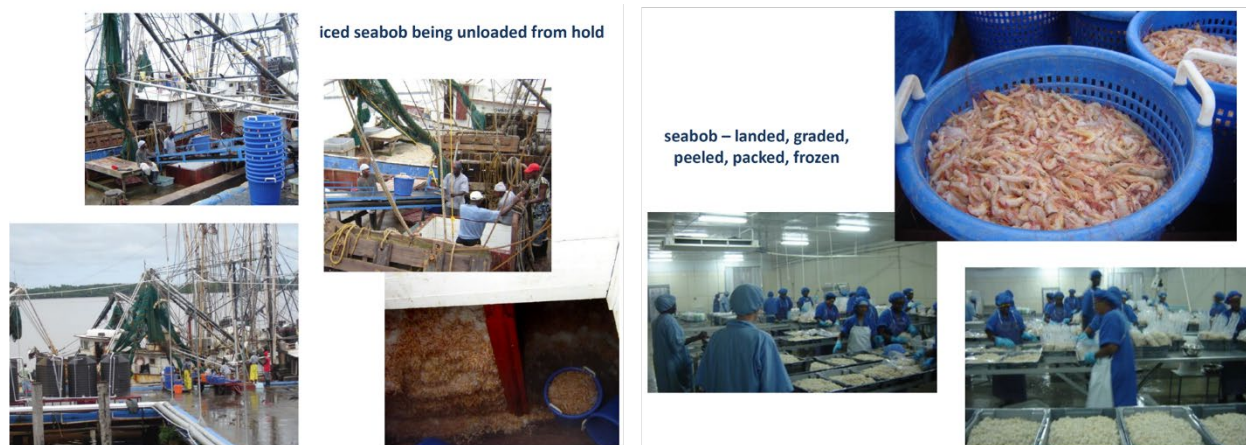
FIGURE 13. SEABOB INDUSTRIAL TRAWLERS AND NETS



©FAO/Dawn Maison

Industrial trawlers land their catch at their privately owned wharfs in East Bank of Demerara river, where they unload their catch and move it to the on-site processing facility for weighing, sorting and processing (peeling, grading and freezing) (Seabob Working Group, 2021; Southhall, Addison and Keus, 2019b, Ministry of Agriculture, 2022). The industrial processing of seabob shrimp is mechanized to peel the shrimp. The shrimp is then packaged and frozen for export markets. All industrial seabob fisheries are export oriented, with the majority (over 90 percent) of the seabob sold overseas, mainly to the United States of America and the European Union markets.

FIGURE 14. INDUSTRIAL UNLOADING AND SORTING OF SEABOB



Source: ©GASTOP

The industrial fishery consists of three vertically integrated firms who are all MSC certified. These firms are Nobel House Seafood, Pritpaul Singh Investments (P.S.I.) and Gopie Investments (see Table 6 for an overview of the firms and Table 7 for average share of seabob

capture by firm). Noble House Seafood is part of Heiploeg International B.V., a major Dutch shrimp supplier that also has its brands in Suriname and India, amongst others.

TABLE 6. INDUSTRIAL SEABOB FIRMS IN GUYANA

Company	Headquarters	Trawlers	Certifications
Pritipaul Singh Investment (PSI)	Guyana	<ul style="list-style-type: none"> • 28 vessels • 2 processing plants 	<ul style="list-style-type: none"> • Hazard Analysis and Critical Control Points (HAACP) • British Retail Consortium (BRC) • MSC
Noble House Seafood (NHS)	Global firm Heiploeg International B.V.	<ul style="list-style-type: none"> • 34 vessels • 1 processing plant 	<ul style="list-style-type: none"> • Hazard Analysis and Critical Control Points (HAACP) • British Retail Consortium (BRC) • MSC
Gopie Investments Inc. (GII)	Guyana	<ul style="list-style-type: none"> • 14 vessels • 1 processing plant 	<ul style="list-style-type: none"> • Hazard Analysis and Critical Control Points • MSC

Source: Gopie Investment Inc, 2020; Pritipaul Singh Investments, 2020; Seabob Working Group, 2021; Vottunarstofan Tún ehf, 2020.

Noble House Seafood (NHS) was the leading company in the Fishery Improvement Project that led to the achievement of MSC certification. In Guyana, NHS currently owns a fleet of 28 vessels targeting seabob. NHS owns 1 processing plant for the peeling, grading and freezing of seabob – a quick process that takes 20 minutes from the time the seabob is landed on shore until it is frozen. Frozen peeled seabob is shipped to Europe for further processing and packaging, and distribution.

Pritipaul Singh Investments (PSI) is a leading Guyanese family-owned firm set up in 1999. The company owns 34 trawlers and two large fishing complexes in Mc Doom and Providence. PSI has the most diversified operations beyond seabob shrimp, including fishing tuna and other fish species. PSI operations are well developed and include shrimp and fish discharging, shrimp processing, packaging, quality assurance, warehousing, general stores, machine shop and maintenance, ice plants, logistics, and gas stations (Pritipaul Singh Investments, 2020). Seabob shrimp is processed (peeled and frozen) in modernized facilities for exports to its Miami, Florida based buyers in the United States of America and buyers in the Caribbean such as supermarkets, hotels and restaurants in Jamaica, Trinidad and Tobago, Saint Lucia, and Barbados. PSI's seabob shrimp are also found in Guyana's local markets.

Gopie Investments Inc. (GII) owns 14 trawlers, and a processing plant and is oriented at export of peeled, frozen shrimp to the United States of America, Canada and Caribbean locations. Overall, for three industrial seabob firms, the fresh peeled shrimp meat is

approximately 44 -50 percent of the weight of the whole shrimp when peeled mechanically in an industrial processing facility which is a standard weight loss in mechanized facilities.

In 2020 Grandaast Inc, a subsidiary of Fuzhou Hongpu Aquatic Products Co., Ltd. in Fujian, China, announced a USD 25 million shrimp and fish facility with a daily processing capacity of 40 tons of shrimp and 30 tons of fish²⁰. The impact of Grandaast Inc. operations on Guyana’s seabob is not clear and warrants further research.

A typical seabob vessel makes 2-3 trip per month (30 trips per year), and an average trip lasts around 7 days (Ministry of Agriculture, 2022). Of the three industrial seabob firms, PSI has the highest number of standardized days at sea (sdas, or fishing efforts) as well as contributes the highest share in the total amount of seabob landed for processing in 2019 (Table 7). These are consistent with the sdas in previous years (2017, 2018) according to CPUE annual reports by the Ministry of Agriculture, Fisheries Department.

TABLE 7. SHARE OF EACH INDUSTRIAL FIRM IN THE TOTAL STANDARDIZED DAYS AT SEA (SDAS) AND TOTAL AMOUNT OF SEABOB PROCESSED AFTER LANDING IN 2019

Firm	Share in total standardized days at sea	Share in total amount of seabob processed after landing
PSI	41%	52%
NHS	39%	28%
GII	20%	19%

Source: Ministry of Agriculture (2019b).

Independent trawler owners

There are 11 trawlers that are independently owned in Guyana but are contracted to Gopie Investments Inc. and Noble House Seafoods (Guyana Fisheries Department, 2021). The independent trawlers are generally managed by their owners but coordinate their fishing schedules, trip duration, and fishing grounds with the industrial firm. Any catch that is unused by the industrial processors is sold in local market, although this amount is too small to be reflected on the VC map.

Frozen seabob in Guyana at the supermarkets

A marginal proportion of seabob of the industrial trawlers catch (average 7 percent) ends up in the domestic market. Frozen seabob, that is of lower than export quality, is carried by supermarkets such as Massy, Mattai, and Survival. Supermarket retailing is still developing in Guyana and these supermarkets target upper middle income and foreign workers in Georgetown who seem to favor frozen seabob. Seabob shrimp is a more recent addition to the range of food products on their shelves in the last 1-5 years. This suggests that it is only recently that industrial processes started marketing their products in the domestic market.

²⁰<https://agriculture.gov.gy/2021/03/23/us-25-million-seafood-processing-facility-providing-markets-for-guyanese-fishermen/>; <https://www.stabroeknews.com/2021/03/26/news/guyana/chinese-seafood-venture-raises-concerns-about-sustainable-fishing/>

Supermarkets receive the products already packaged which then they check for sanitation and presentation before placing them in their freezers. Seabob is obtained from a small number (<5) of local seafood distributors, with whom they have stable business relationship and from whom they also buy other types of fish and seafood. Only Massy supermarket, a Guyanese branch of the international Massy Stores group that cover five Caribbean markets, also sources directly from one industrial plant, Noble House Seafood. Massy is the only one that imports seabob to Guyana yet shows clear preference for local seabob because of their freshness and elevated consumer demand.

Official trade data at the time of writing this report showed a small amount of shrimp and prawn imports but did not show any seabob shrimp imports (Ministry of Agriculture, 2019). However, interviews with the supermarkets revealed that there is a small amount of imported seabob in the market and that there is a growing demand for frozen peeled seabob, especially when seabob is not available in the market. The supermarkets place weekly orders for seabob, but local suppliers are not capable of fulfilling these orders regularly.

2.3.1.2. Artisanal channel

The artisanal sector is fragmented, not organized and informal. Fishers and upstream actors use traditional methods in shrimp capture, handling, processing, and marketing. Artisanal cooperatives, which limit participation to the fishers only, are not effectively functioning. There are hardly any formal channels for collaboration with actors in the artisanal channel for data collection, policy making, training and other activities.

Transactions are cash-based, operations are labor-intensive, and artisanal actors do not make use of many external inputs. Actors in this channel are not aware of any official standards and few have access to (and/or use of) cold chain. Although many actors in this channel use ice in the handling and storage of seabob shrimp and other marine catch, handling practices that ensure freshness of the catch such as good ice to catch ratios are unknown to fishers and traders.

The artisanal seabob capture is an open wild fishery, and depend on external factors such as weather conditions and availability of the catch. Artisanal fishers in general use multiple gear types to catch other species apart from seabob (e.g., finfish, such as bangamary, sea trout, butterfish, catfish). Among different gear types, the Chinese seine, used by around 300 vessels, is the only one used by artisanal fishers to catch seabob (WWF, 2019; Kalicharan and Oxenford, 2020); and thus, this report focuses specifically on the Chinese seine fishers (rather than artisanal fishers in general).

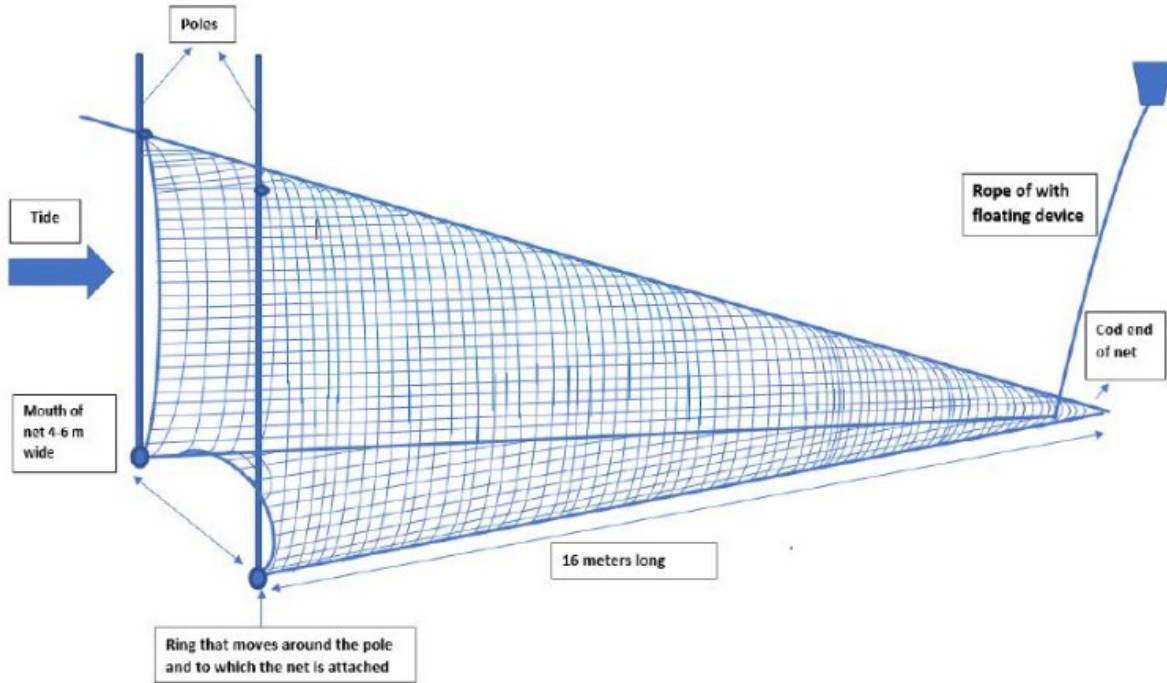
Artisanal fishers

Fishing practices

There are about 300 artisanal seabob shrimp vessels that deploy the Chinese seine nets. According to Kalicharan and Oxenford (2020) and Ministry of Agriculture (2022), Chinese seines are modified fyke nets that are funnel-shaped and of about 16m long and 4-6m wide at the mouth, with mesh size gradually tapering from 8cm at the mouth to 1cm at the funnel (Figure 15). The net is strung between two poles (referred to as “pens”) permanently set in the river estuaries along the coast of Guyana in depth between 3.6 – 7.2m, with 20 meters between them and the fyke net in between (see Figure 15, Figure 16, and Figure 17). Being a passive, fixed gear, the operation of Chinese seines is heavily dependent upon tidal flow in the river mouths and estuaries. The vessels engaged in Chinese seine fishing are wooden flat-bottomed boats powered by paddle, sail, or small outboard engine (Figure 18). Each vessel is licensed to fish at one or more pens and operate between 1 – 10 seines during 6-12 hours per day. Fishers operate along the entire coast of Guyana, on the continental shelf at distances up to 56 km (30 miles) from the shore (Ministry of Agriculture, 2022)²¹.

²¹ See Figure 37 in Annex 1 for a map of fishing zones in Guyana.

FIGURE 15. SCHEMATIC DIAGRAM OF A CHINESE SEINE STAND



Source: Ministry of Agriculture (2022, Figure 33 p.70)

FIGURE 16. ARTISANAL FISHING PENS IN THE WATER



Source: ©FAO/Dawn Maison

FIGURE 17. CHINESE SEINE NET WITH PENS



Source: ©FAO/Dawn Maison

FIGURE 18. ARTISANAL FISHING BOATS



Source: ©FAO/Dawn Maison

Artisanal vessels are locally made, and fishers make and repair their nets and pens. Fishers register their boats once for the life of the boat. Boat licenses are transferable if the boat owner decides to sell his boat. Guyana Department of Fisheries account for the Chinese seine fishers through annual pen licensing. The fisheries department issues pen licenses for fishers to use in specific locations at about eight miles from the shore. Each licensed pen has etchings to recognize it from unlicensed ones. Some fishers use unlicensed pens to catch the shrimp and the Fisheries Department depends on licensed fishers to report these violations. The department does not conduct random checks to confirm the operation of licensed pens.

Artisanal seabob fishing trips are fourteen days long per month. Fishers store their catch on ice and sell it by the bucket and bags (up to six kilograms) upon landing to market vendors, cottage processors, and before 2019, also to aggregators.

Artisanal seabob catch and overall catch composition

Artisanal fishers use Chinese seines to target seabob, white belly shrimp (*Nematopalaemon schmitti*), as well as bangamary/King weakfish (*M. ancylodon*), smalleye croaker/butterfish (*Nebris microps*), and catfish (Kalicharan and Oxenford, 2020; Ministry of Agriculture, 2022). Kalicharan and Oxenford (2020) cited that according to estimates by Richardson (2013), just 2 percent of Guyana's total seabob landings were caught by artisanal fisherfolks using these

Chinese seines; however, a recent study by Southhall et al. (2019) indicates a figure has dropped to lower than 0.5 percent. These estimates are in line with the estimate presented in this VC report using the Fisheries Department data (see Figure 2 on VC map), which is that the artisanal sector contributed around 180 MT/year, or 1 percent, to Guyana's annual seabob landings during 2015–2020.

The share of seabob in the total catch of all artisanal fishers (not just the ones using Chinese seines) is just around 1 percent (own calculation based on Fisheries Department data²²). However, among the Chinese seine fishers alone, the share of seabob in total catch (and thus, total income) of these fishers is estimated to be higher (at 10 percent) because Chinese seine fishing primarily target shrimps including seabob and whitebelly rather than other fish species (Kalicharan and Oxenford, 2020; and Economic interviews with artisanal fishers, 2021).

Due to the small mesh size, Chinese seines also catch small fish such as bangamary, butterfly, rake stardrum, and broadband anchovy (Ministry of Agriculture, 2022). The bycatch of the artisanal fishery in Guyana, however, is unexplored, which is primarily due to the lack of monitoring (by Fisheries Department) and reporting (by fishers) resulting in serious lack of information (Kalicharan and Oxenford, 2020). Unlike bycatch in the industrial seabob fishery which was examined under the MSC certification, the artisanal sector's bycatch remains largely unstudied/undocumented because it was not included in the MSC certification effort (Kalicharan & Oxenford, 2020). The most recent study on artisanal Chinese seine fishing's bycatch - Kalicharan and Oxenford (2020) – explores the catch composition of an inshore artisanal vessel in a total of 16 fishing trips and shows that bycatch discards made up 72 percent of total catch while retained catch 28 percent²³, and the majority of finfish discards are very small-sized. Although these findings are about a single vessel, given that there are over 300 artisanal Chinese seine vessels operating in Guyana, the observed high level of bycatch discards and the prevalence of juvenile bycatch of this single vessel raise concern that the discards of all Chinese seine vessels and their impacts on the ecosystem are likely to be significant. More data collection and studies are thus needed to generate a better understanding of Chinese seine fishing on bycatch and the ecosystem.

Artisanal fishers' sales of seabob

Most of the artisanal catch is sold in the local fresh markets and is available directly to market vendors (main buyers) and also cottage processors (small percentages of catch) from the fishermen. Seabob prices are usually set between the first fisher and buyer for the day. The fishers compete among themselves and sometimes those coming in late lower the price of their fresh seabob, which then pushes others to lower their price as well. Prior to 2019 (when the Guyanese seabob industry obtained MSC certificate), there were a few independent

²² More details in Figure 38 in Annex 1.

²³ "The monitoring fishing trip yielded 194.1 kg wet weight of retained catch (seabob, whitebelly shrimp, king weakfish, small eye croaker, and flapnose sea catfish) and produced 470.4 k of finfish bycatch discards and 25.8 kg of other miscellaneous discards (e.g., jellyfishes and small crabs)." (Kalicharan and Oxenford, 2020, p.5 and Table 1).

aggregators who purchased seabob captured by artisanal fishers on local markets to then sell to industrial processing firms. However, this came to an end after MSC certification due to traceability requirements.

Cottage processors

Cottage processors buy fresh seabob from fishers to dry it. Like artisanal Chinese seine fishers, cottage processors also process other fish species apart from seabob (e.g., fish and whitebelly shrimp). Interviews and consultations with VC stakeholders and experts suggest that the number of cottage processors dealing with seabob is small (around nine) and the volume of seabob handled by them is also small (making up 5 percent of the volume of seabob captured by artisanal fishers, as shown in Figure 2 – VC map). A big share of cottage processors' income is derived from processing fish and whitebelly shrimps rather than seabob, and it is estimated that around 30 percent of their income is derived from drying seabob (Economic interviews with cottage processors, 2021). The cottage processing sector is small-scale, informal and does not have certifications, health and sanitation standards.

Most processors are female business owners who use hired female labor to clean seabob as soon as it is purchased then boiled with salt to loosen the shell. The seabob is then distributed over several female workers who usually dry their seabob at home on floors outdoors in the sun for 2 – 4 days. The artisanal drying process retains about 45 percent of the weight of fresh whole seabob. This process uses largely traditional methods and heavily depends on having dry weather. Rain and humidity impact the quality and the amount of time it takes to dry seabob. Seabob is then placed in a salt bag and beaten against the floor for the shell and head to break off and turn to 'dust'. It is then sifted to remove the 'dust' and packaged in clear plastic bags for sale (Figure 19).

Most of seabob dried by cottage processors is sold to market vendors who then sell dried seabob in the local market (Interviews with cottage processors, 2021). Sometimes dried seabob is also sold to food vendors and restaurants (Ibid.). Dried seabob can be sold wholesale (to market vendors, food vendors, and restaurants) at around 1 200 – 1 800 GYD/kg (USD 6 – 8/kg) depending on high or low season. The dust by-products of dried shrimp are often sold as pig feed to farmers. Dried seabob is usually stored in plastic bags for sales in boxes at home for up to 2 weeks or even 2 months.

FIGURE 19. DRIED SEABOB IN GUYANA



Source: ©FAO/Mark Ram

Market vendors

Market vendors buy dried seabob from cottage processors (as discussed above) and buy fresh seabob from fishers before selling to end-consumers, street food vendors and small restaurants as fresh unpeeled or fresh peeled seabob. Dried seabob makes up just a small share of market vendors' business (around 6 percent of the total amount of seabob procured, in fresh whole equivalent weight), while fresh seabob procured from fishers, which are later sold either peeled or unpeeled, makes up the rest (over 90 percent of seabob procured, in fresh whole equivalent weight). The majority (>70 percent) of the fresh seabob procured by market vendors is sold unpeeled, while around 25 percent is further processed (cleaned and peeled) before being sold.

After purchasing seabob from fishers or cottage processors (very few market vendors reported buying from aggregators), market vendors transport it to fish markets at wharfs and/or municipal markets managed by Neighbourhood Democratic Council. Some vendors own a vehicle to transport seabob to the market and others hire a car or a family member to move the shrimp to the market. Market vendors must pay a daily fee to access markets (wharfs) to purchase and sell seabob. Any leftover seabob is sold by doing door to door sales. Any unsold quantities are also sometimes dried.

During the COVID-19 pandemic which resulted in market restrictions, some market vendors continued their operations from home and their regular buyers came to them to purchase seabob. Vendors who sell seabob from home keep the product chilled in a freezer up to one week until they sell it.

Most market vendors are female business women who hire female workers and other family members to clean and peel seabob (see Figure 20). The peeling process often takes place immediately after seabob is bought from fishers and involves a large amount of water to wash, peel, clean and then wash it again to be ready to pack for customers. The by-products (heads and shell) are discarded, or occasionally fed to livestock (chickens and pigs primarily).

FIGURE 20. A SEABOB MARKET VENDOR



Source: ©FAO/Dawn Maison and Mark Ram

Manually processed (cleaned and peeled) seabob retains about 70 percent of its fresh, whole weight (as compared to mechanized processing (peeling) which retains 45 percent). Seabob cleaners in the market use sharp tools in the manual removal of the shrimp shell and head which gives more control to reduce the amount of shrimp meat lost in the process. The peeled seabob is then sold fresh on ice within the day, or if market vendors have access to freezers and stable electricity, the seabob is packaged and frozen to sell later. The average retail price for fresh peeled seabob is between GYD 1 000 and GYD 1 800 per kg (USD 5 – 9/kg) depending on high or low season.

Like cottage processors, market vendors also handle other fish species apart from seabob. Interviews and consultations with VC stakeholders and experts suggest that there are over 100 market vendors in Guyana trading seabob, and income from seabob makes up around 40 percent of the income of these vendors while income from whitebelly shrimp, fish and sometimes prawns makes up the rest.

Aggregators

Prior to 2019 (when the Guyanese seabob industry was MSC-certified), there were around four aggregators who purchase seabob from artisanal fishers to then sell to industrial processing firms. To aggregate seabob, aggregators used own trucks to purchase the shrimp from various fishers at wharfs. The seabob was then kept on ice spread on the truck floor and then was distributed to industrial processors within hours of purchase. This aggregation business existed due to the demand for fresh seabob from industrial companies who tried to complement their declining catch (seabob supply) by procuring from the artisanal channel. However, since MSC certification in 2019, this aggregators stopped trading seabob between the artisanal and industrial channels due to traceability requirements.

Food service

Seabob is a popular ingredient in Guyanese dishes and offered throughout the country especially in restaurants and street food stands in the coastal region. It is usually curried, steamed with vegetables, or added to fried rice. There is a high level of appreciation and satisfaction amongst consumers for local seabob (as opposed to imported seabob). When seabob is not available, other protein substitutes including fish and other types of shrimps such as white belly are used.

2.3.2. Support providers and factor markets in the extended value chain (layer 2)

2.3.2.1. Physical Inputs

Fuel and ice providers

Fuel, ice, water, and services are fully integrated into the operations of the industrial fishery. The marine diesel used by the industrial sector is supplied through a bilateral arrangement with other nations (e.g. the Bolivarian Republic of Venezuela) that allow the companies to purchase the fuel duty free. The processing plants have their own wells that supply the water used in the processing of the catch and ice manufacturing. The industrial facility uses diesel generators to produce their electricity. The full integration of inputs into their business model allows them control cost more efficiently.

Artisanal fishers do not have access to duty free fuel. They buy fuel from local suppliers and gas stations, and when available through the fishermen's co-operative societies. In terms of ice, very few VC actors can make ice at home with residential freezers. Most fishers and market vendors who need ice to keep seabob fresh buy ice at wharfs, often from the fishermen's coops that manage the wharfs and have ice facilities there (not all wharfs have ice facilities). For example, in region 5, an ice factory is located at the Rosignol Fisheries Co-op compound. They sell ice to fishermen and market vendors at the Rosignol landing site and the nearby region 6 (New Amsterdam landing site). Co-op members (fishers only) are prioritized and buy discounted ice, especially when the seabob catch is low. However, the outdated ice equipment, unreliable electricity and the high operating cost is a constraint to producing enough ice to meet the demand for ice of VC actors (fishers, market vendors) operating at wharfs. In region 6, fishermen reported that they had to buy ice from Suriname until very recently, when a GEF small grant supported the Upper Corentyne Fishermen's Co-operative Society (No 66 village) to purchase a new ice machine. There are also complaints from fishermen that the working hours of the co-op ice factories are not sufficient to accommodate their needs (Interviews with artisanal fishers, 2021).

Fishing vessel, gear, and equipment suppliers

Industrial fishing gears, along with vessel engines and processing equipment's, are manufactured abroad and exempted from tax.

Most artisanal boats are old and an old boat costs around USD 1 300 (GYD 250 000 – 300 000). Artisanal fishing vessels are produced locally and each vessel is often equipped with an used diesel engine that are imported and then sold locally. Boat building is a family business from one generation to the next. The engine that most artisanal Chinese seine fishers are using is 2-stroke engines of between 25-40 HP that cost nearly USD 4 000 per piece (GYD 800 000) when bought new (Interviews with artisanal fishers in 2021 and with GNFO in 2022). Engines and/or fishing equipment that can allow for more efficient and sustainable fishing (such as 4-stroke engine that is more fuel-efficient) are generally either unavailable or unaffordable for artisanal fishers (Ibid.).

2.3.2.2. Finance

Banks

There are five large commercial banks operating in Guyana: Republic Bank, Guyana Bank for Trade and Industry (GBTI), Citizens' Bank, Demerara Bank and Scotia Bank. All five offer a series of financial products for customers including credit cards, overdraft facilities, multi-purpose loans and limited working capital products. Interest rates vary from 4% to 17% (Guyana Ministry of Business, 2015).

Loan schemes are not sector specific. GBTI and Republic Bank target the agricultural sector, with GBTI being the largest provider of agricultural financing in the country. Agricultural lending focuses on farming, especially rice but there is very little, if any, financing available for capture fishery or fish processing²⁴. Loan repayments are short and expensive in fishery and aquaculture compared to other sectors. Standard requirements for loan application include financial statements, collateral ownership, and bankable business plans.

Our filed surveys and interviews revealed that the majority of artisanal actors do not take loans from banks but finance their businesses based on savings and family lending. On the contrary, most actors in the industrial channel (owners of processing companies and supermarkets) can access bank loans.

Other financial institutions

The **Small Business Bureau** (SBB) is a semi-autonomous government agency under the Ministry of Tourism, Industry and Commerce that is dedicated to promoting entrepreneurship and supporting small businesses. Its Credit Guarantee Programme facilitates financing for small businesses by providing collateral guarantees (40 percent of the collateral requirements) to reduce lending risks and offers support in developing bankable business plans. The two partnering financial institutions are GBTI and Republic Bank, who approve and disburse loans of up to GYD 30 million under the programme. GBTI and Republic Bank provide 80 percent and 75 percent of the financing respectively, while the borrowing businesses need to put up the rest as equity contribution. The interest rates are

²⁴ <https://guyanesebank.com/spotlight-on-gbti-and-its-agricultural-loans/>

significantly lower than commercial loan schemes, varying between 6 percent and 8 percent²⁵.

The **Institute of Private Enterprise Development** (IPED) is a non-profit organization that offers loans, business counselling and training to individual entrepreneurs as well as MSMEs. The loans are smaller than those offered by commercial banks, with micro-boost loans as low as GYD 100 000 and loans for purchasing stock, raw materials and other inputs for business development of up to GYD 35 million. The organization also provides businesses guidance during the loan period (up to 5 years). However, interest rates are considerably higher, standing between 15 percent and 40 percent²⁶.

Inter-value chain finance

Fishery coop societies are supposed to provide financial assistance to their members. However, many of these co-ops are not functioning or on the verge of bankruptcy due to mismanagement over the years. Members can also lend money to the society or other members. If a member lends to the society, they will get discounted landing fees and trucking fees that they normally must pay. Fishers no longer trust these organization due to their bad financial management, lack of accountability and lack of transparency.

2.3.2.3. Non-financial services

Market and product development

The Guyana Office for Investment (Go-Invest) under the Ministry of Business and New Guyana Marketing Cooperation (GMC) under the Ministry of Agriculture are the two main government bodies which provide market information, product development and trade facilitation services to value chain actors. Go-Invest serves as the primary contact for investors, provides information on regulation and incentives, and offers liaising services with government agencies to facilitate investment process. GMC provides a one-stop desk for export documentation for non-traditional agricultural products. They assist business with marketing, new market development, market information, logistics and market research.

Both organizations helped organize trade fairs to raise the profile of Guyana's fisheries. However, there are not many examples of successful fulfilment of buyers' requirements that culminated in long-term trade relationships in the seabob sector. As a result, market information continues to be largely based on personal networks, and there is a general lack of understanding about key export market trends. Developing the capacity of these organisations is critical to facilitating the market and product development in the artisanal and industrial seabob sectors. Some of the immediate market research that is highly needed include:

²⁵ <https://sbb.gov.gy/loans/>

²⁶ <https://ipedgy.com/loans/>

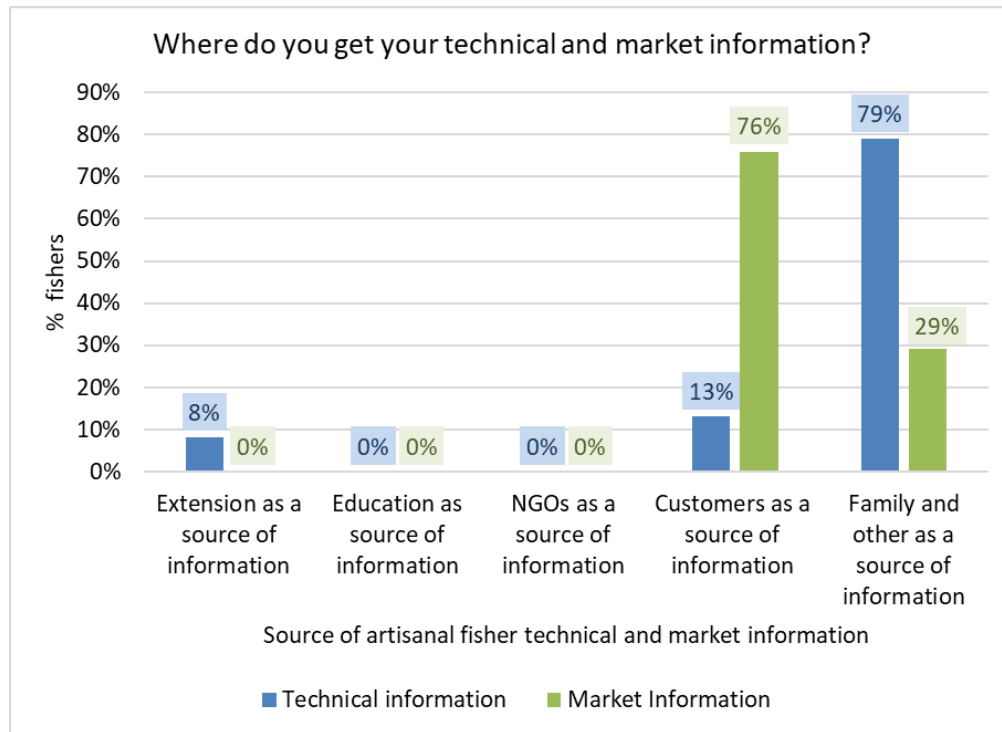
- Market study of consumer and market trends in key seabob export market to develop targeted higher value buyer strategies.
- Domestic market studies to understand market trend, consumer preferences and seabob shrimp local market development.

Currently, there are not any market studies that target the development of local markets. Also, there are not any market studies to guide developing higher value products and develop strategies for product recognition and buyer collaborations in export markets.

Training and extension

Unlike the industrial fishery that keeps records on catch and sales, the artisanal fishery does not. This is partially due to the majority (65 percent) of artisanal fishers having primary education (Survey with artisanal fishers, 2021) and thus having difficulties filling the logbooks, and partially due to the limited technical training that artisanal fishers receive from extension services. Only eight percent of fishers received technical training from extension services and none of the fishers received education or training on market skills. Family and friends, and to a lesser extent, customers, are the main source of technical information for artisanal fishers. Customers are the main source of market information (market trends and prices) for 76 percent of the fishers (Survey with artisanal fishers, 2021). The lack of formal education and training contributes to the lack of organization of artisanal fishers, as well as the lack of certification and lack of development in the whole artisanal fishery. This contrasts with the training that industrial processors have in place to ensure that their operations and products meet standards such as HAACP and MSC.

FIGURE 21. SOURCES OF TECHNICAL AND MARKET INFORMATION FOR ARTISANAL FISHERS



Source: Survey with artisanal fishers in May 2021.

Boat repairs and maintenance

Fishers maintain their boats, pens, engines and nets by themselves and occasionally go to mechanics to repair their engines (Interviews with artisanal fishers, 2021).

2.3.3. The (societal) enabling environment (layer 3)

2.3.3.1. Institutional elements

National regulatory framework

The table below outlines the key policies, regulations, and management plans governing and/or influencing the seabob value chain.

TABLE 8. POLICIES, LAWS, AND MANAGEMENT PLANS OF RELEVANCE FOR THE SEABOB VALUE CHAIN

Policy, Laws, Plan	Strategic Goals	Impact on the seabob VC	Policy gaps
<p>Fisheries Act 2002</p>	<ul style="list-style-type: none"> • Regulate domestic and foreign vessels fishing within Guyanese waters (including the EEZ) • Underline the overall political leadership of the Minister and the Chief Fisheries Officer in matters related to marine fisheries in Guyana • Establish the Fisheries Advisory Committee (FAC) 	<ul style="list-style-type: none"> • Decision-making power of the Minister of Agriculture and Chief Fisheries Officer in regulating entry and requirements in the seabob fishery • Engagement of representatives from the FAC in the management of the seabob VC 	<ul style="list-style-type: none"> • FD offices and staff are limited in number and are not trained in the various field to effectively manage the fishery sector. • The FAC meets regularly to discuss issues raised by the Minister and VC actors. The SWG reports on issues. However, it is not clear how the challenges are addressed. • Consultation and engagement with artisanal fishers are not clear and not streamlined.

<p>Fisheries Regulations 2018</p>	<ul style="list-style-type: none"> • These regulations were made under the Fisheries Act 2002. The regulations include technical measures and schemes to limit entry into fisheries. The primary focus is on addressing foreign and local fishing vessels, fishing gear and equipment, fish aggregating device (FADs), protection of turtles and bycatch (e.g., TED, BRD), vessel monitoring system (VMS), controlled areas, and training and research. 	<ul style="list-style-type: none"> • Technical measures and schemes directly influence and govern entry into the seabob fishery as well as how seabob fishing should be conducted. 	<ul style="list-style-type: none"> • FD offices and staff are limited in number and are not trained to effectively implement the regulations and monitor compliance, as well as to provide technical support (training) for fishers (particular artisanal ones) to comply with the regulations. • Communication with fishers (particular artisanal ones) is lacked and ineffective, further exacerbating the difficulties in implementing the regulations.
<p>Guyana Seabob Fishery Management Plan 2015-2020</p>	<ul style="list-style-type: none"> • Set the framework for the sustainable management and development of the seabob fisheries in Guyana, with the intention to ensure that the fishery meets MSC requirements and to incorporate these requirements into the overall marine fisheries management plan. • Introduced new measures such as trawl zone, closed season, Harvest Control Rule (HCR), by-catch reduction device (BRD), • Endorsed the Seabob Working 	<ul style="list-style-type: none"> • Fishing zone (8 – 18 fathoms) • Closed Seasons (8 – 10 weeks) August-October • Harvest Control Rule: maximum annual effort of 15,000 fleet standardized days at sea, vessel cap of 225 days at sea • All vessels must be equipped with VMS, BRD, TED, cameras • Seabob Working Group as a multi-stakeholder platform to govern the VC • All vessels are equipped with VMS, TEDs, BRDs and cameras 	<ul style="list-style-type: none"> • Management plan has been partially implemented • Only the industrial actors have a closed fishing season • Low capacity to implement and monthly monitor HCR compliance at the Fisheries department • Management overlap in approving fisheries report and lack of capacity at the fisheries department slows communication about the status of the fishery and deploying appropriate actions • Exclusion of the artisanal fishery

	<p>Group as a responsible body for the stock assessment and proposal of management measures</p> <ul style="list-style-type: none"> • Centralized decision-making limited to the Chief Fisheries Officer and the Minister 		
<p>Guyana Seabob Code of Practice (non-statutory)</p>	<ul style="list-style-type: none"> • A standard code of practice for the seabob fishery • Cover vulnerable species and habitats. • Guidance on record keeping and logbooks, avoidance strategies, catch handling practices • Guidance on some health and safety 	<ul style="list-style-type: none"> • All GATOSP members must follow the Code of Practice • All captains working for fishing companies must complete training on the application of the Code • A copy of the Code should be on board each vessel and signed by the captain. 	<ul style="list-style-type: none"> • Lacks implementation strategy and capacity building on fisheries department and fishers' levels • Code of conduct was designed for the captains and not the vessel owners. • Monitoring and enforcement are not clear
<p>Guyana Marine Fisheries Management Plan 2013–2020 <i>(an updated plan for 2022–2027 is being developed)</i></p>	<ul style="list-style-type: none"> • Provide guidance and overall direction (an action plan) for future development of Guyana's marine fisheries. • Focus on five main fisheries in Guyana, namely the industrial fishery (shrimp trawlers targeting seabob and penaeid sheimp), the semi-industrial fishery (targeting red snapper), the artisanal fishery (targeting a wide range of finfish 	<ul style="list-style-type: none"> • The Management Plan sets out various Action plans that directly influence both artisanal and industrial channels in the seabob VC. These includes those action plans related to data collection and management, monitoring, control and surveillance (MCS), and also include a specific action plan for seabob management, a specific action plan the artisanal fishery, and a specific action 	<ul style="list-style-type: none"> • The management plan has been partially implemented. Implementation is weakest with respect to the artisanal sector, mainly due to FD's limited resources, particularly staff, coupled with low technical and financial capacity of artisanal actors.

	species, and targeted and bycatch fishery (yielding various species of sharks from artisanal and trawlers).	plan the industrial fishery.	
Artisanal Fisheries - Guyana's Strategy Framework and Management Plan 2019-2024	<ul style="list-style-type: none"> • This plan was developed to address gaps/weaknesses identified in the Marine Fisheries Management Plan 2013-2020 regarding the artisanal fishery. • Focus on licensing and registration, marine environment, safety and order at sea, dialogue corporation, and coordination and finance for artisanal fishers 	<ul style="list-style-type: none"> • The Management Plan sets out various Action plans that directly influence and provide guidance to development of the artisanal channel in the seabob VC. 	<ul style="list-style-type: none"> • It is still unclear whether the plan will be effectively implemented. Constraints remain related to FD staff and resources and artisanal fishers' capacity. • No mention of activities other than fishing (e.g., fish processing and trading) • No mention of the participation of women and youth in the fishery

Sources: Guyana Fisheries Act 2002; Guyana Fisheries Regulations 2018; Guyana Seabob Fishery Management Plan 2015-2020; Guyana Marine Fisheries Management Plan 2013-2020; Draft Guyana Marine Fisheries Management Plan 2022-2027; Artisanal Fisheries - Guyana's Strategy Framework and Management Plan 2019-2024; Guyana's Fisheries Management Plans Implementation Review in 2020; CANARI (2020).

The Fisheries Act 2002 covers the fishing of all species in Guyanese waters including seabob and sets out basic regulations related to the registration and inspection of fishing boats, licenses for fishing and the exportation of fish and fish products. Seabob, being Guyana's most valuable seafood export, has its own Management Plan which places restrictions on the fishing zones and season, sets Harvest Control Rule (HCR) and outlines the mandatory requirement of by-catch reduction device. The Fisheries Department is in the process of updating the Seabob Management Plan and will incorporate the new HCR (Guyana Fisheries Department, 2021; Seabob Working Group, 2021). The management plan expired in 2020, a joint stock assessment was done with Suriname and a new harvest control rule was developed for the industry (CRFM, 2020).

Some of the issues identified in evaluating the fisheries management and action plans include:

- Relevant regulations, policies and management plans exist; but their implementation is generally weak, particularly with regard to the artisanal sector, due to limited FD's capacity (number of offices and technical staff, finance) coupled with limited technical and financial capacity of artisanal actors.
- Lack of detailed and regular data on catches, fishing effort, bycatch, and seafloor impacts of the industrial trawl and artisanal fleets.
- Lack of an effective communication and engagement strategy to enable and stimulate the participation of VC actors, especially artisanal actors, towards management objectives
- Lack of consideration for other VC actors apart from (artisanal and industrial) fishers, such as seabob processors and market vendors
- Limited consideration for gender equity issues and lack of concrete rules and actions to support women's participation in and benefit from the VC (and fishery in general)

Policy gaps related to the artisanal sector are considerable especially in terms of tracking catch and by-catch, fishing effort, equipment, and data management/documentation. According to a review of the implementation of the Guyana's Fisheries Management Plan 2013–2020 (Fisheries Department, 2020), just around half of all artisanal fishers' vessels are registered and licensing is not consistent. However, among the Chinese seine vessels, the percentage of registered vessels is higher, i.e., 260 out of 305 (or 85%) vessels were registered in 2021 (Pers. Comm. with Fisheries Department, April 2022). This relatively high rate of registration among Chinese seine fishers is partially because these fishers need to license their boats in order to secure their pen spots to capture seabob.

A five-year artisanal fishery management plan has been developed by WWF Guyana towards the end of 2019 and handed over to the Fisheries Department but there is no clear evidence that the plan is being effectively implemented. The marginalization of the artisanal channel is problematic especially since their segment is underdeveloped and lower catches put their livelihoods and food security at risk. There was no evidence of any specific policy response to the COVID-19 crisis to the fisheries sector which further marginalized the fishers (Interviews with artisanal fishers, 2021).

Bilateral/International obligations and trade agreements

Guyana is a signatory to the following international agreements that are of relevance to the seabob VC:

- United Nations Convention on the Law of the Sea (UNCLOS) 1994. A maritime boundary with Suriname has been agreed.

- Port State Measure Agreement (PSMA) to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing 2016. Since the ratification, surveillance and enforcement efforts have increased along the Guyanese coast.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 (CITES), which requires the regulation, control or ban of the import and export of listed species.FAO Code of Conduct for Responsible Fisheries
- International Guidelines on Securing Sustainable Small-Scale Fisheries in the context of Food Security and Poverty Eradication (SSF Guidelines)

In terms of regional frameworks, Guyana is a member of the Caribbean Community (CARICOM) which provided member states with trade privileges and tax exemptions on traded goods including seafood products. Guyana also coordinates its external trade policies with the CARICOM, in accordance with WTO regulations. As such, Guyana is signatory to a range of regional trade agreements such as CARICOM/Costa Rica Free Trade Agreement, CARICOM/Columbia Trade, Economic and Technical Cooperation Agreement, as well as agreements with the Dominican Republic, the Bolivarian Republic of Venezuela, and Cuba related to the elimination of duties or phased reduction of duties on goods.

At the regional level, the Caribbean Community Common Fisheries Policy (CCCFP), drafted and revised by CARICOM governments, is a binding treaty focusing on collaboration of Caribbean countries in conserving, managing and sustainably utilizing fisheries and related ecosystems while supporting the well-being of Caribbean people.²⁷ According to the draft Guyana Marine Fisheries Management Plan 2022–2027, the CCCFP is currently at the stage of legal review prior to ratification.

Under the **Caribbean Basin Trade Partnership Act (CBTPA)**, implemented on 5 October 2000, and due to expire on 30 September 2030, Guyana **enjoys preferential market access to the United States of America** together with several Caribbean countries²⁸. Warm water shrimps, including seabob, from Guyana exported to the US are granted duty-free access (ITC Trade Map, accessed in April 2022). Guyana is also a Commonwealth member state, which provides it with preferential trade and tax exemption privileges to other Commonwealth countries. Guyana is covered by the **CARIBCAN** trade agreement, an economic and trade assistance program introduced by the Canadian Government in 1986, which provides exporters with duty free access to the Canadian market.

²⁷ The Caribbean Community Common Fisheries Policy (CCCFP) Fact sheet and pamphlet, prepared by the CRFM, also available at https://www.cavehill.uwi.edu/cermes/getdoc/d645a4c5-6bae-4a4a-8c7b-ded733b6d1df/cccfp_fact_sheet.aspx and <https://caricom.org/documents/12304-cccf-policy.pdf>.

²⁸ <https://www.cbp.gov/trade/priority-issues/trade-agreements/special-trade-legislation/caribbean-basin-initiative/cbtpa>, particularly Subpart E, 10.222 Definitions, CBTPA beneficiary country; [https://www.ecfr.gov/current/title-19/chapter-I/part-10/subpart-B/section-10.191#p-10.191\(b\)\(1\)](https://www.ecfr.gov/current/title-19/chapter-I/part-10/subpart-B/section-10.191#p-10.191(b)(1)); and <https://www.govinfo.gov/content/pkg/USCODE-2020-title19/pdf/USCODE-2020-title19-chap15-sec2702.pdf>.

In 2018, the 15 states of CARIFORUM – a group of African, Caribbean and Pacific countries - including Guyana and the EU-28 signed an **Economic Partnership Agreement (EPA)**. Under this agreement, Caribbean states enjoy immediate **duty-free and quota-free access to the European Union market** for all goods (with a temporary exception of rice and sugar). Guyanese seabob, therefore, is also exempted from duty when imported into the European Union. Caribbean states have up to 25 years (until 2033) to adjust import tariffs for goods from the European Union under this agreement. The EPA is comprehensive and covers goods, services and trade-related regulations in the areas of competition, innovation and intellectual property, public procurement, and environmental and labor standards. The agreement provides financial support from the European Union to CARIFORUM countries to strengthen the capacity of governments and businesses in the EPA implementation.²⁹

Guyana has several bi-lateral trade agreements with countries in the Americas including Brazil and the Bolivarian Republic of Venezuela which the industrial processors use to buy fuel and operate their vessels.

In addition, Guyana has a trade agreement with China to improve trade and investments between the two countries. Under the Guyana-China Trade Agreement both countries provide each other most-favored-nation treatment (MFN) in areas such as facilitation of trade, custom duties, taxes, import and export regulations, and trade and business licenses³⁰.

2.3.3.2. Organizations and Cooperation

National organizations

The table below lists the main organizations in Guyana that are of strategic relevance to the seabob value chain, along with their mandate and activities. The Ministry of Agriculture, Fisheries Department, assumes the overall leadership in the management of marine fisheries in Guyana.

²⁹ https://trade.ec.europa.eu/doclib/docs/2012/april/tradoc_149286.pdf.

³⁰ <https://www.business.gov.gy/wp-content/uploads/2019/11/China-.pdf>

TABLE 9. NATIONAL ORGANIZATIONS IN THE VALUE CHAIN

National institutions	Roles
Ministry of Agriculture, Fisheries Department	<ul style="list-style-type: none"> Responsible for managing, regulating and promoting the sustainable development of the nation's fishery resources for the benefit of the participants in the sector and the national economy. Registers and provides shrimp fishing licenses, pen licenses, boat registrations Collects monthly fisheries data, prices and publishes fisheries reports
Ministry of Agriculture - New Guyana Marketing Cooperation	<ul style="list-style-type: none"> Promote the cultivation and export of Guyana's non-traditional agricultural crops to Regional and Extra-Regional markets. Assists shrimp producers with finding markets and packaging techniques
Ministry of Public Health – Veterinary Public Health Unit	<ul style="list-style-type: none"> Inspects shrimp products, storage and processing facilities
Ministry of Public Infrastructure – Maritime Administration Department	<ul style="list-style-type: none"> Certifies fishing vessels operating in Guyana's EEZ
Guyana Defence Force – Coast Guard	<ul style="list-style-type: none"> Supports the statutory powers in their mandate and maintains the territorial integrity of Guyana's EEZ and Fisherfolk Participates in enforcement, monitoring and control activities in tandem with the fisheries department
Guyana Police Force – Marine Police Branch	<ul style="list-style-type: none"> Ensures the enforcement of all civil laws within Guyana's territorial zone (12NM) enforcing aspects of the Fisheries Act 2002 Reviews the licenses and permits of fisherfolk who use in Guyana's EEZ Ensures the protection of resources from IUU activities
Ministry of Communities – The Municipal Service Division	<ul style="list-style-type: none"> Each Council is responsible for infrastructure services (roads, bridges, etc.) and market facilities Provides approval for shrimp vending at the different market facilities
Ministry of Natural Resources and the Environment	<ul style="list-style-type: none"> Responsible for the management of natural resources, including marine resources
Guyana Revenue Authority – Customs and Trade Administration	<ul style="list-style-type: none"> Tracks exports, imports and destination of shrimp and shrimp products

Source: Own compilation based on institutional websites and literature review.

Regional organizations

There is a high a degree of regional collaboration in the Caribbean to develop economic opportunities for small island states with small populations. Regional organizations have

been useful platforms to learn and exchange information, as well as formulate harmonized responses to common problems facing the fisheries sector in the Caribbean countries. Guyana, Suriname and Trinidad and Tobago are members of the Coastal Fisheries Working Group and they meet at least twice a year on coastal fisheries issues such as seabob and other groundfish issues (CANARI, 2020; Economic Commission for Latin America and the Caribbean, 2011). The table below presents an overview of the leading organization in the Caribbean active in improving regional fisheries.

TABLE 10. REGIONAL INSTITUTIONS OF RELEVANCE TO THE VALUE CHAIN

Regional Organizations	Roles
Caribbean Regional Fisheries Mechanism (CRFM)	<ul style="list-style-type: none"> • Established in 2003 and headquartered in Belize • CRFM is an inter-governmental organization that promotes and facilitates the responsible and sustainable use of marine and aquatic resources in the Caribbean. • Consists of three bodies: The Ministerial Council, the Caribbean Fisheries Forum, and the CRFM Secretariat • Provides support to member states (national fisheries administrations) in institutional capacity building, knowledge sharing, and advisory services in the development and management of fishery resources
Caribbean Network of Fisherfolk Organisations (CNFO)	<ul style="list-style-type: none"> • Created in 2004 with support from CRFM • Operated as an informal network until registered as an NGO in Belize in 2016 • Builds the capacity of fisherfolks member organisations for the sustainable development of fisheries, improve incomes and empower them to participate in governance and policy formulation • Train fisherfolk leaders in management, communication and advocacy skills, and support members with access to information • Focuses on issues related to food security, livelihoods, ecosystems, and climate change • National Fisherfolk Organization (NFO) in Guyana was relaunched in in 2015 and is a member organization
Western Central Atlantic Fishery Commission (WECAFC)	<ul style="list-style-type: none"> • Established in 1973 with its Secretariat hosted by FAO • WECAFC assists member states in the implementation of FAO Code of Conduct on Responsible Fisheries, the promotion of sustainable small-scale fisheries and cooperation in marine conservation
Centre for Resource Management and Environmental Studies (CERMES) University of West Indies	<ul style="list-style-type: none"> • The Centre promotes and facilitates sustainable development in the Caribbean and beyond. • CERMES focuses on tropical island environmental management and sustainable development in the Caribbean region. • It is a department within the Faculty of Science and Technology on the University of the West Indies (Cave Hill Campus) in Barbados.

	<ul style="list-style-type: none"> • Provides graduate students with advanced training in policies, sustainable use and management of natural resources, research on natural resource and environmental management • Offers consultancy and professional services to regional governments, NGOs and the private sector on environmental matters • Hosts and coordinates regional environmental initiatives and projects • Conducts public awareness campaigns environmental challenges <ul style="list-style-type: none"> • Develops the capacity of private-sector and government decision-makers through short courses and training workshops
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Source: Own compilation based on institutional websites and literature review.

Educational and research institutes and non-governmental organizations (NGOs)

Research institutes and NGOs can play an instrumental role in enhancing knowledge in fisheries, business management and advocate for more inclusive and sustainable practices in the sector. Below are some of the organizations relevant to the development of the seabob VC and the fisheries sector. The table below provides a summary of the leading education and non-governmental organizations in Guyana.

TABLE 11. EDUCATION, RESEARCH INSTITUTES AND NON-GOVERNMENTAL ORGANIZATIONS IN GUYANA

Organizations	Role
University of Guyana (established in 1963)	<ul style="list-style-type: none"> • The Department of Agriculture offers a general BSc in Agriculture that encompasses three major areas: Agronomy, Animal Sciences and Fishery, Aquaculture and Aquaponics • MSc in Agro-technology and Business launched in 2017 • BSc in Food Science and Technology launched in 2019. A multidisciplinary program in agriculture, biology, chemistry, and business to develop the human capital skills needed for food and agrimanufacturing
World Wildlife Fund Guyana (WWF)	<ul style="list-style-type: none"> • WWF promotes sustainable management, biodiversity and conservation through its support of the sustainable fisheries management plans, enforcement capacity of government authorities to combat IUU fishing, expansion of MSC certification and efforts to reduce by-catch of ETP species • WWF was charged with the development of a five-year artisanal fishery management plan, which it submitted to the Fisheries Department for implementation in 2019. The plan included proposals related to the licensing of artisanal vessels, the modification of gears to reduce environmental impact, the introduction of climate-smart fishing practices, amongst others.
Conservation International Guyana (CI)	<ul style="list-style-type: none"> • CI has been working in Guyana since 1989 on species conservation and to set up a national system of protected. • CI has worked with the Fisheries Department on several conservation projects

National Agricultural Research and Extension Institute (NAREI)	<ul style="list-style-type: none"> Government research center of agriculture; however, fisheries is not included in research nor extension.
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Source: Own compilation based on institutional websites and literature review.

Development projects

The table below presents the most recent development projects relevant to the value chain. The FISH4ACP communicated with representatives of the CLME+ representation in Guyana to discuss project synergies. The project team shared GEF Small Grants Programme (SGP) document that FISH4ACP implementation team and expressed interest to collaborate and leverage grants in working with the artisanal fishers and development of the wharfs.

TABLE 12. DEVELOPMENT PROJECTS OF RELEVANCE TO THE VALUE CHAIN

Project title and duration	Brief description	Funding and implementing agencies	Potential link with FISH4ACP
Caribbean Large Marine Ecosystems (CLME+) 2015–2020 https://www.clmeproject.org/	<ul style="list-style-type: none"> Support participating countries from two large marine ecosystems (LMEs) – the Caribbean LEM and the North Brazil Shelf LME - in improving the management of their marine resources through an ecosystem-based management approach (EAF) Address problems of overfishing, pollution, habitat degradation and climate change Address gaps in transboundary and cross-sectoral governance mechanisms that lead to negative environmental impacts Recently completed an ICT project to support fisherfolks to use smart phoned to collect catch data Recently conducted an institutional analysis of artisanal fisheries in Guyana 	<ul style="list-style-type: none"> Co-financed by the Global Environment Facility (GEF). Implemented by the United Nations Development Programme (UNDP) 	<ul style="list-style-type: none"> The project issued grants for the period of 2021–2025 to develop the capacity of Guyana’s artisanal fishery Allocated funds to develop the enabling environment of artisanal fishery Can leverage funds to develop study tours and collaboration between Guyanese fishers and other fishers (e.g., from Belize) Leverage the institutional capacity assessment and incorporate recommendations in the implementation of FISH4ACP

<p>ACP FISH II – Support to update Fisheries Management Plans in Guyana, Suriname and Trinidad and Tobago</p> <p>2009–2013</p> <p>http://acpfish2-eu.org/uploads/com%20products/ACP_Brochure_EN(web).pdf</p>	<p>In Guyana:</p> <ul style="list-style-type: none"> Assisted the fisheries administration of Guyana in reviewing and updating the existing Fisheries Management Plan which covered the period of 2012–2017, as well as built capacity of government staff. Focused on the marine fisheries sub-sector (offshore industrial shrimp trawling, red snapper fisheries, and the artisanal inshore fisheries) 	<ul style="list-style-type: none"> Financed by the European Union Implemented by SOPRECO Consultancy under ACP FISH II 	<p>Fisheries management plans was prepared for the industrial shrimp fishery including prawn and seabob, and the artisanal fishery covering mixed gears and species – predominantly finfish and some shrimp</p>
<p>Sustainable management of bycatch in Latin America and Caribbean trawl fishers (REBYC-II LAC)</p> <p>2015–2020</p> <p>https://www.fao.org/in-action/rebyc-2/en/</p>	<ul style="list-style-type: none"> Operated in six countries: Brazil, Colombia, Costa Rica, Mexico, Suriname and Trinidad and Tobago Aims to support Latin American and Caribbean trawl/shrimp fisheries by making fisheries more productive and sustainable by addressing unsustainable fishing practices and promoting equitable distribution of benefits, supporting policies through improving information on bycatch, strengthening co-management, creating decent employment, reducing discard and promoting utilization of sustainable bycatch. 	<ul style="list-style-type: none"> Co-financed by the Global Environment Facility (GEF). Implemented by FAO 	<p>Potential to apply lessons learned from the implementation of REBYC-II in Latin American and Caribbean countries to the seabob VC in Guyana.</p>

Source: Own compilation based on institutional websites and literature review.

Associations and/or representative bodies of seabob VC actors

In Guyana, participatory management (or co-management) of the seabob fishery exists through the presence of organizations including the Seabob Working Group (SWG), the Fisheries Advisory Committee (FAC), the Guyana National Fisherfolk Organization (GNFO), and fisherman cooperative societies (Inamdar et al., 2019; CANARI, 2020). The table below presents a quick overview of the roles of these bodies in Guyana.

TABLE 13. ASSOCIATIONS AND/OR REPRESENTATIVE BODIES FOR PARTICIPATORY MANAGEMENT IN THE VALUE CHAIN

Associations/ Representative bodies	Roles
Fisheries Advisory Committee (FAC) ¹	<ul style="list-style-type: none"> • Advises the Minister and the Chief Fisheries Officer on: fisheries management and development, fisheries management plan, regional and subregional plans and agreements involving fisheries and development initiatives in the sector • Includes representatives from Fisheries Department, GNFO, Marine Police, Coast Guard, Aquaculture Unit, Environmental Protection Agency (EPA), Veterinary Public Health Unit, inland fisheries representative, SWG, representative of the industrial fishers
Seabob Working Group (SWG) ¹	<ul style="list-style-type: none"> • Oversees the management of the seabob fishery and evaluate the fishery's performance based on the objectives set out by the management plan • Reviews issues in the seabob fishery and provides recommendation to address them • Addresses the MSC certification process and its maintenance • Includes representatives from Fisheries Department, GATOSP, the artisanal channel, NGOs (WWF), private companies, processors and investors
Guyana National Fisherfolk Organization (GNFO) ¹	<ul style="list-style-type: none"> • Is an umbrella organization for primary fisherfolk organisations and fishing cooperatives in Guyana • Facilitates capacity building of members • Advocates for the interests of members and the small-scale fisheries • Promotes sustainable management of fisheries resources • Supports members to process products and access markets • Partners with other fisherfolk organizations in the region, including the CNFO
Fisherman cooperative societies ²	<ul style="list-style-type: none"> • Formed in the 1950s and 1960s, fully established around the 1970s • Supported the development and management of fishing complexes in the 1980s, which provide ice, docking facilities, fuel, market areas and chandleries for the sale of fishing supplies • Represents and advocates for the interests of members and local fishing community • Assists with monitoring fishing efforts and fisheries resources • Facilitates capacity building of fishers

	<ul style="list-style-type: none"> • Promotes sustainable utilization and management of fisheries resources
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Source: ¹ CANARI (2020) pp. 28-31, Ministry of Agriculture (2022) p.20

² Ministry of Agriculture (2022), pp.26-27; CANARI (2020) p.65

The organizations listed in the table above currently exist³¹, thereby allowing artisanal and industrial fisherfolk to participate in and influence decision-making in fisheries to some degree (CANARI, 2020). In particular, the FAC and GNFO are key to ensure the involvement of artisanal fisherfolk in decision-making processes, and to some extent, they have been effective in achieving this objective. According to CANARI (2020), through the representation of the GNFO chairmain in the FAC, the FAC has been effective in brinigng attention to issues faced by artisanal fisherfolk and fishing cooperatives. However, GNFO current faces challenges related to dwindling level of participation and engagement of members, who do not feel that they are benefitting from being part of GNFO (CANARI, 2020). A lot of fishermen cooperatives face similar challenges as the GNFO, which is also largely due to the cooperatives' poor management of fishing complexes (Interviews with GNFO, 2022). As for the SWG, although its membership includes artisanal representatives, artisanal fishers are not well-represented in the SWG, partially because they do not feel that the mandate and role of the SWG are relevant to their issues and livelihoods (CANARI, 2020). These challenges in encouraging and ensuring artisanal fisherfolk involvement in decision-making processes highlight the need to improve GNFO and FAC's strategies in communicating and engaging with artisanal fisherfolk, as well as to strengthen fisherfolk cooperatives's knowledge and capacity, and raise their awareness of the importance of and benefits from effective participation in decision-making through collective action.

Apart from the organizations listed in Table 13, there is also the Artisanal Fisheries Advisory Committee (AFAC) whose mandate is to advise the ministry on issues related to artisanal fisheries. The AFAC should include a representative from each fishermen cooperative. However, due to the dysfunctional cooperatives, the AFAC has not been functional (WWF, 2019).

2.3.3.3. Infrastructures

Ports

Although there are several ports in Guyana, 90 percent of goods are handled at the main port, the Port of Georgetown, located on the north coast, along the East Bank of the Demerara River. The other two ports, New Amsterdam and Linden are small and principally cater to the mining industry (bauxite).

³¹ The FAC had fallen into disarray in the 1990s but has been re-established after the completion of the previous Fisheries Management Plan 2013–2020 FMP. Since 2015 the FAC has been meeting approximately monthly (Ministry of Agriculture, 2022, p.21).

At present, 1 million tons of exports and almost the same amount of imports pass through Georgetown Harbor monthly. The port is run by the Maritime Administration Department (MARAD) under the Maritime Act. Its main responsibilities include registering and licensing ships and pilotage, amongst others. There are a number of independent operators, either public or privately owned, but none provide dedicated container handling facilities.

The decreasing water depth of the port (now only 4.5 meters at low tide), due to siltation brought about by the Amazon River outflows, has become a significant issue. It has limited the accessibility of the port to larger vessels and thus reduced the cargo capacity, which in turn has translated into higher freight rates. In addition, poor services due to lack of or outdated equipment (e.g. cranes), fragmentation of terminals, and poor pilotage and inadequate navigational aids, are some key factors that limit the efficiency of cargo handling at Georgetown Harbor.

The Liner Shipping Connectivity Index (LSCI) based on World Bank data indicates the level of connectivity to the global maritime networks. Guyana together with other Caribbean neighbors have low LSCI scores of Guyana from 2014 to 2019, except for Jamaica, Bahamas and Trinidad & Tobago.

Private wharfs

Three industrial seabob firms have their own ports in Georgetown to land and export seabob (i.e., NHS wharf, PSI wharf and Gopie wharf). Their processing plants are nearby the ports. Each port is exclusively used for the seabob handled by respective company.

The independent trawlers are located at government-owned wharf (Guyana Fisheries Limited wharf), which is close by PSI and NHS wharfs.

Fishing complexes

While the industrial trawlers have their own docks, the artisanal fishers land at fishing complexes. The complexes include landing sites, roads connecting to processors and the markets in Georgetown, processing, and export facilities. Artisanal fishers land at these complexes, offload their capture and sell to buyers. Field research revealed that there are not any assessments of the current state and conditions of the infrastructure supporting the artisanal fishery.

There are an estimated seven fishing complexes in Guyana that range from not functional to working in poor condition (Inamdar *et al.*, 2019; Maison, 2013). The fishing complexes include wharfs, ice services, market infrastructure (tables, stands and covered areas) and some storage (Maison, 2013). Five of these facilities were built about 30 years ago by international development assistance under the Canadian International Development Agency (CIDA). The fisheries cooperatives were envisioned at the time to manage and maintain the complexes through membership dues, and fees paid to access the complex. The cooperatives are now legacy organizations, that are mostly not functioning and have a history of corruption and

financial mismanagement (Industry experts, 2021). Complexes are owned by the Government of Guyana and the Fisheries Department has responsibility of the wharfs and fisher's cooperatives are supposed to pay an annual rent to the Department. It is not clear which organization is accountable and it appears that rent fees are not paid to government (Inamdar *et al.*, 2019).

Interviews with fishers show a high level of dissatisfaction with the deteriorating conditions and security at the wharfs, without running water, electricity and female washroom facilities (see Figure 22). All value chain stakeholders stated that security is a big problem with most of them experienced various crimes including theft (Interviews with artisanal fishers, 2021).

FIGURE 22. SOME FISHING COMPLEXES IN GUYANA



Source: ©FAO/Dawn Maison. Pictures are from Meadowbank Wharf and Rosignol.

In many cases, any attempts by the fishers to voice their concerns to the fisherman cooperatives have not been successful. Cooperatives challenge the fishers' claims without any action to address the site problems. Appeals have also been made to the Ministry of Agriculture for support but there is not any evidence to actions to remedy the situation.

Many artisanal fishers land at informal sites because of the current condition. They land at kokers within their neighborhood where they have easier access to the markets and vendors. The number of these landing sites is unknown and is a concern if left unmonitored (Inamdar *et al.*, 2019).

Roads

Only one-third of the roads in Guyana are paved which is limited to the ones along the coast and the riverbanks. The roads leading to landing sites are unpaved and are in poor conditions due to lack of maintenance and heavy rains.

River crossings are key constraints on the road network. Bridges on the coast are very congested and require upgrading, especially the Demerara Harbour Bridge, built in 1978. The section of the East Bank road between the bridge and Georgetown, where many of the industrial processing plants are located, is even more congested due to the increasing economic and housing activity in the catchment area which it serves.

Markets

The Neighborhood Democratic Council (NDC) is responsible for local administration and management of the municipal markets. Market vendors pay a fee to access the market and have a stand. Weekend fees are higher than weekdays and fees are paid for the daily use of the facilities.

Value chain stakeholders reported that most markets are run-down, the infrastructure is deteriorated, and storage space is insufficient. Lack of ice and water is a problem for market vendors who need these inputs to clean the shrimp and keep it fresh. Lack of onsite ice making facilities and freezers forces the vendors to buy ice from sellers outside of the market at high prices and transport it to the market. As the ice melts throughout the day, it is quite difficult for vendors to leave their stands to buy more ice to keep their shrimp fresh. Vendors drop their prices to sell the shrimp faster as the ice melts or opt to take to dry it at home. Access to clean running water is also limited which makes onsite cleaning of the shrimp challenging. Most market vendors are females and do not have access to bathroom facilities.

Electricity

The electric grid in Guyana is unreliable and costly to maintain due to expensive fuel costs. This in turn negatively affects business operations, especially small and medium businesses. A substantial share of the industrial and business community, especially large companies, needs to generate their own power to secure their electric supply. Guyana developed a Green State Development Strategy to support the development of alternative energy. Solar energy is being deployed for specific purposes such as drying agriculture produce and irrigation systems under the Hinterland Electrification Programme (Guyana Energy Agency, 2021). These projects are quite small and have not expanded to include the fisheries sector and improve access to electricity at the fishing complexes and markets.

Technology

Guyana lags its Caribbean neighbors in terms of telecommunications, with mobile usage standing at 70 percent and internet usage below 40 percent. Internet and broadband infrastructures are concentrated in the coastal regions, and there is a considerable discrepancy between the accessibility of services in the different communities in Guyana, with the interior population much more disadvantaged. Furthermore, while telecommunication services might be present in some communities, there are no outlets or repair shops for telecommunications devices. Even for the coastal areas, access prices are very high. The cheapest plan for broadband home access costs around GYD 10 000 (USD 50), which can rise up to GYD 30 000 (USD 150) for more bandwidth. This is expensive and unaffordable for most of the population.

The Guyana Telephone & Telegraph Co Ltd (GTT) has a fixed line monopoly over the telecom industry. There have been increasing demands for the liberalization and modernization of the sector, which resulted in the approval of a new Telecommunications Amendment Bill in

mid-2017. The Bill aims to help competition in the market to increase the availability and affordability of internet access to support a digital economy.

2.3.3.4. Socio-cultural norms

(Perceived) Gender roles

In small-scale fisheries, traditional division of labour prevails – men seen as fishers and women are responsible for sales, cleaning, and processing of the shrimp. Women are concentrated in post-harvest and traditional processing activities (e.g. drying), and retailing. Some women are boat owners rather than fishers themselves. However, women do get involved in catching fish and seafood using traditional methods near the shore. According to Béné and Merten (2008), female processors and traders tend to earn smaller profit margin than male fishers.

Like other small-scale, artisanal fisheries throughout the world, gender roles in the Caribbean fisheries are established along the lines that recognize most of the activities, rights and responsibilities of men. Much of the work of small-scale fisherfolk, especially by women, is not documented, is not recognized as labour or is unpaid, such as their contribution to constructing or mending fishing gears, sorting and handling of the catch. As cited in the draft Guyana Marine Fisheries Management Plan 2022–2027, persistent gender inequalities prevent women from fully participating in economic and decision making activities, which in turn limits the potential of fisheries sector. In the interviews conducted under the scope of this VC report in 2021, interviewed cottage processors and market vendors, who are mostly women, indicated specific gender-based constraints facing them, including that women are most often not allowed to work on fishing boats, and the different roles between men and women lead to their different pays and incomes. In the industrial sector, women are workers in the processing of shrimp. Women tend to work as operators in processing lines, involved in activities that require attention to detail and smaller hands, such as peeling, de-heading, packing, labelling and cleaning in general. Although women are also increasingly occupying positions characterized by higher education and skills, such as quality control and product development, most of these jobs are still occupied by men.

2.3.4. The natural environment (layer 4)

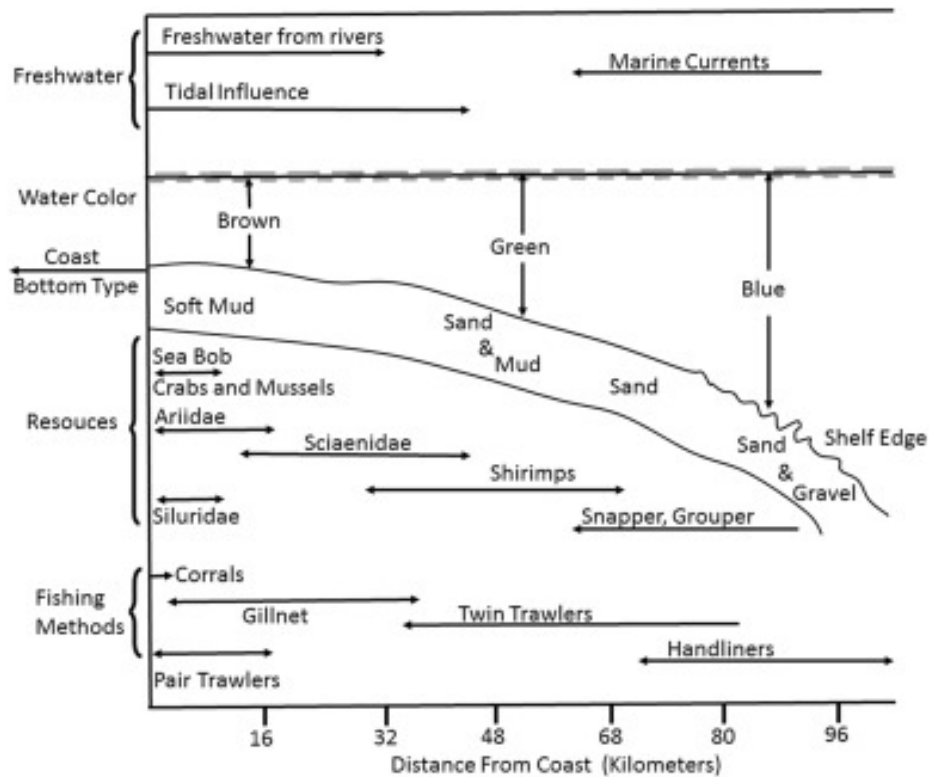
Guyana is bordered by the Atlantic Ocean to the north, Suriname to the east, the Bolivarian Republic of Venezuela to the west, and Brazil to the south and west. The geography of Guyana is defined by five main regions, low coastal plains, hilly sand and clay region, rain forests, and interior lowland savannah. Four main rivers (Corentyne, Berbice, Demerara, and Essequibo) drain the interior of Guyana, bringing nutrients, sediment and freshwater to the coastal plain. The rich marine habitat is fed by these rivers as well as the Orinoco river and the current flowing north-northwest along the Brazilian coast. The exclusive economic zone of Guyana is generated by a coastline of approximately 285 miles (459 KM) that projects seaward to 200 nautical miles into the Atlantic, this constitutes an EEZ of 138,420 km², or a little more than half the size of its total land area (215,000 km²).

Habitat and Biodiversity

The landscape of Guyana is dominated by rain forests which cover approximately 80 percent of the landscape and extend from dry evergreen forests in the south to lowland rainforest in the north. These forests are home to over a thousand species of trees. The tropical climate, varied terrain, relatively intact forest ecosystems are home to over 1 000 species of trees, 814 species of birds and over 1 100 vertebrate species. This means that Guyana has one of the highest levels of biodiversity in the world. In recognition of this rich biodiversity some areas have been set aside as conservation areas, such as the Konashen Community-Owned Conservation Area (COCA), the largest community owned conservation area.

Guyana's marine environment exists within the North Brazil Shelf Large Marine Ecosystem, which lies within the area bounded by the Orinoco and Amazon rivers. During the rainy season is greatly influenced by the heavy sediment load and great discharge of fresh water from these rivers along with the Guyana's Four main rivers (Corentyne, Berbice, Demerara, and Essequibo). The seasonal influx of fresh water affects the salinity and contribute large amounts of sediment and nutrient discharge to the nearshore marine environment. This sediment discharge creates a series of shifting sand bars and mud flats that cover the nearshore shelf to a depth of about 30 meters. At a depth of about 30 meters (40 in some areas) the marine environment on the Guyana shelf is characterised by a shift between coastal and offshore ecosystem (Willems 2018, FAO Country profile FID/CP/CUY November 2005). Accompanying this shift from coastal to offshore the seabed transitions from mud to sand, and then sand and gravel gradually become the dominant seabed substrates in deeper waters (as shown in the figure below, extracted from Isaac & Ferrari, 2017). Corals become prevalent at about 100m in depth. The Guyanese marine EEZ supports a diverse array of other shrimp and prawns, along multiple finfish many of which have long histories of commercial exploitation. Multiple gear types used including bottom longline, trap, pelagic longline, hand line and shark longline gear (Singh et al. 2020).

FIGURE 23. COASTAL AND OFFSHORE ECOSYSTEM IN GUYANA



Source: Chackalall and Dragovich, 1982

The seabob fishery in Guyana is restricted between 8 and 18 fathoms which means that it takes place in a habitat of sand and mud mixture. The brown nearshore waters have a high turbidity and low salinity due to suspension of the muddy deposits and freshwater input of both the Amazon and local rivers. The benthic invertebrate community in this ecosystem, both in Guyana and Suriname, is dominated by seabob shrimp, with few other invertebrate species present on seabob trawling grounds. (Willems, 2018). A range of other fish species are found in the same habitat, recent studies identified 72 other fish species belonging to 36 families in 11 orders (Willems, 2018), of which 10 species accounted for 70 percent of all the fish bycatch.

Impact of sargassum seaweed

A substantial increase in sargassum seaweed has wreaked havoc on Caribbean coasts, with direct impacts on catch rates of commercial fish (including seabob). In 2011 a mass assemblage of *Sargassum natans* (common gulfweed), was reported as having direct impacts to fisheries communities and livelihoods due to entangled lines and nets, difficulties accessing fisheries resources, and direct effects to vessels via the clogging of motor cooling

water intakes, fouling props and creating launching issues (Franks et al 2012). Since 2011 sargassum seaweed mats have increased in density and aerial extent to generate an approximately 9000 km long belt that extends from West Africa to the Caribbean (Wan et al 2019). According to research the blooms disrupt fishing operations through gear entanglement and damage; impeding fishing and other vessels at sea; reducing catches of key fish species and change the availability and distribution of coastal and pelagic fisheries resources. This in turn can disrupt coastal fishing activities and lower catch rates.

Potential impact of climate change

The direct and indirect impacts of climate change in the North Brazil Shelf (and Guyana Shelf) While factors such as wind strength and the intensity of the mixing of surface waters can affect primary production, sea surface temperatures are the principal factor on both the North Brazil Shelf and throughout much of the tropics (Behrenfeld, et al., 2006; Belkin, 2009). As the surface of the ocean warms, it forms a buoyant layer above the denser and more nutrient-rich deep water. The difference in density between the layers prevents the nutrients in the deeper waters from mixing back into the surface water. This impacts the populations of phytoplankton, which require both light and nutrients to develop. The decline in primary productivity is thus linked closely to the rise in global sea surface temperatures, which have risen 0.1 °C per decade since 1901 (Rayner, et al., 2006), primarily, as a result of human activities (Isaac & Ferrari, 2017). If emissions of heat-trapping gases continue, temperatures on the North Brazil Shelf may rise by as much as 2 °C by the end of the twenty-first century (Knutson et al., 2008). This warming will likely affect the maximum fish catch potential by 16–50 percent by the middle of this century (Cheung et al., 2010). Cheung et al. (2013) have predicted that tropical fisheries will lose many of their principal target species over the next 10 or 20 years, as populations migrate to temperate and subtropical waters. Long term changes in rainfall amounts, distribution patterns and timing will also likely Guyanese seabob fisheries. Inland rainfall will particularly affect the artisanal fisheries which operate at the river mouth and rely on outgoing tides to capture seabob, increased discharge may lead to lower catches. Overall abundance and recruitment maybe related to rainfall. Aragão et al (2001) note that in some years, recruitment closely follows patterns similar to those of rainfall for pink shrimp and seabob on the North Brazilian shelf (Isaac and Ferrari, 2017; Shephard *et al.*, 2000).

Impact of oil and gas activities

The discoveries of large oil reservoirs off the coast of Guyana by Exxon Mobil have attracted significant international attention in recent years and fuelled hopes of unprecedented economic growth in the country. Until now, Guyana is one of the poorest countries in the Caribbean and the country had never produced oil. Investments from the oil industry, therefore, are expected to bring employment as well as improve Guyana's infrastructures.

On the one hand, the presence of an oil industry can open considerable opportunities for the fishery sector by increasing local demand through rising incomes of local workers and

an expected increase in the number of foreign workers. Revenues from oil could also be used to develop the agricultural and fishery sector, thereby benefiting artisanal communities that are traditionally dependent on fishing and farming. On the other hand, oil and gas extraction can create tension with coastal communities due to the perceived threat of damage to marine life, intrusion on fishing grounds, altered water quality and seismic activities. In the case of an oil spill, the impact could be disastrous not only for fishermen in Guyana but also in neighbouring countries.

There are concerns regarding the government's capacity to regulate a growing oil and gas industry, and to negotiate with international giants like Exxon Mobil. For example, there are only nine officers technically trained in oil production, engineering and geological research at the Ministry of Natural Resources. There has yet been independent public research into how offshore exploration activities will affect Guyana's fisheries reserves, nor has there been consultation with fisherfolk communities and fishery businesses.

Unique aquatic genetic resources

While Guyana has many endemic fish, these almost exclusively live in fresh and intermittent brackish water marshes. These areas are outside the main fishing area for artisanal and industrial seabob fisheries. One concern would be that if oceanic fisheries resources are depleted the effort could then be shifted to areas with higher rates of endemism.

Qualities and quantities of fish available for capture (current stock rates)

The most recent stock assessment for Guyanese seabob occurred in 2019, using data through 2017 (CRFM2019). This assessment found that Guyana seabob stock is fluctuating at or above the MSY level. The stock is productive, and this has helped it maintain recent catch levels, despite being at approximately 40 percent of the unexploited biomass. The assessment found that in recent years, fishing (seabob) mortality in Guyana has fluctuated around or lower than F_{MSY} . The fishery is fairly well managed and has harvest control rules (HCR) in place to protect the stock from overfishing should large declines in the biomass occur. These management strategies (HCR) are regularly revised and are considered moderately effective, because they have not been in practice long enough to be tested for effectiveness (CFRM 2019).

The Fisheries Department within the Ministry of Agriculture produce interim fishery reports that document the annual catch per unit of effort (CPUE, in units of kilograms per standardized days at sea, i.e. kgs/sdas) from which some information about the status of the stock can be obtained. Annual CPUE reports from 2017, 2018 and 2019 show values of 715, 912, and 573 kgs/sdas, respectively. A total of 87 vessels operated during the year of 2019 and the overall effort (sdas) decreased by 9.5 percent, compared to 2018.

The 2019 annual report notes that 2019 the seabob production in Guyana was influenced by several factors, including an influx of Sargassum weed which extended from February to July. Management measures in 2019 included extending the closed period from 6 weeks to 8.

In 2020 new methodology to calculate the Harvest Control Rule and was adopted, with the use of nominal days at sea (opposed to standardized), thus the 2020 value of 320kg/das is not comparable to the 2019 value. However, the 2020 annual CPUE is approximately 13 percent higher than level that would trigger fishing effort reduction according to the harvest control rule.

Aside from the seabob stock the natural environment supports many species of commercially exploited finfish and other shrimp (e.g. whitebelly, prawns, seatrout, etc.). The sustainability of these species and their relative abundance has in indirect effect on seabob stock as artisanal fishers may switch to or away from targeting seabob as the abundance of these species' changes. Fishery Department statistics indicate that 2019 total production is slightly below the 2011–2019 average, with 2019 artisanal finfish production higher than the 2011–2019 average.

The effect of natural disasters

Guyana lies south of the path of Caribbean hurricanes and in general none is known to have hit the country. However tropical storms with high winds and large accumulations of rainfall are prevalent during the wet season. It is unlikely that natural disasters would significantly disrupt the seabob resource.

2.4. Governance analysis (linkages)

2.4.1. Vertical linkages

The relationship between the industrial exporters and buyers in importing countries appear to be transactional i.e. limited to order taking and fulfilment. There is neither knowledge nor technology transfer between PSI and GII and their buyers. The transactional nature in the relationship suggests that buyers can replace the Guyanese suppliers by others elsewhere.

Noble House Seafoods (NHS) is a subsidiary of Heiploeg Group and must comply with quality requirements and standards established by the parent company. Heiploeg Group has a developed market, its own brand and line of products that it supplies to its buyers globally. Heiploeg's market position and being the lead buyer from NHS provides better market access, information, knowledge transfer and a stable market for NHS.

As for the artisanal channel, transactions are informal. Each actor is responsible for their own product handling and transport, and operates individually instead of in coordination with their buyers or suppliers (e.g., fishers go fishing without knowing how much quantity is

needed by their potential buyers). Fishers sell their catch directly to aggregators, market vendors, processors and consumers at the wharf and they do not have a stable distribution network. Fishers and other actors using the wharf pay a fee to access the site for product sales and purchases. Wharf and market fees are paid to the cooperatives who manage these sites and collect the fees.

2.4.2. Horizontal linkages

In the industrial channel, horizontal linkages between three industrial firms are formalized through the presence of the Guyana Association of Trawler Owners and Seafood Processors (GATOSP) and the Seabob Working Group (SWG). While GATOSP comprises of shrimp trawler owners and processing plant owners, SWG includes representatives from Fisheries Department, GATOSP, the artisanal channel, NGOs (WWF), private companies, processors and investors. These two mechanisms have demonstrated some level of effectiveness in supporting the industrial firms to coordinate their activities and collaborate with policy-makers (Fisheries Department) in the fisheries management to comply with regulations and certification requirements. The MSC certification and export orientation of the sector are the leading incentives behind the firms' cooperation on and adoption of fisheries management measures such as harvest control rules (HCR).

BOX 1. THE SEABOB WORKING GROUP

The Seabob Working Group

- The government prioritized the seabob value chain by setting up the Seabob Working Group in 2012, chaired by the Fisheries Department of the Ministry of Agriculture. It is a public-private partnership and is instrumental in achieving MSC certification.
- The group includes representatives from the processors, the seabob vessels, the artisanal fleet, and NGOs. SWG meets monthly and reviews all fisheries data provided by the Fisheries Department and makes recommendations on the operation of the fishery. The Ministry can accept or reject recommendations by the Seabob Working Group and can unilaterally modify the Management Plan if needed.
- The working group is supported by other departments within the government as well as by the seabob industry stakeholders, providing sector-specific advice to the Minister, particularly by its technical sub-committee.

The **artisanal channel**, however, is fragmented. There is little to no coordination between artisanal actors. Primary fisherfolk organizations (i.e., fisherman cooperatives, or cooperative societies) are the main organizations of artisanal fishers; and their memberships are limited to fishers only (i.e., not including other artisanal actors such as cottage processors and market vendors). Formed during the 1960s-1970s within the context of fishing complex

development, it was expected that fisherman cooperative societies would manage and maintain the fishing complexes that were handed over to them (including provision of ice, fuel, equipment, market areas, and other facilities to support the sales of fishing supplies and products and to reduce post-harvest losses) as well as support the marketing of their members' catch (Ministry of Agriculture, 2022, p.26). Although there has been some progress toward achieving the first objective, no cooperatives have made any progress towards the second. This is partially due to the lack of cold storage and freezing facilities at fishing complexes required for the marketing of products, and partially due to the limited business capacity of cooperatives. Furthermore, there are also issues in the cooperatives' management of fishing complexes, which resulted in degraded quality of many fishing complexes and their facilities. Over time some cooperatives stopped functioning and thus, the management and maintenance of many fishing complexes were halted. Currently in Guyana, there are five active cooperatives who still manage fishing complexes³², but all cooperatives still need capacity building and fishing complexes' facilities need restoration (Ministry of Agriculture, 2022).

Largely due to the ineffectiveness and poor management (particularly financial management) of fisherman cooperatives and lack of communication with fishers, fishermen's trust and interest in joining cooperatives has been dwindling as fishers do not see the benefits of being part of the cooperatives. This is confirmed through the survey with Chinese seine fishers conducted under the scope of this VC report in 2021, with nearly 80percent of the surveyed fishers indicating that they are not part of any association or cooperative.

At the national level, the Guyana Natinoal Fisherfold Organization (GNFO) is the umbrella organization for primary fisherfolk organisations and fishing cooperatives in Guyana. Like the fishermen cooperatives that it represents, the GNFO currently also facts challenges with engagement of membership (Ministry of Agriculture, 2022).

As for other artisanal actors apart from fishers (i.e., cottage processors, market vendors), there is also little to no cooperation among them. Interviews with cottage processors and market vendors conducted under the scope of this VC report indicate that most respondents do not belong to any organization because no organization exists and because there is little willingness to collaborate and coordinate (the actors do not see much benefits in doing so).

³² These include: Upper Corentyne Fishermen's cooperative Society (UCFCS), Three Door Fishermen Coop Society, Rosignol Fishermen's Co-operative Society Limited, Essequibo Island/West Demerara Fishermen's Cooperative Society Limited (Parika), Parika Fishermen Co-operative Society (Ministry of Agriculture, 2022, p.27).

2.4.3. Factors that influence governance

Market power

In the seabob VC in Guyana, the industrial channel contributes almost all of the catch, and thus, is the dominant driver of the whole chain. However, there is little coordination and collaboration between the industrial and the artisanal channels, largely due to industrial firms' having little to no interest in collaborating with (e.g., sourcing from) the artisanal channel. Prior to 2019, the industrial processors leverage aggregators to purchase seabob from the artisanal fishers but did not interact directly with them and maintain an arm's length relation with the artisanal sector. Since MSC certification in 2019, this connection between the industrial and the artisanal channels was stopped and no new type of collaborations has been formed. This lack of coordination between two distinct but related channels in the VC limits the development of the VC, particularly when common issues across two channels such as the sustainability of seabob stock and by-catch can be tackled much more effectively with a higher level of coordination.

Within each channel, the buyers appear to have relatively more power than the sellers of seabob in determining seabob prices. For the industrial channel, this is largely due to the importance of the US and the European Union buyers to Guyanese industrial firms, as opposed to the negligible shares of Guyanese seabob in total imports of warm water shrimps (which include other shrimps apart from seabob) on those markets. For the artisanal channel, the informality of transactions and the lack of cold chain and storage facilities to preserve seabob for a longer time in order to sell at higher prices can be considered two main constraints for artisanal fishers and market vendors when marketing their products.

Trust

There is a low level of trust between artisanal actors, which is largely due to the past and current experience related to the dysfunction of cooperatives and which in turn discourages actors's engagement and participation in any forms of associations or groups. Between artisanal and industrial actors, the level of trust is also low due to the lack of interactions between them. With the government, the artisanal fishers' interactions are limited to licencing and registration. The fishers and other artisanal actors are marginalized from policy making, do not receive training and do not receive government support. Consequently, artisanal actors have low level of trust in policy makers and avoid interacting with the government all together.

3. Sustainability assessment

3.1. Economic analysis (Economic snapshot)

The economic analysis of the seabob value chain is based on several assumptions as follows:

- Estimate of seabob as a percentage of all the income of VC actors (see Table 14). The estimates are based on field economic interviews with VC actors, which were then validated with Fisheries Department reports.

TABLE 14. ESTIMATED SHARES OF SEABOB IN VC ACTORS' OPERATIONS

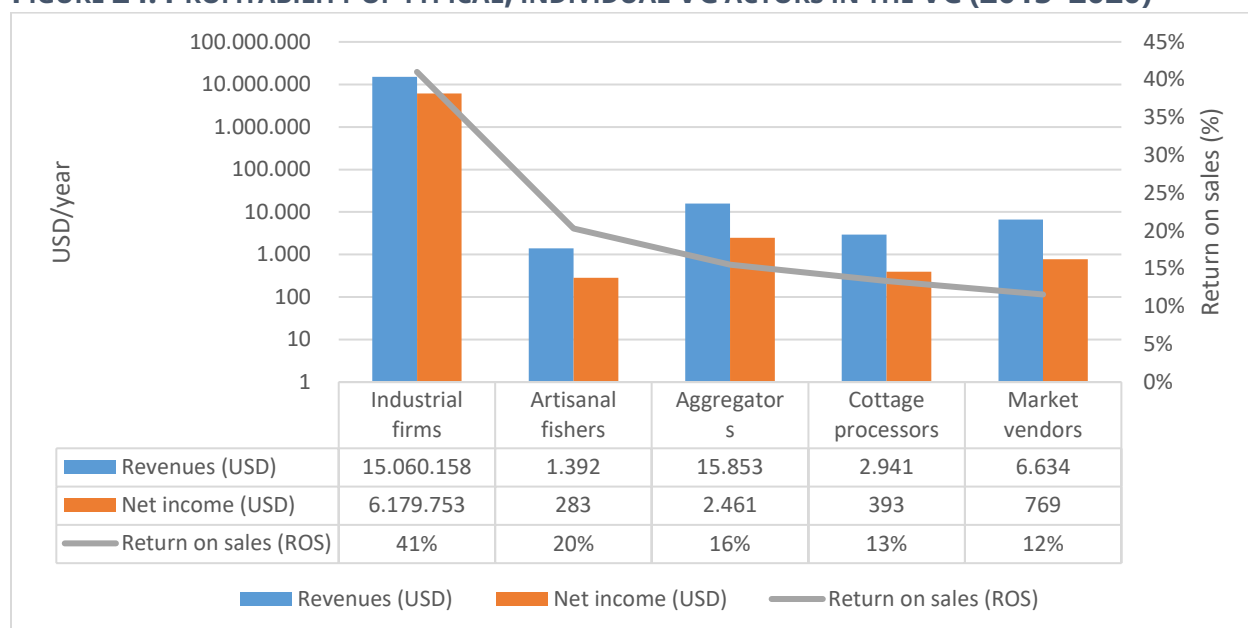
	Industrial firms	Artisanal fishers	Aggregators	Cottage processors	Market vendors
Share of seabob	100%	10%	50%	30%	40%

- Quantities traded and prices are based on the production quantities reported by the Fisheries Department (through annual reports and personal communication with FD officers) and field economic interviews with VC actors.
- The flows of VC products along the VC are based on field economic interviews with VC actors
- The artisanal channel is informal and almost all actors, did not report tax payments.
- Labour data are based on field economic interviews with VC actors

3.1.1. Profitability

The operating accounts of VC actors were developed based on various data obtained from economic interviews with VC actors as well as literature review (e.g., Fisheries Department data/report). An overview of the VC actors' profitability is provided in Figure 24. The figure presents the average annual revenue, net income, and return on sales (RoS, or net income over revenue) for a typical, individual VC actor along the seabob value chain in Guyana during 2015–2020.

FIGURE 24. PROFITABILITY OF TYPICAL, INDIVIDUAL VC ACTORS IN THE VC (2015–2020)

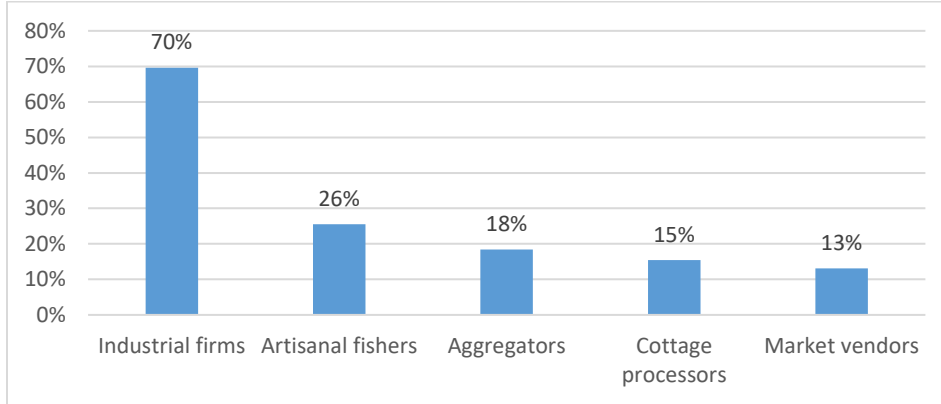


Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

The figure shows the greater operational efficiency of industrial firms, as showed through higher level of RoS (or profit per unit of sales), as compared to the artisanal actors. The high level of profitability of industrial firms can be attributed to several factors, including: (i) the firms are vertically integrated (including fishing, processing, and exporting functions), which allows them to improve the operational efficiency more easily than when having to coordinate with external suppliers, (ii) the firms target export markets in the United States of America and the European Union, which offer higher prices per unit than domestic buyers, and (iii) the larger volumes of seabob that the firms handle provide them with better cost efficiencies and economies of scales.

In the artisanal channel, artisanal fishers have the lowest net income, but their RoS is the highest. This is due to the relatively low cost per unit of good sold of fishers as compared to other artisanal actors. Figure 25 on returns on investment (RoI), or net income over costs, confirms similar findings. The least profitable segment of the VC are cottage processing and market vendings, with cottage processors and market vendors, who are mostly women, having the lowest RoS and RoI.

FIGURE 25. RETURN ON INVESTMENT (ROI) OF TYPICAL, INDIVIDUAL VC ACTORS (2015–2020)



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

For VC actors in both channels, labour are among the highest operating costs. For industrial firms and artisanal fishers, fuel is another main cost. For other artisanal actors (aggregators, cottage processors, and market vendors), the cost of purchasing seabob makes up the biggest share in total costs.

TABLE 15. MAIN COSTS FOR VC ACTORS

Main costs (as % of total costs related to seabob)	Industrial firms	Artisanal fishers	Aggregators	Cottage processors	Market vendors
Fuel	35%	30%			
Labour	12%	57%	20%	25%	27%
Seabob			73%	56%	61%

Note: (1) The table shows the shares of the main cost items as a percentage of total costs related to seabob. For artisanal actors, the total costs of all their business activities include more than just seabob-related costs. (2) For industrial firms, direct tax on gross income makes up 47% of their costs. Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

Based on the scoring guidance of FISH4ACP methodology³³, the profitability indicators of the VC are assessed as below:

- *Net income*: Not concerning (green) because all VC actors have positive profits.
- *Trend in net income*: Concerning (yellow) because the net profits of all VC actors decreased compared to preceding years due to declining catch.

³³ A score 1 – 3 (corresponding to red (1), yellow (2) and green (3)) is provided to each economic indicator, with 1 (red) means highly concerning, 2 (yellow) means concerning, and 3 (green) means not concerning.

- *Return on sales (RoS)*: Concerning (yellow) because two out of five VC actor types have RoS around the cost of capital, or the lending interest rate in Guyana (i.e. in 2020, lending interest rate was 9.5 percent, and real interest rate, when adjusted for inflation, was 48.5%³⁴).
- *Return on investment (RoI)*: Concerning (yellow) because two out of five VC actor types have RoI around the cost of capital, or the interest lending rate in Guyana.

3.1.2. Employment

Table 16 presents the number of jobs, or the numbers of workers, across all functions in the VC. Industrial firms contribute the highest share (nearly 50 percent) of all the jobs in the core VC, followed by artisanal fishers and market vendors who generate jobs for around 490 and 320 people respectively. The numbers of jobs at the aggregation and cottage processing stages are low because of the small numbers of aggregators and cottage processors as compared to other artisanal actors. The VC is dominated by men, with women being involved in only processing and retailing activities taking place at industrial firms and the businesses of cottage processors and market vendors. No women are hired by artisanal fishers and aggregators (although there are a few women who are boat owners, they do not participate in fishing activities).

TABLE 16. NUMBER OF JOBS (WORKERS) IN THE VALUE CHAIN

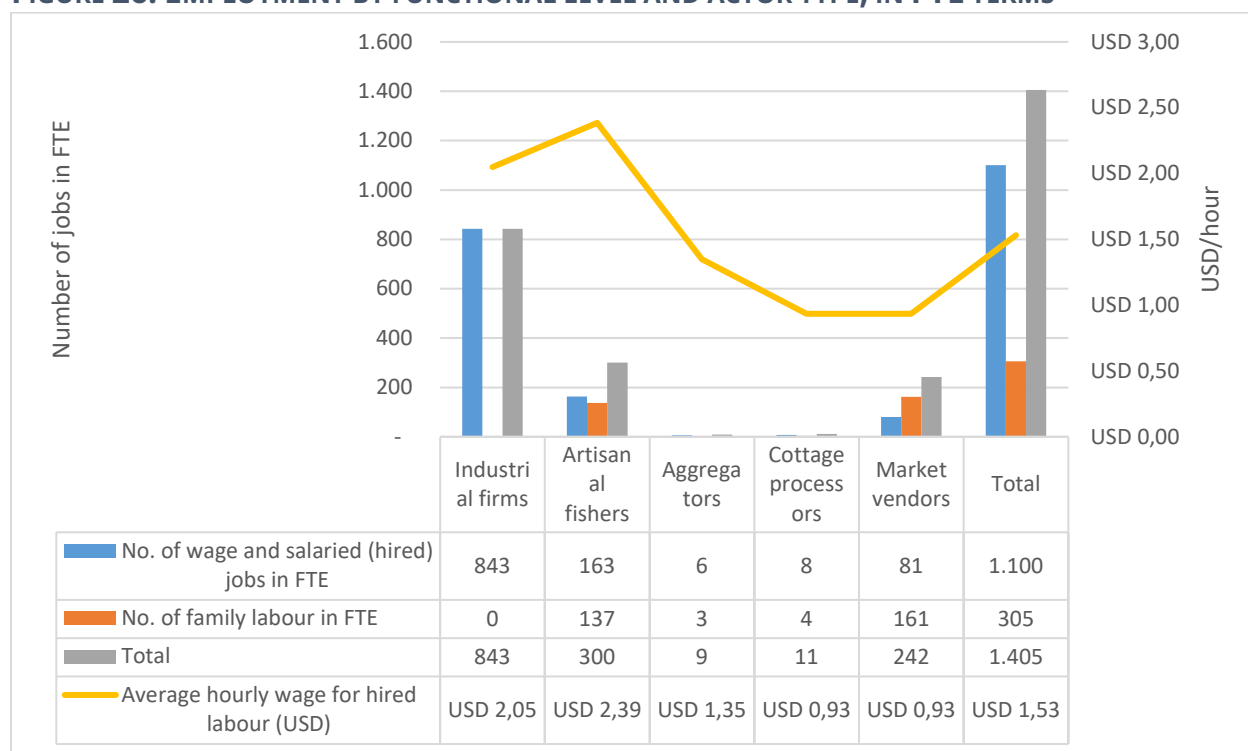
	Industrial firms	Artisanal fishers	Aggregators	Cottage processors	Market vendors	Core VC
Number of jobs, incl. family labour	798	488	12	27	321	1 646
Of which, women share	39%	0%	0%	67%	100%	39%
Number of jobs for women	310	0	0	18	321	649

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

Figure 26 summarises employment by functional level and actor type, in fulltime equivalent (FTE) terms (i.e. working 8 hours/day for 230 days/year). Two kinds of jobs are distinguished: wage and salaried jobs (or hired jobs) are jobs for the workers hired by VC actors, and jobs for the family members of the VC actors. Both kinds of jobs are remunerated, but only the wages of the hired workers are depicted in the figure because family labour wages are considered as a less precise indicator of employment conditions in the VC.

³⁴ Lending interest rate (%) – Guyana (retrieved from <https://data.worldbank.org/indicator/FR.INR.RINR?locations=GY> on May 2022), and Real interest rate (%) – Guyana (retrieved from <https://data.worldbank.org/indicator/FR.INR.RINR?locations=GY> on May 2022)

FIGURE 26. EMPLOYMENT BY FUNCTIONAL LEVEL AND ACTOR TYPE, IN FTE TERMS



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

There are approximately 1 100 jobs in FTE along the VC, with most (77 percent) of the jobs being created by the three industrial firms, followed by artisanal fishers and market vendors (around 15 percent and 7 percent respectively). The number of FTE jobs (in Figure 26) are lower than the number of jobs (in Table 16) because almost all the jobs in the artisanal channel are not full-time (8 hours/day in 230 days/year), as opposed to the jobs in industrial firms which require around 8 working hours or more per day.

The average hourly gross wages for hired workers ranged from USD 0.93 to USD 2.39. All industrial workers earn higher than the national minimum wage (USD 1.3/hour)³⁵, while for artisanal workers, the processing and market vending workers, who are mostly women, earn lower than minimum wage. Fishing workers, who are men and employed by either artisanal fishers or by industrial firms, earn the highest pay. It should be noted that the wage of industrial workers as indicated in Figure 26 is the average of the wages for all workers, including fishing, processing and support staff (e.g., mechanic), and that if considering fishing alone, the fishing workers in industrial firms (i.e., trawler crew) earn slightly higher than artisanal fishing workers. In contrast, the female workers employed by cottage processors and retailers have the lowest pay. In industrial firms, women are only hired for processing and get paid less than their male counterparts, who are involved in fishing and other

³⁵ <https://guyanachronicle.com/2022/01/08/tripartite-committee-agrees-to-60000-as-new-national-minimum-wage/>

supporting and/or management tasks. The differences in roles and pays between male and female workers in both channels, as well as the lowest profitability levels of female VC actors (who are cottage processors and market vendors, as discussed in section 3.1.1), raise concern about the limited economic opportunities for women in the VC.

Based on the scoring guidance of FISH4ACP methodology, the employment indicators of the VC are assessed as below:

- *Number of jobs expressed in FTE term (in the core VC)*: Not concerning (green) because the number of jobs is nearly four times higher than the number of actors.
- *Number of fulltime jobs (in the core VC)*: Concerning (yellow) because fulltime jobs account for around 48 percent of all jobs and because of the prevalence of parttime employment in the artisanal channel.
- *Number of wage or salaried jobs (in the core VC)*: Not concerning (green) because over 50 percent of all the jobs are wage or salaried jobs.
- *Average gross wage paid to hired workers*: Concerning (yellow) because the workers hired by two out of five VC actor types earn lower than national minimum wage; but the average hourly wage at VC level (USD 1.53) is more than 10 percent higher than the minimum wage level (USD 1.3/hour).
- *Total value of net wages*: Concerning (yellow) because the total value of net wages of all workers in the VC makes up 10 percent of direct value added.

3.1.3. Value added

The (financial) value added is assessed at two levels: (i) the *direct value added*, which includes net profits (after taxes) for VC actors, net wages for their workers, and government revenue in the form of taxes and fees, and (ii) the *indirect value added*, which is embedded in the domestic goods and services that the VC actors purchase from outside of the core VC.³⁶ The generation of direct value added, the distribution of this value added, and the total value of outputs (i.e., total revenues) are therefore calculated from the operating accounts of the core VC actors and are summarized in Table 17 and Figure 27 below.

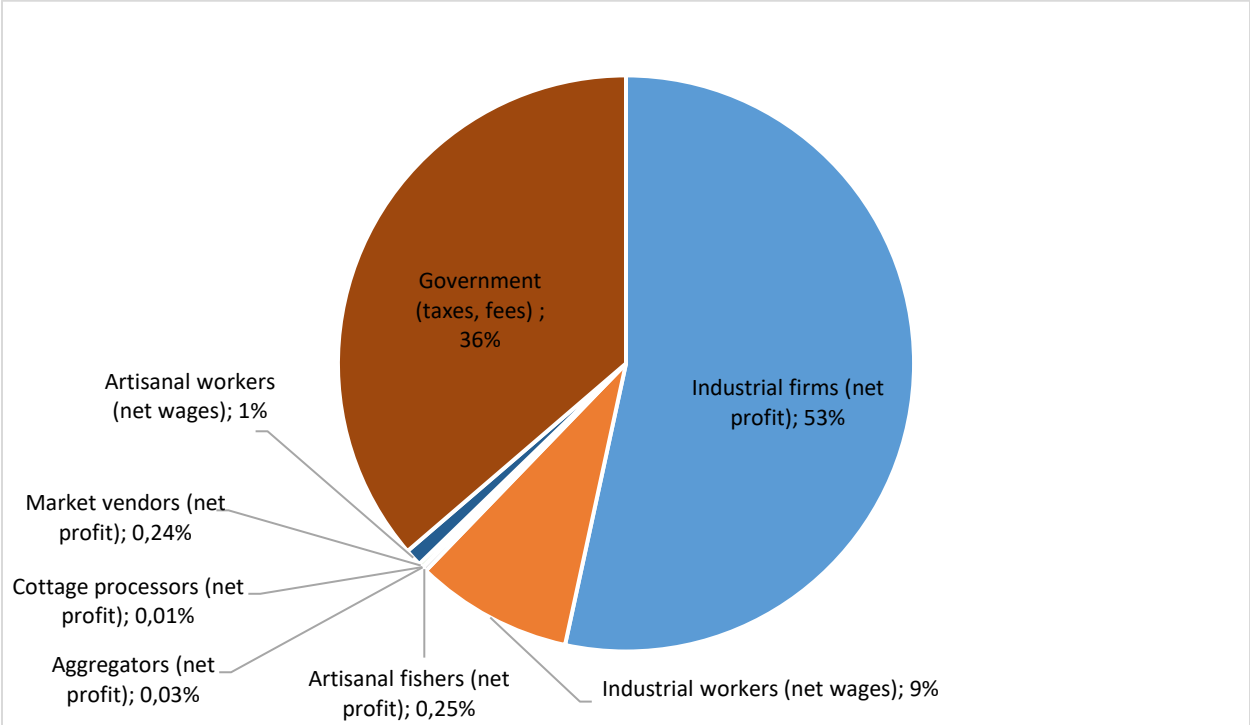
³⁶ FISH4ACP full methodological guide.

TABLE 17. GENERATION OF DIRECT VALUE ADDED (NET PROFITS + NET WAGES + TAXES/FEEES) AT VC LEVEL (2015–2020)

	USD/year	Contribution to direct value added (%)
Industrial firms	34 202 791	98.5%
Artisanal fishers	242 493	0.7%
Aggregators	20 729	0.1%
Cottage processors	6 124	0.0%
Market vendors	248 649	0.7%
Total direct value added	34 720 786	
Total value of output (i.e., total revenues)	46 404 655	
Direct value added as proportion of outputs	75%	

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

FIGURE 27. DISTRIBUTION OF DIRECT VALUE ADDED CAPTURED BY CORE VC ACTORS, THEIR WORKERS, AND THE GUYANESE GOVERNMENT (2015–2020)



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

Almost all of the direct value added in the VC is generated by industrial firms while the artisanal sector (from fishers to market vendors) contributes less than 2 percent (Table 17), which is reflective of their catches as a share of national seabob catch. As they generate the most value added, industrial firms also capture the largest share (53 percent) of the generated value added in the form of net profits for the companies. Meanwhile, artisanal actors and their workers altogether capture the smallest share, which is 1.5 percent of the value added in the form of net profits and net wages (Figure 27). Within industrial firms, the distribution of value added shows big differences between the wages for the workers and the corporate profit captured by companies’ owners, with the former being five times less than the latter. The government captures around one-third of the generated value added in the form of direct tax on revenue and fishing licenses paid by industrial firms. In other words, from the perspective of the firms, these tax/fee is considered as a cost; but from the perspective of the society, they are considered as part of direct value-added from the VC to the society. This helps to explain the high share of direct value added as a proportion of total output (revenues) of the whole VC (i.e., 75 percent, as per Table 18).

The indirect value added is calculated by summing up the costs of *domestic* goods (inputs) and services in operating accounts of core VC actors. According to the FISH4ACP

methodology, only the indirect value added for cost items that represent at least 20 percent of the total cost is taken into account. In the seabob VC in Guyana, this means only the costs of physical inputs other than raw materials (seabob) such as fuel for artisanal fishing, salt for artisanal processing³⁷ and so on, are considered as part of indirect value added. Based on economic interviews with VC actors in 2021, the indirect value added of the VC is estimated at around GYD 21 million, or over USD 100 000³⁸ per year, and all the indirect value added is derived from the artisanal channel because industrial firms import their inputs (source directly from foreign suppliers).

The total value added of the VC equals the sum of the direct value added and the indirect value added, and is presented in Table 18. As the table shows, almost all of the value added in the VC is direct value added generated by VC actors. This implies the low contribution of input and support service providers in generating value in the VC, which is reflective of the underdeveloped situation and/or low performance of support service provision in the VC (as discussed in section 2.3.2).

TABLE 18. TOTAL VALUE ADDED IN THE VALUE CHAIN

	USD/year	Share in total value of output
Direct value added	34 720 786	74.8%
Indirect value added	104 866	0.2%
Total value added	34 825 652	75%

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

Based on the scoring guidance of FISH4ACP methodology, the value-added indicators of the VC are assessed as below:

- *Direct value added*: Not concerning (green) because direct value added makes up over 25 percent of the total value of output at VC level.
- *Indirect value added*: Highly concerning (red) because indirect value added less than 5 percent of the total value of output at VC level.
- *Total value added*: Not concerning (green) because total value added makes up over than 35 percent of the total value of output at VC level.

3.1.4. Effects in the national economy

The effects of the value chain on Guyana’s national economy can be assessed mainly in terms of the value chain’s contribution to national GDP, the balance of trade, and public funds.

³⁷ Artisanal fishers buy fuel and other inputs from local suppliers in Guyana (who are often fisherman cooperatives) – these inputs, hence, are considered as indirect value-added of the VC. Meanwhile, industrial firms import their own fuel and other inputs – these inputs, hence, are not considered as indirect value-added as they are sourced directly from abroad.

³⁸ See Table 54Table 54 in Annex 3 for more details.

The **contribution of the VC to national GDP** is calculated as the share of the total value added in the VC in the national GDP. As such, during 2015–2020, on average the VC contributed around 0.8 percent to national GDP, around 3.4 percent to national agricultural GDP, and around 64 percent to national fisheries GDP.³⁹ Although for the whole economy, seabob VC's contribution is negligible, the high share in national fisheries GDP shows the importance of seabob VC to Guyana's fisheries sector.

The **net impact of the VC on Guyana's balance of trade** is calculated by subtracting the value of imports of seabob and of intermediate consumables (i.e., goods and services) from the value of exports of seabob products. In the seabob VC in Guyana, imports of seabob are not officially recorded, while imports of intermediate consumables mainly consist of fuel imported by industrial firms. The net impact of the VC on national balance of trade is therefore positive and is summarized in the table below.

TABLE 19. THE VC'S CONTRIBUTION TO THE BALANCE OF TRADE (2015–2020)

	GYD/year	USD/year
Exports of peeled seabob	2 818 924 617	14 049 594
Imports of inputs (fuel)	1 865 961 300	9 300 000
Net impact on the balance of trade	952 963 317	4 749 594

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

The rate of integration⁴⁰ of the VC is calculated based on the FISH4ACP methodology and equal 91 percent.

The **contribution of the VC to public funds** is calculated by deducting from the government's revenues collected from the VC the government's expenditure spent on the VC. In the VC, government's revenues are mainly derived from direct tax on revenue and fishing licence fees paid by industrial firms to the government. Government's expenditure on the VC is estimated as a proportion (around 30 percent) of government's expenditure on fisheries and aquaculture sector. The net impact of the VC on public funds is therefore positive (making up 1 percent of government revenue in 2020) and is summarized in the table below.

³⁹ See Table 51 in Annex 1 for national GDP figures during 2015–2020.

⁴⁰ Calculated as $100 * (\text{total value added} / (\text{total value added} + \text{imported consumables}))$, expressed as a percentage

TABLE 20. THE VC'S CONTRIBUTION TO PUBLIC FUNDS (2015–2020)

	GYD/year	USD/year
Government revenue from VC	2 528 300 455	12 601 116
Government expenditure for VC	87 714 000	437 169
Net impact on public funds	2 440 586 455	12 163 947
Contribution to government revenue in 2020		1.0%

Source: Own analysis based on economic analysis and Ministry of Finance (2021) report.

Based on the scoring guidance of FISH4ACP methodology, the indicators related to the effects of the VC in the national economy are assessed as below:

- *Contribution to trade balance*: Not concerning (green) because the VC's net impacts on Guyana's balance of trade is positive.
- *Rate of integration*: Not concerning (green) because the VC's rate of integration is more than 50 percent.
- *Public finances impact*: Not concerning (green) because the VC's net impacts on public funds is positive.

3.1.5. International competitiveness

Guyana is not a seabob shrimp importer. The country is the leading supplier globally for the seabob shrimp. The VC, therefore, is considered internationally competitive.

3.1.6. Value for end-consumers (domestic)

Number of annual food safety violations recorded in the VC

Interviews and consultations with VC stakeholders indicate that no official records are kept for food safety violations in the VC. However, consultations also suggest that food safety and quality in the VC need to be improved.

Consumer evaluation of seabob products

As showed from Table 3 in section 2.2.3, consumer evaluation of the VC products varies according to product types. When asked to evaluate different seabob product types based on selected criteria (including price, health benefits, convenience for food preparation/purchase, quality, taste, and seabob as part of popular dishes), consumers provided very positive ranking for fresh seabob, with fresh peeled seabob being more preferred than unpeeled one. However, dried seabob, either unpeeled or peeled, are the least preferred (most consumers having rather negative or very negative perception of this product type). Frozen peeled seabob received mixed evaluation results, with roughly similar numbers of responses for “very negative” and “neutral”. Given that most of the seabob products available on domestic market are fresh peeled seabob (seen from VC map), it can be inferred that in general, domestic consumers’ evaluation of the VC products is either positive or very positive.

Consumer preference for seabob products

In the survey conducted under the scope of this VC report in 2021, consumers were asked to evaluate the attractiveness of specific products in relation to similar products. The table below shows the most frequent responses and the shares of consumers indicating those responses.

TABLE 21. CONSUMER EVALUATION OF SEABOB PRODUCTS AND SUBSTITUTES

Product	1 (most attractive)	2	3	4	5 (least attractive)
Seabob			X 35.8%		
Whitebelly shrimp				X 33.1%	X 31.1%
Other types of shrimps					X 43.2%
Fish		X 64.4%			
Meat	X 76.4%				

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

Among different kinds of shrimps, seabob is considered the most attractive by consumers. However, when compared to fish and meat, seabob is less attractive to consumers. The attractiveness of seabob compared to its substitute, therefore, is rated as medium.

Based on the scoring guidance of FISH4ACP methodology, the indicators related to the value for end-consumer (domestic) are assessed as below:

- *Food safety violations*: Concerning (yellow) because there are some concerns about food safety in the VC.
- *Consumer evaluation*: Not concerning (green) because the VC products are perceived positive by consumers.
- *Consumer preference*: Concerning (yellow) because the VC products are less preferred than fish and meat, but more preferred than other shrimps.

3.1.7. Economic analysis overview

Based on the analytical assessment of economic performance as discussed above, and using the FISH4ACP economic picture tool, an overview of economic performance for the seabob value chain in Guyana is provided in Table 22 and

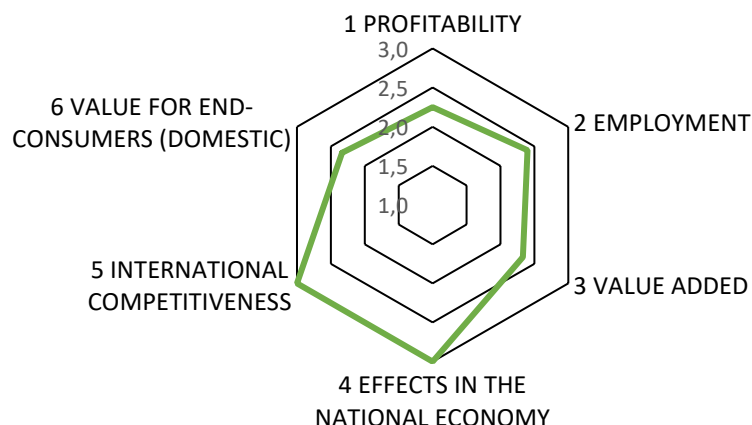
Figure 28 below. A score in the range 1 – 3 (with 1 being “highly concerning” (red), 2 being “concerning” (yellow), and 3 being “not concerning” (green)) is given to each sub-domain of the six economic sustainability domains (i.e. profitability, employment, value added, effects in the national economy, international competitiveness, and value for end-consumers).

TABLE 22. ECONOMIC SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN

1 PROFITABILITY		
Net income	3	Not concerning
Trend in net income	2	Concerning
Return on sales	2	Concerning
Return on investment	2	Concerning
Average	2.3	Concerning
2 EMPLOYMENT		
Number of jobs in FTE	3	Not concerning
Number of fulltime jobs	2	Concerning
Number of wage labour jobs	3	Not concerning
Average wage for hired workers	2	Concerning
Total value of net wages	2	Concerning
Average	2.4	Concerning
3 VALUE ADDED		
Direct value added at VC level	3	Not concerning
Indirect value added at VC level	1	Highly concerning
Total value added	3	Not concerning
Average	2.3	Concerning
4 EFFECTS IN THE NATIONAL ECONOMY		
Contribution to trade balance	3	Not concerning
Rate of integration	3	Not concerning
Public finances impact	3	Not concerning
Average	3	Not concerning
5 INTERNATIONAL COMPETITIVENESS		
International competitiveness	3	Not concerning
6 VALUE FOR END-CONSUMERS (DOMESTIC)		
Food safety violations	2	Concerning
Consumer evaluation	3	Not concerning
Consumer preference	2	Concerning
Average	2.3	Concerning

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

FIGURE 28. ECONOMIC SUSTAINABILITY PERFORMANCE DIAGRAM OF THE VALUE CHAIN



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

TABLE 23. KEY ISSUES, RECOMMENDATIONS AND MITIGATION MEASURES - ECONOMIC SUSTAINABILITY

Key Issues	Main Recommendations
<ul style="list-style-type: none"> Declining revenue due to declining catch Low profitability of artisanal actors, particularly cottage processors and market vendors Wages lower than national minimum for workers hired by cottage processors and market vendors Low level of indirect value added due to underdeveloped support service provision Competition with substitute products such as meat and fish 	<ul style="list-style-type: none"> Conduct a study to understand the reasons for declining catch and identify solutions Provide support to artisanal actors to improve their techniques/practices and enhance linkages to higher-value markets Provide support to input/service providers (particularly at landing sites/wharfs) to improve the quality of their services Conduct market studies to verify the potential and requirements on domestic and export markets
Main Risks	Mitigating Measures
<ul style="list-style-type: none"> The trend of declining catch may continue Competition on export and domestic markets may increase, especially as more substitute products are available 	<ul style="list-style-type: none"> Support / improve fisheries data collection efforts for stock assessment and monitoring, utilize updated data to revise fisheries management policies as needed, and support VC actors to better comply with regulations Develop and/or strengthen the selling point of Guyanese seabob as sustainably captured seabob through maintaining MSC certification Support artisanal actors to improve their skills and efficiency of operations to enhance their product quality

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

3.2. Social analysis (Social profile)

3.2.1. Inclusiveness

Wage and employment distribution

As discussed in section 3.1.2, it is estimated that there are nearly 1 700 people employed in the VC, either as wage and salaried labour (hired labour) or family labour. However, due to the prevalence of parttime employment in the artisanal channel, there are just over 1 400 jobs in FTE terms. Given their bigger scale as compared to artisanal actors, three industrial firms contribute 60 percent of the total number of FTE jobs in the core VC. All of the jobs in industrial firms are for hired labour, whereas in the artisanal channel, family labour makes up the majority (54 percent of all FTE artisanal jobs). Notably, family labour is most dominant in market vending businesses, which involve mainly women. Because of the high numbers of artisanal fishers and market vendors, most of the artisanal jobs are generated by fishers and market vendors, while cottage processors and aggregators employ few numbers of people, which reflects both their small number (4 aggregators and 9 processors) and their small scale of operation. More detailed numbers related to employment distribution in the VC is provided in Table 55 in Annex 3.

General characteristic of workers

Responses from the workers' survey suggest that there are nearly 30 different types of jobs across the different value chain segments (e.g. artisanal fishers, trawlers owners, captains, industrial processing workers, artisanal processors, market vendors, cleaners, shrimp pickers/cleaners). This is wider for industrial actors where there are HR managers, marketing/sales, drivers, merchandisers, cleaners, administrators, and board of directors.

While the findings show that most persons are employed from nearby communities, the data show that 83 percent are from regions 3 and 4, with the remaining persons coming from regions 5 and 6, which are 13 percent and 4 percent respectively. This is consistent with the population distribution for Guyana (see National Population Summary⁴¹, Government of Guyana, 2012). The census report shows that the majority of Guyana's population reside in the coastal regions of 2, 3, 4, 5 and 6, with the largest distribution of the population in Region 4 and Region 6 respectively. The least populated Region was found to be Region 8.

In terms of ethnic distribution, the data also show that the sector hires mostly persons of East Indian descent at about 65 percent, followed by persons of Afro-Guyanese (15 percent) and mixed heritage (13 percent). Indigenous people (Amerindians) are not at all represented, with only one worker from the survey. At a general level this is not reflective of the distribution for ethnic groups in Guyana, which include Africans, Amerindians, East Indians, Chinese, Mixed, Portuguese, European, other. Further, the 2012 census shows that persons

of African descent form the highest populations of persons in region 4, which constitutes 13 percent more than the second group, which remains their East Indian counterparts. The opposite exists for region 3, where persons of East Indian descent form the highest populations, which is three times that of the Afro-Guyanese group.

In terms of age, the industrial workers survey show that highest frequency of workers falls between 30 – 55 years of age. With 57 percent of the population (449,970) falling between age 20 and 64, the age distribution remains consistent with that of national trends for Guyana.

Value added distribution

As discussed in section 3.1.3 (Figure 27), industrial firms and the government capture the biggest share of the direct value added in the VC (53 percent and 36 percent respectively), followed by industrial workers (9 percent), and all artisanal actors and their workers capture just 1.5 percent of the direct value added. While this distribution of direct value added reflects the different scales and operational efficiency of the industrial channel versus artisanal one, the fact that the artisanal sector has low profitability level is concerning. Additionally, value added distribution within industrial firms is disproportionate, with worker wages being five time less than the corporate profit captured by companies' owners. Nevertheless, it is noted that the high share (36 percent) of direct value added capture by the government implies the broader society *may* benefit from the value added from the VC thanks to increased public spending and investments, for example on social development and natural conservation activities/initiatives.

Poverty and vulnerability

Poverty did not appear to be an issue based on the reported data within the survey. Reported levels of income per month is at USD 120 per month, which stands above both the national and international poverty lines, at USD 1.75 and USD 1.90 a day, respectively. While the data produces this finding, the existing levels for Guyana based on their country poverty assessment, suggests that this is an area for closer examination and cross referencing, in this case with household income and expenditure. While this is beyond the data available for this report, it is certainly a level of analysis and review necessary for gaining deeper insights going forward.

Discrimination

The survey with workers conducted under the scope of this VC report in 2021 suggests that there is the lack of knowledge on labor regulations or laws related to discrimination. In the survey with workers conducted as part of this VC report in 2021, only 16 percent of workers indicated that there were formal or informal standards to prevent discrimination in the workplace, 53 percent indicated that there were no formal practices and 23 percent were not aware of any standards or rules. Nevertheless, the surveyed workers did not see discrimination as an issue, with 97 percent indicating that the question of discrimination did not apply to their work experience. In fact, both industrial firms and artisanal fishers

maintained that there were no discriminatory or unfair practices within their engagements and that in some cases, as per communication of industrial actors, it is encouraged to have open discussions with employees, where issues emerged.

Based on the scoring guidance of FISH4ACP methodology⁴², the four 'inclusiveness' subdomains of the VC are assessed as below:

- *Wage and employment distribution*: This subdomain is rated as "moderate concerns", averaged score is 3, based on the assessment of three questions:
 - How equitable are the wages between workers hired by the different types of value chain actors? – Score 3 – somewhat equitable.
 - To what extent is the value chain contributing to national employment with equal opportunity jobs (through core and extended value chain)? – Score 3 - moderate contribution.
 - To what extent are vulnerable and marginalised groups capturing jobs in the sector and receiving equitable wages? – Score 3 – some vulnerable and marginalized groups included in the VC and receiving an equitable share of income.
- *Value added distribution*: This subdomain is rated as "very concerning", averaged score is 1.33, based on the assessment of three questions:
 - How equitably is value added distributed between the different types of VC actors and stakeholders? – Score 2 – unequitable, because artisanal actors receive very small share of value added, which is reflective of their small scale.
 - Is direct net value added equitably distributed between small and large VC actors? – Score 1 – very unequitable, because there are stark differences between industrial firms and artisanal actors.
 - How equitable are the net profits of the VC actors distributed between VC functions? – Score 1 – very unequitable, for the same reason as the previous question.
- *Poverty and vulnerability*: This subdomain is rated as "minor concerns", averaged score is 4.33, based on the assessment of three questions below.
 - What is the prevalence of poverty across the value chain amongst VC participants (comparing incomes to national poverty line)? – Scoring 5 – no to very low poverty
 - What is the prevalence of extreme poverty across the value chain amongst VC participants (comparing incomes to the international poverty line of USD1.9/day)? – Score 5 - no to very low extreme poverty, because all workers get paid more than USD1.9/day.
 - To what extent do impoverished VC participants diversify income to reduce the risk of poverty (e.g., ownership of assets, production/catch of multiple species)? –

⁴² Each social subdomain is assessed based on a few key questions. A score ranging from 1 – 5 is provided to each question under the subdomains, with 1 (red) means "very concerning" and 5 (dark green) means "no concerns". The score of each subdomain is the average of the scores of the questions under that subdomain.

- Score 3 – moderate, because all artisanal actors have income from sources other than seabob, but the industrial firms are heavily dependent on seabob.
- *Discrimination*: This subdomain is rated as “moderate concerns”, averaged score is 3, based on the assessment of three questions:
 - Application of national/ international laws preventing discrimination in the workplace across the value chain – Score 4 - laws could be better respected and enforced
 - Application of formal or informal business-level standards or practices to prevent discrimination in the workplace across the value chain – Score 3 – some (50-70 percent) of firms have formal or informal standards in place to prevent workplace discrimination
 - How do value chain actors influence sociocultural norms related to workplace discrimination (based on age, gender, ethnic group, migration status, etc.)? – Score 2 – negative influence, because the VC reinforces social norms related to distribution of roles (and wages) based on age, gender and ethnic.

3.2.2. Gender equality

Women's economic involvement

While there are no regulatory nor legal restriction on women’s participation in the value chain, our review of this value chain shows that this is a male dominated sector and there is limited involvement of women in the VC. Women occupy around 40 percent of all the jobs along the VC, but they are only involved in processing and market vending activities, which are the least profitable activities in the artisanal channel (for processing and retailing) and the lowest-paid jobs in the industrial channel (for processing). The wage gaps between men and women are evident in both channels. As a result, women only capture a negligible share of the direct value added in the VC, which is 3 percent, in the forms of net profits for owning cottage processing and market vending businesses and for being hired as processing and market vending workers in artisanal businesses and industrial firms. A general review of the data show that compared to men, women are less often owners of capital (those being land, labor, finance, resources), and have more limited assets and ability to negotiate price. Additionally, according to a gender study conducted by Peters (2020), in government agencies, women are given equal opportunities, but the procedure for women promotion are “stymied”.

Gendered division of labor

Traditional perceptions and gender stereotypes limit women’s participation in the value chain, as opposed to their male counterparts. Although the primary data indicated that VC actors perceived no discriminatory practices within the value chain, the gendered division of labor saw a traditional clustering of women in the areas of shrimp cleaning/picking, cooking, cashiers, and retailing. As mentioned above, these are the least profitable activities, or

lowest-paid jobs, in the VC, both in artisanal and industrial channels. More profitable, or higher paid jobs, are dominated by men.

Most of the women interviewed within the workers' survey indicated that there is a greater burden for domestic work for women, who typically work around the household and engage in value chain activity around their housework. This is in line with the gender analysis conducted by Peters (2020), which indicates that women take more responsibilities for household domestic work while the men are more involved in economic and social activities outside of the households, such as fishing, meetings, and trainings. This gendered division of roles shows that women have more limited opportunities for community involvement and personal development/empowerment (through training, meetings) as compared to men. Therefore, although there are no explicit forms of discrimination within the VC, the practices of the VC produce a number of constraints for women to more actively participate in and benefits from VC activities. Within the informal operations of the chain, women's employment depends on the size and frequency of catch. This type of engagement negatively impacts women's rates of earnings. On the other hand, men were represented across various jobs within artisanal and industrial firms, including that of being owners and asset holders, e.g. firm owners, wholesalers, boat owners, trawler owners, crew members, machine operators, plant attendants, and freezer supervisors. Within the informal labor structures of the VC, in the cases of younger lower skilled men, they may start with holding positions such as packers and bag boys and then are able to shift from fishers to boat owners over time. This upward movement is facilitated through a practice, where owners of multiple boats rent boats to younger fishers and over time, the younger men will purchase the boats from the owners, thereby creating a critical leveraging point upwards within the VC for younger fishermen.

Gendered access to productive resources

As VC actors, women's participation in the chain tends to be artisanal processors and retailers who use rather traditional technologies and equipment. Examinations of the VC survey data show that men generally have more access to productive resources than women. For instance, 27 percent of men own a vehicle while it is 19 percent for women, and 38 percent of men own houses while it is 30 percent for women. In the fishing function, women are generally excluded due to the traditional norms that women are not allowed to work on fishing boats. Women, therefore, are generally excluded from obtaining fishing licenses. Access to finance is indicated to be limited for both men and women actors and workers; but given that women have more limited ownership of household and productive assets (such as buildings, boats), it can be implied that they also have relatively more limited access to finance (which often requires collaterals) than men.

Women's decision-making and leadership

Women have limited roles in decision-making and leadership in the VC. In industrial firms, women are mainly involved in low-ranked and low-paid processing jobs. Although women are also increasingly occupying positions characterized by higher education and skills such as quality control and product development, most of these jobs (particularly the managerial positions) are still occupied by men. In the artisanal channel, women are dominant in processing and market vending stages; but their influence on the whole channel is limited due to the lack of coordination between artisanal actors, each of whom tends to operate rather individually (as already discussed in section 2.4.1). In government agencies, there are promotion opportunities for women, but they are often “stymied” (Peters, 2020).

Women have a stronger decision-making role only at the household level, albeit still somewhat weaker than men’s roles. From the worker survey conducted under the scope of this VC report, in terms of how money is spent within the household, 30 percent of workers shared that decisions were made jointly, while 27 percent indicated this as a maternal decision and 44 percent a paternal decision. These survey results are also in line with the findings in Peters (2020) that within households in the fisheries sector, decisions on budgeting are often done jointly between women and men. However, Peters (2020) also noted that women often make decisions on domestic matters (such as food, education, and discipline; while men are more often the ones to decide on the household economic activities, such as the production and selling of products and negotiation when purchasing and/or selling products.

In terms of involvement in cooperatives/associations, consultations with VC stakeholders hint at a lower level of involvement of participation of women as compared to men. For instance, fisheries cooperatives are generally composed of only men.

Based on the scoring guidance of FISH4ACP methodology, the four ‘gender equality’ subdomains of the VC are assessed as below:

- *Women’s economic involvement*: This subdomain is rated as “concerning”, averaged score is 2.33, based on the assessment of three questions:
 - To what extent are women economically involved across the value chain overall, and by VC function (considering also support services)? – Score 4 - 25-50 percent women
 - How equitable is the share of value added (wages and profits) captured by women VC participants compared to men? – Score 1 – very unequitable
 - Does gender discrimination prevent women from actively engaging in VC activities? Score 2 - high gender discrimination
- *Gendered division of labour*: This subdomain is rated as “concerning”, averaged score is 2, based on the assessment of three questions:
 - Are overall domestic workloads of women and men VC participants in the value chain equitably distributed (including domestic work and child/elderly care)? –

- Score 2 - unequal unequal share of time spent on domestic work between women and men
- Are VC activities equitably distributed between men and women VC participants by the level of effort (considering time, technology, transport, and working conditions, etc.)? – Score 2 – unequal level of effort for VC activities conducted by women and men
- To what extent are the jobs and businesses that women are engaged in equal to men in terms of formality (business registration and employment contracts) across the value chain? – Score 2 - unequal formality between women and men
- *Gendered access to productive resources (including information):* This subdomain is rated as “concerning”, averaged score is 2.33, based on the assessment of three questions:
 - To what extent do women VC actors have equal access to land/ fishing tenure as men? – Score 2 – unequal
 - To what extent do women VC actors have equal access to finance as men? – Score 3 – somewhat equal
 - To what extent do women VC actors have equal access to non-financial support services as men? – Score 2 – unequal
- *Women’s decision-making and leadership:* This subdomain is rated as “concerning”, averaged score is 2.33, based on the assessment of two questions:
 - To what extent do women have equal control over spending of income earned or decisions related to shared assets at the household level? – Score 3 – somewhat equal
 - Are women VC actors equally and meaningfully involved in cooperatives/associations, industry associations, etc. as men? – Score 2 - unequal share
 - Are women VC actors equally involved in leadership/ decision-making positions as men in the VC? – Score 2 – unequal share

3.2.3. Food and nutrition security

In terms of **availability of seabob** the current production levels satisfy existing local demands, although the declining catch level in recent years have begun to create shortage as surveyed consumers indicated that sometimes they could not find seabob on the domestic market. **In terms of accessibility**, seabob is sold by market vendors, especially in Georgetown and the coastal regions, as well as, from fish markets at landing sites. In the hinterland, access to fresh seabob is less likely but dried seabob can be found at small supermarkets and food shops. At the consumer level, focus group data shows that seabob is available in local markets, fish landing, and supermarkets. A significant percentage of consumers indicated a preference for local seabob.

In terms of seabob utilization, data shows that 56 percent of surveyed consumers consuming seabob at their homes to feed both adults and children; and on

average, a household consume just above 1 lbs (around 0.5 kg) of seabob per month, or 5.4 kg/year. There is no indication that consumers faces any difficulties in terms of preparing seabob in a healthy and safe way. Seabob's contribution to food and nutrition security and healthy diets in Guyana is considered to be moderate, given the high per capita consumption of fish and shrimps in Guyana (as discussed in section 2.2.3) and consumers' preferences for fish as compared to shrimps (see Table 18).

Stability of food - While the closed season for industrial fishing of seabob is between September – November only, seabob is not consistently available throughout the year due to factor external to the value chain (e.g. weather, tides). This unreliable supply of seabob, in turn, leads to price fluctuations on the market between high and low seasons (see Table 5 in section 2.2.4).

Based on the scoring guidance of FISH4ACP methodology, the four 'food security, safety and nutrition' subdomains of the VC are assessed as below:

- *Availability of food (seabob)*: This subdomain is rated as "minor concerns", averaged score is 3.67, based on the assessment of three questions:
 - To what extent does current national production meet national demand for this commodity? – Score 4 – meet 75-90 percent of national demand
 - How does trade of this commodity impact national food security? – Score 4 – supportive
 - To what extent is the availability of this commodity consistent across the country? – Score 3 – somewhat inconsistent availability
- *Accessibility of food (seabob)*: This subdomain is rated as "minor concerns", averaged score is 3.67, based on the assessment of three questions:
 - Is the current cost of this commodity relatively affordable considering all types of consumers? – Score 3 – somewhat affordable
 - Is this commodity equally accessible to all household members? – Score 4 – nearly equal access
 - Are the prices of this commodity becoming more accessible to consumers relative to household incomes in the past five years? – Score 4 – more accessibility
- *Utilisation of food (nutrition, safety)*: This subdomain is rated as "minor concerns", averaged score is 3.67, based on the assessment of three questions:
 - Is this commodity prepared and consumed in a healthy and safe manner (at consumer level)? – Score 4 – mostly healthy and safe
 - To what extent does this commodity contribute to national food and nutrition security? – Score 3 – medium contribution
 - Is this commodity consumed as part of a healthy balanced diet? – Score 4 – high dietary diversity
- *Stability of food (seabob)*: This subdomain is rated as "moderate concerns", averaged score is 3, based on the assessment of two questions:

- To what extent is this commodity consistently available throughout the year? – Score 3 – somewhat inconsistently available
- To what extent is the price of this commodity stable throughout the year for the past 5 years? – Score 3 – somewhat stable
- To what extent do VC activities stabilize the supply of this commodity? – Score 3 – some contribution

3.2.4. Decent employment

Respect of labor rights

The issue of adherence to levels of decent employment throughout the value chain may be questionable, partially due to the knowledge base of actors and their workers throughout the VC of the national regulations that govern decent work. Both for industrial and artisanal players, there was a dearth of knowledge of decent work regulations and a lack of accountability on the renewal of contracts in the firms, despite extended periods of employment. Surveyed workers did not indicate the presence of established bargaining units through which they negotiated with management.

Most industrial workers indicated that they were satisfied with their wages, which, in their estimation, were higher than comparative public sector employees. However, conditions of employment emerge a source of concern. Over 60 percent of the surveyed workers (including both industrial and artisanal workers) do not have employment contract. High informality (without contract) and parttime employment (working for less than 230 days/year and less than 8 hours/day) are especially high in the artisanal channel. For industrial workers, it is more common to have work contract for longer duration (1 year or permanent); but their working hours also tend to be longer than 8 hours/day, even up to 12-14 hours/day, which is also concerning. Despite these employment conditions, 40 percent of the surveyed workers indicated that they were satisfied with the terms and conditions of their employment (while nearly 57 percent did not provide any answer). This rather high level of satisfaction, however, should not be interpreted as a sign of good working conditions, but rather a consequence of limited employment opportunities for the working labour in Guyana coupled with their limited understanding of decent work conditions. Indeed, from the survey, it is also indicated that over 70 percent of the workers are solely dependent on their involvement in this sector as a source of income.

Child labour and forced labour

Across industrial and artisanal channels, there is no evidence or reports of the wide scale involvement of child labour and forced labour. The lowest age observed in processing firms was 17. In the case of small-scale fisheries, incidents of child labor were not reported. About 95 percent of the survey respondents said that children were not employed as waged labor within the VC.

Job safety and security

Job safety does not appear to be a concern in industrial firms, with 71 percent of surveyed workers reporting no workplace accidents in the last year. Interestingly, nearly half said that safety standards were adhered to, while an almost equal number of workers said these standards were not. Nevertheless, across the value chain there is some evidence showing that VC actors make effort to ensure job safety. Within the firms, there was an ease of access to occupational training, continuous professional development, and PPE. At the artisanal level, there was reference to the use of life jackets, availability of safety gears, diving tanks and PPE, though it is difficult to attest to this without visit trips on boats. Artisanal boats, however, report incidents of piracy.

In terms of job security, the survey shows that despite the lack of employment contracts, 47 percent of workers were employed with the same company for more than 10 years. On one hand, this shows that there is low turnover in the sector. However, on the other hand, this also suggests there is limited mobility for these workers to change to doing other jobs that may have better conditions.

Attractiveness

The majority of the surveyed workers in the VC felt their compensation was fair and competitive. However, it was difficult to ascertain the extent to which industrial workers were empowered to negotiate remuneration and terms and conditions of labor. Meanwhile, the often seasonal and informal arrangements of labor for artisanal actors eliminate any options for negotiation of labor conditions.

The adoption of technology/innovation to reduce strenuous activities in the VC is limited to the fishing function and operations within industrial firms. Most artisanal actors, particularly cottage processors and market vendors, use largely traditional, manual practices.

Based on the scoring guidance of FISH4ACP methodology, the four 'decent employment' subdomains of the VC are assessed as below:

- *Respect of labour rights*: This subdomain is rated as "concerning", averaged score is 1.67, based on the assessment of three questions:
 - To what extent do firms respect national labour laws on the right to organise and collective bargaining? – Score 1 - <20 percent of firms respect national laws on the right to organize and collective bargaining
 - To what extent do firms respect national labour laws regarding working conditions? – Score 2 – 20-50 percent of firms respect national laws on working conditions
 - To what extent do workers benefit from enforceable and fair employment contracts? – Score 2 – 10-25 percent of workers have fair and enforceable contracts

- *Child and forced labour:* This subdomain is rated as “no concerns”, averaged score is 4.67, based on the assessment of three questions:
 - To what extent are firms respecting national labour laws with regards to child labour (e.g., minimum age for employment)? – Score 5 - >90 percent of firms respect child labour laws
 - What is the prevalence of child labour across the value chain, particularly where children are missing school to participate in VC activity or support HH activities in VC households (SADD)? – Score 4 – very low, <5 percent, with sporadic cases
 - Is forced labour, including debt bondage and trafficking for labour exploitation, an issue across the VC? – Score 5 - no forced labour in the value chain
- *Job safety and security:* This subdomain is rated as “moderate concerns”, averaged score is 3.33, based on the assessment of three questions:
 - To what extent do firms across the value chain implement and enforce formal workplace safety standards? – Score 1 – <20 percent of firms implement and enforce safety standard (VC actors have rather informal standards)
 - What is the prevalence of occupational injuries across the value chain? – Score 5 - none to very low
 - To what extent do VC actors and workers persist in the VC (turnover)? – Score 4 – low turnover
- *Job attractiveness:* This subdomain is rated as “moderate concerns”, averaged score is 2.67, based on the assessment of three questions:
 - To what extent are remunerations fair and competitive based on national standards (e.g., living wage and social benefits)? – Score 3 – somewhat competitive.
 - To what extent are the business opportunities and activities along the value chain attractive? – Score 3 – somewhat attractive
 - To what extent are technologies, practices or innovations adopted, particularly to reduce strenuous activities across the value chain? – Score 2 - low rates.

3.2.5. Social and cultural capital

Collective action (horizontal linkages)

Interviews with VC actors in 2021 suggest that there is a low level of participation in associations or organizations, with only 18 percent of participants registered as members of cooperatives and associations (e.g. trawlers, farmers, and fishers’ cooperatives) for value chain actors. The main reasons for this low level of engagement is that VC actors often see little to no benefits of being part of a group or association, which is in turn largely due to the dysfunction of coepratives due to poor management and lack of communication with members (as discussed in section 2.4.2). That said, in a few cases where groups/cooperatives/associations exist and are active, it is suggested that these organizations help to facilitate the negotiation of market prices for input materials, for access to equipment and other type of resources needed within the production process. Other

gains are for networking, sharing of information related to the market, collective representation, and skills sharing.

The collaboration between the artisanal and industrial channels is very low. The SWG has representative from the artisanal channel, but artisanal actors' participation in this working group is rather marginal.

Coordination of transactions (vertical linkages)

Interviews with VC actors indicate that the relationship between VC actors and their buyers appears to be transactional, i.e. limited to order taking and fulfilment. For artisanal actors, transactions are largely informal (without contracts). This transactional (for industrial firms) and informal (for artisanal actors) nature of the buying-selling relationship suggests that access to buyers and markets is not secured, and that buyers can replace their suppliers by someone else rather easily.

There is limited knowledge or technology sharing between industrial firms and their overseas buyers; but among artisanal actors (e.g., fishers and their buyers), there is some sharing of market information.

Social cohesion

Interviews and surveys with VC actors indicate that few VC actors think that they contribute to, or participate in, decision-making processes that affect the VC. The majority of artisanal actors are not interested in networking and information sharing. Networking and collaboration among industrial firms are stronger and somewhat effective, as demonstrated through their collective effort to obtain and maintain the MSC certification. Nevertheless, industrial firms still need to improve their cooperation to address various issues facing the whole industry such as declining catch and increasing export values, as well as to better coordinate with artisanal actors and Fisheries Department in fisheries management. Communication is highlighted as a key area of intervention to build and enhance trust between VC actors and between VC actors and Fisheries Department, which will in turn enable more effective networking and collaboration within the VC.

Cultural traditions

In the seabob VC in Guyana, while there is some level of technology and innovation adoption in the industrial channel, in the artisanal channel, traditional and artisanal practices are prevalent. Those traditional practices, however, are associated with issues related to bycatch sustainability and food hygiene and safety, and thus, are not supportive of the improvement and sustainability of the VC.

In the seabob VC (and in the fisheries sector in general), employment patterns reinforced traditional gender-based stereotypes and work clusters for women. Cultural beliefs also influenced the exclusion of women from fishing and their potential for obtaining income within their sector. However, women's participation in the VC (and in the fisheries sector) as

processors and market vendors (or as workers at these businesses) has helped to weaken the stereotype that home is the only place for women and that women's roles only concern domestic work (Peters, 2020).

Considering the public perception of consuming seabob, there is strong cultural, traditional appetite for seafood in Guyana, as shown through high per capita fish and shrimp consumption.

Based on the scoring guidance of FISH4ACP methodology, the four 'social and cultural capital' subdomains of the VC are assessed as below:

- *Collective action*: This subdomain is rated as "moderate concerns", averaged score is 2.67, based on the assessment of three questions:
 - To what extent are value chain actors organized into cooperatives or producers' organizations, industry associations, trade unions, etc.? – Score 2 – 10-25 percent are organized into groups.
 - To what extent does participation in such organizations result in improved socioeconomic gains for members (benefits)? – Score 3 - some benefits
 - Do VC actors work together to share resources, or engage in joint advocacy for the sector for mutual benefit? – Score 3 – minority of VC actors work together
- *Coordination of transactions*: This subdomain is rated as "moderate concerns", averaged score is 3, based on the assessment of three questions:
 - To what extent do VC actors have contracts or agreements at the functional level - for product procurement and sales (SADD) – Score 3 – 25-65 percent have contracts
 - To what extent do VC actors report reliable and secure access to markets? – Score 3 – Minority of VC actors report secure access to markets
 - To what extent are the relationships between value chain actors perceived as trustworthy? – Score 3 – Minority of VC actors indicate relationships are trustworthy
- *Social cohesion*: This subdomain is rated as "concerning", averaged score is 2.33, based on the assessment of three questions:
 - To what extent are VC actors able to contribute to decision-making processes that affect the sector? – Score 3 – Minority of VC actors contribute to decision-making
 - To what extent do VC actors engage in networking and information sharing for the benefit of the VC? – Score 2 – Majority of VC actors do not engage in regular networking and information
 - To what extent do value chain actors collaborate with the public sector (e.g., public-private collaboration)? – Score 2 - low public-private collaboration
- *Cultural tradition*: This subdomain is rated as "moderate concerns", averaged score is 2.67, based on the assessment of three questions:
 - To what extent do VC activities support or strengthen positive traditional beliefs, knowledge and artisanal techniques on the sector? – Score 2 - unsupportive

- How do VC activities impact sociocultural norms (e.g., gender norms)? – Score 3 - neither positively nor negatively
- How do VC activities influence public perception of the domestic consumption of this commodity? – Score 3 – moderate public perception

3.2.6. Institutional strength

Policy, regulations and standards

The national regulations that relate to MSC and food handler certification are effectively complied with by the industrial firms. However, VC activities conducted by artisanal actors are largely unregulated, as open access to the fisheries and little to no monitoring are the norm. Although over 85 percent of all the Chinese seine vessels were registered in 2021 (Pers. Comm. with Fisheries Department, April 2022), most of the interviewed artisanal fishers said that the registration process with the Fisheries Department is somewhat cumbersome for them; and most fishers have difficulties in complying with data reporting requirements (e.g., using logbooks) by Fisheries Department. There are Fisheries Management Plan and Artisanal Fisheries Management Plan in place to support the sustainable development of fisheries sector, but their implementation is weak due to various constraints from both the Fisheries Department and artisanal actor sides.

Access to finance

Interviews and surveys with artisanal actors indicate that 66 percent of VC actors have a bank account, 68 percent have their own home, 46 percent own a vehicle, and 46 percent have bank loans (while the rest reported self-financing). There is no data on savings or loans for industrial firms. As for artisanal actors, the data from commercial banks suggested that they are not preferred loan applicants for many reasons including lack of registration and stability of income.

Access to natural resources

Access to fisheries resources is regulated through the use of vessels registration, vessel licenses and pen licenses. As discussed above, industrial firms effectively comply with these regulations, while around 85 percent of artisanal Chinese seine fishers are licenced. Artisanal fishers, however, report difficulties in complying with licensing requirements such as regular data reporting using logbooks.

Access to information

Due to poor national data collection and management capacity, there is a general lack of updated data on seabob catch, fishing efforts, stock status, and bycatch that are necessary to inform policy-making as well as VC actors' operations. Only eight percent of fishers received technical training from extension services and none of the fishers received education or training on market skills. Family, friends, and customers are the main source of

technical and market information for artisanal fishers (Survey with artisanal fishers, 2021). The lack of training contributes to the lack of organization of artisanal fishers, as well as the lack of certification and lack of development in the whole artisanal fishery. This contrasts with the training that industrial processors have in place to ensure that their operations and products meet standards such as HACCP and MSC.

The majority of VC actors were not interested in networking and information sharing or any forms of cooperation beyond buying-selling relationship. However, they agreed that the networks worked for them in terms of setting of prices for commodities. Many of the fisher cooperatives only exist in name and no longer distribute information and services to members. Some fishers and wholesalers indicated that they never heard of any associations and therefore were not involved.

Based on the scoring guidance of FISH4ACP methodology, the four 'institutional strength' subdomains of the VC are assessed as below:

- *Policy and regulation*: This subdomain is rated as "moderate concerns", averaged score is 2.67, based on the assessment of three questions:
 - To what extent is a sustainable fisheries management/aquaculture development plan implemented and enforced? – Score 2 - plan in place, but not enforced
 - To what extent are value chain activities formally registered/licensed across the value chain? – Score 3 – 25 – 65 percent are formally registered
 - To what extent are public policies and sector standards supportive of business growth in the sector? – Score 3 – somewhat supportive, but implementation is an issue
- *Access to finance*: This subdomain is rated as "concerning", averaged score is 2.33, based on the assessment of three questions:
 - To what extent do VC actors have bank accounts? – Score 3 – 50-70 percent of VC actors have bank accounts
 - To what extent do VC actors have access to finance? – Score 2 – 20-50 percent of VC actors have access to finance
 - To what extent are measures (e.g., insurance) used to reduce the risk of lending to firms along the VC? - Score 2 - few measures used
- *Access to natural resources*: This subdomain is rated as "moderate concerns", average score is 2.5, based on the assessment of two questions.
 - To what extent are VC actors adhering to national land/fishing tenure policies, and international best practices on tenure? – Score 3 – 50-70 percent of VC actors adhere to national tenure policies
 - To what extent do value chain actors report security of land/fishing tenure? - Score 2 – 20-50 percent of VC actors have secure land/fishing tenure

- *Access to information:* This subdomain is rated as “concerning”, averaged score is 2, based on the assessment of two questions:
 - What is the national capacity for providing accurate and timely data on fisheries/aquaculture? - Score 2 - low capacity for data collection
 - Are technical extension services reaching Vc actors? – Score 1 – Extension services reaching <20 percent of VC actors
 - To what extent do VC actors have access to market information? – Score 3 – 50-70 percent of actors have access to market information

3.2.7. Social analysis overview

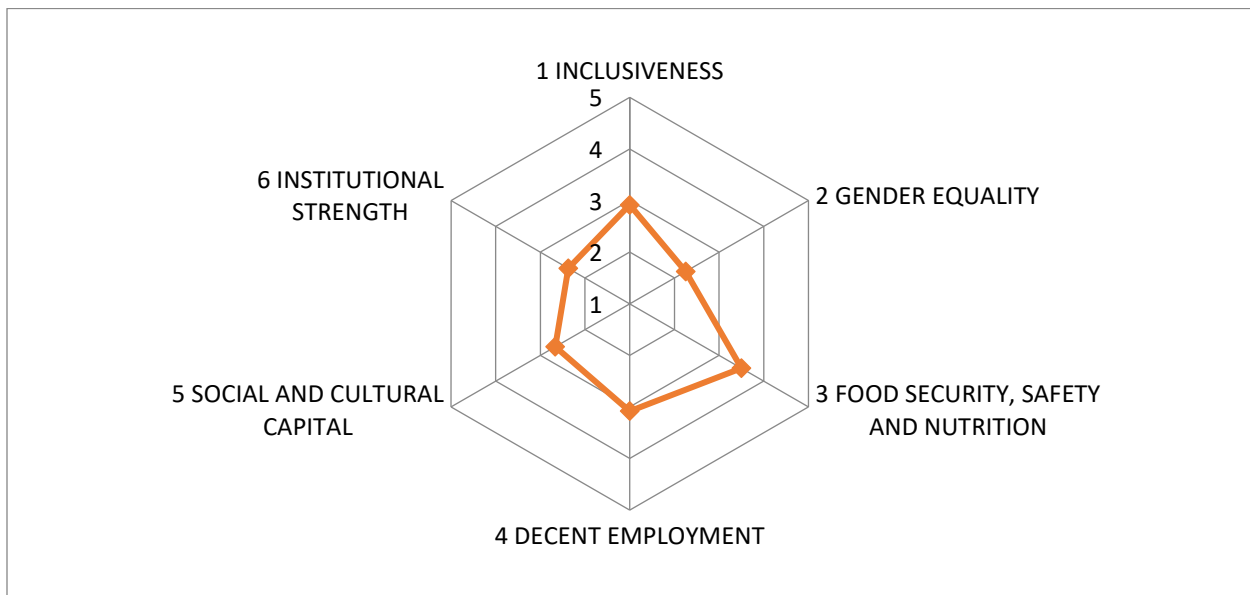
Based on the analytical assessment of social performance as discussed above, and using the FISH4ACP social profiling tool, an overview of social performance for the Guyana seabob VC is provided in Table 24 and Figure 29 below. A score in the range 1 – 5 (with 1 means “very concerning” (red) and 5 means “no concerns” (dark green)) is given to each sub-domain of the six social sustainability domains (i.e., inclusiveness; gender equality; food security, safety and nutrition; decent employment; social and cultural capital; and institutional strength).

TABLE 24. SOCIAL SUSTAINABILITY PERFORMANCE SCORES FOR THE VALUE CHAIN

1 INCLUSIVENESS		
1.1 Wages and employment distribution	3.00	Moderate concerns
1.2 Value added distribution	1.33	Very concerning
1.3 Poverty and vulnerability	4.33	Minor concerns
1.4 Discrimination	3.00	Moderate concerns
Average	2.92	Moderate concerns
2 GENDER EQUALITY		
2.1 Women's economic involvement	2.33	Concerning
2.2 Gendered division of labour	2.00	Concerning
2.3 Gendered access to productive resources	2.33	Concerning
2.4 Women's decision-making and leadership	2.33	Concerning
Average	2.25	Concerning
3 FOOD SECURITY, SAFETY AND NUTRITION		
3.1 Availability of Food	3.67	Minor concerns
3.2 Accessibility of food	3.67	Minor concerns
3.3 Utilisation of food (nutrition, safety)	3.67	Minor concerns
3.4 Stability of food (trends)	3.00	Moderate concerns
Average	3.50	Minor concerns
4 DECENT EMPLOYMENT		
4.1. Respect of labour rights	1.67	Concerning
4.2 Child and forced labour	4.67	No concerns
4.3 Job safety and security	3.33	Moderate concerns
4.4 Attractiveness	2.67	Moderate concerns
Average	3.08	Moderate concerns
5 SOCIAL AND CULTURAL CAPITAL		
5.1 Collective Action (horizontal linkages)	2.67	Moderate concerns
5.2 Coordination of transactions (vertical linkages)	3.00	Moderate concerns
5.3 Social Cohesion	2.33	Concerning
5.4 Cultural Traditions	2.67	Moderate concerns
Average	2.67	Moderate concerns
6 INSTITUTIONAL STRENGTH		
6.1. Policy, regulation, and standard	2.67	Moderate concerns
6.2 Access to finance	2.33	Concerning
6.3 Access to natural resources	2.50	Moderate concerns
6.4 Access to information	2.00	Concerning
Average	2.38	Concerning

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

FIGURE 29. SOCIAL SUSTAINABILITY PERFORMANCE DIAGRAM OF THE VALUE CHAIN



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

TABLE 25. KEY ISSUES, RECOMMENDATIONS, RISKS, AND MITIGATION MEASURES - SOCIAL SUSTAINABILITY

Key issues	Main recommendations
<ul style="list-style-type: none"> • Unequal income among VC actors and workers, especially between men and women and between artisanal and industrial actors • Unequal division of roles between men and women • Limited number of women holding decision making positions • Women having more limited access to assets • Unstable supply of seabob throughout the year • Absence of formal work contracts and low wages for workers, especially in the artisanal channel • General lack of formality in the artisanal channel (from lincensing and logbook filling and reporting by fishers, to monitoring of landings and retail markets) • Lack of access to financial services by both male and female artisanal actors in the VC 	<ul style="list-style-type: none"> • There is a need to put up mechanisms to improve employment contracts and conditions. • Empowerment is needed for women, coupled with sensitization and awareness raising in the community about women’s rights, abilities and potential • Platforms/organizations (e.g., women groups) should be created, established, or strengthened to cater for challenges faced by women • Improvement of the VC’s efficiency to improve the stability of supply • Awareness raising and training for artisanal VC actors on the importance of getting formalized, coupled with improved enforcement of regulations • Suitable financing mechanisms should be instituted to enable artisanal actors acquire the finance required to improve and expand their business.
Main risks	Mitigating measures
<ul style="list-style-type: none"> • Lack of proper facilities in landing sites and wharfs for proper handling and processing seabob in the artisanal channel, which is largely due to poor management, could hinder the economic potential of the VC as well the livelihood of the dependent communities • Additional benefits from improving the VC may benefit mainly men, if women’s involvement in the VC is not improved. 	<ul style="list-style-type: none"> • Need to have in place plans for improving the quality of landing site/wharf infrastructure and their management. • Continuous empowerment for women and sensitization of fishing communities on women’s rights, abilities, and potential to help enhancing women’s position in the VC .

3.3. Environmental analysis (Ecological footprint)

3.3.1. Climate impact

The effect of the seabob fishery on the climate is mainly due to emissions from fuel used to run fishing vessels or generate the electricity that powers the industrial processing plants. Interviews with both artisanal and commercial fishers, processors and retailers indicated that beyond any emissions due to fuel use from the fishing stage, the entire value chain is seen as a low polluting industry. Many actors mentioned that air pollution is not a problem in the Seabob fishery, and no measures are in place to reduce air pollution.

Aside from the fuel used to power the fishing vessels diesel and fuel oil is used to generate electricity both privately (in the case of commercial organizations) and at the municipal level. Guyana produces over 92 percent of its electricity with diesel and heavy fuel oil, although plans to transition to renewables by 2040 are in place (Department of Energy, 2019). Most cottage processors use wood or kerosene to boil the seabob prior to drying in the sun, therefore the artisanal processing sector consumes little to no electricity.

Based on the scoring guidance of FISH4ACP methodology⁴³, the 'climate impacts' domain of the VC are assessed as below:

- *Electricity use*: Not concerning (green)
- *Fuel consumption*: Not concerning (green)
- *Carbon footprint*: Not concerning (green)
- *Renewable clean energy use*: Highly concerning (red)

3.3.2. Water footprint

Water usage (both fresh and saltwater) is extensive in the capture, storage, transfer of seabob and in some processing activities. However, the extent of use differs among actor types depending on their location and niche within the value chain (e.g. processors that dry versus processors that boil the seabob or sell shelled). Further depending on access to markets and the relative proximity of the landing sites to vendors, artisanal fishers may not use ice at all. Others make ice at home or purchase through local retailers and or fishery co-operatives.

The processors in the value chain typically use significant amounts of water. Artisanal processors usually sort and wash the seabob prior to sale, often with seawater. In contrast, the industrial processors have private wells that supply sufficient freshwater and can use between 20 000 and 150 000 gallons per day depending on volume of seabob processed and

⁴³ A score 1 – 3 (corresponding to red (1), yellow (2) and green (3)) is provided to each environmental indicator, with 1 meaning highly concerning (red), 2 meaning concerning (yellow), and 3 meaning not concerning (green).

ice made. Another sector where water is used is the market vendor where water is used for cleaning and washing. Those vendors with permanent locations and access to city water infrastructure do not experience water shortages and consequently do not need to store or conserve water aside from avoiding wasting the resource. Those that need to store water by saving it in tanks. No actors indicated that lack of water as a natural resource was an issue, though some artisanal actors (processors and vendors) indicated that water supply was limited due to insufficient water infrastructure.

Food vendors regularly use freshwater for cleaning, cooking and washing. Similar to market vendors near municipalities, there are rarely shortages of water for many vendors in markets. In contrast, those food vendors who are based out of smaller (roadside) stalls, or on one of the islands without municipal water service do experience water shortages Their mains source of water is water trucks from which they buy water in bulk. Storage and rainwater capture for non-potable uses is common, though freshwater is available year-round. The super and hypermarkets do not process the seabob and have limited water use aside from the cleaning of the supermarket.

Of the interviewed actors all note that there are no potential risks of water pollution from the seabob value chain. Common practice in Guyana is to discard untreated wastewater to the river or the sea. Infrastructure and processing facilities for wastewater treatment do not exist. Some of the actors indicated that this process leads to the processing waste (mainly head and shells) re-entering the food chain and is beneficial to ecosystem. At the capture level, seawater is usually used during the washing and sorting of the seabob before sale. There are no potential risks of water pollution since the seawater used is drawn from and returned to the sea.

Water is mainly used in the processing sector of the value chain, where wastewater is not treated before discharging in nearby drains since that is uncommon in Guyana. At the artisanal level, waste from the processing the seabob (shells, head, etc.) is often discarded to the sea, or occasionally fed to domestic livestock or pets (e.g., chicken, pigs, or cats). At the industrial level, wastewater is discharged to the river. The industrial processing process uses some chemicals (e.g., chlorine dioxide) for sterilization purposes as well as various, detergents and cleaning agents for the factory. The sole biological contamination from seabob processing is the shells and associated fish waste (from any bycatch), similar to the artisanal sector.

The wastewater discharge practices for wholesalers, market vendors, and food vendors is very similar, in that wastewater is not treated before discharging, and that nearby drains, or trenches carry the water to the sea or river based on location. Wastewater treatment is not regulated for these actors in Guyana, and the wastewater is primarily linked to cleaning of the premises and is minimal compared to the water use for procession.

The perception that the risk to water pollution is low is because few chemicals are used in the fishery combined with the fact that the return of fish waste to the river / sea is seen as non-impactful given that it will return to the food chain.

Based on the scoring guidance of FISH4ACP methodology, the 'water footprint' domain of the VC are assessed as below:

- *Water and ice consumption*: Concerning (yellow)
- *Water pollution and waste water treatment*: Not concerning (green)

3.3.3. Fish stock sustainability

Seabob is subject to a stock assessment process supported by the Caribbean Regional Fisheries Mechanism (CRFM). An initial assessment in 2013 suggests that the stock status was healthy, with no overfishing occurring, but with wide confidence intervals in the results (Medley 2013). As part of the effort to achieve Marine Stewardship Council certification (MSC, Southall et al. 2019) the stock was re-assessed in 2019 using data through 2017 (CFRM 2019). During the certification process the stock assessment (initially peer reviewed in 2014) was updated with several technical advances in the population dynamics model and the catches were corrected for the presence of white belly shrimp. The 2019 seabob stock assessment (Medley 2019) indicated that the Guyana stock is fluctuating at or just above its MSY point, during the later years of the assessment, indicating a relatively healthy stock (Medley 2019). The assessment found that fishing mortality has tended to fluctuate around or lower than FMSY for Guyana in recent years and that is no evidence that recruitment has been reduced significantly by fishing (CFRM 2019). This latter point is important given the estimation that the stock is at approximately 40 percent of the unexploited state.

The most recent assessment (Medley 2019) covered the period 2002–2017 and it is important to note more recent data points. In addition to comprehensive stock assessments, the Fisheries Department produce interim fishery reports that document the annual catch per unit of effort (CPUE), from which some information about the status of the stock can be obtained. Currently there are reports from 2017, through 2020 which show annual values of 715, 912, and 573 kgs per standardised day at sea (sdas), for 2017–2019 respectively for the industrial fishery. In 2020 new methodology to calculate the Harvest Control Rule and was adopted, with the use of nominal days at sea, thus the 2020 value of 320kg/sdas not comparable to the 2019 (or previous values). However, the 2020 annual CPUE is approximately 13 percent higher than level that would trigger fishing effort reduction according to the harvest control rule, indicating a healthy stock.

Due to decreased CPUE in 2019 management measures included extending the closed period from 6 weeks to 8. This closed season was extended another 2 weeks in 2020, due to low CPUE in 2019 (CRFM 2020, 2020).

There has been considerable advancement in the harvest control rules (HCR) used for managing the seabob stock along with the broader fishery management plan. During the 'Meeting of CRFM Continental Shelf Fisheries Working Group (CRFM-CSWG) on Atlantic Seabob, *Xiphopenaeus kroyeri*, fisheries of Guyana and Suriname', the group acknowledged the need for a revision of the FMP and HCR including annual reports, better management efforts directed at non-target species, development of an adequate research plan, and a need for a more implementation schedule, among other items.

The fishery is sufficiently healthy to have achieved MSC certification, however this was associated with 6 conditions that needed to be addressed during the period of certification.

Based on the scoring guidance of FISH4ACP methodology, the 'fish stock sustainability' domain of the VC are assessed as below:

- *Stock status and stock dynamics*: Concerning (yellow)
- *Fishing pressure*: Concerning (yellow)

3.3.4. Biodiversity and ecosystems

The seabob fishery in Guyana has high bycatch rates in both the artisanal and industrial channels. Juvenile finfish, along with mammals, sharks, rays, sea-cucumbers, and hard corals are commonly encountered in the fishery. MSC report indicates that closer to 50 percent of the catch in the industrial fishery is bycatch (2018 Fisheries Department last haul data, MSC, 2019, page 34). As for artisanal fishery, bycatch is not well-studied, which is primarily due to the lack of monitoring (by Fisheries Department) and reporting (by fishers) resulting in serious lack of information (Kalicharan and Oxenford, 2020). The most recent study on artisanal Chinese seine fishing's bycatch - Kalicharan and Oxenford (2020) - explores the catch composition of an inshore artisanal vessel and shows that bycatch discards made up 72 percent of total catch while retained catch 28 percent, and the majority of finfish discards are very small-sized. While some of the bycatch is discarded, commercially marketable species such as Banga, butterflyfish, catfish, mullet are retained for processing, sold to local markets, or kept for crew consumption. Although the bycatch is diverse in the number of species that occur, three species of fish comprise more than 90 percent of the retained fish bycatch, Bangamary (*Macrodon ancylodon*), Green weakfish, or Trout (*Cynoscion virescens*) and Butterflyfish (*Nebris microps*). There are species of concern that are commonly caught as some species have near-threatened status (e.g., chola guitarfish) and at least one critically endangered species (lesser electric ray). The impact of bycatch overall has been rated as of 'high' concern by the NGO Seafood watch (Seafood watch 2019).

As part of the Marine Stewardship Council (MSC) certification in August 2019, management improvements including an inshore no trawl zone, requirements for Bycatch Reduction Devices (BRD) for all industrial trawl nets, and the adoption of onboard electronic monitoring (CCTV) are now needed on all industrial trawlers.

Additionally, all industrial trawlers are required to use turtle excluder devices (TEDs) and vessel monitoring systems (VMS) to track the location and activity of the vessel. Recordings from the electronic monitoring systems are downloaded after every trip and is used primarily an internal control mechanism, however government inspectors do now request to see the CCTV footage as an additional spot-check tool to confirm that TEDs are in use (MSC 2019).

Impact of seabob trawl fisheries on marine habitats is limited, due to the naturally dynamic, muddy seabed in the areas trawled for seabob shrimp (Willems, 2016). Bottom trawl fisheries typically impact the sea floor, but the bottom where this fishery takes place is composed of sand/mud mixture. Moreover, bottom trawlers are only allowed in a limited area, leaving other portions of the habitat undisturbed. There are also closing seasons, which benefit habitat recovering from potential impacts. (Seafood Watch, 2019).

Based on the scoring guidance of FISH4ACP methodology, the 'biodiversity and ecosystems' domain of the VC are assessed as below:

- *Impact on associated species*: Highly concerning (red)
- *Status of vulnerable ecosystems*: Not concerning (green)
- *Status of ETP species*: Highly concerning (red)

3.3.5. Animal health and welfare

Wild capture shrimp in general suffer less from diseases than farmed shrimp and other traditional agricultural livestock. Disease within the wild seabob catch was not mentioned in any of the primary data collection and interviews Fishers interviewed noted that seabob generally die as soon as they are caught and hauled on board as a regular part of the fishing process. This is due to the removal of seabob from the marine environment combined with the process of rinsing and icing down the catch. However, the high level of bycatch discards raises potential concerns regarding animal handling, although more studies are needed to understand its impacts.

Based on the scoring guidance of FISH4ACP methodology, the 'animal health and welfare' domain of the VC are assessed as below:

- *Application of biosecurity measures*: Not concerning (green)
- *Appropriate animal husbandry and handling*: Concerning (yellow)

3.3.6. Toxicity/pollution

The general perception from the actors interviewed is that the toxicity and pollution resulting from the seabob value chain is minimal or non-existent. Very few chemicals are used in the capture, production, transport, or processing of the seabob. This is due in large part to the wild capture nature of the fishery, in comparison to land based agricultural products which are often reliant on fertilizers, herbicides and or pesticides.

Air pollution is not thought to be a problem in the seabob fishery, and no measures are in place to reduce air pollution. The main source of what little air pollution would be due to the outboard motors used in fishing process for artisanal fishers, and the equivalent source of exhaust for the industrial trawlers along with any exhaust caused by generators that are used to make electricity and produce ice. The actors interviewed note that it is uncommon to have measures in place to reduce air pollution, and that the process of burning trash is common in areas without trash collection services. Little inorganic waste is generated in the fishery, in the artisanal fishery plastic bags for ice are often reused when ice is produced at home. Most of the inorganic waste is disposed of in trash bins or as previously stated, by burning.

Aside from the capture fisheries the processors and food vendors are the only other actor types that produce any exhaust based on the fuel (wood or kerosene) used for boiling processing seabob. Market vendors and supermarkets do incur some emissions as part of the transfer process though this is thought to be minimal.

Waste from unwanted seabob (broken/spoiled/ low quality) seabob, along with other fish waste in either disposed of in bins collected by the local trash service or in the case of areas that are close to the river or sea, is discarded into the waterway. The main source of organic waste is processing activities and capture activities via bycatch. In practice unmarketable bycatch is discarded at sea by both artisanal and industrial fishers, while processing waste is (shells and heads) is washed into the river. A minimal amount of fish waste (3-4 percent of total waste) is processed and sold to pig farmers as feed by the industrial processors.

Based on the scoring guidance of FISH4ACP methodology, the 'toxicity and pollution' domain of the VC are assessed as below:

- *Responsible use of drug and chemicals*: Not concerning (green)
- *Air pollution*: Not concerning (green)
- *Inorganic solid waste pollution*: Not concerning (green)
- *Organic solid waste pollution*: Concerning (yellow)

3.3.7. Food loss and waste

Given the relative proximity of the artisanal fishers to the fishing ground and the market, most of the artisanal fishers indicated that no seabob was lost or wasted. Because bycatch is common, the catch is sorted at sea, very small quantities of unmarketable seabob are discarded along with the bycatch, and the landed catch is almost always sold in its entirety. There is little loss reported by the fishermen who rely on a middleman to transport their catch to the capital, Georgetown, for sale. In these situations, it has been reported that catches can spoil during transport and or arrive 'late' for sale.

There are hardly any losses in the chain from capture to market. Cottage processors note that a few percentages of the seabob can be lost during the drying process, but only if the weather is unfavourable (e.g. rainy or humid without sun), so this is a seasonal issue.

Proper storage with ice in coolers or keeping the seabob frozen is the main method of reducing seabob loss. External factors beyond the control of actors will such as rainy weather for artisanal processors who dry their seabob in the sun, will always be a challenge. For this specific example, it has been said that an oven or other drying equipment would be useful to ensure reliable processing conditions.

The industrial fisheries are for the most part vertically integrated, meaning that their fishery inputs (ice, fuel, gear et.) are procured under the same management as the processing facilities operate and are generally coordinated. The net effect of this integration is a system whereby in theory, the vessels never leave without proper stock of ice and the return of the vessel is coordinated with the processing schedule so that timely processing of the seabob can occur. Nevertheless approximately 1-2 percent of the industrial catch quantity is lost due to spoilage within the industrial sector.

In aggregate (artisanal and industrial) the total potential loss of seabob catch in the VC is approximately 1 – 3 percent of the total quantity of seabob catch.

At the retailing and consumption level, there is also hardly any food (seabob) waste. Market vendors indicate that some (~1 percent in terms of quantity) seabob can be lost due to improper storage or shortage of ice, whereas the supermarkets and food vendors that were interviewed indicated no loss of their product. As for consumers, the consumer survey indicated that consumers rarely throw away seabob, and when they do, it is done in small quantities, mostly when seabob has too low quality or seem to be spoiled.

Based on the scoring guidance of FISH4ACP methodology, the ‘food loss and waste’ domain of the VC are assessed as below:

- *Food loss*: Not concerning (green)
- *Food waste*: Not concerning (green)

3.3.8. Environmental sustainability overview

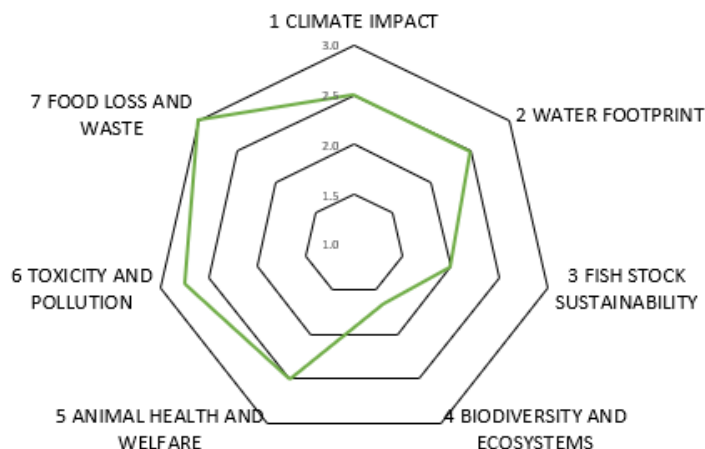
Based on the environmental analysis discussion above and using the FISH4ACP environmental assessment tool (which uses a score range of (1-3), with 1 being “Highly concerning” and 3 being “Not concerning”), a summary of performance for the Guyana seabob shrimp value chain is provided in Table 26 and Figure 30 below. Key issues, recommendations, risks, and mitigating measures flowing from the assessment of performance are provided in Table 27.

TABLE 26. ENVIRONMENTAL SUSTAINABILITY PERFORMANCE SCORES OF THE VALUE CHAIN

1 CLIMATE IMPACT		
1.1 Electricity use	3	Not concerning
1.2 Fuel consumption	3	Not concerning
1.3 Carbon footprint	3	Not concerning
1.4 Renewable clean energy use	1	Highly concerning
Average	2.5	Not concerning
2 WATER FOOTPRINT		
2.1 Water and ice consumption	2	Concerning
2.2 Water pollution and waste water	3	Not concerning
Average	2.5	Not concerning
3 FISH STOCK SUSTAINABILITY		
3.1 Stock status and stock dynamics	2	Concerning
3.2 Fishing pressure	2	Concerning
Average	2.0	Concerning
4 BIODIVERSITY AND ECOSYSTEMS		
4.1 Impact on associated species	1	Highly concerning
4.2 Status of vulnerable ecosystems	3	Not concerning
4.3 Status of ETP species	1	Highly concerning
Average	1.7	Concerning
5 ANIMAL HEALTH AND WELFARE		
5.1 Application of biosecurity measures	3	Not concerning
5.2 Appropriate animal husbandry and	3	Concerning
Average	2.5	Not concerning
6 TOXICITY AND POLLUTION		
6.2 Responsible use of drug and of	3	Not concerning
6.3. Air pollution	3	Not concerning
6.4 Inorganic solid waste pollution	3	Not concerning
6.5 Organic solid waste pollution	2	Concerning
Average	2.8	Not concerning
7 FOOD LOSS AND WASTE		
7.1 Food loss	3	Not concerning
7.2 Food waste	3	Not concerning
Average	3.0	Not concerning

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

FIGURE 30. ENVIRONMENTAL SUSTAINABILITY PERFORMANCE DIAGRAM OF THE VALUE CHAIN



Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

TABLE 27. KEY ISSUES, RECOMMENDATIONS, RISKS, AND MITIGATION MEASURES - ENVIRONMENTAL SUSTAINABILITY

Key Issues	Main Recommendations
<ul style="list-style-type: none"> • Wild capture seabob is at risk to overfishing • Bycatch from both the artisanal and industrial fishery may be impacting the stocks of other species and the ecosystems • Data for the artisanal landings and bycatch are incomplete 	<ul style="list-style-type: none"> • Additional capacity building for the Fisheries Department as well as industrial and artisanal fishers on the collection and processing of catch and bycatch data • Assessment of the benefits and costs (and potential risks) of providing government subsidies (e.g., duty free fuel) to fishers
Main Risks	Mitigating Measures
<ul style="list-style-type: none"> • Because of the lack of coordination between the industrial and artisanal channels, improvements in the performance of industrial firms (e.g., due to MSC certification) will likely not lead to improvements in the artisanal sector. 	<ul style="list-style-type: none"> • Emphasize and sensitize artisanal and industrial actors on the mutual benefits for both channels if collaborating on stock management

3.4. Resilience assessment

3.4.1. Potential shocks

Based on literature review, past experience with similar stocks (i.e. prawns in Guyana), stakeholder interviews and the literature, the most relevant potential shocks to the seabob value chain include the following, text in brackets indicates the type/nature of the potential shock.

1. Decline in the availability of the seabob stock, i.e. a reduction in the resource base (environmental shock, potentially due to either natural fluctuations in stock abundance or to overfishing).
2. Increase in the cost of inputs to the VC (i.e. gasoline or diesel fuel, economic shock, with fuel being the single most important variable cost item).
3. Decline in market share (economic shock, potentially itself resulting from a health shock such as COVID-19 or from competition from other fisheries and aquaculture products).

3.4.2. Resilience of the VC to potential shocks

A rapid qualitative assessment based on six domains results in the resilience sustainability heat map shown in Table 28. The text following the table explains the colour coding.

TABLE 28. RESILIENCE OF THE VALUE CHAIN

Resilience domains		
Structural resilience domains		
Redundancy	Diversity	Connectivity
Behavioural resilience domains		
Collaboration and governance	Learning and adaptation	Participation and inclusion
Hotspot classification		
Not concerning	Concerning	Highly concerning

Note: **Structural domains** evaluate the presence and nature of certain structural elements that may contribute to resilient value chains. **Behavioral domains** refer to how actors and other stakeholders' behavioral patterns interact in ways that may contribute to resilient value chains (FISH4ACP methodological guide, 2021, Internal project document).

Redundancy: There is a low level of redundancy in the VC.

In the industrial channel, the industrial firms are unable to retain any catch/stocks as a buffer to shocks due to the hunting nature of their activity coupled with declining seabob stock, and the perishable nature of their product. The small number of actors in the industrial channel (three firms) also means that resilience to shocks is reduced. However, the fact that one company (NHS) is part of a major Dutch shrimp supplier may, mean that savings from the Dutch company can be used to provide resilience to shocks for NHS.

In the artisanal channel, actors are unable to retain any seabob stocks as buffer inventories to prepare for shocks due to various reasons, including: (i) the nature of their activities (the catch quantities are difficult to predict), (ii) the nature of the VC products (easily perishable), (iii) the lack of proper handling and storage facilities, inputs and equipment (such as cold storage and ice), (iv) the lack of knowledge about proper seabob handling and processing techniques, and (v) limited financial resources to maintain some level of excess capacity.

Diversity: There is a medium level of diversity in the value chain.

In the artisanal channel, the majority of the seabob is sold fresh, with the rest either dried for later sale. Artisanal actors have several local markets for sale of seabob products, however in rural areas, markets are not always close to the landing sites, which limit the ability of fishers to choose from different points of sale. The artisanal fishery is a mixed species and mixed gear fishery, so if the seabob catch rates decline, there is another resource to exploit in the short term. However, in the long term, a pattern of exploitation and resource switching, in absence of management, will lead to a fully depleted marine ecosystem, which highlights the need for comprehensive marine planning and fisheries management. As for other artisanal actors apart from fishers, they are also engaged in other economic activities apart from seabob, which helps to increase their resilience to shocks in case seabob market declines.

In the industrial channel, although industrial firms also catch other fish species (e.g., PSI with tuna), they are all heavily concentrated on seabob. The majority of the seabob is exported as frozen peeled product, mostly to the US, followed by the European Union. There are few value added products resulting from the industrial fishery due to the demand for raw frozen product. The heavy reliance on a single species combined with the limited diversity in terms of markets and product types make the firms vulnerable to changes in seabob stock and end-markets, and thus, reduce their resilience to shocks.

Fishing methods in both the artisanal and industrial channels of the VC are very similar across different fishers and firms (all using Chinese seines or bottom trawls, respectively), which is typical for single species fisheries. Inputs to the fishery, i.e. gear, fuel etc have few alternatives.

Connectivity: There is a low level of connectivity in the value chain.

In the artisanal channel, there is a lack of formal organization and networks of artisanal actors (as discussed in section 2.4.2), the connections between artisanal actors and input and output markets are weak, and infrastructures and supporting facilities (e.g., landing sites, wharfs, market places, support services) are degraded and/or insufficient (as discussed in sections 2.3.2 and 2.3.3.3). Connections and interactions with the Fisheries Department are limited especially when it comes to collection of data required for catch and bycatch monitoring and fisheries management and participation in policy and decision making processes.

In the industrial channel, the level of connectivity is higher, given the vertically integrated nature of industrial firms and the presence of industry association (GATOSP) and the Seabob Working Group (SWG), which have demonstrated some level of effectiveness in supporting

the industrial firms to upgrade and obtain MSC certification. However, artisanal actors are not well-represented in the SWG, and thus, have little opportunities to participate in decision-making processes. Compared to the artisanal actors, industrial firms demonstrate higher level of compliance with fisheries regulations, for instance through data reporting and application of tools to reduce bycatch. However, data reporting by industrial firms also needs improvement.

Collaboration and governance: There is low level of collaboration in the value chain.

In the artisanal channel, vertical linkages are weak, characterized by informal transactions and little to no collaboration/coordination between buyers and sellers beyond the buying-selling transactions. Horizontal linkages between actors are also weak, with most actors not being part of any associations or groups. This lack of collaboration is largely attributed to the lack of trust in cooperatives due to past and current dysfunction and poor management of cooperatives and the lack of communication between cooperatives and their members. In the industrial channel, horizontal linkages are stronger, as demonstrated through the presence of GATOSP and the SWG. However, the relationships between industrial firms and their buyers are purely transactional, and oversea buyers can easily replace Guyanese suppliers by other suppliers. Between artisanal and industrial actors, the level of trust, and thus collaboration, is also low due to the lack of interactions between them. With the government, the artisanal fishers' interactions are limited to licencing and registration, and there is little to no effective collaboration between artisanal actors and the government.

Learning and adaptation: The level of learning and adaption in the value chain is low.

In the 1980s, when the once profitable prawn fishery (*Penaeus* species) was overfished, the industrial fishery switched to concentrating on seabob. Although this example demonstrates some level of adaptability of industrial firms, the ability of these firms to deal with future shocks is still uncertain, especially given their current strong focus on seabob, lack of product and market diversity, and rather unresponsive reaction to the declination of seabob catch in the last five years. In the artisanal channel, the level of technology/innovation adoption is very low due to the lack of access to learning/training opportunities and information in general. Almost all actors use largely traditional practices that contribute to low level of value addition, low product quality and safety, and low profitability. The fishing practices of artisanal fishers, in particular, also raise concerns related to their impacts on bycatch and the ecosystems.

Participation and inclusion: The level of participation and inclusion in the value chain is medium to low.

Participation and inclusion in the value chain can be assessed as low in the artisanal channel but medium in the industrial one. As discussed above, industrial firms are well-presented in their industrial association/group (i.e., GATOSP, SWG), and thus, also in policy and decision-

making processes together with the government. Artisanal actors, on the other hand, are not well-presented even at the cooperative level (both at primary fishermen cooperatives and national cooperative (GNFO) levels), and thus, are marginalized in decision-making processes. Interviews indicate that it is difficult for artisanal actors to advocate for and protect their rights, for instance, they have made various efforts to request improvements to wharf facilities, but no action has been taken by the wharf management and/or the government.

3.4.3. Sustainability impact pathways of potential shocks

The impact pathways of the potential shocks listed above include the following:

1. Decline in the availability of the seabob stock, i.e. a reduction in the resource base (environmental shock, potentially due to either natural fluctuations in stock abundance or to overfishing).
2. Increase in the cost of inputs (i.e. gasoline or diesel fuel), potentially due to economic shocks.
3. Decline in external market share due to economic shocks and/or health shocks such as COVID-19
4. Reduced income for artisanal fishers, resource switching to other shrimp (e.g., whitebelly) and fish species.
5. Reduced profitability for both industrial and artisanal actors due to increased costs of fishing operations and reduced sale volume due to reduced catch.
6. Reduced earnings for industrial and artisanal workers due to reduced business operations and profitability.
7. Reduced government tax revenues from private sector companies due to their reduced profits.

3.4.4. COVID 19 impacts

The COVID-19 pandemic has impacted the fisheries sector all around the globe, with indirect and negative impacts being felt in fisheries sector value chains which rely on cross border movements of labor and fishing vessels, international movements of fish to markets, and the international sourcing of inputs, all of which have been affected by COVID-19 related restrictions put in place by governments. The shock to the seabob VC in Guyana has been significant and provides an example of a shock, resilience, and impacts in action.

COVID-19 restrictions, guidance and government action

The Guyanese government instituted a series of lockdowns and travel restrictions at the onset of the pandemic, along with restriction on gatherings of more than 10 persons. This in turn limited the participation in normal market activities in the artisanal channel and halted the industrial channel as well.

Impacts on fishing, exporting, and support service companies

The fishing activities were reduced due to the shutdown. It also took companies some time to address the impacts of the COVID-19 pandemic in terms of the supply of gear and equipment for their workers. Some companies developed their own measures for their workers. Industrial companies reduced their trawling activity and their exports suffered from shutdowns and port closures in importing countries.

Artisanal fishing activities were not impacted but sales and market access was more difficult due to market closures. There are not many reports of service disruption such as ice and gasoline due to the pandemic.

Food security (local population/consumers)

Labour layoffs increased, due to confinement measures in the short term, but also because of financial or cash flow issues facing some companies. This in turn negatively affected the consumer demand for seabob and other fish products. Lower demand was met with lower supply, due in part to the fact that fewer fishermen were actively fishing. Production was low for some fishers who had to find other sources of employment to compensate for lost income.

3.5. Sustainability heat map

A sustainability heat map in the table below provides a synthesis of the economic, social and environmental sustainability assessment and the resilience analysis (see sections 3.1, 3.2, 3.3, and 3.4).

TABLE 29. SUSTAINABILITY HEAT MAP OF THE VALUE CHAIN

Economic Sustainability	Social Sustainability	Environmental Sustainability
Net income	Wage & employment distribution	Electricity use
Trend in net income	Value added distribution	Fuel consumption
Return on sales	Poverty and vulnerability	Carbon footprint
Return on investment	Discrimination	Renewable clean energy use
No. of jobs in FTE	Women's economic involvement	Water and ice consumption
No. of fulltime jobs	Gendered division of labour	Water pollution & wastewater treatment
No. of wage labour jobs	Gendered access to productive resources	Stock status and stock dynamics
Average wage for hired workers	Women's decision-making and leadership	Fishing pressure
Total value of net wages	Availability of food	Impact on associated species
Direct value added at VC level	Accessibility of food	Status of vulnerable ecosystems
Indirect value added at VC level	Utilization of food	Status of ETP species
Total value added	Stability of food	Application of biosecurity measures
Contribution to trade balance	Respect of labour rights	Appropriate animal husbandry and handling
Rate of integration	Child and forced labour	Responsible use of drugs and chemicals
Public finances impact	Job safety and security	Air pollution
International competitiveness	Job attractiveness	Inorganic solid waste pollution
Food safety	Collective action	Organic solid waste pollution
Consumer evaluation	Coordination of transactions	Food loss
Consumer preference	Social cohesion	Food waste
	Cultural traditions	
	Policy, regulations, and standards	
	Access to finance	
	Access to natural resources	
	Access to information	

Resilience		
Redundancy	Diversity	Connectivity
Collaboration and governance	Learning and adaptation	Participation and inclusion

Key

Not concerning	Concerning	Highly concerning
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Economic sustainability score⁴⁴:	74%
Social sustainability score:	42%
Environmental sustainability score:	71%
Resilience score:	17%
Overall sustainability score:	57%
Number of highly concerning hotspots (red):	17

The main conclusions to be drawn from the heat map when viewed in totality are that the **overall sustainability performance of the VC is medium**, with overall sustainability score of 57 percent. Economic sustainability and environmental sustainability are the areas where the VC demonstrates the best performance, while resilience is the weakest area. There are 17 hotspots (red or highly concerning areas) in terms of the VC's sustainability performance and resilience.

With respect to **economic sustainability**, overall performance of the VC is positive. The VC is profitable (all VC actors, both industrial and artisanal, have positive RoS), although there is a downward trend in revenues as the seabob catch decreases and low level of profitability for cottage processors and market vendors who are mostly women. The share of total value-added in total outputs (revenues) is beyond sustainable levels, but indirect value added is very low, and thus, concerning. The effects on the national economy are positive as taxes and fees paid by VC actors are more than the government's expenditure for the VC. However, the size of the VC is small compared to the size of the wider agriculture sector and the national economy, so contributions to GDP are insignificant. Value for end consumers is concerning, especially in terms of consumer preference as seabob is ranked lower than substitute products such as meat and fish. Employment is also an area of concerns due to the low number of full-time jobs and low wages for hired workers in the artisanal channel.

The **social sustainability** performance of the VC is low. The most concerning social hotspots are related to the women and workers participating in the VC. Specifically, the levels of women's involvement in and benefits from the VC are low as compared to men's, which are largely attributed to the nature of many VC activities (e.g., fishing is physically demanding) coupled with gender norms disadvantaging women (e.g., women are not allowed to work on fishing boats). As for workers, the absence of formal (written) contracts combined with temporary employment and low wages place workers in a vulnerable situation due to the lack of respect of labour rights and job security. Additionally, the supply of seabob is unstable throughout the year. This instability in supply has adversely affected the demand for seabob (and thus, profits for VC actors and workers), as well as consumers' access to these products.

In terms of **environmental sustainability**, it was found that wide capture seabob fishing is at risk of overfishing, as implied through declining catch in the past years. Bycatch from both

⁴⁴ According to the FISH4ACP methodological guide, "the (sustainability scores) indexes are calculated by adding up across sub-domains (1 for green, 0.5 for yellow, 0 for red) and dividing this by the number of subdomains, expressed as a percentage".

the artisanal and industrial fishery may be impacting the stocks of other species and the ecosystems. Data on seabob catch and bycatch landings are incomplete, especially for artisanal channel. The carbon footprint in the VC is mainly due to emissions from fuel used to run fishing vessels or generate the electricity that powers the industrial processing plants; and there is no form of renewable energy used in the VC. Water usage (both fresh and saltwater) is particularly extensive in processing activities; but there is no concern regarding waste water treatment. Animal health and welfare, toxicity/pollution, and food loss and waste are also rated as not concerning.

When considering **resilience**, the VC performs extremely poorly. Four out of six domains are highly concerning (red), while the other two are concerning (yellow). The lack of resilience in the VC are mainly due to the lack of technical and financial resources all the VC actors in the artisanal channel, coupled with their lack of trust in cooperatives and other forms of groups and collaboration, and the unfavourable conditions in the support service provision (e.g., lack of ice supply) and the enabling environment (e.g., degraded wharfs). In the industrial channel, there is a heavy reliance on a single species (seabob) and a few end-markets (United States of America, European Union). These factors in the artisanal and industrial channels contribute to and/or result in the absence of any stocks/inventories of VC products (and thus, low redundancy), the low level of diversity in terms of markets and products, the limited connectivity with input and output markets, and the limited capabilities of VC actors to improve their practices/processes or to prepare for future shocks.

4. Vision and upgrading strategy

This section of the report draws on the analysis presented in Sections 2 and 3 to develop an upgrading strategy for the Guyana seabob value chain which comprises two channels – the industrial seabob channel and the artisanal channel (i.e. a subset of the artisanal finfish value chain that includes fishers catching seabob (as well as finfish) using Chinese seine nets). It starts with a SWOT analysis to begin the process of moving from analytical complexity to strategic simplicity (sub-section 4.1). Informed by the SWOT analysis, the sustainability heat-map, the VC map (see Figure 2), and varied stakeholder interests reflected during consultations, an overall objective for the upgrading strategy is developed in the form of a vision statement. The vision statement includes concrete targets, and will be realised through four main elements, or outcomes of an upgrading strategy, brought about by a range of activities and outputs which are presented graphically in a theory-of-change diagram (Sub-section 4.2). Sub-section 4.3 presents assumptions about factors that will change under the upgrading strategy, and then business models, the enabling environment and governance arrangements under the baseline situation and following upgrading. Sub-section 4.4 builds on preceding sub-sections to develop an assessment of the sustainability impact the upgrading strategy is expected to have.

4.1. SWOT analysis

The seabob value chain in Guyana comprises two distinct channels, the industrial and artisanal channel, and therefore, for the purpose of identifying strategic interventions for upgrading the entire seabob value chain, the SWOT analysis considers the specificities of each of these channels as well as those issues considered to be cross-cutting.

FIGURE 31. SWOT ANALYSIS OF THE VALUE CHAIN

Strengths (Internal)	Weaknesses (Internal)
<p>Industrial channel</p> <ul style="list-style-type: none"> • Well organised and regulated export sector led by three vertically integrated companies who have demonstrated commitment to sustainable practices through MSC certification • Good representation through GATOSP and Seabob Working Group • Leading global exporter of seabob shrimp • Highly efficient processes (20 minutes from catch to freezing) • Employment creation for nearly 800 people (hired jobs) per year on average, of which nearly 40 percent women hired for processing work; salary above minimum wage; low staff turnover (almost 50 percent of workers employed for 10+ years) • Sufficient pool of skilled and unskilled labour for future expansion <p>Artisanal channel</p> <ul style="list-style-type: none"> • Contributes to national food security • Creates employment for 840 people (jobs) per year on average, including family labour and hired workers. Fishing makes up nearly 60 percent of the jobs. <p>Cross-cutting</p> <ul style="list-style-type: none"> • Fisheries Department (FD) committed to improve fisheries management policies(e.g. implementation review of Guyana Fisheries Management Plan 2013–2020 and Guyana Seabob Management Plan 2015–2020; new plans for both under development; collaboration with WWF to develop Artisanal Fisheries Management Plan 2019–2024) 	<p>Industrial channel</p> <ul style="list-style-type: none"> • No collective strategy/vision for industry to grow exports in next 5-10 years • No research activities to assess stock decline • Captains lack skills and incentives in data collection and reporting • No gender-targeted efforts and wage gaps for women workers • Concerns regarding labour conditions (lack of formalised long-term contracts, long working hours) <p>Artisanal channel</p> <ul style="list-style-type: none"> • Fishery is open and no monitoring of by-catch • Sustainability concerns regarding use of Chinese seine nets (high by-catch discards, including juveniles) • Concerns regarding labour conditions (lack of formalised contracts) • Weak horizontal coordination with low participation and trust in cooperatives • Poor infrastructure for landing, processing and marketing fish, exacerbated by poor wharf management, compromises food safety and quality and wharf security • Input costs are high (high cost for ice; limited electricity access) • Inadequate extension services and finance service provision (only 8 percent of artisanal fishers receive training) • Education levels are low which impacts on data collection (65 percent of artisanal fishers having primary education only) • Limited engagement in policy-making • Low levels of licensing (approximately 50 percent of total artisanal vessels, including both Chinese seine (which catch seabob) and non-Chinese seine vessels) • Low adoption of improved technologies/practices leading to low levels of value addition, limited product safety and quality, and low profitability especially for processors and vendors • Low access nationwide to technology (mobile phones & internet) and high cost • Gender norms limit women’s participation

	<p style="text-align: center;">Cross-cutting</p> <ul style="list-style-type: none"> • Low levels of coordination across two channels potentially hampers fishery management efforts • Inadequate data management systems make the monitoring of catch and bycatch challenging • FD does not have sufficient representation (offices, tools and staff) to adequately monitor activities and capture data
<p style="text-align: center;">Opportunities (External)</p> <p style="text-align: center;">Industrial channel</p> <ul style="list-style-type: none"> • Demand for seabob shrimp in the US and the European Union as Guyana's first and second-largest export markets remains strong (no perceived limits to growth) • Potential to strengthen sustainability brand <p style="text-align: center;">Artisanal channel</p> <ul style="list-style-type: none"> • Strong domestic demand: Guyana has one of the highest levels of domestic seafood consumption in CARICOM countries. Consumer survey found that three-quarters of the surveyed households consume seabob with average family consumption of 5.4 kg/year. • Demand for safe, clean, <u>fresh</u> finfish and shrimp (including seabob) increasing with retail outlets changing (supermarkets and restaurants); tourism and oil and gas sector developing 	<p style="text-align: center;">Threats (External)</p> <p style="text-align: center;">Industrial channel</p> <ul style="list-style-type: none"> • Declining catch trend, which implies declining stock abundance, threatens long-term profitability • Increased competition from India in US market, India, China and Belize in regional markets • Cheaper imports available for farmed shrimp compared to wild catch • MSC certification potentially under threat longer-term if pressure on stock continues and impacts on ETP species are not adequately monitored • Reports that new MSC standard under development will cover social issues – companies are under-prepared to respond <p style="text-align: center;">Artisanal channel</p> <ul style="list-style-type: none"> • No data on associated species and undocumented by-catch threatens the sustainability of the fishery. <p style="text-align: center;">Cross-cutting</p> <ul style="list-style-type: none"> • Impacts from climate change and offshore drilling on fish stock are unclear • Causes of increased sargassam seaweed blooms unknown

The **strengths** of the industrial channel for seabob lie in the vertically integrated nature of the three industrial firms operating from capture to export, that allow for a coordinated approach towards fulfilling MSC requirements. The industrial channel accounts for 99 percent of the total average annual seabob catch (2015–2020), of which, 93 percent is exported, primarily to the US market (>70 percent share), where demand remains strong. In 2019, the Guyana seabob fishery became MSC certified on a conditional basis. In order to maintain this certification, the three leading industrial companies that account for 87 percent (76) of the total licensed trawlers, plus the 11 independently-owned trawlers who are contracted by them, have demonstrated commitment towards improving the sustainability

of fishing practices by implementing requirements put forward by MSC and enforced by the Fisheries Department (e.g. an inshore no trawl zone, requirements for By-catch Reduction Devices (BRDs) and Turtle Exclusion Devices (TEDs) for all industrial trawl nets, Vessel Monitoring Systems (VMS) including the adoption of onboard electronic monitoring (CCTV)), and compliance with Harvest Control Rules that reduce the allowable number of days at sea to 225 per year).

According to a recent review of the Seabob Fisheries Management Plan 2015–2020 (Fisheries Department, 2020), industrial players' compliance with fisheries management measures has been high (100 percent, no systematic non-compliance). Industrial players are also well represented through membership in the Guyana Association of Trawler Owners and Seafood Processors (GATOSP), and through their participation in the Seabob Working Group, a public-private partnership coordinating mechanism for the industry, chaired by the Fisheries Department of the Ministry of Agriculture. While the artisanal channel accounts for a mere 1 percent of total seabob catch during 2015–2020, its strengths lie in the contribution that these 300+ Chinese seine fishing vessels make to food security both in terms of seabob landings and other saleable species, as well as employment created in fishing and downstream in processing and retailing of seabob for the domestic market.

Some of the **weaknesses** of the industrial sector include the lack of long-term vision and market-orientation beyond MSC certification. The industry does not have any coordinated targets for export market, nor strategic research plans to comprehensively address priority issues raised related to the decline of seabob stock levels since 2017. Although industrial firms generate employment for nearly 800 people, a lack of attention to labour conditions and gender equality have also given rise to weaknesses in terms of wage gaps for women workers for industrial processing jobs (when compared to male workers for industrial fishing and other operations) and a lack of formalised long-term employment contracts for some staff. For the artisanal channel, the weaknesses identified are common across the entire artisanal channel (not just the subset of Chinese seine seabob fishers). Key weaknesses that prevent the adoption of more sustainable fishing practices include no data collection on catch and by-catch levels, low levels of education of fishers which inhibits data collection and reporting, poor access to services including training and finance, a lack of willingness to formally register vessels for licensing, and degraded infrastructure at landing sites and wharfs which poses risks to food safety and security of workers. Input costs are also high (e.g. fuel accounts for an estimated 30 percent total operating costs of fishers) and value addition by artisanal fishers, processors, and market vendors is low (just over 1 percent of total direct value added from seabob value chain comes from the artisanal channel). Across both channels, long-term sustainability is hampered by inadequate data collection and management systems within the Fisheries Department, which make catch and stock monitoring more challenging.

The main **threat** to the value chain is the sustainability of seabob stocks which have reported a declining catch trend since 2017 according to data from the Fisheries Department. Seabob

stock assessments were conducted in 2012 and most recently in 2019. The seabob Harvest Control Rule (HCR), which has been in place since 2013, sets limits on fishing effort based on the observed annual catch per unit of effort (CPUE) in the prior management period. The observed CPUE in 2019 was the first time it fell below the trigger level CPUE, leading to reduced fishing effort allowed in 2020 and closer monitoring of the HCR indicator. As a result, management measures were introduced in 2019, including an extension to the closed period from 6 to 8 weeks. This closed season was extended another 2 weeks to 10 weeks in total in 2020, due to low CPUE in 2019 (CRFM 2020, 2020). While the factors contributing to this decline are yet to be confirmed by scientific evidence, climate change impacts, as well as offshore drilling and an increase in sargassam seaweed blooms are thought to be contributing to this issue and require urgent research. Another threat to maintaining MSC certification is inadequate data collection, monitoring and management of Endangered Threatened and Protected (ETP) species and efforts to reduce unwanted catches. To this end, although efforts to reduce by-catch have already begun in the industrial channel (e.g., adoption of BRDs, TEDs and VMS), more improvements in data collection and monitoring are needed. Moreover, there is no baseline established for stock levels of species targeted by the artisanal channel, and currently no ability to monitor the stock levels of these species, determine by-catch levels and reduce unintended catch associated with artisanal fishing gear, including turtles.

Key **opportunities** include strong demand from the US and Europe for increased volumes of higher value seabob if stock issues can be addressed and bigger shrimp can be caught; as well as strong domestic demand for fresh, minimally processed (i.e. peeled) seabob that meets food safety and quality requirements and can be sold into restaurants and supermarkets to meet projected demand by the tourism and oil and gas sector⁴⁵.

Key **strategic options** emerge from the SWOT and revolve around the listed opportunities and threats as follows:

- Supporting sustainable fisheries management across both channels to address issues of declining catch (threat), by building on existing commitment of vertically integrated companies to stabilise stock and reduce by-catch (strength), and improving stock and by-catch assessments in the artisanal channel, and data collection and monitoring of catch across both channels (weaknesses)
- Increasing export value for industrial actors through increased sales of larger sized shrimp to the US and the European Union markets (opportunity) by complying with changes in fishing regulations implemented in response to MSC conditions (strength) and proactively adopting additional sustainable fishing practices (e.g. longer periods without fishing) to reduce pressure on stock (threat) as recommended by findings from scientific research studies on factors affecting stock decline.

⁴⁵ According to the Guyana National Budget 2022, the oil and gas subsector is projected to grow by 96.7% in 2022 (PWC, 2022)

- Improving the food safety and quality of artisanally captured seabob traded from strategic landing sites (weakness to be addressed) combined with facilitating market linkages and developing business models to enable higher-value products to reach potential higher-value domestic markets such as supermarkets and hospitality (opportunity).
- Recognising the key role that women play as workers in processing factories in the industrial channel and as processors and vendors in the artisanal channel (strength), improving the conditions for women workers in the industrial channel (weakness) and increasing the share of value added for women business owners (as processors and vendors) and women workers in the artisanal channel (weakness) by improving representation of women and access to higher value markets (opportunity).

4.2. Vision, upgrading strategy and theory of change

The FISH4ACP team held a validation workshop on 18 August 2021, where the findings from the VCA were presented to artisanal and industrial fishers, processors, market vendors, and other industry stakeholders to validate results. A VC planning workshop was then held on 23 November 2021 to develop a common vision for the VC in the next 10 years, the theory of change to support this vision and a tentative upgrading strategy with associated outcomes and outputs to achieve the vision. Following revision of this work by the FISH4ACP project management team, it was decided that the vision and upgrading strategy proposed were too general, insufficiently linked to evidence to support the proposed outcomes and outputs and lacked specific indicators to ensure that the vision could be achieved. In February 2022, efforts were made to revise and redefine this vision and upgrading strategy in consultation with key informants (Fisheries Department, GATOSP, WWF, GNFO). During these key informant interviews (KIIs), the key constraints facing the industrial and artisanal seabob channels were discussed, and priorities for upgrading were clarified. The revised shared vision articulated by the stakeholders is as follows:

(before February 2022) *"In the next 10 years they would like Guyana to have a sustainable resilient, well managed and inclusive fishery that benefits all actors in the value chain."*

(after February 2022) *"In 2032, Guyana will have strengthened its position as a leading exporter of seabob shrimp globally by ensuring a sustainable and resilient value chain for seabob across the industrial and artisanal channels, that is well-regulated and supported by data ⁴⁶, with improved infrastructure for artisanal fishers and empowerment of women across both channels."*

This vision is coherent with, and relevant to national needs and policies. It is aligned with the findings and recommendations emerging from the implementation review of the Guyana

⁴⁶ For monitoring of stock and catch levels

Fisheries Management Plan (FMP) 2013–2020, the draft Guyana Marine Fisheries Management Plan 2022–2027, the Guyana Seabob Management Plan (SMP) 2015–2020, the Artisanal Fisheries Management Plan (AFMP) 2019–2024; the recommendations made in the 2019 MSC Assessment of the Guyana Seabob Fishery and subsequent MSC Surveillance reports conducted in 2020 and 2021, and the recommendations from the WWF Gender Analysis of the Fisheries Sector conducted in 2020. Collectively, these policies and assessments aim to:

- Maintain and improve nutrition, social and economic benefits from all current fisheries
- Prioritise increasing incomes of artisanal fishers, e.g., through better access to processing and marketing facilities.
- Match fishing capacity to resource availability – i.e., ensure sustainable exploitation; introduce environmentally sound practices.
- Implement cross-cutting management strategies for: data collection and management; monitoring, control and surveillance, and piracy; capacity building for the Fisheries Department
- Use scientific information based on stock assessment and fisheries monitoring to provide management guidance on the ecological and economic performance of the seabob fishery (SMP)
- Introduce climate change adaptation and mitigation efforts across both channels, but in particular for artisanal fishers to safeguard their livelihoods from climate change impacts (FMP, AFMP)
- Improve low representation of women in decision making regarding policy/ legislation and management of the fisheries sector (WWF Gender study)

The revised vision incorporates the key components of the policy objectives mentioned above, as well as many of the main areas of concern identified in the sustainability heat map (e.g. fish stock sustainability, biodiversity and ecosystems, gender equality, labour rights, renewable clean energy use and value-added distribution). Furthermore, the vision supports four Sustainable Development Goals (SDG) goals of the United Nations, namely:

- SDG 5: Achieve gender equality and empower all women and girls
- SDG 8 Decent work and economic growth, and its goal to ‘promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all’.
- SDG 12: Ensure sustainable production and consumption patterns
- SDG 14 Life below water, and its goal to ‘conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Specific and **measurable targets** associated with the vision (by 2032) are:

Environmental:

- Industrial CPUE⁴⁷ does not fall below the trigger level CPUE in any quarter (monitored monthly with changes to Harvest Control Rule (HCR) made quarterly by FD if needed)
- Reduction of by-catch discard levels of Chinese seine fishers⁴⁸
- Maintaining 100 percent adoption of Bycatch Reduction Devices (BRDs) and Turtle Excluder Devices (TEDs) by all industrial vessels

Economic:

- Total export value increased to USD 15.5 million by 2025 and USD 16.9 million by 2032 (10 percent and 20 percent increase respectively compared to baseline 2015–2020)
- Number of fulltime equivalent (FTE) jobs in core VC increased to 1 425 by 2025 and 2032 (1.5 percent increase compared to baseline 2015–2020)
- Direct value added by core VC increased to USD 39 million by 2025 and USD 43 million by 2032 (12 percent and 24 percent increase respectively compared to baseline 2015–2020)

Social:

- Share of FTE jobs for women increased to 43 percent by 2025 and 2032 (3 percent increase compared to baseline 2015–2020)
- Number of FTE jobs for women with earning not below national minimum wage increased to over 420 by 2025 and 2032 (29 percent increase compared to baseline 2015–2020)

Theory of change

The Theory of Change to achieve the above vision is based on an integrated approach to working with the industrial and artisanal channels to increase adoption of sustainable fishing practices, while at the same time building the capacity of the Fisheries Department (FD) to revise policies and regulations based on sound scientific evidence, data collection and improved coordination with and provision of services (e.g., training, extension) to value chain actors. This in turn, will increase compliance with, and enforcement of these regulations. The upgrading strategy proposed would have no impact on, or incentives to increase seabob catches, and as such, does not envisage any increase in average annual total catch volume or additional pressure on seabob stock levels. Indeed, pressure on stock levels should decrease through the adoption of sustainable fishing practices across both channels (e.g. reduced no. of days at sea, reduced by-catch discards, improved monitoring of ETP species etc.).

Artisanal fishers will also be supported to adopt climate smart technologies to increase their resilience (learning and adaptation) while reducing their carbon emissions and dependency

⁴⁷ According to the MSC audit report 2019 by Southall et al. (2019, p.26), the most appropriate stock status indicator is the annual catch rate (CPUE) calculated as kilos per day fishing based upon processors' landings data.

⁴⁸ Reduction level to be determined following a study on the impact of Chinese seine fishing on stock levels and by-catch.

on non-renewable fuels. Changes to the business model of the downstream (processing and market vendor) segment of the artisanal value chain will be incentivised through training on improved seabob handling practices (e.g., processing, storage) and food safety and quality, coupled with infrastructure upgrades at strategic wharfs and landing sites and facilitating linkages to emerging higher value retail outlets such as supermarkets, hotels and restaurants. Women dominate the market vendor (retailing) and processing segments of the chain, where profitability levels are the lowest of all actors in the value chain. Upgrades to the business model of market vendors and processors will generate sufficient additional income to increase the number of FTE employment opportunities for woman and increase wages paid to female employees.

The proposed upgrading strategy consists of four key elements (outcomes), which aim to holistically improve the (economic, social, and environmental) sustainability performance of the seabob VC, as below.

- **Industrial firms adopt sustainable practices to maintain MSY stock levels, reduce pressure on ecosystem and build resilience**

This outcome draws on the strengths and willingness of the industrial channel to maintain MSC certification over the next ten years, but encourages actors to look beyond certification alone, and adopt changes in fishing practices as recommended by research studies (including regular stock assessments) conducted to investigate the root causes associated with stock decline. The aim is to stabilise stock levels by not increasing total catch quantity over the next 10 years, while at the same time increasing export value for the industrial channel as a whole by developing a strategic vision for the export industry and associated marketing plan targeting the US and the European Union markets as the main outlets for seabob exports (>70 percent annually to the US in 2015–2020; 20 percent destined for the European Union in 2020). While the business model of industrial seabob firms does not change, changes in fishing practices may involve potentially reducing the number of days spent fishing each year, while increasing CPUE, in order to allow for increased catch of bigger sized shrimp, which in turn will generate greater export value in the US and the European Union markets based on higher prices⁴⁹ paid for bigger sizes.

As a means to strengthen the behavioural resilience domains of participation and inclusion and learning and adaptation, industrial processing companies will take a proactive approach towards preparing for the inclusion of social issues (e.g. labour conditions, gender equality) that will likely become part of the revised MSC standard in the future. One way to initiate this process, will involve a comprehensive review of occupational health and safety standards (OHS) currently in place in seabob processing firms, and the development of an industry-wide set of OHS standards that can be adopted and implemented by management across the three firms. These industry standards will also take into account gender-specific OHS

⁴⁹ Interview with Gopie Investments Inc. (GII) in 2021, Questions 6 & 7: Biggest size USD 3.6/lbs (or GYD 1 589/kg), smallest USD 1.8/lbs (or GYD 794/kg). Taking into consideration price fluctuations.

needs, given that almost 40 percent of all employees working in processing factories are women. Consideration should also be given to issues related to women's economic empowerment, given that in industrial firms, women workers are mainly engaged in processing and get paid considerably lower salaries (1.5 times less) than male workers who are hired for fishing and supervision/management roles.

To further increase the behavioural resilience domains of learning and adaptation through increasing adoption of innovative technologies and reducing reliance on non-renewable energy sources, the feasibility of industrial firms investing in renewable energy sources (e.g. solar power) and sourcing at least part of their energy requirements from renewable sources will be investigated. Adoption of renewable energy will be encouraged to the extent possible during the lifetime of the upgrading strategy.

- **Artisanal seabob fishers (Chinese seine) adopt sustainable fishing practices to maintain a healthy stock of species captured by them**

Through research, grants/loans and other supporting outputs (such as trainings, business plan development support, and linking to finance and other service providers), artisanal fishers will be incentivized to shift to more sustainable and resilient practices for catching seabob and other finfish. A Chinese seine vessel working group (across different regions) will be established to improve coordination of artisanal seabob fishers and as a means for both the FISH4ACP project and Fisheries Department to better target this sub-set of artisanal fishers, improve two-way communication and better understand the specific challenges they face. Their adoption of climate smart technologies will also be facilitated by linking fishers to service providers and financing/matching grants for technologies that generate lower emission (e.g. fuel-efficient technologies such as use of 4-stroke engines, use of sails etc). The business case for changing engines/adopting fuel-efficient technologies will be evidenced through a decrease in the operating costs for artisanal fishers associated with fuel consumption of traditional 2-stroke engines (currently 30 percent of total costs for artisanal fishers).

- **Increased compliance with and enforcement of revised fisheries regulations by improving data collection and coordination between VC stakeholders**

Declining seabob stock is a significant threat to the value chain and could jeopardize MSC certification and artisanal fisher livelihoods in the longer-term. One of the greatest challenges facing the Fisheries Department is the inadequate data collection and monitoring system across both channels to assess stock levels, catch and by-catch data, and revise fisheries regulations in a timely manner based on the data collected. Environmental monitoring of ETP species also needs to be improved based on MSC conditions (MSC 2019, 2020, 2021). By developing a communication strategy for the Fisheries Department, the importance of providing regular feedback to VC actors on data collection and analysis will be addressed, as well as communicating the importance of/incentives for complying with

licensing⁵⁰ regulations for the artisanal channel, where around 85 percent all Chinese seine vessels are licensed in 2021 (Consultation with Fisheries Department, April 2022). A functioning stakeholder grievance mechanism will also be established within the FD, to improve the responsiveness of government to the needs of the actors, and provide artisanal fishers in particular, with an anonymous outlet to report their grievances.⁵¹

These measures are the first step towards building trust between the Fisheries Department and VC actors (artisanal actors in particular) and creating the social capital required to effectively implement a participatory approach to data collection, monitoring and inspection. A range of pilot approaches⁵² can then be trialled to improve data collection and monitoring across both channels. Fisheries regulations will then be revised based on updated data coming from stock assessments from both channels and improved catch and by-catch data collection, including the monitoring of ETP species. The revision of fisheries regulations will build on recommendations/conditions from MSC reports as well as broader/more effective consultations with VC stakeholders and/or their representative bodies. In turn, the compliance with fisheries regulations will be increased through improved service provision by the Fisheries Department (e.g., transparent communication, regular feedback on data collected, training for fishers) and enhanced mutual commitment across channels to increase the sustainability of seabob stock. While service provision by the Fisheries Department will be supported by capacity building, technical assistance, and support to use digital tools that can make Department's operations more efficient, enhanced commitment by industrial and artisanal actors will be stimulated through more effective communication with Fisheries Department and increased coordination between VC actors thanks to strengthening/revitalizing their representative bodies such as the SWG and the Artisanal Fisheries Advisory Committee.

- **Artisanal actors adopt improved seabob handling practices (including food safety and quality) to enter high-value markets by improving infrastructure, facilities and services**

Market vendors and cottage processors are the least profitable segment of the value chain (returns on sales of 12 percent and 13 percent respectively) and these VC functions are largely carried out by women. Therefore, additional attention will be paid to gender

⁵⁰ A key incentive for licensing and submission of accurate catch data that needs to be explained clearly to artisanal fishers is the requirement for vessels to be licensed to be considered under the disaster risk management plan for the oil and gas sector under preparation by the Fisheries Department. Only those vessels that are licensed will be able to seek compensation proportionate to the scale of their fisheries operations in the event of a disaster such as an oil spill. As such, failure to comply with licensing regulations exposes vessel owners to additional risks.

⁵¹ For example, this may involve reporting poor/corrupt management of cooperatives, damage to fishing gear caused by industrial trawlers etc.

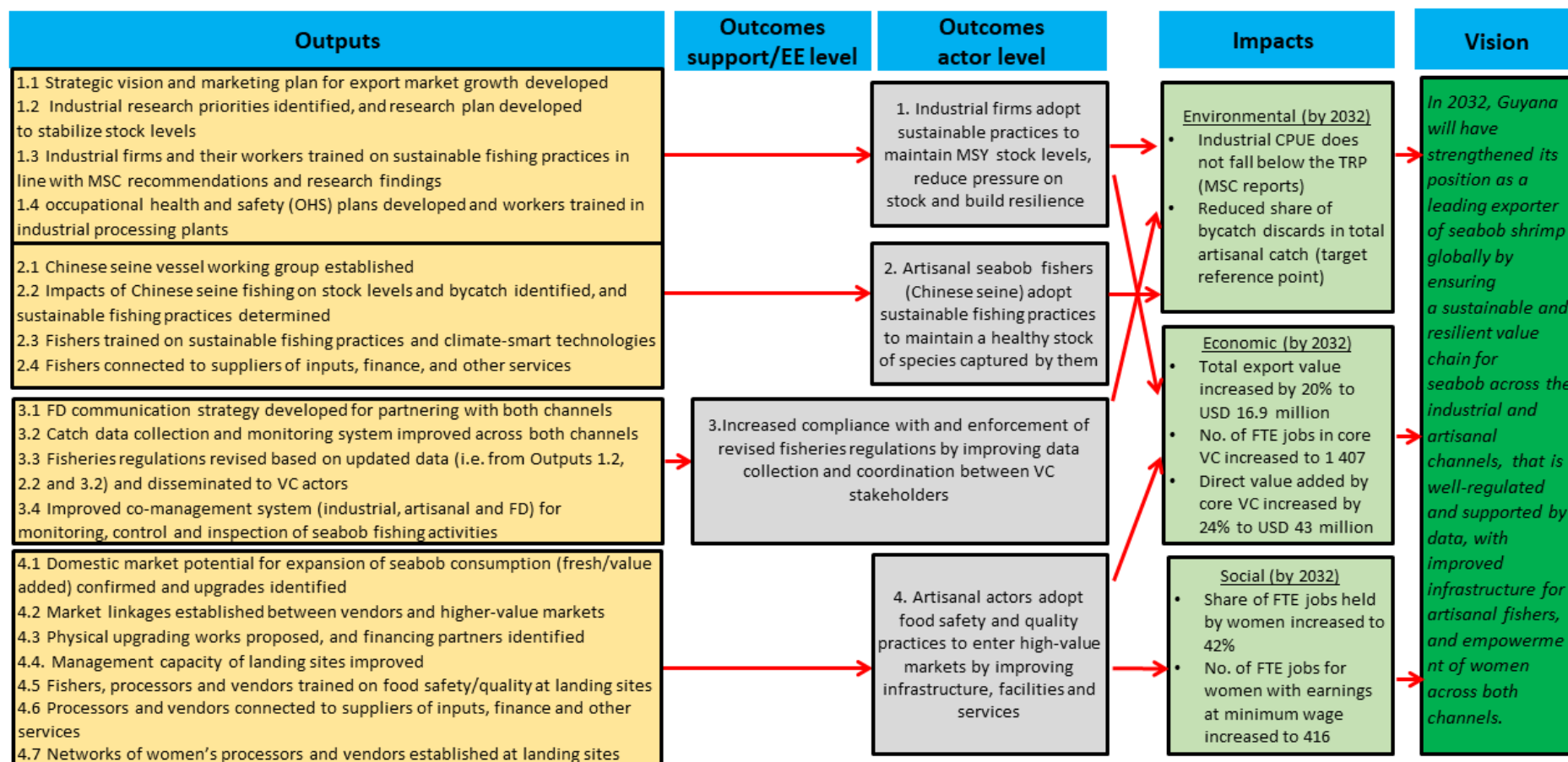
⁵² For example, hiring youth to collect data in early mornings at landing sites, introducing artisanal fishers to VMS and digital data collection tools that can be used to improve real-time catch reporting, timely submission of data will be rewarded with incentives such as safety at sea training and support to purchase safety equipment or fuel-saving equipment, etc.

constraints and opportunities allowing the increased participation of women and increased share of direct value captured by women. To this end, a study will firstly be conducted to verify the potential for expansion of domestic seabob consumption in higher value outlets including supermarkets, hotels and restaurants as a result of the growth of the oil and gas and tourism sectors in Guyana. By providing training on improved seabob handling practices (e.g., food safety and quality, improved drying and storing techniques), coupled with infrastructure upgrades at strategic wharfs and landing sites (mainly Meadowbank in Region 4 and Rosignol in Region 5), women processors and vendors will be linked to higher value customers as well as necessary service providers (e.g. suppliers of solar dryers, ice and ice boxes) to increase their incomes from higher value sales of fresh seabob. Their representation and voice in decision-making regarding the management of landing sites will also be improved by forming a network of women vendors and processors, subject to their interest.

As highlighted above, a range of **activities** (e.g. studies, trainings) and investments by different stakeholders, including government, the private sector (core VC actors and service providers), the FISH4ACP project, and other donors (discussed in detail in Section 5), will produce the **outputs**. These outputs will in turn bring about **outcomes at the support/enabling environment level**, which will in turn support the realization of the **outcomes at actor level**, and thereby the achievement of the **vision**.

The explanatory text above is presented graphically in the **Theory of Change (ToC)** overleaf. The ToC covers the whole upgrading strategy (whose implementation may go beyond the scope of FISH4ACP project) rather than being specific to the FISH4ACP project. Assumptions contained in the ToC are indicative and not linked directly to specific levels of the ToC (i.e. outputs, outcomes, etc) - the more detailed logframe for the upgrading strategy contains assumptions that are specific to different levels of the logframe.

FIGURE 32. THEORY OF CHANGE - GUYANA SEABOB VALUE CHAIN



4.3. Upgrading activities

4.3.1. Assumptions about changes from upgrading

The **key assumptions** underpinning and impacting on the assessment of current and future VC performance relate to economic factors. The key assumptions for factors that are expected to change with implementation of the upgrading strategy, are provided in the table below, and relate to business models, the enabling environment, and governance arrangements. These will be discussed in some detail in the following sub-sections.

TABLE 30. KEY ASSUMPTIONS UNDER UPGRADED SITUATIONS

Item	Baseline (2015– 2020)	2025	2032	Justification
Volumes				
Total catch volume (MT)	17 173	unchanged	unchanged	CPUE increases, but number of fishing days decreases.
Artisanal catch (MT)	180	unchanged	unchanged	
Industrial catch (MT)	16 992	unchanged	unchanged	
Export volume, in fresh equivalent (MT)	15 867	unchanged	unchanged	Volume does not change, but higher prices thanks to bigger seabob
Market vendors' sales directly to consumers (% of total sales by market vendors)	85%	80%	70%	Sales redirected to supermarkets/hotels
Market vendors' sales to street food vendors/ small restaurants (%)	10%	unchanged	unchanged	
Market vendors' sales to supermarkets/ hotels (%)	5%	10%	20%	Expected growth thanks to oil/gas industry and tourism.
Volume previously (before 2019) sold by artisanal fishers to aggregators (kg)	27 216	0	0	Aggregators do not participate in the VC any more. The sales of fresh seabob from fishers to

				aggregators (15% of catch volume by fishers in baseline) will be directed to cottage processors and market vendors.
Artisanal fishers' sales directed to cottage processors (kg)	0	1 635	1 635	Around 94% of the sales will be directed to market vendors, and 6% to cottage processors
Artisanal fishers' sales directed to market vendors (kg)	0	25 581	25 581	Around 94% of the sales will be directed to market vendors, and 6% to cottage processors
Volume of fresh seabob purchased by cottage processors (kg)	9 018	10 653	10 653	Based on above assumption about sales directed to cottage processors
Volume of fresh seabob purchased by market vendors (kg)	147 650	173 231	173 231	Based on above assumption about sales directed to market vendors
Prices				
Exported peeled seabob (GYD/kg)	1 184	1 303	1 421	Bigger seabob, higher price. Increased prices are within the price range indicated by industrial firms in interviews.
Wholesale price of dried seabob when sold to market vendors (GYD/kg)	1 312	1 352	1 352	Increased by 3% thanks to improved product quality
Retail price of dried seabob when sold to domestic consumers (GYD/kg)	1 875	1 931	1 931	Increased by 3% thanks to improved product quality
Kg of ice bought per kg seabob	1.3	0.2	0.2	Better ice boxes help to reduce the amount of ice needed because ice can be stored for 4 days compared to 6 hours as currently.
Cost of old fridges	15 000	Unused	Unused	Taken from economic interviews with market vendors
Cost of ice boxes	Unused	45 000	45 000	Online research

Labour				
Number of FTE jobs for artisanal processing workers	11.3	12.0	12.0	Increased thanks to increased volume of fresh seabob to dry, but save 10% labour thanks to improved processing techniques.
Wages for hired cottage processor workers (USD/hour)	0.93	1.3	1.3	Increased profits helps to increase wages for hired workers to minimum wage
Number of FTE jobs for market vendor workers	242	270	270	Increased thanks to increased volume of fresh seabob to sell. Labour become more efficient thanks to training.
Wages for hired market vendor workers (USD/hour)	0.93	1.3	1.3	Increased sales to supermarkets/hotels helps to increase wages for hired workers to minimum wage

Upgrading activities generally fall under three types of upgrading: upgrading business models; upgrading the enabling environment; and upgrading governance.

4.3.2. Upgraded business models

Upgrading business models includes improved technologies that value chain actors adopt to improve performance. For this value chain, the upgraded business models focus on the artisanal channel and include improved fishing practices for artisanal fishers (e.g. using 4-stroke engines or other techniques that are environmentally friendly), improved processing equipment/techniques by cottage processors (e.g. solar dryers), and improved use of cold chain inputs (e.g., ice, ice boxes) by market vendors. For market vendors, new market opportunities for the sale of higher value fresh seabob will also be targeted in supermarkets, hotels and restaurants, with the scale of these opportunities to be confirmed following a domestic market study.

The provision of training and extension in the artisanal fish VC is currently delivered by the FD through its network of Fisheries Offices, but it faces challenges with inadequate funding and outreach, with less than 8 percent of fishers participating in any form of training. When adopting new technologies, artisanal fishers, processors and market vendors will need training on how to use these and also other skills such as fish-handling practices to ensure

food safety and quality, establishing business partnerships and forging market linkages. For sustainability purposes, FISH4ACP will partner with local Business Development Service (BDS) providers to provide this training, rather than delivering the training directly. Representatives from the Fisheries Department will also be included in this training to develop their capacity to independently deliver the training beyond the project period (i.e. training-of-trainers approach). A curriculum and training materials will be developed with the BDS providers in partnership with FD representatives, and training will be jointly delivered with FD staff.

Business model upgrades for artisanal fishers

Under the assumption that grants/loans and other supporting outputs (such as training) will be available for artisanal fishers, and appropriate service providers for the equipment required for environmentally sustainable fishing practices (e.g. engines, sails or other technology) are identified and linked to fishers participating in cooperatives and/or the Chinese seine working group (to be established), artisanal fishers will adopt these practices. To estimate the potential economic and environmental impacts of fishers adopting such practices, the transition to use of 4-stroke engines is used as **an example of a potential upgraded technology** that is more fuel-efficient and generates lower emission than the engines currently used (2-stroke engines). However, the specific technology upgrades to be supported by the FISH4ACP project will only be confirmed following a study to be conducted under FISH4ACP. For the purpose of this example, the adoption of four-stroke engines by artisanal fishers would lead to a reduction in total operating costs related to fuel to 20 percent (down from 30 percent in baseline 2015–2020). This reduction in operating costs will increase the profitability of artisanal fishers, not only for seabob catch but also for the catch of finfish, as operating costs related to seabob catch are estimated to account for only 10 percent of total operating costs for Chinese seine fishers.

TABLE 31. COMPARING 2-STROKE ENGINES AND 4-STROKE ENGINES

	Current engine (2-stroke)	4-stroke engine ¹
Cost of engine (GYD/engine)	800 000 ³	1 500 000 ⁴
Average amount of fuel used (gallon per trip) ²	5 ³	3 ⁵
Speed and power of engines		Less powerful and slightly slower than 2-stroke engines (but in fishing, fuel efficiency is more important than power and speed) ⁶

Notes and sources: ¹ Four-stroke engine is used here purely as an example of a potential upgrade for fishers. Specific upgrade will be identified by a study to be conducted under FISH4ACP; ²One trip is 4-6 hour long; ³Based on Economic interviews with artisanal fishers in 2021, which was then validated through consultation with GNFO and dealers in Guyana; ⁴ Estimated based on consultation with GNFO in March 2022; ⁵ Assuming 4-stroke engines use 40 percent less fuel than 2-troke engines (based on various sources, e.g., consultation with FD and GNFO in March 2022, <https://www.latimes.com/archives/la-xpm-2002-dec-29-op-foote29 tory.html>; https://www.ncei.noaa.gov/data/oceans/coris/library/NOAA/NonCRCP/Corals/Case_Studies_Economic_Incentives_Approaches_Marine_Conservation.pdf; ⁶Consultation with GNFO, March 2022.

Business model upgrades for market vendors and cottage processors

In the artisanal channel, prior to 2019, market vendors purchased nearly 80 percent of total seabob catch from artisanal fishers, while 5 percent went to cottage processors for dried shrimp and 15 percent went to independent aggregators for sale to the industrial companies (see Figure 2). However, since MSC certification in 2019, independent aggregators⁵³ are no longer allowed to supply seabob to industrial companies due to traceability issues (i.e. artisanal captured seabob is not MSC certified). As a result, an additional 15 percent of catch (estimated at 27 tonnes) from artisanal fishers has been redirected to market vendors (around 94 percent of 27 tonnes) and cottage processors (around 6 percent), thereby increasing the availability of seabob supply for sale in domestic outlets, without increasing overall artisanal catch volumes. It is expected that these increased volumes will be redirected towards higher value customers including supermarkets, hotels and restaurants.

Table 32 below compares the current drying technique and a potential improved technique using solar dryers. Compared with the current drying techniques, the main advantages of using solar dryers include improved dried seabob quality thanks to faster drying (reduced risk of spoilage) and more hygienic practices (seabob does not touch the ground and can be

⁵³ It should be noted that although aggregators no longer buy seabob from the artisanal channel and supply it to industrial processors, they still operate as aggregators of finfish and other shrimp species (e.g. whitebelly), and are unlikely to suffer significant economic losses from the loss of seabob traded, given the small volumes procured from the artisanal channel.

protected against flies, pests and dust), and saving labour as the product can be left in the dryer for drying overnight.⁵⁴ A main drawback of the solar dryer (compared to current practices) is the investment cost (see table below). To stimulate processors' adoption of the technology, a potential approach could be facilitating groups of around 20 processors to co-invest in a dryer and group members pay a fee when using the dryer. As discussed in section 2 (e.g., VC map), it is estimated that currently there are only around 9 seabob processors; however, the processor group would include not only seabob processors but also those who process other products and altogether, they would share a solar dryer. Training and technical support for processor group formation and management will be needed to facilitate adoption and effective maintenance/utilization of the dryers over time.

TABLE 32. COMPARING CURRENT AND IMPROVED DRYING TECHNIQUES

	Current practice	Improved practice
Processing techniques	Drying on the floor	Using solar dryer
Investment cost (to purchase equipment)	Zero	GYD 5 000 000 ¹ for a 20 ft X 50 ft solar dryer (a group of 20 processors collectively own and manage the dryer)
Fee per use (GYD/100 kg of fresh seabob)	Zero	1 100 ² (members of processor group pay a fee when using the dryer)
Labour		90% of the labour needed under current practice ³
Average price of dried seabob (GYD/kg)	1 875	1 931 (3% higher thanks to improved product quality)

Notes and sources:¹ Based on the cost of solar dryers developed by the National Agricultural Research and Extension Institute - NAREI (<http://narei.org.gy/wp-content/uploads/2020/12/NAREI-MAGAZINE-2019.pdf>, p.8) validated through consultation with Institute of Applied Science and Technology (IAST) in March 2022; ² Fee per use is assumed to be around 2 times lower than the cost of wood and coconut shells used for processing using current practices; ³ Using solar dryers requires hiring labour for fewer days because the product can be left in the dryer overnight or during rain (<https://guyanachronicle.com/2018/05/06/solar-drying-helps-to-preserve-food/>).

Table 33 below compares the current and improved business models for market vendors. The main differences include the transition from using old freezers to using properly insulated ice boxes for ice storage and the increase in vendors' share of sales to higher-value markets. Compared with the current techniques, using ice boxes would greatly increase the duration during which ice can be properly stored (not melting), thereby significantly reducing the amount of ice that vendors need to buy to preserve seabob. Additionally, through market facilitation activities (e.g. organization of trade fairs, match-making forum between buyers and sellers), market vendors will be supported to connect to new markets/buyers, potentially

⁵⁴ <https://guyanachronicle.com/2018/05/06/solar-drying-helps-to-preserve-food/> (accessed in March 2022).

the hospitality and oil and gas sectors, who can offer higher prices for seabob products. With reduced cost (for ice) and increased revenue (through selling to new buyers), the profitability of market vendors would be expected to increase as compared to baseline.

TABLE 33. COMPARING CURRENT AND IMPROVED BUSINESS MODELS FOR MARKET VENDORS

	Current practice	Improved practice
Ice storage technique	Use old freezers to store ice	Use insulated ice boxes to store ice
Investment cost (GYD/equipment)	15 000 for an old freezer ¹	45 000 for a new ice box (57 liters) ²
Maximum ice storage duration	6 hours ¹	4 days ²
Share of sales directly to consumers	85% ¹	70% by 2032 ³
Share of sales to street food vendors/small restaurants	10% ¹	unchanged ³
Share of sales to supermarkets/hotels (%)	5% ¹	20% by 2032 ³

Notes and sources: ¹ Based on Economic interviews with VC actors in 2021; ² Estimated based on online research (<https://guyana.desertcart.com/products/103455991-coleman-60-quart-performance-wheeled-cooler>); ³ Own projection based on potential increased linkages to supermarkets/hotels.

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Operating accounts of VC actors in baseline and upgraded situations

Table 34 and Table 38 are constructed using economic interviews with VC actors conducted in 2021 (which were then validated by further literature review and consultations with key stakeholders in 2022), and the key assumptions presented in Table 30.

TABLE 34. OPERATING ACCOUNT OF A TYPICAL ARTISANAL FISHERS, FOR SEABOB ONLY (IN GYD/YEAR)

	Baseline (average 2015–2020)	2025 (for adopters)	2032 (for adopters)
Outputs			
Fresh seabob high catch season	191 840	191 840	191 840
Fresh seabob low catch season	56 320	56 320	56 320
Seabob consumption	4 840	4 840	4 840
Sales to aggregators, high season	21 840	21 840	21 840
Sales to aggregators, low season	4 356	4 356	4 356
Total revenue	279 196	279 196	279 196
Inputs			
Boat	-	-	-
Boat Maintenance	3 000	3 000	3 000
Boat registration	480	480	480
Pen licence	200	200	200
Boat licence	380	380	380
Net	-	-	-
Net maintenance	9 000	9 000	9 000
Engine	-	-	-
Engine maintenance	3 600	3 600	3 600
Pens	-	-	-
Fuel	67 200	40 320	40 320
Labour jackman	84 000	84 000	84 000
Jackman licence	50	50	50
Family labour	42 000	42 000	42 000
Depreciation boat	2 500	2 500	2 500
Depreciation net	2 000	2 000	2 000
Depreciation engine	8 000	15 000	15 000
Depreciation pen	14	14	14
Total cost	222 424	202 544	202 544
Operating profit (after tax)	56 772	76 652	76 652
Return on sales (RoS)	20%	27%	27%
Return on investment (RoI)	26%	38%	38%

Note: (1) The operating accounts of non-adopters in 2025 and 2032 stay the same as in baseline. (2) Around 10% of artisanal fishers' income is from seabob (based on Economic interviews with artisanal fishers, 2021; and consultation in 2022). (3) Exchange rate 1 USD = 200.641 GYD (obtained from Oanda, 8 February 2022).

TABLE 35. OPERATING ACCOUNT OF A TYPICAL COTTAGE PROCESSOR, FOR SEABOB ONLY (IN GYD/YEAR)

	Baseline (average 2015–2020)	2025 (for adopters)	2032 (for adopters)
Outputs			
Dried seabob high season	461 898	558 724	558 724
Dried seabob low season	103 950	138 182	138 182
Dried seabob own consumption	24 310	25 040	25 040
Total revenue	590 159	721 946	721 946
Inputs			
Fresh seabob high season	239 246	278 882	278 882
Fresh seabob low season	49 500	63 884	63 884
Salt	60 480	63 769	63 769
Wood	15 120	0	0
Coconut shells	10 080	0	0
Transportation	7 200	7 592	7 592
Labour peeler	27 000	39 057	39 057
Labour collector	27 000	39 057	39 057
Labour family labour	75 600	80 345	80 345
Solar dryer depreciation (per processor per year)	0	7 500	7 500
Solar dryer rent	0	13 020	13 020
Total cost	511 226	593 106	593 106
Operating profit (after tax)	78 933	128 840	128 840
Return on sales (RoS)	13%	18%	18%
Return on investment (RoI)	15%	22%	22%

Note: (1) The operating accounts of non-adopters in 2025 and 2032 stay the same as in baseline. (2) Around 30% of cottage processors' income is from seabob (based on Economic interviews with processors, 2021, and consultation in 2022). (3) Exchange rate 1 USD = 200.641 GYD (obtained from Oanda, 8 February 2022).

TABLE 36. OPERATING ACCOUNT OF A TYPICAL MARKET VENDOR, FOR SEABOB ONLY (GYD/YEAR)

	Baseline (average 2015-2020)	2025 (for adopters)	2032 (for adopters)
Outputs			
Fresh seabob high season	810 520	810 520	810 520
Fresh seabob low season	167 640	167 640	167 640
Peeled seabob high season - sold to consumers, small restaurants	222 640	333 822	296 731
Peeled seabob low season - sold to consumers, small restaurants	37 400	99 991	99 991
Peeled seabob high season - sold to supermarkets/hotels	14 824	43 014	86 028
Fresh seabob high season, own consumption	10 120	10 120	10 120
Dried seabob high season	55 502	67 136	67 136
Dried seabob low season	12 491	16 604	16 604
Total revenue	1 331 137	1 548 848	1 554 770
Inputs			
Fresh seabob high season	538 706	622 861	622 861
Fresh seabob low season	136 903	178 981	178 981
Dried seabob high season	38 851	46 995	46 995
Dried seabob low season	8 743	11 623	11 623
Ice	40 000	5 866	5 866
Transport	40 000	42 772	42 772
Old freezer		0	0
Ice box	0		
Market fee – weekdays	24 000	25 663	25 663
Market fee - Saturdays	12 480	13 345	13 345
Plastic bags	24 000	25 663	25 663
Labour pickers	72 000	109 152	109 152
Family labour	120 000	133 765	133 765
Family labour (self-employed)	120 000	133 765	133 765
Depreciation freezer	1 200	0	0
Depreciation ice boxes		1 800	1 800
Total cost	1 176 883	1 350 453	1 350 453
Operating profit (after tax)	154 254	198 395	204 317
RoS	11.6%	12.8%	13.1%
RoI	13.1%	14.7%	15.1%

Note: (1) The operating accounts of non-adopters in 2025 and 2032 stay the same as in baseline. (2) Around 40% of market vendors' income is from seabob (based on Economic interviews with market vendors, 2021, and consultation in 2022). (3) Exchange rate 1 USD = 200.641 GYD (obtained from Oanda, 8 February 2022).

**TABLE 37. OPERATING ACCOUNT OF AN AVERAGE INDUSTRIAL FIRM, FOR SEABOB ONLY
(GYD/YEAR)**

	Baseline (average 2015-2020)	2025	2032
Outputs			
Processed seabob domestic market	202 760 518	198 011 704	198 011 704
Processed seabob export	2 818 924 617	3 100 817 079	3 382 709 541
Total revenue	3 021 685 136	3 298 828 783	3 580 721 245
Inputs			
Fresh seabob high season, from aggregators to industrial firms	2 593 360	0	0
Fresh seabob low season, from aggregators to industrial firms	561 000	0	0
Industrial trawler with net and gear	-	-	-
Diesel engine	-	-	-
Trawler maintenance	7 273 236	7 273 236	7 273 236
Engine maintenance	120 628	120 628	120 628
Fuel	621 987 100	621 987 100	621 987 100
Net maintenance	4 825 136	4 825 136	4 825 136
Labour trawler crew	136 242 000	136 242 000	136 242 000
Labour mechanic	4 471 200	4 471 200	4 471 200
Labour health safety manager	864 000	864 000	864 000
Labour operation manager	864 000	864 000	864 000
Labour facility manager	1 008 000	1 008 000	1 008 000
Labour processing plant worker	61 479 000	61 479 000	61 479 000
Processing equip packaging line	-	-	-
Building	-	-	-
Public fees and licenses	11 690 556	11 690 556	11 690 556
MSC certification (initial cost)	2 879 893	2 879 893	2 879 893
MSC certification (annual cost)	1 439 947	1 439 947	1 439 947
Labour fleet manager	55 012	55 012	55 012
Ice machine	-	-	-
Depreciation industrial trawler with net and gear	72 732 363	72 732 363	72 732 363
Depreciation diesel engine	4 020 947	4 020 947	4 020 947

Depreciation processing equip packaging line	7 279 300	7 279 300	7 279 300
Depreciation building	8 319 200	8 319 200	8 319 200
Depreciation ice machine	103 965	103 965	103 965
Direct tax on gross income	830 963 412	907 177 915	984 698 342
Total cost	1 781 773 255	1 854 833 398	1 932 353 825
Operating profit (after tax)	1 239 911 881	1 443 995 385	1 648 367 420
Return on sales (RoS)	41%	44%	46%
Return on investment (RoI)	70%	78%	85%

Note: (1) All of industrial firms' income is from seabob (based on Economic interviews with firms, 2021). (2) Exchange rate 1 USD = 200.641 GYD (obtained from Oanda, 8 February 2022).

TABLE 38. OPERATING ACCOUNT OF A TYPICAL AGGREGATOR, FOR SEABOB ONLY (GYD/YEAR)

Baseline 2015-2020	
Outputs	
Fresh seabob high season	2 593 360
Fresh seabob low season	561 000
Fresh seabob own consumption	26 400
Total revenue	3 180 760
Inputs	
Fresh seabob high season	1 624 251
Fresh seabob low season	336 600
Vehicle	-
Vehicle maintenance	5 250
Ice	84 000
Market fee	8 400
Small plastic bag (package of 40)	10 000
Large plastic bag (package of 20)	10 000
Large plastic (2 bag)	10 000
Labour supervisor	210 000
Labour general worker	126 000
Family labour	210 000
Depreciation vehicle	52 500
Total cost	2 687 001
Operating profit (after tax)	493 759
Return on sales (RoS)	16%
Return on investment (RoI)	18%

Note: (1) Around 50% of aggregators' income is from seabob (based on Economic interviews with aggregators, 2021, and consultations in 2022). (2) Aggregators are no longer part of the VC since MSC certification in 2019. (3) Exchange rate 1 USD = 200.641 GYD (obtained from Oanda, 8 February 2022)

4.3.3. Upgraded enabling environment

The upgrading of the enabling environment of the VC involves the improved design and enforcement of fisheries legislations and the physical upgrading of strategic wharfs (mainly Meadowbank in Region 4 and Rosignol in Region 5 – see Figure 36 in Annex 1 for a map of Guyana).

Design and enforcement of revised fisheries legislation

Under the upgrading strategy, fisheries regulations will be revised based on updated data coming from stock assessments from both the industrial and artisanal channels and improved catch and by-catch data collection including the monitoring of ETP species in line with MSC recommendations. A range of pilot approaches (e.g. digital applications for data collection via mobile phones, youth employment schemes for data collectors at more remote landing sites etc.) will be trialled to improve data collection and monitoring across both channels, accompanied with training for artisanal fishers, captains of industrial trawlers and Fisheries Officers. Data collected will also be supplemented by research efforts in both the industrial and artisanal channels to identify, monitor and minimise the impact of negative factors (e.g. climate change, sargassam seaweed outbreaks, impacts of gear types etc.) contributing to the decline of seabob stock in recent years.

Some of these pilot activities can be funded under the FISH4ACP project, while others will require partnerships with other projects/donors/private sector, coupled with increased public funding commitments from the government and contributions from fishers to ensure longer-term sustainability. Any changes to fisheries policies and regulations will need to be made in line with recommendations in the Guyana Marine Fisheries Management Plan 2021–2025 and the Guyana Seabob Management Plan 2021–2025 currently under development, as well as the Artisanal Fisheries Management Plan 2019–2024. Care will also be taken to ensure that MSC conditions and recommendations from the most recent surveillance reports are incorporated into revisions.

When it comes to enforcement, efforts to encourage compliance with fisheries regulations (e.g. registration and licensing of artisanal vessels and submission of daily logsheets) will firstly be stimulated through improved service provision (transparent communication and regular feedback on data collected, additional training of artisanal fishers) by the Fisheries Department, which will help to build mutual commitment across channels and better understand the requirements and importance of co-management of resources. Specific efforts will be made within the artisanal channel to incentivise licensing and data collection by simplifying the licensing process and logsheets to be completed, as well as looking at options to offer additional incentives (e.g., training by Fisheries Department, access to safety equipment and support to purchase more fuel-efficient engines) to members of functioning

cooperatives/Chinese seine working group who can prove compliance with licensing and other fisheries management regulations.

On the enforcement side, a system of sanctions will be developed for the artisanal channel (already in existence for the industrial channel) with penalties to be enforced for non-compliance with licensing and submission of logsheets. This will require increased coordination between the Fisheries Department officers and the Guyana Coast Guard and marine police to monitor vessels, maintain records on non-compliance, and issue penalties. Given the current constraints in funding facing the Fisheries Department, the means for funding these increased inspection and enforcement services will need to be identified, and the feasibility of adopting innovative approaches such as the use of drone-based surveillance will be investigated by the FISH4ACP Project.

Physical upgrading of strategic wharfs

The two wharfs that have been selected for upgrading are Meadow Bank in Region 4 and Rosignol in Region 5. These wharfs were selected following consultation with stakeholders, both in terms of their importance to the artisanal value chain for seabob, and the potential for large-scale positive impact on fishers and vendors operating from these wharfs. A third and a fifth of all Chinese seine fishers operate in Region 4 and Region 5 respectively (WWF, 2019) and Meadow Bank wharf and Rosignol wharf are their main landing sites for seabob and finfish catch. The wharfs are desperately in need of repairs and improved management to address both environmental issues such as lack of access to clean water, and security concerns including dilapidated walkways and lack of police presence and surveillance to reduce crime.

FIGURE 33. DILAPIDATED WALKWAYS AT MEADOW BANK WHARF AND UNSANITARY FACILITIES FOR MARKET VENDORS



Source: ©FAO/Dawn Maison

FIGURE 34. ROSIGNOL WHARF



Source: ©FAO/Dawn Maison

A feasibility study will firstly be conducted to determine the upgrading works needed and associated costs for bringing Meadow Bank and Rosignol wharfs up to a standard that supports food safety and hygiene as well as public safety for fishers, vendors and other businesses who operate there. Financing options from both public and private investment will be identified as the scale of investment required is beyond the capacity of the FISH4ACP project alone. The FISH4ACP project can however, potentially fund small-scale upgrades with potential for significant social impact, such as the building of simple toilet facilities for women vendors to be managed and maintained by them.

4.3.4. Upgraded governance

Upgraded governance strives to improve the relationships between value chain stakeholders including core actors, support providers, and the public sector and create more efficient coordination along the value chain. The upgrading strategy proposed aims to improve two-way communication between the Fisheries Department and the Chinese seine fishers, as well as strengthen the existing coordination and communication with the industrial channel. The FISH4ACP project will support the Fisheries Department to develop and implement a communication strategy for partnering with both channels and support the formation of a Chinese seine working group in order to better target project activities suited to these stakeholders and strengthen their linkages to both the Fisheries Department and service providers.

To improve representation and voice in seabob fisheries management and policy-making, as well as build the foundations for a co-management system for improved monitoring (data collection), control and inspection of seabob fishing activities, the project will support the **revitalisation of the Artisanal Fisheries Advisory Committee**, as an important vehicle for artisanal fishers (including but not limited to Chinese seine fishers) to directly voice their concerns to the Fisheries Department, have a say in how new/revised regulations may impact on them (socially and economically), as well as stay informed of updates and opportunities related to sustainable fisheries management. This advisory committee should include a representative from each cooperative to speak on behalf of their respective artisanal fishers, however, membership should also include other artisanal value chain actors including processors and market vendors if they are not represented by cooperatives. The existing **terms-of-reference (ToRs) and membership structure of the Seabob Working Group** will also be reviewed. A potential option is to expand the ToRs of the SWG to make it an overall body (or a form of a “Value chain-Task Force”) coordinating the development of the whole VC, including both artisanal and industrial channels, in the long run. For the SWG to fulfil this expanded role, recommendations will be made to expand the SWG’s membership as needed to include a representative from the Artisanal Fisheries Advisory Committee, Chinese seine fishers, female processors and retailers, Extension Unit from the Fisheries Department, and potentially also service providers such as financing partners, input suppliers etc. In both the Artisanal Fisheries Advisory Committee and the Seabob Working Group, adequate representation of women as key stakeholders in the seabob value chain as both workers and business owners must be achieved.

In addition to representation in the abovementioned committees, based on the interest of female processors and vendors at the two strategic wharfs of Meadow Bank and Rosignol, the project will support the formation of women's networks for market vendors and processors. Once formed, these networks will be supported to actively engage in the revived/expanded Artisanal Fisheries Advisory Committee and the Seabob Working Groups to advocate for/speak on behalf of the female processors and vendors. As a first step

towards establishing these networks, a needs assessment will be conducted to determine which services such a network may be able to provide to its members (e.g. toilets and childcare facilities, secure lockers for storage of personal equipment etc.), and how the project could support these.

4.4. Anticipated sustainability impact

4.4.1. Will the strategy lead to the realization of the vision and deliver impact at scale?

Impact at scale is determined by the number of VC stakeholders adopting the improved technologies to reduce cost and increase environmental sustainability, food safety and quality (for artisanal fishers, processors, and market vendors) and to enter higher-value markets to sell fish for higher prices (for market vendors). The table below shows the projected number of adopters of upgraded business models in 2025 and continuing to 2032. The baseline numbers of actors are taken from the value chain map.

TABLE 39. NUMBER OF ADOPTERS

Adoption Rate	0%	10% for fishers, 15% for processors and market vendors		20% for fishers, 25% for processors and market vendors	
	Baseline	2025		2032	
No. of VC actors	Current no. of VC actors	Non-adopters	Adopters	Non-adopters	Adopters
Artisanal fishers	305	274	31	244	61
Cottage processors	9	8	1	7	2
Market vendors	107	91	16	80	27

Source: Own assumptions.

Based on the upgraded business models, the upgraded operating accounts of artisanal fishers, cottage processors and market vendors (as explained in section 4.3.2) and their projected adoption rates, the profitability of the whole VC under upgrading are assessed. As shown through table 11, upgrading would bring about higher level of profitability at the VC level, with higher profits, RoS and RoI.

TABLE 40. PROFITABILITY ASSESSMENT OF WHOLE VC, IN BASELINE, 2025, AND 2032

	Baseline (2015–2020) (USD)	2025 (USD)	2032 (USD)
Revenues	46 404 655	50 503 418	54 718 770
Tax on gross revenue	12 424 630	13 564 195	14 723 287
Costs	15 258 818	15 169 499	15 169 499
Operating profits	18 721 206	21 769 724	24 825 985
Return on sales (RoS) (%)	40%	43%	45%
Return on investment (RoI) (%)	151%	160%	169%

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

The potential economic, social and environmental impacts of VC upgrading are summarized in Table 41 below. As VC actors become more profitable, they would hire more labour, thereby increasing the number of FTE jobs in the VC. As most of the increased jobs (with higher wages thanks to more profitable businesses) will be generated by the processing and retailing functions in the artisanal channel, this is expected to particularly benefit the female workers employed to work for these businesses. Increased profits and wages will lead to increased direct value-added. Additionally, positive environmental impacts would be expected as artisanal and industrial fishers adopt more sustainable fishing practices and explore the possibilities of using some forms of renewable energy.

TABLE 41. KEY ECONOMIC, SOCIAL, AND ENVIRONMENTAL PERFORMANCE INDICATORS UNDER CURRENT AND UPGRADED SITUATIONS (AGGREGATED AT VC LEVEL)

Item	Baseline (2015–2020)	2025	2032
Economic indicators			
Total export value (USD/year)	14 049 594	15 454 554	16 859 513
Number of FTE jobs (including family labour)	1 406	1 425	1 425
Total value of net wages (USD/year)	3 398 464	3 426 598	3 426 598
Direct value added by core VC (USD/year)	34 720 786	38 937 003	43 158 271
Social indicators			
Share of FTE jobs captured by women	41.1%	42.5%	42.5%
Number of FTE jobs for women with earning not	327	421	421

below national minimum wage			
Environmental indicators			
Industrial CPUE does not fall below the TRP level in any quarter	Yes	Yes	Yes
Number of artisanal fishers using environmentally friendly practices	0	30	60
Number of industrial firms using some forms of renewable energy	0	1	1
Share of by-catch in total catch by artisanal fishers	A study will be done to establish baseline	Tbd following baseline	Tbd following baseline

Source: Duong, G., Rankin, M., Ahmed, G., Rice, J., Nguyen, H., Esnard, T., McFee, D. 2023. The Seabob Value Chain in Guyana: Analysis and design report. Rome, FAO.

4.4.2. Will the strategy generate important positive or negative economic, social or environmental externalities?

Possible externalities of the upgrading strategy on the broader environment are summarized in Table 42 table below. Most of the externalities are positive due to benefits accruing to non-VC core actors, such as increased income and employment for ancillary services, benefits for the broader communities operating in the landing sites/wharfs thanks to upgraded infrastructure and facilities, and reduced environmental footprints. Potential negative externalities include possible increased pressure on fisheries resources due to the adoption of more fuel-efficient fishing techniques; however, according to consultation with Fisheries Department in March 2022, this externality is unlikely to be a serious concern.

TABLE 42. POTENTIAL EXTERNALITIES OF THE UPGRADING STRATEGY

Item	Positive Externality	Negative Externality
Economic	<p>Increased income and employment for ancillary services at wharfs/landing sites and other services such as youth employed to collect data for FD</p>	<p>Revision of fisheries management regulations may lead to fewer days at sea, which may reduce employment opportunities during the closed season for factory workers, artisanal fishers and industrial fishing workers. This impact will need to be quantified and ways to offset this negative externality identified (e.g., supporting alternative means of livelihoods).</p>
Social	<p>VC actors who adopt improved food safety and quality practices can apply these skills and knowledge to other VCs and transfer the knowledge to others</p> <p>Increased representation of women in fisheries management (not just seabob VC) through seat in Artisanal Fisheries Advisory Committee and establishment of Women's vendor's networks</p> <p>Improved landing site infrastructure and facilities will benefit not only VC actors but also the broader communities around the landing sites (e.g., better sanitary facilities, increased security)</p>	
Environmental	<p>Reduction in carbon emissions by artisanal fishers through adoption of technologies to lower emissions (e.g., 4-stroke engines)</p> <p>Reduction in water footprint by market vendors through adoption of insulated ice boxes (thereby saving ice use).</p> <p>Seabob stock stabilised due to adoption of sustainable fishing practices across industrial and artisanal channel</p>	<p>The adoption of fuel-efficient fishing methods has the potential to lead to increased catch of other finfish species (not seabob as these are fished in pens) and additional pressure on stock for these species as each fishing trip can be longer. However, this externality is unlikely to be a serious concern because fishers tend to get back to shore as quickly as possible to get better deals when selling fish (the earlier they arrive at market, the better).</p>

4.4.3. Will the strategy increase the resilience of the VC?

The upgrading strategy is expected to strengthen the resilience of the value chain. This is assessed according to the six resilience domains in the table below.

TABLE 43. POTENTIAL IMPACTS OF THE UPGRADING STRATEGY ON THE VALUE CHAIN'S RESILIENCE

Item	Strengthened or weakened?
Redundancy	Strengthened: Improved availability and quality of the inputs (e.g. ice and ice chests, solar dryers) and services required for proper handling, processing, and storage of fresh and dried seabob in the artisanal channel will enable processors and market vendors to maintain higher levels of stock of fresh and processed seabob, which act as a buffer to some extent against shocks (such as flood, heavy rainfall) and fluctuations in supply (due to catch variations). For the industrial channel, this should remain unchanged as they already have sophisticated processing technologies to ensure seabob is frozen and stored within 20 minutes following landed catch.
Diversity	Strengthened: By adopting improved techniques in the artisanal channel (i.e., food safety and quality practices; increased cold storage), market vendors will be able to ensure better quality of fresh seabob. This will open up access to higher value domestic markets (supermarkets, hospitality, oil and gas catering sector), which will in turn lead to increased market diversification and less dependency on local markets/buyers, which helps to increase resilience to shocks. For the industrial channel, while the main end markets for frozen seabob will not change (i.e. US and the European Union), opportunities to diversify product offerings in these markets (e.g. frozen cooked seabob in addition to fresh) as well as increased trade to regional markets will be investigated under the marketing plan to be developed for GATOSP as a means to reduce risk and diversify market opportunities.
Connectivity	Strengthened: Various upgrading activities related to institutional strengthening, advocacy and co-management (e.g., communications strategy to be implemented by Fisheries Department for partnering with industrial and artisanal channels, revitalising the Artisanal Fisheries Advisory Committee and expansion of stakeholder membership base for Seabob Working Group; supporting the establishment of women's vendor networks etc.) will bring about stronger social linkages and networks between VC stakeholders.
Collaboration and governance	Strengthened: Various upgrading activities (e.g., facilitation of domestic market linkages for seabob vendors, support to form the Chinese seine working group, training on cooperative management of joint assets for processors and management of landing sites/wharfs for artisanal fishers' cooperatives, strengthening co-management) will lead to more and strengthened horizontal and vertical linkages between VC stakeholders,

	which will in turn increase the level of collaboration and governance in the VC.
Learning and adaptation	Strengthened: Various upgrading activities aim at improving the availability, affordability, and quality of the inputs and services required for proper handling, processing, and storage of fresh and dried seabob in the artisanal channel, which will in turn lead to enhanced adoption of improved technologies by VC actors and increase their ability to resist to shocks as they are no longer fully dependent on traditional methods (e.g. sun drying for processors, lack of ice storage equipment for vendors). Climate smart technologies will also be encouraged across both the industrial and artisanal channel which will reduce the dependence on non-renewable energy.
Participation and inclusion	Strengthened: Across both the industrial and the artisanal channel, the role of women workers and business owners will be strengthened through support for gender-targeted OHS plans for industrial seabob processing companies and efforts to close the wage gap for women workers; and in the artisanal channel, the upgrading strategy will lead to FTE employment creation for women working for market vendors and processors, as well as salary increases (to meet minimum wage) for the women workers employed by market vendors and processors. Opportunities to create employment for youth in data collection activities at landing sites/wharfs will also be examined.

5. Value chain development plan

In this final section of the report, the upgrading strategy presented in Section 4 is translated into a VC development plan. This section includes four main components: (1) a logframe for the whole upgrading strategy, which will be used to monitor and evaluate the implementation and results of the strategy; (2) specification of the action and investment plans for sustainably developing the value chain. This also covers the whole set of activities all VC stakeholders will have to engage in, as well as those specifically by the FISH4ACP project; (3) a detailed FISH4ACP project design (i.e. the role of the project in the overall plan); and (4) a risk analysis which reflects on the risks that could prevent the achievement of the envisioned impact, and which develops associated mitigation strategies affecting both the overall and project-specific plans.

5.1. Overall log-frame for VC upgrading

A log-frame for the VC upgrading is provided below. As with all log-frames, it should be seen as a living framework to monitor and evaluate progress towards achieving the stated vision and upgrading strategy.

The logframe will be further discussed, validated, and refined (with missing indicator targets added)

during an inception phase for the project.

Aspects of the logframe design to note include:

- The impact reflects the vision statement.
- Four outcomes reflect the four upgrading components.
- All outputs are attached to one outcome only.
- Assumptions in the logframe at one level are those that must hold true to support result at the next level up i.e., an assumption at output level should be that which if holds true means a related outcome will be achieved.

Interim targets are specified for February 2025, which would be the end of the FISH4ACP project.

TABLE 44. LOGFRAME FOR VALUE CHAIN UPGRADING

Impact	Impact indicator 1	2021 baseline		2025 target	2032 target	Assumptions
<i>In 2032, Guyana will have strengthened its position as a leading exporter of seabob shrimp globally by ensuring a sustainable and resilient value chain for seabob across the industrial and artisanal channels, that is well-regulated and supported by data, with improved infrastructure for artisanal fishers, and empowerment of women across both channels.</i>	Total export value (USD/year)	14 049 594	Planned	15 454 554	16 859 513	n/a
			MoV	Export data. Economic survey with VC actors		
	Impact indicator 2	2021 baseline		2025 target	2032 target	n/a
	Number of FTE jobs in core VC	1 406 (578 for women)	Planned	1 425 (606 for women)	1 425 (606 for women)	
			MoV	Economic survey with VC actors		
	Impact indicator 3	2021 baseline		2025 target	2032 target	n/a
	Direct value added by core VC (USD/year)	34 720 786	Planned	38 937 003	43 158 271	
			MoV	Economic survey with VC actors		
	Impact indicator 4	2021 baseline		2025 target	2032 target	*Jobs for women in the VC include processing at industrial firms, processing at cottage processing businesses, and retailing/peeling seabob at market vendor businesses.
	Share of FTE jobs held by women	41.1%*	Planned	42.5%*	42.5%*	
Impact indicator 5	2021 baseline		2025 target	2032 target	*All industrial workers earn above national minimum wage in both baseline and upgraded situations. With processors and market vendors, no workers earn minimum wage in baseline, and	
Number of FTE jobs for women with earning not below	327*	Planned	421*	421*		

	national minimum wage					hired workers earn minimum wage thanks to upgrading.
	Impact indicator 6	2021 baseline		2025 target	2032 target	Total catch volume does not change compared to baseline. The number of fishing days may decrease as management measures related to closing season are implemented according to CPUE monitoring results. Less fishing pressure will help the stock to recover leading to catch of bigger seabob and thus, higher CPUE, in 2032.
	Industrial CPUE does not fall below the TRP in any quarter	Yes	Planned	Yes	Yes	
			MoV	MSC reports. Fisheries Department catch data.		
	Impact indicator 7	2021 baseline		2025 target	2032 target	Most recent study of finfish by-catch discharges by Chinese Seine fishers (Kalicharan & Oxenford, 2020) found by-catch levels up to 69% (finfish discards), but they only examined catches of one Chinese seine vessel over a 2-month period. No other study specific to Chinese seine gear exists.
	Share of by-catch discards in total catch by artisanal fishers	A study will be done to establish baseline and targets then set for reduction by 2025 & 2032	Planned	Tbd following baseline	Tbd following baseline	
			MoV	Fisheries Department catch data.		
Outcome 1	Outcome indicator 1	2021 baseline		2025 target	2032 target	Assumptions (necessary for impact to be achieved)
Industrial firms adopt sustainable practices to maintain MSY stock levels, reduce pressure on ecosystem and build resilience	Share of industrial trawlers equipped with turtle excluder devises (TED) and bycatch reduction devices (BRD)	100%*	Planned	100%*	100%*	Continued commitment of industrial firms to comply with MSC requirements to maintain MSC certificate. *Baseline is taken from MCS final audit report 2019 and Guyana Fisheries Management Plans implementation review – 2020.
			MoV	MSC reports. FD reports.		

						Confirmed in 2 nd MSC Surveillance Report 2021.
	Share of industrial trawlers complying with number of days-at-sea limit	100%	Planned	100%*	100%*	Continued commitment of industrial firms to comply with MSC requirements to maintain MSC certificate. *Baseline is taken from MCS final audit report 2019
			MoV	MSC reports. FD reports.		
Output 1.1	Output indicator 1.1	2021 baseline		2025 target	2032 target	Assumptions (for outcome 1 to be achieved)
Strategic vision and marketing plan for export market growth developed	Number of GATOSP vision and marketing plans developed	n/a	Planned	1	1	GATOSP members fully engage with consultant to co-develop a mission and vision statement for the association and an export marketing plan for the next 10-years to be implemented and monitored by the industry.
			MoV	GATOSP vision and marketing plan endorsed by members		
Output 1.2	Output indicator 1.2	2021 baseline		2025 target	2032 target	Assumptions (for outcome 1 to be achieved)
Industrial research priorities identified, and research plan developed to stabilize stock levels	Number of proposals on industrial research plans developed	n/a	Planned	1	1	GATOSP members and Fisheries Department are committed to revising existing SWG research plan and identify and prioritise research topics for inclusion in research plan.
			MoV	Updated seabob research plan for the industry endorsed by GATOSP and Fisheries Department		
Output 1.3	Output indicator 1.3	2021 baseline		2025 target	2032 target	Assumptions (for outcome 1 to be achieved)
Industrial firms and their workers trained on sustainable fishing practices in line	Share of industrial captains and second mates trained on	100%	Planned	100%	100%	Industrial firms are committed to apply sustainable fishing practices in line with MSC recommendations. Fisheries Department has
			MoV	Training record. MSC reports.		

with MSC recommendations and research findings	sustainable fishing practices					improved capacity to provide training.
Output 1.4	Output indicator 1.4	2021 baseline		2025 target	2032 target	Assumptions (for outcome 1 to be achieved)
OHS plan developed and workers trained in industrial processing plants	Number of national OHS plan developed for industrial processing plants	0	Planned	1	1	Three industrial firms and GATOSP support the industry-wide OHS standards. Recruitment of a skilled consultant will be required to assess the current OHS conditions across the three firms and work with GATOSP to develop an industry-wide OHS plan to be adopted by all processing firm and endorsed by Ministry of Labour and Social Affairs.
			MoV	OHS plan document		
	Share of industrial processing workers trained on OHS	n/a	Planned	30%*	100%*	Industrial firms are committed to apply OHS standards. *Expecting gradual increase over time
			MoV	Training record. Quick survey with workers.		
Outcome 2	Outcome indicator 2	2021 baseline		2025 target	2032 target	Assumptions (necessary for impact to be achieved)
Artisanal seabob fishers (Chinese seine) adopt sustainable fishing practices to maintain a healthy stock of species captured by them	Number of artisanal Chinese seine fishers adopting sustainable fishing techniques (specific techniques to	Tbd	Planned	Tbd	Tbd	Artisanal seabob fishers (Chinese seine) are provided with sufficient incentives and capacity building to adopt sustainable fishing practices.
			MoV	Tbd		

	be identified based on the study under Output 2.2)					
Output 2.1	Output indicator 2.1	2021 baseline		2025 target	2032 target	Assumptions (for outcome 2 to be achieved)
Chinese seine vessel working group established	Number of Chinese seine vessel working groups established	0	Planned	1*	1*	Confirmed interest of Chinese seine fishers to join the working group. The working group will help to improve coordination of artisanal seabob fishers and will work as a means to improve communication between fishers, Fisheries Department, and other partners. *1 working group of fishers across 3 regions (3, 4, 5), and then expanded to also cover Regions 2 and 6.
			MoV	Document confirming the establishment of the working group		
	Number of meetings held by the working group	0	Planned	10*	31*	*1 meeting in 2022, followed by 3 meetings/year in subsequent years.
			MoV	Meeting reports		
Output 2.2	Output indicator 2.2	2021 baseline		2025 target	2032 target	Assumptions (for outcome 2 to be achieved)
Impact of Chinese seine fishing on stock levels and by-catch identified, and sustainable fishing practices determined	Study on impact of Chinese seine fishing and sustainable fishing practices conducted	0	Planned	1	1	A study is necessary to understand the impacts of Chinese seine fishing on stock levels and by-catch and thus, to recommend improved practices (no study currently exists). Recommendations from the study will be incorporated in training and other support for fishers.
			MoV	Completed study		

Output 2.3	Output indicator 2.3	2021 baseline		2025 target	2032 target	Assumptions (for outcome 2 to be achieved)
Fishers trained on sustainable fishing practices and climate smart technologies	Number of fishers trained on sustainable fishing practices and climate smart technologies	0	Planned MoV	150*	240*	<p>Fishers are willing to learn new practices. Training will be provided to fishers in 5 regions (Regions 2, 3, 4, 5, and 6), starting with regions 3, 4 and 5 which have the highest number of Chinese seine fishers. Fishers will also be supported with facilitation to inputs, finance and other services.</p> <p>*50% and 80% of Chinese seine fishers will get trained by 2025 and 2032. Total number of fishers stays the same as baseline.</p>

Output 2.4	Output indicator 2.4	2021 baseline		2025 target	2032 target	Assumptions (for outcome 2 to be achieved)
Fishers connected to suppliers of inputs, finance and other services	Number of fishers receiving facilitation support to connect to suppliers	0	Planned	150*	240*	Support will be provided to fishers in 5 regions (Regions 2, 3, 4, 5, and 6). Fishers will also be supported with training on sustainable practices. *50% and 80% of Chinese seine fishers will receive facilitation support by 2025 and 2032. Total number of fishers stays the same as baseline.
			MoV	Quick survey with fishers.		
Outcome 3	Outcome indicator 3	2021 baseline		2025 target	2032 target	Assumptions (necessary for impact to be achieved)
Increased compliance with and enforcement of revised fisheries regulations by improving data collection and coordination between VC stakeholders	Number of revised fisheries management measures approved by government	0	Planned	2	4	Updated data (thanks to improved data collection and recording) are sufficient to support sound revision of fisheries measures. Regulatory revision will be accompanied with strengthened enforcement and supports for VC actors to comply with the measures.
	Share of Chinese seine artisanal fishing vessels which are licensed/registered	85%*	Planned	95%*	100%*	
		85%	Planned	95%*	100%	*Baseline is provided by Fisheries Department in 2022. The share is expected to increase in 2025 and 2032 thanks to upgrading activities.

	Share of Chinese seine artisanal vessels submitting log sheets		MoV	Government's record of/report on log sheet submission		All licensed vessels submit log sheets. *Based on the share of licensed vessels above.
	Share of industrial vessels submitting log sheets	100%*	Planned	100%	100%	All licensed vessels submit log sheets. *Based on the Guyana Fisheries Management Plans implementation review – 2020
			MoV	Government's record of/report on log sheet submission		
Output 3.1	Output indicator 3.1	2021 baseline		2025 target	2032 target	Assumptions (for outcome 3 to be achieved)
Fisheries Department communication strategy developed for partnering with both channels	Fisheries Department communication strategy document developed	0	Planned	1	1	The communication strategy will be effectively implemented by Fisheries Department to enhance communication with fishers and to sensitize artisanal and industrial fishers on the need to comply with data reporting and other regulations.
			MoV	Completed communication strategy document endorsed by Fisheries Department		
Output 3.2	Output indicator 3.2	2021 baseline		2025 target	2032 target	Assumptions (for outcome 3 to be achieved)
Catch data collection and monitoring system improved across both channels	Number of Fisheries Department's improved system for data collection and management	0	Planned	1*	1*	Built on the new/strengthened system, data reporting (by fishers) and data collection and management (by Fisheries Department) will be improved. * A digital system for data collection, storage and overall management
			MoV	FD's systems in place for data collection and management		
		0	Planned	100%	100%	

	Share of industrial captains and second mates trained on data reporting using improved system		MoV	Training record		Improved data reporting systems are supported by captains. Training and sensitization of captains will help them to effectively use the systems and improve data report quality. All licensed vessels submit data. * Based on the share of licensed vessels
	Share of Chinese seine artisanal fishers trained on data reporting using improved system	0	Planned	95%*	100%*	Improved data reporting systems are supported by fishers. Training and sensitization of fishers will help them to effectively use the systems and improve data report quality. All licensed vessels submit data. * Based on the share of licensed artisanal vessels above.
			MoV	Training record		
Output 3.3	Output indicator 3.3	2021 baseline		2025 target	2032 target	Assumptions (for outcome 3 to be achieved)
Revised fisheries regulations drafted based on updated data (i.e., from Outputs 1.2, 2.2, and 3.2)	Number of revised fisheries management measures drafted	0	Planned	4*	8*	Updated data (thanks to improved data collection and recording) are sufficient to support sound revision of fisheries measures. *Based on the targets set for Outcome indicator 3: number of fisheries management measures revised and approved by government (assuming government's approval rate 50%).
			MoV	Drafts/proposals of revised fisheries management measures		

Output 3.4	Output indicator 3.4	2021 baseline		2025 target	2032 target	Assumptions (for outcome 3 to be achieved)
Improved co-management system (industrial, artisanal and FD) for monitoring, control, surveillance, and inspection of seabob fishing activities	Number of FD offices supported with improved monitoring, control, surveillance, and inspection equipment and training	n/a	Planned	5*	6*	Key constraints facing FD's operations include the lack of staff and equipment. Representation bodies of artisanal and industrial actors will also be supported to co-manage fishing activities. *Aim to support FD offices in regions 2, 3, 4, 5, and 6 by 2025, and FD offices in Region 1 by 2032 (one office per region)
			MoV			
	Number of revised ToRs drafted and proposals made to expand the membership base of the Artisanal Fisheries Advisory Committee	n/a	Planned	1	1	Artisanal Fisheries Advisory Committee is important to increase artisanal actors' representation in policy-making and dialogues. Support from Fisheries Department and artisanal actors to revitalise the Committee.
			MoV	Proposals of revised ToRs and membership base endorsed by Fisheries Department and GNFO		
	Number of meetings held per year by the Artisanal Fisheries Advisory Committee	n/a	Planned	10*	31*	*1 meeting/year in 2022, followed by 3 meetings/year in subsequent years
			MoV	Meeting reports of the Artisanal Fisheries Advisory Committee		

	Number of revised ToRs drafted and proposal made to expand membership base of the SWG	n/a	Planned	1	1	Support from Fisheries Department, the private sector and other stakeholders in broadening the membership base of the SWG.
			MoV	Proposals of revised ToRs and membership base endorsed by GATOSP		
	Number of meetings held per year by the SWG	6 times/year	Planned	24*	66*	* 6 meetings per year, as currently
			MoV	Meeting reports of SWG		
Outcome 4	Outcome indicator 4	2021 baseline		2025 target	2032 target	Assumptions (necessary for other outcomes and overall impact to be achieved)
Artisanal actors adopt improved seabob-handling practices (including food safety and quality) to enter high-value markets by improving infrastructure, facilities and services	Number of processors adopting improved drying techniques (e.g., using solar dryers)	0	Planned	1*	2*	Seabob processors are willing to collaborate with other processors to co-invest in and co-manage improved equipment. Processors are also supported with better access to other inputs/equipment, training, and services. *Based on the expected adoption rate 15% by 2025 and 25% by 2032. Total numbers of processors stay the same as baseline.
			MoV	Survey with processors		
	Number of market vendors adopting improved storage techniques (e.g., using	0	Planned	16*	27*	Vendors are willing to adopt new storage techniques for seabob which allow for better preservation of quality while reducing the cost of ice consumption. Vendors are also supported with better access to
			MoV	Survey with market vendors		

	proper ice boxes)				other inputs/equipment, training, and services. *Based on the expected adoption rate 15% by 2025 and 25% by 2032. Total numbers of market vendors stay the same as baseline	
	Number of processors and market vendors adopting trained food safety and quality practices	n/a	Planned	17*	29*	Vendors and processors are interested in participating in training and see the benefits of adopting new practices to improve food safety and quality at landing sites, as the first step towards increasing the value of the product to be offered to higher-paying customers in tourism and oil and gas sector. * Based on the expected adoption rate 15% by 2025 and 25% by 2032. Total numbers of processors and market vendors stay the same as baseline.
			MoV	Survey with processors and market vendors		
	Number of fishers adopting trained food safety and quality practices	n/a	Planned	31*	61*	Fishers are willing to participate in training and adopt measures to reduce post-harvest losses associated with poor handling of seabob at sea and on unloading at landing sites. *Based on the expected adoption rate 10% by 2025 and 20% by 2032. Total number of fishers stays the same as baseline.
			MoV	Survey with fishers		

Output 4.1	Output indicator 4.1	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)
Domestic market potential for expansion of seabob consumption (fresh/value added) confirmed and upgrades identified	Number of studies conducted on domestic market potential for seabob and recommendation for upgrades	n/a	Planned	1	1	Hospitality clients (e.g., restaurants and hotels) and catering services in the oil and gas industry are willing to promote seabob in their menus and increase purchases of seabob directly from market vendors rather than from industrial processors or supermarkets.
			MoV	Market study		
Output 4.2	Output indicator 4.2	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)
Market linkages facilitated between vendors and higher-value markets	Number of match-making forums organized to connect vendors to buyers on higher-value markets	0	Planned	3*	3*	Being connected to buyers on higher-value markets will create incentives for market vendors to adopt improved techniques because they need to meet higher quality requirements. *Three events across five regions (2, 3, 4, 5, 6)
			MoV	Brief report after each event		
	Number of market vendors receiving facilitation support to connect to buyers in	0	Planned	54*	86*	Support will be provided to market vendors in five regions (Regions 2, 3, 4, 5, and 6), starting with region 4 (Meadow Bank) and region 5 (Rosignol). Vendors are also supported with training, services, and access to suppliers of inputs and finance.
			MoV	Survey with market vendors		

	higher-value markets					*50% and 80% of market vendors will receive market facilitation support by 2025 and 2032. Total number of market vendors stay the same as baseline.
Output 4.3	Output indicator 4.3	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)
Physical upgrading works proposed, and financing partners identified	Number of proposals on physical upgrading works and financing partners	0	Planned	1	1	Commitment of wharf managers (cooperative societies), wharf users, and Fisheries Department to support wharf upgrading. A skilled consultant can be hired to comprehensively assess the current status of targeted landing sites/wharfs and provide detailed costing of the upgrades required.
			MoV	Completed proposal endorsed by partners		
Output 4.4	Output indicator 4.4	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)
Management capacity of landing sites/wharfs improved	Number of landing site/wharfs whose managers and users are trained on management skills	0	Planned	2*	5	Current management teams are willing to engage in training and adopt improved practices and management structures to increase transparency and efficiency in management. *Expected to train the managers and users of Meadowbank and Rosignol by 2025 and 3 other landing sites/wharfs in Regions 2, 3, and 6 (one wharf per region) by 2032.
			MoV	Training records		

Output 4.5	Output indicator 4.5	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)	
Fishers, processors and vendors at landing sites trained on improved seabob handling practices to increase food safety and quality	Number of fishers trained on improved seabob-handling practices	0	Planned	150*	240*	<p>Fishers are willing to learn new practices. Training will be provided to fishers in five regions (Regions 2, 3, 4, 5, and 6), starting with regions 3, 4 and 5 which have the highest number of Chinese seine fishers.</p> <p>*50% and 80% of Chinese seine fishers will get trained by 2025 and 2032. Total number of fishers stays the same as baseline.</p>	
			MoV	Training records			
	Number of processors and market vendors trained on improved seabob-handling practices	0	Planned	58*	93*		<p>Processors and vendors are willing to learn new practices. Training will be provided in five regions (regions 2, 3, 4, 5 and 6), starting with region 4 (Meadow Bank) and region 5 (Rosignol). Processors and vendors are also supported with access to inputs/equipment, services, and markets.</p> <p>*50% and 80% of processors and market vendors will get trained by 2025 and 2032. Total numbers of processors and market vendors stay the same as baseline.</p>
			MoV	Training records. Quick survey with processors and market vendors.			

Output 4.6	Output indicator 4.6	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)
Processors and vendors connected to suppliers of inputs, finance, and other services	Number of processors and market vendors receiving facilitation support to connect to suppliers	0	Planned	58*	93*	Support will be provided to processors and market vendors in five regions (Regions 2, 3, 4, 5, and 6), starting with region 4 (Meadow Bank) and region 5 (Rosignol). Processors and vendors are also supported with training, services, and access to markets. *50% and 80% of processors and market vendors will receive facilitation support by 2025 and 2032. Total numbers of processors and market vendors stay the same as baseline.
			MoV	Quick survey with processors and market vendors.		

Output 4.7	Output indicator 4.7	2021 baseline		2025 target	2032 target	Assumptions (for outcome 4 to be achieved)
Networks of women processors and vendors established at landing sites/wharfs	Number of networks of female processors and market vendors established	0	Planned	2*	5*	Women see value in the establishment of a women's network to improve representation of women in the artisanal fisheries channel and facilitate access to gender-specific services. *Support the establishment of women networks in Meadowbank and Rosignol by 2025 and 3 other locations in regions 2, 3 and 6 (one per region) by 2032.
			MoV	Quick survey with processors and market vendors at landing sites/wharfs		
	Number of meetings held by networks of female processors and market vendors	0	Planned	20*	155*	*For each network: 1 meeting in 2022, followed by 3 meetings/year in subsequent years.

5.2. Activity and investment plans

The VC development action table below lists all the activities that need to be implemented by the VC stakeholders (both public and private) and by the FISH4ACP project (and possibly other development partners), to generate the outputs and outcomes that are needed to realize the vision. The table thus depicts the critical interplay between the FISH4ACP project and the VC stakeholders.

Following the summary table, information is provided for each activity on the key stakeholders involved, the costs/investments, the timing, along with a short activity description to aid with implementation. It should be noted that the level of investments identified in the section below is indicative and will have to be confirmed by the various parties involved.

TABLE 45. SUMMARY OF UPGRADING ACTIVITIES AND INVESTMENTS (IN USD)

In the table below:

- Activities to be funded by FISH4ACP are shaded in green
- Activities to be funded by private sector are shaded in orange
- Activities to be funded by the Governments/ donors are shaded in yellow
- Activities to be funded from blended sources (FISH4ACP and other stakeholders) shaded in pink

Outcome 1 – Industrial firms adopt sustainable practices to maintain MSY stock levels, reduce pressure on ecosystem and build resilience		Funding Source (lead/ support)	Total Costs (USD)	Type of Cost	Timing (start – finish)
Outputs	Activities				
1.1. Strategic vision and marketing plan for export developed	1.1.1 Facilitate guided strategic planning sessions with GATOSP members to develop mission and vision statement for GATOSP for next 10 years	FISH4ACP	7 000 x 2 sessions = 14 000	Facilitation	Jul - Oct 2022
	1.1.2 Complete a study on seabob import demand potential (volumes, product attributes (e.g. sizes), options for value added products, consumer demands regarding sustainability standards/ certifications) in the United	FISH4ACP	25 000	Studies/ Technical assistance	Jul - Dec 2022

	States of America and the European Union market.				
	1.1.3 Facilitate the development of the industry-level export marketing plan (2023–2033) with GATOSP members	FISH4ACP, GATOSP	24 000	Facilitation	Jan - Jun 2023
	1.1.4 Implement the actions outlined in the export marketing plan	SWG, GATOSP/ FD, FISH4ACP	n/a	Facilitation	Jul 2023–ongoing
1.2. Industrial research priorities identified, and research plan developed to stabilize stock levels	1.2.1 Review SWG research plan with GATOSP and FD to identify research gaps/consolidate industry research priorities	FISH4ACP	12 000	Studies/ Technical assistance	Oct - Dec 2022
	1.2.2 Facilitate the development of the updated SWG research plan, with research partners and potential funding sources identified	FISH4ACP, SWG, GATOSP, FD/ CRFM	12 000	Facilitation	Jan - Apr 2023
	1.2.3 Implement the actions outlined in the revised seabob research plan	SWG, FD, GATOSP/ FISH4ACP	n/a	Facilitation	Apr 2023-ongoing
1.3. Industrial firms and their workers trained on sustainable fishing practices in line with MSC recommendations and research findings	1.3.1 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for industrial fishers	FISH4ACP	2 500	Facilitation	Jun – Jul 2023
	1.3.2 Develop training materials for industrial fishers on sustainable fishing practices with FD and BDS providers	FISH4ACP	20 000	Studies/ Technical Assistance	Sep - Dec 2023
	1.3.3 Integrate training of industrial fishers (boat captains, boat staff) on sustainable fishing practices with MSC	FISH4ACP, FD/ BDS providers	20 000	Training	Jan 2024 - ongoing

	training program and other FD's extension programs				
1.4. OHS plan developed and workers trained in industrial processing plants	1.4.1 Conduct a study to assess the existing OHS conditions and plans across the three firms	FISH4ACP	15 000	Studies/ Technical Assistance	Jul - Dec 2022
	1.4.2 Facilitate the development of a draft national OHS plan for the seabob industry	FISH4ACP, GATOSP, FD, Ministry of Labour and Social Security	15 000	Facilitation	Jan - Jun 2023
	1.4.3 Implementation of the draft OHS plan	GATOSP, FD, Ministry of Labour and Social Security/ FISH4ACP	n/a	Facilitation	Jun - Dec 2023
	1.4.4 Revision and finalisation of the OHS plan based on implementation experience	FISH4ACP, GATOSP, FD, Ministry of Labour and Social Security	10 000	Facilitation	Jan - Jun 2024
Outcome 2 - Artisanal seabob fishers (Chinese seine) adopt sustainable fishing practices to maintain a healthy stock of species captured by them					
Outputs	Activities				
2.1. Chinese seine vessel working group established	2.1.1 Identify Chinese seine fishers in Regions 2, 3, 4, 5 and 6 who wish to participate in the working group	FISH4ACP, FD, GNFO	1 000 x 5 regions = 5 000	Facilitation	Jul - Oct 2022
	2.1.2. Facilitate the establishment of the Chinese seine working group	FISH4ACP, FD, GNFO	5 000	Facilitation	Oct - Dec 2022
	2.1.3 Develop an inventory (data base) of Chinese seine vessel characteristics to keep record of engine types and fishing practices	FISH4ACP, FD, GNFO	10 000	Studies/ Technical Assistance	Nov 2022- Apr 2023
2.2. Impact of Chinese seine fishing on stock levels	2.2.1. Design and conduct a baseline study on Chinese seine fishing's impacts on the seabob	FISH4ACP, FD, GNFO, WWF, and other	30 000	Studies/ Technical Assistance	Aug 2022- Feb 2023

and by-catch identified, and sustainable fishing practices determined	stock and by-catch to identify improved fishing practices needed	partners (e.g., University of Guyana)			
2.3. Fishers trained on sustainable fishing practices and climate smart technologies	2.3.1 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for artisanal fishers	FISH4ACP	2 500	Facilitation	Feb – Apr 2023
	2.3.2 Develop training materials for artisanal fishers on sustainable fishing practices with FD and BDS providers	FISH4ACP, BDS, FD	25 000	Studies/ Technical Assistance	Apr - Oct 2023
	2.3.3. Integrate training for fishers on sustainable fishing practices into FD's extension programmes	FD, FISH4ACP/ BDS providers	20 000	Training	Nov 2023 - ongoing
2.4 Fishers connected to suppliers of inputs, finance and other services	2.4.1 Identify suppliers of sustainable (e.g., climate smart) technologies/equipment and finance for fishers	FISH4ACP, FD, GNFO	3 000	Facilitation	Feb – Apr 2023
	2.4.2 Facilitate linkages between artisanal fishers and input suppliers/financers (e.g. through match-making forums, business plan development support)	FISH4ACP, input suppliers, financers, BDS providers	35 000 (for 5 regions)	Facilitation	May 2023 - May 2024
	2.4.3. Purchase of equipment/inputs required for sustainable fishing practices	Fishers/ FISH4ACP	440 000	Equipment	Jul 2023 - ongoing
Outcome 3 – Increased compliance with and enforcement of revised fisheries regulations by improving data collection and coordination between VC stakeholders					
Outputs	Activities				
3.1. Fisheries Department communicatio	3.1.1 Develop a draft communication strategy with FD staff and	FISH4ACP, FD, SWG, GNFO	15 000	Studies/ Technical assistance	Dec 2022– Apr 2023

n strategy developed for partnering with both channels	artisanal and industrial representatives				
	3.1.2 Implement the draft communication strategy	FD / GATOSP, SWG, GNFO, FISH4ACP	n/a	Facilitation	Apr – Sep 2023
	3.1.3. Revise and finalize FD's communication strategy based on implementation experience	FISH4ACP, FD	5 000	Studies/ Technical assistance	Oct – Dec 2023
3.2. Catch data collection and monitoring system improved across both channels	3.2.1. Develop the draft design of an improved system for catch data collection and monitoring with FD	FISH4ACP, FD/ CRFM	25 000	Studies/ Technical assistance	Jun – Dec 2022
	3.2.2. Purchase equipment required for piloting the draft improved system in one region	FISH4ACP	10 000 (one region)	Equipment	Jan – Apr 2023
	3.2.3. Train FD staff, industrial captains and second mates, and Chinese seine fishers to pilot the draft improved system	FISH4ACP	10 000 (one region, one firm)	Training	Apr – May 2023
	3.2.4. Pilot the draft improved system in one region	FISH4ACP, FD/ CRFM	15 000	Facilitation	May – Sep 2023
	3.2.5. Revise and finalize the improved system for catch data collection and monitoring based on pilot experience	FISH4ACP, FD/ CRFM	10 000	Studies/ Technical assistance	Oct – Dec 2023
	3.2.6. Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the improved system	FISH4ACP, FD, CRFM, other donors	15 000	Facilitation	Dec 2023 – May 2024
	3.2.7. Purchase equipment and set up digital systems required for implementing the improved data	FD, other donors	100 000	Equipment	Jun 2024 – ongoing

	collection/monitoring system				
	3.2.8. Train FD staff, industrial captains and second mates, and Chinese seine fishers on the revised, improved system	FISH4ACP / CRFM	25 000	Training	Apr 2024 – Feb 2025
	3.2.9. Conduct data collection and monitoring using improved system	FD	n/a	Facilitation	Aug 2024 - ongoing
3.3. Revised fisheries regulations drafted based on updated data (i.e., from Outputs 1.2, 2.2, and 3.2)	3.3.1 Review and propose drafts of revised fisheries regulations	FISH4ACP, FD	25 000	Studies/ Technical assistance	Jan – Jun 2024
	3.3.2. Facilitate the government’s adoption of the draft revised regulations	FISH4ACP, FD	10 000	Facilitation	Jun 2024 – Feb 2025
3.4. Improved co-management system (industrial, artisanal and FD) for monitoring, control, surveillance, and inspection of seabob fishing activities	3.4.1. Support FD staff in regional offices with purchase of improved equipment/tools for monitoring, control, surveillance, and inspection (e.g., software, drones)	FISH4ACP	6 000 each x 5 FD offices = 30 000	Equipment	May 2023 – Jan 2024
	3.4.2. Train FD staff in regional offices on the use of improved equipment/tools	FISH4ACP, Suppliers of equipment/ tools	3 000 x 5 FD offices = 15 000	Training	Feb – May 2024
	3.4.3. Draft the revised ToRs and propose the expanded membership base of the Artisanal Fisheries Advisory Committee	FISH4ACP, FD, GNFO	12 000	Studies/ Technical assistance	Jul – Nov 2022
	3.4.4. Facilitate the endorsement of the draft revised ToRs and membership base of the Artisanal Fisheries Advisory Committee	FISH4ACP	12 000	Facilitation	Dec 2022 – Mar 2023
	3.4.5. Draft the revised ToRs and propose the expanded membership base of the SWG	FISH4ACP, FD, GATOSP	12 000	Studies/ Technical assistance	Jul – Nov 2022

	3.4.5. Draft the revised ToRs and propose the expanded membership base of the SWG	FISH4ACP	12 000	Facilitation	Dec 2022 – Mar 2023
Outcome 4 - Artisanal actors adopt improved seabob-handling practices (including food safety and quality) to enter high-value markets by improving infrastructure, facilities and services					
Outputs	Activities				
4.1 Domestic market potential for expansion of seabob consumption (fresh/value added) confirmed and upgrades identified	4.1.1. Conduct a study on domestic market potential for seabob to identify needed upgrades	FISH4ACP	30 000	Studies/ Technical assistance	Jun – Dec 2022
4.2 Market linkages facilitated between vendors and higher-value markets	4.2.1. Identify potential buyers on higher-value markets	FISH4ACP	2 000	Facilitation	Jan - Mar 2023
	4.2.2. Facilitate match-making forums to connect vendors and buyers	FISH4ACP	20 000 (for 5 regions)	Facilitation	Apr 2023 – Apr 2024
4.3 Physical upgrading works proposed, and financing partners identified	4.3.1. Conduct a feasibility study to identify/design infrastructural upgrades required in strategic wharfs/ landing sites	FISH4ACP	32 000 (for 5 wharfs/landing sites)	Studies/ Technical Assistance	Jan – Jun 2023
	4.3.2. Conduct a gender-specific study to identify the upgrades specifically required by women in wharfs/landing sites	FISH4ACP	5 000 x 2 wharfs = 10 000	Studies/ Technical Assistance	Mar – Jun 2023
	4.3.3. Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the infrastructural upgrading plan (including gender-specific infrastructural upgrades)	FISH4ACP, FD, Ministry of Public Infrastructure, other donors	15 000 (for 2 wharfs)	Facilitation	Jun – Dec 2023

	4.3.4. Implement the infrastructural upgrading plan	FD, Ministry of Public Infrastructure , other donors/ FISH4ACP	1 300 000 for 2 wharfs	Infrastructure	Jan 2024 - ongoing
4.4 Management capacity of landing sites improved	4.4.1. Develop best management/operational model for wharfs/landing sites (e.g. direct management by cooperatives, PPP, women groups, or hired managers) and assess management/operational capacity gaps	FISH4ACP	30 000 (for 2 wharfs)	Studies/ Technical assistance	Mar - Oct 2023
	4.4.2. Prepare and deliver programme on capacity building/ business management training for wharf/landing site managers and wharf users	FISH4ACP, FD, BDS providers	27 000 (for 2 wharfs)	Training	Nov 2023 - Feb 2025
4.5 Fishers, processors and vendors at wharfs/landing sites trained on improved seabob-handling practices to increase food safety and quality	4.5.1. Identify fishers, processors and vendors who want to adopt improved seabob-handling practices to increase food safety and quality	FISH4ACP, FD	800 x 5 regions = 4 000	Facilitation	Jan - Mar 2023
	4.5.2 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on improved seabob-handling practices	FISH4ACP, FD, Ministry of Health	3 000	Facilitation	Jan - Mar 2023
	4.5.3 Develop training materials on improved seabob-handling practices with FD and BDS providers	FISH4ACP, BDS providers, FD, Ministry of Health	30 000	Studies/ Technical Assistance	Mar - Sep 2023
	4.5.4 Integrate training for fishers, processors and vendors on improved seabob-handling practices into	FD, Ministry of Health FISH4ACP	20 000	Training	Oct 2023 - ongoing

	FD's extension programmes				
4.6 Processors and vendors connected to suppliers of inputs, finance, and other services	4.6.1 Identify suppliers of improved seabob-handling technologies/equipment and finance for processors and vendors	FISH4ACP, FD, GNFO	2 000	Facilitation	Jan – Mar 2023
	4.6.2 Facilitate linkages between processors/vendors and input suppliers/financers (e.g. through match-making forums, business plan development support)	FISH4ACP, BDS providers	30 000 (for 5 regions)	Facilitation	Apr 2023 - Apr 2024
	4.6.3. Purchase of equipment/inputs required for improved technologies	Processors, vendors/ FISH4ACP	10 000	Equipment	Sep 2023 - ongoing
4.7 Networks of women processors and vendors established at wharfs/landing sites	4.7.1. Identify female processors and vendors who want to form into groups/networks	FISH4ACP, FD, GNFO	800 x 5 regions = 4 000	Facilitation	Jan – Mar 2023
	4.7.2. Train women on organization/collective action and how to form and manage groups	FISH4ACP, FD, GNFO, BDS providers	5 000 x 5 regions = 25 000	Training	Mar – Dec 2023
	4.7.3. Train women on women's rights, leadership, business and management	FISH4ACP, FD, GNFO, BDS providers	4 000 x 5 regions = 20 000	Training	Jan 2024 – Feb 2025

In the descriptions below, the costs to implement specific activities are expected to be financed by the VC stakeholders identified in the line 'Stakeholders and catalysts involved'. The **costs to be potentially funded (or co-funded) by FISH4ACP are indicated with an asterisk (*)** under the line 'Costs and investments'.

Activity number and name: Activity 1.1.1 – Facilitate guided strategic planning sessions with GATOSP members to develop mission and vision statement for GATOSP for next 10 years

Stakeholders or catalysts involved: FISH4ACP in collaboration with GATOSP

Costs and investments: USD 7 000 x 2 sessions = USD 14 000*

Type of investment: Facilitation

Timing: Jul – Oct 2022

Description: Under this activity, FISH4ACP will provide facilitatory support to GATOSP to develop its mission and vision statement for the next 10 years. It is envisioned that two strategic planning sessions will be organized to support GATOSP members to jointly a mission and vision. Report of each session will be prepared and the shared mission and vision endorsed by GATOSP members.

Activity number and name: Activity 1.1.2 – Complete a study on seabob import demand potential (volumes, product attributes (e.g., size), options for value added products, consumer demands regarding sustainability standards/ certifications) in US and the European Union markets

Stakeholders or catalysts involved: FISH4ACP in collaboration with industrial firms, SWG and Fisheries Department

Costs and investments: USD 25 000*

Type of investment: Studies/ Technical assistance

Timing: Jul – Dec 2022

Description: A market study will be conducted to identify/validate the potential/opportunities in the US and the European Union markets for Guyanese seabob products. The study will build on findings from this VC report (particularly the end-market section), but will explore in greater details the demand and requirements (e.g., sustainability standards, certifications) on these potential markets and identify implications for Guyanese seabob industry, particularly in terms of gaps in meeting market requirements.

Activity number and name: Activity 1.1.3 – Facilitate the development of the industry-level export marketing plan (2023–2033) with GATOSP members

Stakeholders or catalysts involved: FISH4ACP in collaboration with industrial firms, GATOSP, SWG, and Fisheries Department

Costs and investments: USD 24 000 (of which USD 12 000 from FISH4ACP and USD 12 000 from GATOSP)

Type of investment: Facilitation

Timing: Jan - Jun 2023

Description: Built on GATOSP's mission and vision (activity 1.1.1) and the market study (activity 1.1.2), a marketing plan (2023–2033) for GATOSP members will be developed to

target the United States of America and the European Union markets. The plan will include an overall strategy to capture market opportunities as well as specific activities to implement the strategy. Focus will be placed on increasing export value thanks to value-addition (i.e., exporting higher-value seabob products) rather than increasing export volume (i.e. increasing the quantity of seabob captured). FISH4ACP will provide funding and technical expertise to support the development of the marketing plan.

Activity number and name: Activity 1.1.4 – Implement the actions outlined in the export marketing plan

Stakeholders or catalysts involved: GATOSP and SWG, with support from FISH4ACP and Fisheries Department

Costs and investments: n/a (tbd depending on activity 1.1.3)

Type of investment: Facilitation

Timing: Jul 2023 - ongoing

Description: This activity is about the implementation of the export marketing plan, which will be under the responsibility of seabob industrial firms (GATOSP members). Technical support could be provided by FISH4ACP as needed/relevant.

Activity number and name: Activity 1.2.1 – Review SWG research plan with GATOSP and FD to identify research gaps/consolidate industry research priorities

Stakeholders or catalysts involved: FISH4ACP in collaboration with GATOSP, SWG, Fisheries Department, and other partners (e.g., University of Guyana)

Costs and investments: USD 12 000*

Type of investment: Studies/ Technical assistance

Timing: Oct – Dec 2022

Description: Under this activity, FISH4ACP will provide fund for a review of current SWG research plan and related research plans (e.g., by the Fisheries Department), in close collaboration with GATOSP and Fisheries Department and other partners (e.g., University of Guyana)⁵⁵ to identify research gaps/consolidate industry research priorities. Topics to cover include but are not limited to: MSC conditions, potential factors affecting stock decline (e.g., climate change), preparation for possible inclusion of social issues (e.g., working conditions, gender equality) in MSC requirements in the future, as well as recommended sustainable fishing practices for industrial firms and the potentials for industrial firms to use some forms of renewable energy to reduce reliance on fuel and thus, emission.

⁵⁵ Cooperation with University of Guyana to conduct research project is recommended in the draft Guyana Marine Fisheries Management Plan 2022–2027, p.48.

Activity number and name: Activity 1.2.2 – Facilitate the development of the updated SWG research plan, with research partners and potential funding sources identified

Stakeholders or catalysts involved: FISH4ACP in collaboration with GATOSP, SWG, Fisheries Department, other partners (e.g., CRFM)

Costs and investments: USD 12 000*

Type of investment: Facilitation

Timing: Jan – Apr 2023

Description: Based on the findings of Activity 1.2.1, a research plan for the SWG will be developed to address the identified research gaps/priorities. Partners and funding sources for will be identified for the implementation of the plan. FISH4ACP will provide support to the development of the plan as well as stakeholder/donor engagement. For instance, partnerships with the Caribbean Regional Fisheries Mechanism (CRFM) would be sought to leverage on the technical and financial capacities of CRFM.

Activity number and name: Activity 1.2.3 – Implement the actions outlined in the revised seabob research plan

Stakeholders or catalysts involved: GATOSP, SWG, with support from FISH4ACP, Fisheries Department, and other partners (e.g., CRFM)

Costs and investments: n/a (tbd depending on activity 1.2.2)

Type of investment: Facilitation

Timing: Apr 2023 - ongoing

Description: This activity is about the implementation of the research plan, which will be under the responsibility of seabob industrial firms (GATOSP members). Technical support could be provided by FISH4ACP as needed/relevant. Findings from the implementation of the research plan will be later incorporated in other upgrading activities including activities 1.3.1 – 1.3.3 and 3.3.1 – 3.3.2 (see below).

Activity number and name: Activity 1.3.1 – Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for industrial fishers

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 2 500*

Type of investment: Facilitation

Timing: Jun - Jul 2023

Description: Built the work done related to the SWG research plan (activities 1.2.1 – 1.2.3), sustainable fishing practices for industrial fishing firms will be identified. BDS providers will then be identified to provide Training-of-Trainer services to the staff in the Fisheries Department (Extension Unit) on sustainable fishing practices, who will then provide training to industrial fishers. FISH4ACP will provide funding for the identification of providers, in consultation with Fisheries Department.

Activity number and name: Activity 1.3.2 – Develop training materials for industrial fishers on sustainable fishing practices with FD and BDS providers

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 20 000*

Type of investment: Studies/ Technical assistance

Timing: Sep - Dec 2023

Description: This activity involves the development of training materials for industrial fishers on sustainable fishing practices. The activity will be led by FISH4ACP, but will be conducted in close collaboration with the BDS providers (identified in activity 1.3.1) and Fisheries Department to ensure sustainability. It is expected that through jointly developing the training materials, the capacity building of Fisheries Department staff will also be enhanced.

Activity number and name: Activity 1.3.3 – Integrate training of industrial fishers (boat captains, boat staff) on sustainable fishing practices with MSC training program and other FD's extension programs

Stakeholders or catalysts involved: FISH4ACP, Fisheries Department, supported by BDS providers

Costs and investments: USD 20 000*

Type of investment: Training

Timing: Jan 2024 - ongoing

Description: Under this activity, support will be provided to Fisheries Department (Extension Unit) to integrate training of industrial fishers (boat captains, boat staff) on sustainable fishing practices into MSC training program and other related programs by Fisheries Department. This will involve training of Fisheries Department staff and technical assistance to Fisheries Department staff in incorporating different components in the training programs and in delivering trainings to industrial fishers.

Activity number and name: Activity 1.4.1 – Conduct a study to assess the existing OHS conditions and plans across the three firms

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 15 000*

Type of investment: Studies/ Technical assistance

Timing: Jul - Dec 2022

Description: This activity (as well as activities 1.4.2 – 1.4.4) will build on FAO's experience/expertise in supporting the development of national occupational health and safety (OHS) plans in various countries (e.g., Ecuador, Ghana and Cameroon for the export banana industry under the World Banana Forum). Under this activity, a comprehensive review of the OHS conditions and plans currently in place in three industrial seabob firms will be conducted. A purpose of this study is to prepare the industry to begin addressing social issues in preparation for possible upgrades to MSC certification requirements in the future.

Activity number and name: Activity 1.4.2 – Facilitate the development of a draft national OHS plan for the seabob industry

Stakeholders or catalysts involved: FISH4ACP in collaboration with GATOSP, Fisheries Department, Ministry of Labour and Social Security

Costs and investments: USD 15 000*

Type of investment: Facilitation

Timing: Jan – Jun 2023

Description: Built on activity 1.4.1, this activity will involve the development of a draft national OHS plan (or draft industry OHS standards) that can be adopted and implemented by management across the three industrial seabob firms. Given that almost 40% of all employees working in processing factories are women and that women workers get paid considerably lower salaries (1.5 times less) than male workers, these standards will also take into account gender-specific OHS needs and issues related to women’s economic empowerment.

Activity number and name: Activity 1.4.3 – Implementation of the draft OHS plan

Stakeholders or catalysts involved: GATOSP, Fisheries Department, Ministry of Labour and Social Security, supported by FISH4ACP

Costs and investments: n/a

Type of investment: Facilitation

Timing: Jun - Dec 2023

Description: This activity is about the implementation of the draft OHS plan, which will be primarily under the responsibility of seabob industrial firms (GATOSP members), in collaboration with Fisheries Department and Ministry of Labour and Social Security. Technical support could be provided by FISH4ACP as needed/relevant.

Activity number and name: Activity 1.4.4 – Revision and finalisation of the OHS plan based on implementation experience

Stakeholders or catalysts involved: FISH4ACP in collaboration with GATOSP, Fisheries Department, Ministry of Labour and Social Security

Costs and investments: USD 10 000*

Type of investment: Facilitation

Timing: Jan - Jun 2024

Description: Under this activity, the draft OHS plan will be revised and finalized based on implementation experience and findings (activity 1.4.3). FISH4ACP will provide technical expertise to revise the plan and to facilitate endorsement of the plan by GATOSP, Fisheries Department, and Ministry of Labour and Social Security.

Activity number and name: Activity 2.1.1 – Identify Chinese seine fishers in Regions 2, 3, 4, 5 and 6 who wish to participate in the working group

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, cooperatives and Fisheries Department

Costs and investments: USD 1 000 x 5 regions = USD 5 000*

Type of investment: Facilitation

Timing: Jul – Oct 2022

Description: This activity will involve the identification of Chinese seine fishers in Regions 2, 3, 4, 5 and 6 who wish to participate in the working group. These regions are selected because they have high numbers of Chinese seine fishers who catch seabob.⁵⁶ Particular focus will be placed on regions 3, 4, and 5 which have the highest number of Chinese seine fishers. The identification of fishers will probably take place through public meetings and be coordinated by the cooperatives and GNFO and with support from FISH4ACP. The project strategy, the purpose and benefits of forming a Chinese seine working group and requirements to participate will be fully explained. A list of interested fishers who want to participate in the project will then be made and the fishers will be invited to participate in and benefit from the training, match-making forums and facilitatory support described further below.

Activity number and name: Activity 2.1.2 – Facilitate the establishment of the Chinese seine working group

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, Fisheries Department

Costs and investments: USD 5 000*

Type of investment: Facilitation

Timing: Oct – Dec 2022

Description: The Chinese seine fishers identified under activity 2.1.1 will be supported to form into a working group. Innovative approaches will be considered in facilitating this group formation, including for instance, forming group using digital apps (e.g., WhatsApp). The main purposes of the working group is to improve coordination between artisanal seabob fishers. As such, the working group can function as a means for both the FISH4ACP project and Fisheries Department to better target this sub-set of artisanal fishers, improve two-way communication and better understand the specific challenges they face and thus, better support them to improve their practices.

⁵⁶ According to the draft Guyana Marine Fisheries Management Plan 2022–2027, p.18.

Activity number and name: Activity 2.1.3 – Develop an inventory (data base) of Chinese seine vessel characteristics to keep record of engine types and fishing practices

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, Fisheries Department

Costs and investments: USD 10 000*

Type of investment: Studies/ Technical assistance

Timing: Nov 2022 – Apr 2023

Description: The formation of the Chinese seine working group (activity 2.1.2) will enable the development of an inventory (data base) of Chinese seine vessel characteristics to generate better understanding of the engine types (including power levels) and fishing practices of artisanal seabob fishers. The results from this activity 2.1.3 would thus provide important inputs to other upgrading activities such as those under Outputs 2.2, 2.3 and 2.4. FISH4ACP will provide funding to develop the inventory database, which will then be transferred to Fisheries Department for regular update and maintenance.

Activity number and name: Activity 2.2.1 – Design and conduct a baseline study on Chinese seine fishing's impacts on the seabob stock and by-catch to identify improved fishing practices needed

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, Fisheries Department, WWF and other partners (e.g., University of Guyana)

Costs and investments: USD 30 000*

Type of investment: Studies/ Technical assistance

Timing: Aug 2022 – Feb 2023

Description: Under this activity, a study on Chinese seine fishing's impacts on stock levels and by-catch will be conducted to establish baseline regarding the impacts of artisanal seabob fishing as well as to identify solutions/improved sustainable fishing practices needed. In identifying improved technologies/practices to promote, particular attention will be paid to those that are climate smart (e.g., reduction of fuel use)⁵⁷, aligned with sustainable levels of exploitation of the marine resources (e.g., reduced impacts on by-catch and ETP species through potential use of BRD in Chinese seine vessels⁵⁸), while also demonstrating financial viability for fishers to adopt. FISH4ACP will provide funding for this activity, in collaboration with GNFO, Fisheries Department, WWF and other partners (e.g., University of Guyana)⁵⁹.

⁵⁷ Recommended in the Artisanal Fishery Strategic Framework and Management Plan 2019–2024, p.18.

⁵⁸ A strategic action mentioned in the draft Guyana Marine Fisheries Management Plan 2022–2027, p.40.

⁵⁹ Cooperation with University of Guyana to conduct research project is recommended in the draft Guyana Marine Fisheries Management Plan 2022–2027, p.48.

Activity number and name: Activity 2.3.1 – Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for artisanal fishers

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, Fisheries Department

Costs and investments: USD 2 500*

Type of investment: Facilitation

Timing: Feb - Apr 2023

Description: Under this activity, BDS providers will be identified to provide Training-of-Trainer services to the staff in the Fisheries Department (Extension Unit) on sustainable fishing practices (as identified under activity 2.2.1), who will then provide training to artisanal fishers. FISH4ACP will provide funding for the identification of providers, in consultation with Fisheries Department.

Activity number and name: Activity 2.3.2 – Develop training materials for artisanal fishers on sustainable fishing practices with FD and BDS providers

Stakeholders or catalysts involved: FISH4ACP in collaboration with BDS and Fisheries Department

Costs and investments: USD 25 000*

Type of investment: Studies/ Technical assistance

Timing: Apr - Oct 2023

Description: This activity involves the development of training materials for artisanal fishers on sustainable fishing practices. In particular, trainings will include topics related to destructive fishing gears, endangered, threatened and protected (ETP) species, and more sustainable modern fishing technologies (e.g., more fuel-efficient equipment, fishing techniques that reduce bycatch). The development of training materials will be led by FISH4ACP, but will be conducted in close collaboration with the BDS providers (identified in activity 2.3.1) and Fisheries Department to ensure sustainability. It is expected that through jointly developing the training materials, the capacity building of Fisheries Department staff will also be enhanced.

Activity number and name: Activity 2.3.3 – Integrate training for fishers on sustainable fishing practices into FD's extension programmes

Stakeholders or catalysts involved: FISH4ACP in collaboration with BDS and Fisheries Department

Costs and investments: USD 20 000*

Type of investment: Training

Timing: Nov 2023 - ongoing

Description: Under this activity, support will be provided to Fisheries Department (Extension Unit) to integrate training of artisanal fishers on sustainable fishing practices into extension programs by Fisheries Department. This will involve training of Fisheries Department staff and technical assistance to Fisheries Department staff in incorporating different components in the training programs and in delivering trainings to artisanal fishers.

Activity number and name: Activity 2.4.1 – Identify suppliers of sustainable (e.g., climate smart) technologies/equipment and finance for fishers

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and GNFO

Costs and investments: USD 3 000*

Type of investment: Facilitation

Timing: Feb – Apr 2023

Description: Based on the sustainable technologies (e.g., climate smart) for artisanal fishers as identified under activity 2.2.1, this activity will then involve the identification of suppliers of the equipment required for the adoption of these technologies as well as potential sources of finance for fishers to obtain the equipment. In terms of finance particularly, options to explore would include but are not limited to: commercial bank loans, preferential financing schemes by the government, and other donors/funds such as the GEF Small Grants Programme (SGP) which offer grants of different sizes to community-based organisations (CBOs) and non-governmental organizations (NGOs) in Guyana.⁶⁰

Activity number and name: Activity 2.4.2 – Facilitate linkages between artisanal fishers and input suppliers/financers (e.g. through match-making forums, business plan development support)

Stakeholders or catalysts involved: FISH4ACP in collaboration with input suppliers, financers, and BDS providers

Costs and investments: USD 7 000 x 5 regions = USD 35 000*

Type of investment: Facilitation

Timing: May 2023 – May 2024

Description: Under this activity, facilitatory support will be provided to connect artisanal fishers to the suppliers of the inputs/equipment required for the adoption of improved sustainable technologies as well as potential financers/partners who can provide financial support for fishers to purchase the inputs/equipment. To this end, match-making forums will be organized in 5 regions with high numbers of Chinese seine artisanal fishers, starting with regions 3, 4, and 5 and then regions 2 and 6. These forums could take the form of input/equipment suppliers and financers having sale stands to present their products/services so that fishers can approach them to enquire about the products/services and how to obtain/purchase them. Additionally, FISH4ACP will also collaborate with local BDS providers to support fishers develop business plans on investments in the improved technologies, including preparation of applications for grants and/or bank loans. To the extent possible, synergies will be created with related upgrading activities (e.g., 4.6.2, described further below).

⁶⁰ The SGP is funded by the Global Environment Facility (GEF). Under this programme, three types of grants are offered: planning grants (USD 5 000), project grants (USD 50 000), and strategic grants (USD 150 000) (The GEF Small Grants Programme information guide in 2020, shared by the National Coordinator of the programme in Guyana).

Activity number and name: Activity 2.4.3 – Purchase of equipment/inputs required for sustainable fishing practices

Stakeholders or catalysts involved: Artisanal fishers, with support from FISH4ACP and financiers

Costs and investments: tbd (depending on the technologies to be identified), but for purpose of the upgrading investment table, is estimated to be USD 440 000 based on the cost of 4-stroke engines and estimated number of adopters

Type of investment: Equipment

Timing: Jun 2023 – ongoing

Description: This activity will involve the purchase of equipment/inputs required for sustainable fishing practices (as identified under activity 2.2.1). This investment will be primarily made by artisanal fishers, with FISH4ACP potentially providing financial support (e.g., through matching grants, or loan guarantees) with the purchase of a small number of equipment for pilot purposes, as a way to de-risk the implementation of new practices and to convince fishers of the benefits of investing in the improved technologies. Specific ways through which FISH4ACP will provide support will be discussed and agreed with involved stakeholders during the project implementation period.

Activity number and name: Activity 3.1.1 – Develop a draft communication strategy with FD staff and artisanal and industrial representatives

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department, GATOSP, SWG and GNFO

Costs and investments: USD 15 000*

Type of investment: Studies/ Technical assistance

Timing: Dec 2022 – Apr 2023

Description: Under this activity, a draft communication strategy between Fisheries Department and artisanal and industrial actors will be prepared by FISH4ACP in close collaboration with Fisheries Department, GATOSP, SWG and GNFO. The strategy would aim to improve two-way communication between Fisheries Department and artisanal and industrial fishers (e.g., fishers report to the Fisheries Department and Fisheries Department provide analytical results using reported data to fishers, regular interaction/consultations between Fisheries Department and stakeholders).⁶¹ Such effective communication is important to sensitize the fishing communities on the importance of compliance with fisheries regulations (e.g. licensing, data reporting) but is currently hampered by a lack of circulation of information and dialogues. The development of the communication strategy will also involve a review of the Fisheries Department's stakeholder grievance mechanism (i.e. how artisanal and industrial fishers can make complaints about fisheries management issues, and how these complaints will be dealt with in a timely and efficient manner). Such a grievance process must be outlined in the communication strategy and adhered to by the Fisheries Department. Additionally, as part of the communication strategy, proposals will also be made regarding upgrades to the Guyana Seabob Fishery website

⁶¹ Recommended in the draft Guyana Marine Fisheries Management Plan 2022–2027, pp.29-30.

(<https://guyanaseabobfishery.com/>) following the recommendations of the MSC Surveillance report in December 2021⁶² related to providing a wider range of information on the website to improve communication and transparency. In line with these recommendations, the communication strategy (to be drafted) will also be published on the Guyana Seabob Fishery website for transparency purposes.

Activity number and name: Activity 3.1.2 – Implement the draft communication strategy
Stakeholders or catalysts involved: Fisheries Department, in collaboration with GATOSP, SWG and GNFO, and with support from FISH4ACP
Costs and investments: n/a (depending on activity 3.1.1)
Type of investment: Facilitation
Timing: Apr – Sep 2023
Description: Once prepared, the draft communication strategy will be implemented by the Fisheries Department in collaboration with GATOSP, SWG and GNFO, and with technical support from FISH4ACP as needed/relevant. The purpose is to pilot the draft strategy and to make further improvements as needed.

Activity number and name: Activity 3.1.3 – Revise and finalize FD’s communication strategy based on implementation experience
Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department
Costs and investments: USD 5 000*
Type of investment: Studies/ Technical assistance
Timing: Oct - Dec 2023
Description: Under this activity, the draft communication strategy will be revised and finalized based on implementation experience and findings (activity 3.1.2). FISH4ACP will provide technical expertise to revise the plan and to facilitate endorsement of the plan by Fisheries Department.

Activity number and name: Activity 3.2.1 – Develop the draft design of an improved system for catch data collection and monitoring with FD
Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and the Caribbean Regional Fisheries Mechanism (CRFM)
Costs and investments: USD 25 000*
Type of investment: Studies/ Technical assistance
Timing: Jun - Dec 2022
Description: This activity will involve developing the draft design of an improved system for catch data collection and monitoring system for Fisheries Department to inform policy and decision-making. The drafting of this improved system would include elaboration about the approaches to be used for data collection and management (e.g., overall process, using paper-based forms and/or digital tools, using offline databases (e.g., Excel files) or online

⁶² These include, for instance, to provide key documents related to stock assessment, CPUE annual reports and a wider range of documents (e.g., VMS annual reports, working group minutes) (Cappell, R. et al. (2021), p.32).

databases, who will collect/report data), the standard operating procedures for data collection and management (including key forms to use, e.g. logbooks for fishers' reporting), and incentives for relevant stakeholders to involve in/support data collection. FISH4ACP will provide funding and expertise for the conduct of this activity. Collaboration will be sought with other organisations who have demonstrated experience in fisheries data collection, e.g. the CRFM. A range of possible approaches will be explored to be incorporated in this draft improved system. These include but are not limited to: digital applications for data collection via mobile phones (e.g., ABALOBI app: <http://abalobi.org/>⁶³), and youth employment schemes for data collectors at more remote landing sites where Fisheries Department's presence (office and staff) is weak. Notably, to ensure data quality, self-reporting by fishers (through completing logbooks) will have to be accompanied by data collection/sampled surveys by Fisheries Department staff (data collectors in regional FD offices) and/or fisheries cooperatives (who will then report to Fisheries Department). For data collection/monitoring system to work, it is important to create incentives for fisherfolks and their cooperatives to use and comply with the system. To this end, potential incentives may be considered, including but are not limited to: (i) provision of training and support to purchase safety equipment or fuel-saving equipment as reward for timely and correct reporting by fishers/cooperatives⁶⁴, (ii) periodic (e.g., every month or 3 months) collection of submitted data by Fisheries Department and effective communication with fishers/cooperatives about how the data are used so that fishers/cooperatives can see their collected data are put in good use⁶⁵, (iii) making submission of logbooks by fishers a pre-requisite for obtaining/maintaining fishing licences⁶⁶, and (iv) channelling funds from licensing towards rehabilitation of marine environment to increase stock for fishers.⁶⁷ A feasibility assessment will be conducted before any proposals are made regarding which approaches and incentives will be incorporated in the draft improved data collection/monitoring system. Particularly, incentives that involves revision of certain regulatory measures will also be embedded in activity 3.3.1 (described below).

Activity number and name: Activity 3.2.2 – Purchase equipment required for piloting the draft improved system in one region

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 10 000* (one region, one firm)

Type of investment: Equipment

Timing: Jan – Apr 2023

Description: This activity (and activities 3.2.3, 3.2.4) is related to piloting the draft improved data collection and monitoring system, or some key components of the system, with

⁶³ Recommended in the Artisanal Fishery Strategic Framework and Management Plan 2019–2024 (WWF, 2019, p.15) and the draft Guyana Marine Fisheries Management Plan 2022–2027, p.47.

⁶⁴ Based on consultation with Fisheries Department in March 2022.

⁶⁵ Recommended in the Artisanal Fishery Strategic Framework and Management Plan 2019–2024 (WWF, 2019, p.16).

⁶⁶ Recommended in the Artisanal Fishery Strategic Framework and Management Plan 2019–2024 (WWF, 2019, p.16).

⁶⁷ Ibid.

artisanal fishers in one region in Guyana and with one industrial firm (to be identified at a later stage). The purpose is to field-test the draft system and to make further improvements as needed. Under this activity, selected equipment will be purchased for piloting the draft improved system.

Activity number and name: Activity 3.2.3 - Train FD staff, industrial captains and second mates, and Chinese seine fishers to pilot the draft improved system

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 10 000*

Type of investment: Training

Timing: Apr – May 2023

Description: Under this activity, training will be provided to Fisheries Department staff, industrial captains and second mates, and Chinese seine fishers to pilot the draft improved data collection/monitoring system. Apart from technical aspects related to using the system (e.g., how to complete logbooks, how to use digital apps), this training will also include sensitization on the benefits of licensing (for artisanal fishers) and of correctly and timely reporting data on catch and by-catch (for both industrial and artisanal fishers).

Activity number and name: Activity 3.2.4 - Pilot the draft improved system in one region

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 15 000*

Type of investment: Facilitation

Timing: May - Sep 2023

Description: This activity is about implementing the draft improved system for data collection/monitoring in one region and with one industrial company to field-test the system. FISH4ACP will provide funding and expertise to execute this pilot.

Activity number and name: Activity 3.2.5 - Revise and finalize the improved system for catch data collection and monitoring based on pilot experience

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and the Caribbean Regional Fisheries Mechanism (CRFM)

Costs and investments: USD 10 000*

Type of investment: Studies/ Technical assistance

Timing: Oct – Dec 2023

Description: Under this activity, the draft improved data collection/monitoring system will be revised and finalized based on implementation experience and findings (activity 3.2.4). FISH4ACP will provide technical expertise to revise the system and to facilitate endorsement of the system by Fisheries Department. Similar to activity 3.2.1, collaboration will be sought with other organisations who have demonstrated experience in fisheries data collection, e.g. the CRFM.

Activity number and name: Activity 3.2.6 - Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the improved system

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and other partners/donors (e.g., CRFM)

Costs and investments: USD 15 000*

Type of investment: Facilitation

Timing: Dec 2023 – May 2024

Description: Based on the finalization of the improved data collection/monitoring system, this activity will involve the identification of partners for the funding and implementation of the system, and agreeing on the mechanism for involved partners to collaborate so as to ensure regular collection and monitoring of quality data over time. The Fisheries Department would take the lead in this stakeholder engagement process. FISH4ACP will provide experts to support, particularly in the development of mechanisms for collaboration (e.g., development of funding proposals) in close coordination with Fisheries Department.

Activity number and name: Activity 3.2.7 - Purchase equipment and set up digital systems required for implementing the improved data collection/monitoring system

Stakeholders or catalysts involved: Fisheries Department and other partners/donors

Costs and investments: tbd (depending on the improved system to be designed), but for the purpose of the upgrading investment table, is estimated to be USD 100 000

Type of investment: Equipment

Timing: Jun 2024 - ongoing

Description: Based on the agreed mechanism for funding/implementation (activity 3.2.6), the equipment and digital systems required for the conduct of the implementing the improved data collection/monitoring system will be purchased.

Activity number and name: Activity 3.2.8 - Train FD staff, industrial captains and second mates, and Chinese seine fishers on the revised, improved system

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and other partners (e.g., CRFM, the Caribbean Large Marine Ecosystems (CLME+))

Costs and investments: USD 35 000*

Type of investment: Training

Timing: Apr 2024 – Feb 2025

Description: This activity will involve training of Fisheries Department staff, industrial captains and second mates, and Chinese seine fishers on the improved data collection/monitoring system and how to use the system (e.g. how to complete logbooks and/or use digital apps). Like activity 3.2.3, the training will also include sensitization on the benefits of licensing (for artisanal fishers) and of correctly and timely reporting data on catch and by-catch (for both industrial and artisanal fishers). This activity will thus provide budget from FISH4ACP for relevant training in five focused regions which have highest numbers of Chinese seine fishers (i.e. regions 2, 3, 4, 5, 6). Collaboration will be sought with other organisations/projects who have demonstrated experience in fisheries data collection, e.g. the CRFM and CLME+. Potentially, a study tour may be organized for a group of Fisheries Department staff to one of the countries suggested by CRFM/CLME+ to learn about good practices in data collection that can be applied in Guyana. It is expected that Fisheries Department will later replicate the trainings in the remaining region (region 1) and with other groups of artisanal fishers (not only Chinese seine ones).

Activity number and name: Activity 3.2.9 - Conduct data collection and monitoring using improved system

Stakeholders or catalysts involved: Fisheries Department

Costs and investments: n/a

Type of investment: Facilitation

Timing: Aug 2024 - ongoing

Description: Under this activity, Fisheries Department will conduct and coordinate the implementation data collection and monitoring using the improved system, in collaboration with industrial and artisanal fishers. This implementation will need to be carried out regularly, and an annual report presenting the collected data will be prepared and disseminated to all relevant stakeholders, including industrial and artisanal private actors.

Activity number and name: Activity 3.3.1 - Review and propose drafts of revised fisheries regulations

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department

Costs and investments: USD 25 000

Type of investment: Studies/ Technical assistance

Timing: Jan – Jun 2024

Description: Based on updated data obtained from research and improved data collection/monitoring (i.e., activities 1.2.1 – 1.2.2, 2.2.1, and 3.2.4 – 3.2.9), fisheries regulations will be reviewed and recommendations will be made regarding how specific fisheries management measures should be revised. Of particular relevance are the regulations related to: (i) vessel registration and license (e.g., to establish maximum numbers of fishing licenses for all fishing gear types and target limits for license capacity in line with the status of the exploited stocks, to simplify vessel registration and license application process)⁶⁸; (ii) mechanisms to co-manage the fisheries with local organisations (e.g., cooperatives), to build and enhance partnerships between the public sector, private sector and civil society⁶⁹; (iii) reduction of negative impacts on ecosystems (e.g., investigate the use of BRD in Chinese seine fishing, explore the possibilities of to reduce bycatch through selectivity of gears, mesh size)⁷⁰; (iv) revision of logbooks for artisanal fishery reporting and creating incentives for fishers and cooperatives to support the system (as well as sanctions for not doing so)⁷¹, and (v) requirements regarding the execution of fish stock assessments to inform sustainable fisheries management⁷². It must be noted that the revision of fisheries regulations is a dynamic process (e.g., use of CPUE data to modify HCR on quarterly basis as needed, recent revisions to logsheets that may need to be further simplified/ revised base on implementation); and thus, while FISH4ACP will provide support in this process during the project’s duration, regular revision of regulations by the Fisheries Department will be necessary to allow for timely adjustments as needed in the future.

Activity number and name: Activity 3.3.2 - Facilitate the government’s adoption of the draft revised regulations

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department

Costs and investments: USD 10 000

Type of investment: Facilitation

Timing: Jun 2024 – Feb 2025

Description: This activity will involve facilitation for the government’s adoption of the draft revised regulations prepared under activity 3.3.1.

Activity number and name: Activity 3.4.1 - Support FD staff in regional offices with purchase of improved equipment/tools for monitoring, control, surveillance, and inspection (e.g., software, drones)

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department

Costs and investments: USD 6 000 x 5 Fisheries offices in 5 regions = USD 30 000*

Type of investment: Equipment

Timing: May 2023 – Jan 2024

⁶⁸ A strategic action mentioned in the draft Guyana Marine Fisheries Management Plan 2022–2027, pp.30-33.

⁶⁹ A strategic action mentioned in the draft Guyana Marine Fisheries Management Plan 2022–2027, p.29.

⁷⁰ A strategic action mentioned in the draft Guyana Marine Fisheries Management Plan 2022–2027, p.40.

⁷¹ A strategic action mentioned in the draft Guyana Marine Fisheries Management Plan 2022–2027, pp.46-47.

⁷² A strategic action mentioned in the draft Guyana Marine Fisheries Management Plan 2022–2027, pp.47-48.

Description: This activity will involve the identification and purchase of necessary equipment (such as drones, computers) and tools (e.g., software such as Global Fishing Watch (<https://globalfishingwatch.org/>) for vessel monitoring) for Fisheries Offices in 5 regions with high numbers of Chinese seine fishers (i.e. regions 2, 3, 4, 5, 6) to conduct monitoring, control and inspection activities. A quick study (around USD 5 000 - 10 000) will be done to assess the need for equipment/tools and the feasibility for Fisheries Department staff for using and maintaining the identified equipment/tool. The identification of the equipment/tool and the management/utilization of the purchased equipment will be decided based on this study and in close consultation with Fisheries Department.

Activity number and name: Activity 3.4.2 - Train FD staff in regional offices on the use of improved equipment/tools

Stakeholders or catalysts involved: FISH4ACP in collaboration with suppliers of equipment/tools

Costs and investments: USD 3 000 x 5 Fisheries offices in 5 regions = USD 15 000*

Type of investment: Training

Timing: Feb - May 2024

Description: Once equipment/tools for monitoring, control and inspection for Fisheries Offices are procured, training will be provided to Fisheries Department staff on the use of the equipment/tools. For sustainability reasons, this training will be provided in collaboration with suppliers of equipment/tools.

Activity number and name: Activity 3.4.3 - Draft the revised ToRs and propose the expanded membership base of the Artisanal Fisheries Advisory Committee

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and GNFO

Costs and investments: USD 12 000*

Type of investment: Studies/ Technical assistance

Timing: Jul – Nov 2022

Description: Under this activity, revised Terms of Reference (ToRs) for the Artisanal Fisheries Advisory Committee (AFAC) will be drafted and a proposal will be made regarding the expansion of the membership of the Committee. The committee should include a representative from each fisher cooperative to speak on behalf of their respective artisanal fishers, however, membership should also include other artisanal value chain actors including processors and market vendors if they are not represented by cooperatives. This activity, therefore, will be done in close consultation with the Fisheries Department as well as GNFO, the working of Chinese seine fisher (to be established under activity 2.1.2), and the networks of processors and market vendors, who are mostly women (to be established under activity 4.6.2, described below) to ensure that the views of all artisanal actors (not just fishers), both men and women, are well-represented.

Activity number and name: Activity 3.4.4 - Facilitate the endorsement of the draft revised ToRs and membership base of the Artisanal Fisheries Advisory Committee

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 12 000*

Type of investment: Facilitation

Timing: Dec 2022 – Mar 2023

Description: Once the revised ToRs and the proposed expanded membership base of the Artisanal Fisheries Advisory Committee (AFAC) are prepared, FISH4ACP will facilitate the endorsement of these drafts by Fisheries Department and other involved stakeholders.

Activity number and name: Activity 3.4.5 - Draft the revised ToRs and propose the expanded membership base of the SWG

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and SWG

Costs and investments: USD 12 000*

Type of investment: Studies/ Technical assistance

Timing: Jul – Nov 2022

Description: Under this activity, the existing Terms of Reference (ToRs) and membership structure of the Seabob Working Group will be reviewed, and recommendations made to expand membership to include a representative from the Artisanal Fisheries Advisory Committee, and potentially also service providers such as financing partners, input suppliers etc. In preparing the revised ToRs and membership base, it is necessary to ensure adequate representation of women as key stakeholders in the seabob value chain as both workers and business owners. A potential option is to expand the ToRs of the SWG to make it an overall body (or a form of a “Value chain-Task Force”) coordinating the development of the whole VC, including both artisanal and industrial channels, in the long run. To fulfil this expanded role, the membership base of the SWG should also be expanded to include representatives from the Chinese seine fisher working group (to be formed under activity 2.1.1), the network of female processors and retailers (to be formed under activities 4.7.1 and 4.7.2) and Extension Unit from the Fisheries Department.

Activity number and name: Activity 3.4.6 - Facilitate the endorsement of the draft revised ToRs and membership base of the SWG

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 12 000*

Type of investment: Facilitation

Timing: Dec 2022 – Mar 2023

Description: Once the revised ToRs and the proposed expanded membership base of the SWG are prepared, FISH4ACP will facilitate the endorsement of these drafts by Fisheries Department and other involved stakeholders.

Activity number and name: Activity 4.1.1 - Conduct a study on domestic market potential for seabob to identify needed upgrades

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 30 000*

Type of investment: Studies/ Technical assistance

Timing: Jun – Dec 2022

Description: This activity will involve the conduct of an in-depth market study to identify/validate the potential/opportunities for Guyanese seabob products on domestic market. The study will build on findings from this VC report (particularly the end-market section), but will explore in greater details the demand and requirements on domestic market (specified by market segments, locations, or types of buyers) and identify the implications for Guyanese seabob value chain, particularly the artisanal channel, in terms of the upgrades needed to meet market requirements. The findings from this activity, therefore, will be incorporated in the implementation of other activities in support of the artisanal channel (i.e., those activities under Outputs 4.2 – 4.7).

Activity number and name: Activity 4.2.1 - Identify potential buyers on higher-value markets

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 2 000*

Type of investment: Facilitation

Timing: Jan - Mar 2023

Description: Based on the market study carried out under activity 4.1.1, this activity will involve the identification of potential buyers in the targeted segments and/or locations on the domestic market, as well as their specific procurement requirements.

Activity number and name: Activity 4.2.2 - Facilitate match-making forums to connect vendors and buyers

Stakeholders or catalysts involved: FISH4ACP

Costs and investments: USD 20 000* (for 5 regions)

Type of investment: Facilitation

Timing: Apr 2023 – Apr 2024

Description: Under this activity, match-making forums will be organized to facilitate the market vendors identified in activity 4.5.1 described below and the buyers identified in activity 4.2.1 above to meet and discuss possible business partnerships regarding the supply of quality seabob products. This could take the form of buyers presenting their companies and buying requirements and each vendor having a sales stand where they can exhibit their goods and meet with the potential buyers.

Activity number and name: Activity 4.3.1 - Conduct a feasibility study to identify/design infrastructural upgrades required in strategic wharfs/ landing sites

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries department, Ministry of Public Infrastructure, GNFO, cooperatives, and women networks/groups

Costs and investments: USD 32 000* (for 5 wharfs/landing sites)

Type of investment: Studies/ Technical assistance

Timing: Jan – Jun 2023

Description: A feasibility study will be conducted to identify and design the infrastructural upgrades required in two strategic wharfs/ landing sites, namely Meadow Bank in Region 4 and Rosignol in Region 5 (as identified through consultations with key stakeholders), as well as other three wharfs/ landing sites in Regions 2, 3 and 6 (one per region), for which stakeholders also indicate dire needs for infrastructural upgrades, although they are of less strategic importance than Meadow Bank and Rosignol. The study will also identify the costs associated with the upgrading works needed for bringing the wharfs/ landing sites up to a standard that supports food safety and hygiene as well as public safety for fishers, vendors and other businesses who operate there. Given their importance, stronger focus will be placed on Meadow Bank and Rosignol wharfs, with the aim of providing in great detail a proposal for infrastructural upgrades in these two wharfs, while a more generic proposal would be acceptable for the other three wharfs/ landing sites.

Activity number and name: Activity 4.3.2 - Conduct a gender-specific study to identify the upgrades specifically required by women in wharfs/landing sites

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department, GNFO, cooperatives, women networks/groups

Costs and investments: USD 10 000* (for 2 wharfs)

Type of investment: Studies/ Technical assistance

Timing: Mar – Jun 2023

Description: Apart from a feasibility study about infrastructural upgrades in wharfs/landing sites in general, a gender-specific study will be carried out in the two most strategic wharfs (Meadow Bank and Rosignol) to identify the upgrades specifically required by women in these wharfs/landing sites. Consultations with key stakeholders (e.g., GNFO, Fisheries Department) indicated various needs that women in particular are facing when operating at the wharfs because different from fishers who are members of cooperatives and have access to certain services/facilities at wharfs (e.g., toilettes), female processors and market vendors are most often not members of cooperatives and thus, are denied such access. The gender-specific study will verify these consultation findings. The findings from the gender-specific study will be incorporated in the overall design of wharf/landing site infrastructural upgrades under activity 4.3.1.

Activity number and name: Activity 4.3.3 - Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the infrastructural upgrading plan (including gender-specific infrastructural upgrades)

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department, Ministry of Public Infrastructure, GNFO and cooperatives, and other partners/donors

Costs and investments: USD 15 000* (for 2 wharfs)

Type of investment: Facilitation

Timing: Jun - Dec 2023

Description: Based on the identification and design of required infrastructural upgrades in Meadow Bank and Rosignol wharfs under activities 4.3.1 and 4.3.2, this activity will involve the identification of partners for the funding and implementation of the upgrades, and agreeing on the mechanism for involved partners to collaborate on implementing the upgrading plan. The Fisheries Department would take the lead in this stakeholder engagement process. FISH4ACP will provide experts to support, particularly in the development of mechanisms for collaboration (e.g., development of funding proposals) in close coordination with Fisheries Department.

Activity number and name: Activity 4.3.4 - Implement the infrastructural upgrading plan

Stakeholders or catalysts involved: Fisheries Department, with support from FISH4ACP and other partners/donors

Costs and investments: tbd (depending on the design of upgrading plan), but for purpose of the upgrading investment table, is estimated to be USD 1 300 000 for 2 wharfs

Type of investment: Infrastructures

Timing: Jan 2024 - ongoing

Description: Based on the agreed mechanism for funding and implementation of the infrastructural upgrading plan (activity 4.3.3), involved partners will be responsible for implementing the plan in Meadow Bank and Rosignol wharfs. In addition to potentially co-financing the upgrading plan (particularly small-scale investments such as sanitary/toilette facilities, storage/lockers), periodic monitoring of building works and expenditure will also be undertaken by FISH4ACP, and FISH4ACP will provide technical support to the implementation of the upgrading plan as required/relevant. It must be noted that any infrastructural investments made by FISH4ACP are conditional on the confirmed, actual commitment of other involved partners/donors to fund and implement the upgrading plan following the mechanism agreed under activity 4.3.3.

Activity number and name: Activity 4.4.1 – Develop best management/operational model for wharfs/landing sites (e.g. direct management by cooperatives, PPP, women groups, or hired managers) and assess management/operational capacity gaps

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department, GNFO, cooperatives, women networks/groups

Costs and investments: USD 30 000* (for 2 wharfs)

Type of investment: Studies/ Technical assistance

Timing: Mar - Oct 2023

Description: Under this activity, a study will be carried out to develop the best management/operational model for each strategic wharf (Meadow Bank and Rosignol), which will differ depending on the current institutional arrangements and the facilities (to be) available in each wharfs. For instance, potential models could include management by cooperatives, or a PPP, or women groups (especially for those facilities/services particularly required by women, see also activity 4.7.2 described below on women's groups), or professional managers/agribusinesses hired to operate/manage the facilities. Service fees could be charged for using the facilities (for instance, toilettes) to cover costs and ensure their maintenance. Special attention must be paid to ensure a transparent mechanism for managing the wharfs (including for instance mutual agreement between wharf users and wharf managers on how collected service fees would be used and monitored), which allows for trust building and effective communication between wharf users and managers. The management model also needs to ensure fair representation by different groups of wharf users, men and women alike. Based on the proposed improved management/operational model, the study will assess the management/operational capacity gaps of wharf managers and wharf users that will need addressing to implement the improved management model, particularly in view of the management, operation and maintenance of the wharf infrastructure after upgrading.

Activity number and name: Activity 4.4.2 – Prepare and deliver programme on capacity building/ business management training for wharf/landing site managers and wharf users

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and BDS providers

Costs and investments: USD 27 000* (for 2 wharfs)

Type of investment: Training

Timing: Nov 2023 – Feb 2025

Description: A key element to managing and maintaining the wharfs will be effective management of the facilities and services to be provided by the wharfs. Based on the assessment carried out under activity 4.4.1, a programme of capacity building on management and business skills will be provided to the wharf management teams as well as to wharfs users (i.e. artisanal fishers, processors, vendors) to empower them to better prevent frauds (by the management) and protect their rights when using the wharf facilities, which may involve discussion/negotiation with the management teams to resolve issues/conflicts arising during operation. Focus will be placed on two most strategic wharfs, namely Meadow Bank and Rosignol. FISH4ACP will provide funding for this activity, but for

sustainability reasons, the activity will be conducted in collaboration with Fisheries Department and BDS providers.

Activity number and name: Activity 4.5.1 – Identify fishers, processors and vendors who want to adopt improved seabob-handling practices to increase food safety and quality

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and GNFO

Costs and investments: USD 800 x 5 regions = USD 4 000*

Type of investment: Facilitation

Timing: Jan – Mar 2023

Description: This activity will involve the identification of artisanal fishers, processors and vendors in 5 regions (2, 3, 4, 5 and 6) who want to adopt improved practices, including seabob handling and food safety/quality practices in general as well as seabob drying practices for processors in particular. These regions are selected because they have high numbers of Chinese seine fishers who catch seabob⁷³, and thus, high amount of seabob landings and high level of post-harvest activities. Particular focus will be placed on regions 3, 4, and 5 which have the highest number of Chinese seine fishers. The identification of fishers, processors and vendors will probably take place through public meetings and be jointly coordinated by the cooperatives/GNFO and to ensure women’s participation, also by Fisheries Department and with support from FISH4ACP. The project strategy, the purpose and benefits of improving practices will be fully explained. A list of interested fishers, processors and vendors who want to participate in the project will then be made and the interested actors will be invited to participate in and benefit from the training, match-making forums and facilitatory support described under activities 4.2.2, 4.5.4, 4.6.2, and 4.6.3.

Activity number and name: Activity 4.5.2 – Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on improved seabob-handling practices

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and Ministry of Health

Costs and investments: USD 3 000*

Type of investment: Facilitation

Timing: Jan – Mar 2023

Description: Under this activity, BDS providers will be identified to provide Training-of-Trainer services to the staff in the Fisheries Department (Extension Unit) on improved seabob-handling practices as well as food safety and quality, who will then provide training to artisanal fishers, processors and market vendors. FISH4ACP will provide funding for the identification of providers, in consultation with Fisheries Department and Ministry of Health.

⁷³ According to the draft Guyana Marine Fisheries Management Plan 2022–2027, p.18.

Activity number and name: Activity 4.5.3 – Develop training materials on improved seabob-handling practices with FD and BDS providers

Stakeholders or catalysts involved: FISH4ACP in collaboration with BDS providers, Fisheries Department and Ministry of Health

Costs and investments: USD 30 000*

Type of investment: Studies/ Technical assistance

Timing: Mar – Sep 2023

Description: This activity involves the development of training materials for artisanal fishers, processors and market vendors on improved practices when handling seabob onboard, upon landing, and during processing, packaging and storage to ensure and increase food quality and safety. Potential improved techniques might include improved practices (for fishers) when handling seabob on board and unloading seabob from boats to landing sites, the use of solar dryers for drying seabob (for processors) and the use of ice boxes for storing seabob on ice (mostly for market vendors, but also of relevance for fishers). Additional improved practices may be identified during the development of training materials. The identified practices will take into consideration food safety and quality issues as well as the financial viability for processors and vendors to adopt the practices. The development of training materials will be led by FISH4ACP, but will be conducted in close collaboration with the BDS providers (identified in activity 4.5.2), Ministry of Health, and Fisheries Department to ensure sustainability. It is expected that through jointly developing the training materials, the capacity building of Fisheries Department staff will also be enhanced.

Activity number and name: Activity 4.5.4 – Integrate training for fishers, processors and vendors on improved seabob-handling practices into FD’s extension programmes

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and Ministry of Health

Costs and investments: USD 20 000*

Type of investment: Training

Timing: Oct 2023 - ongoing

Description: Under this activity, support will be provided to Fisheries Department (Extension Unit) to integrate training of artisanal fishers processors and market vendors on improved seabob handling practices into extension programs by Fisheries Department. This will involve training of Fisheries Department staff and technical assistance to Fisheries Department staff in incorporating different components in the training programs and in delivering trainings to artisanal fishers, processors and market vendors.

Activity number and name: Activity 4.6.1 – Identify suppliers of improved seabob handling technologies/equipment and finance for processors and vendors

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department and GNFO

Costs and investments: USD 2 000*

Type of investment: Facilitation

Timing: Jan – Mar 2023

Description: Based on the improved seabob handling practices identified under activity 4.5.3 (development of training materials), this activity will then involve the identification of suppliers of the equipment required for the adoption of these technologies as well as potential sources of finance for artisanal processors and market vendors to obtain the equipment. In terms of finance particularly, options to explore would include but are not limited to: commercial bank loans, preferential financing schemes by the government, and other donors/funds such as the GEF Small Grants Programme (SGP) which offer grants of different sizes to community-based organisations (CBOs) and non-governmental organizations (NGOs) in Guyana.⁷⁴

Activity number and name: Activity 4.6.2 – Facilitate linkages between processors/vendors and input suppliers/financers (e.g. through match-making forums, business plan development support)

Stakeholders or catalysts involved: FISH4ACP in collaboration with input suppliers, financers, and BDS providers

Costs and investments: USD 30 000* (for 5 regions)

Type of investment: Facilitation

Timing: Apr 2023 – Apr 2024

Description: Under this activity, facilitatory support will be provided to connect cottage processors and market vendors to the suppliers of the inputs/equipment required for the adoption of improved seabob handling technologies/food safety practices as well as potential financers/partners who can provide financial support for processors and vendors to purchase the inputs/equipment. To this end, match-making forums will be organized in 5 regions, starting with regions 3, 4, and 5 and then regions 2 and 6. These forums could take the form of input/equipment suppliers and financers having sale stands to present their products/services so that processors and vendors can approach them to enquire about the products/services and how to obtain them. Additionally, FISH4ACP will also collaborate with local BDS providers to support processors and vendors develop business plans, or applications, to apply for loans and grants. To the extent possible, synergies will be created with related upgrading activities (e.g., 2.4.2 on business plan development and 4.2.2 on match-making forums with buyers of seabob products).

⁷⁴ The SGP is funded by the Global Environment Facility (GEF). Under this programme, three types of grants are offered: planning grants (USD 5 000), project grants (USD 50 000), and strategic grants (USD 150 000) (The GEF Small Grants Programme information guide in 2020, shared by the National Coordinator of the programme in Guyana).

Activity number and name: Activity 4.6.3 – Purchase of equipment/inputs required for improved seabob-handling technologies

Stakeholders or catalysts involved: Cottage processors and market vendors, with support from FISH4ACP and financiers

Costs and investments: tbd (depending on the improved practices/technologies to be identified), but for purpose of the upgrading investment table, is estimated to be USD 10 000 based on the cost of solar dryers and insulated ice boxes and estimated number of adopters

Type of investment: Equipment

Timing: Sep 2023 – ongoing

Description: This activity will involve the purchase of equipment/inputs required for improved seabob handling and food safety practices. This investment will be primarily made by cottage processors (organized in groups) and market vendors, with FISH4ACP potentially providing financial support (e.g., through matching grants, or loan guarantees) with the purchase of a small number of equipment for pilot purposes, as a way to de-risk the implementation of new practices and to convince processors and vendors of the benefits of investing in the improved technologies. In particular, given the relatively high costs of improved technologies such as solar dryers (see table 3) and the small number of cottage processors who dry seabob, one option is to facilitate groups of seabob and non-seabob processors (e.g., 20 processors/group) to co-invest in the technologies (e.g., sharing the cost of a solar dryer and co-manage the dryer) to ensure financial feasibility (see also activities 4.7.1 and 4.7.2 below about processor groups).

Activity number and name: Activity 4.7.1 – Identify female processors and vendors who want to form into groups/networks

Stakeholders or catalysts involved: FISH4ACP in collaboration with Fisheries Department, cottage processors and market vendors, and cooperatives at landing sites/wharfs

Costs and investments: USD 800 x 5 regions = USD 4 000*

Type of investment: Facilitation

Timing: Jan – Mar 2023

Description: This activity will involve the identification of the female processors and vendors operating in five landing sites/wharfs in regions 2, 3, 4, 5 and 6 who wish to form into women groups/networks. Particular focus will be placed on regions 3, 4, and 5. The identification of processors and vendors will probably take place through public meetings and be coordinated by the cooperatives managing respective landing sites/wharfs and with support from Fisheries Department and FISH4ACP. The project strategy, the purpose and benefits of forming into groups and requirements to participate will be fully explained. Specifically, benefits of women groups such as better access to wharf facilities/services particularly required by women (detailed under activity 4.3.2) and better access to inputs and finance to improve practices and enter higher-value markets (detailed under activity 4.6.3) will be highlighted to ensure they are fully understood by female processors and vendors. A list of interested processors and vendors and/or their groups who want to participate in the project will then be made and the processors and vendors will be invited to participate in and benefit

from the training and facilitatory support related to group formation, management, and strengthening, as described in activities 4.7.2 and 4.7.3 below.

Activity number and name: Activity 4.7.2 – Train women on organization/collective action and how to form and manage groups

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, Fisheries Department, BDS providers

Costs and investments: USD 5 000 x 5 regions = USD 25 000*

Type of investment: Training

Timing: Mar – Dec 2023

Description: The female processors and vendors identified under activity 4.7.1 will be supported to form into a groups. This activity will thus involve training of women on the benefits of organization, of collective action and facilitating women to form into groups and manage their groups. This activity would thus involve the identification of trainers and/or BDS providers in Guyana, the design of training mechanism, the development of training materials, training delivery by trainers as well as support/technical assistance provided to the establishment and/or strengthening of women groups. FISH4ACP will provide budget for relevant trainings, but for sustainability purposes, the project will partner with local partners, rather than providing trainings directly.

Activity number and name: Activity 4.7.3 – Train women on women’s rights, leadership, business and management

Stakeholders or catalysts involved: FISH4ACP in collaboration with GNFO, Fisheries Department, BDS providers

Costs and investments: USD 4 000 x 5 regions = USD 20 000*

Type of investment: Training

Timing: Jan 2024 – Feb 2025

Description: Under this activity, women groups formed and supported under activity 4.7.2 will be provided with training on women’s rights, leadership, business and management skills. The goals are to enable women to be aware of their rights (as women, as VC actors and as users of wharfs/landing sites), to be empowered to defend their rights, and to be capable of effectively managing/operating women-specific services/facilities at landing sites/wharfs such as toilettes and lockers, if this is the optimal management model identified under activity 4.4.2. FISH4ACP will provide budget for relevant trainings, but for sustainability purposes, the project will partner with local partners, rather than providing trainings directly.

Drawing on the information provided above, the investment table below provides an overview of the investments needed to realize the vision and how these investments are expected to be financed.

TABLE 46. VC UPGRADING INVESTMENT TABLE (IN USD)

In USD	Financing sources			Total
Type of investments	FISH4ACP	Government/Donors	Private sector	Totals by type of investments
Equipment	104 000	100 000	386 000	590 000
Facilitation	260 000		12 000	272 000
Infrastructure	70 000	1 230 000		1 300 000
Studies / Technical assistance	373 000			373 000
Training	192 000			192 000
Totals by funding source	999 000	1 330 000	398 000	2 727 000

Note: Some investments depend on further studies providing sufficient justification and more detailed costings.

The above costs are allocated between four outcomes of the upgrading strategy as follows:

- Outcome 1: USD 169 500, or 6% of total costs
- Outcome 2: USD 575 500, or 21% of total costs
- Outcome 3: USD 358 000, or 13% of total costs
- Outcome 4: USD 1 624 000, or 59% of total costs

Of the total costs (USD 2.7 million), FISH4ACP's contribution can potentially reach USD 999 000 (37%), mostly in the forms of studies/technical assistance, facilitation and training.

To aid with implementation and planning, a provisional scheduling and drawn-down of FISH4ACP funds is provided in the table below (only for those activities to be funded by FISH4ACP) over the life of the project (2022–2025).

TABLE 47. PROPOSED PHASING OF FISH4ACP INVESTMENT, 2022–2025 (IN USD)

Activity number and name	2022	2023	2024	2025	Total (USD)
1.1.1 Facilitate guided strategic planning sessions with GATOSP members to develop mission and vision statement for GATOSP for next 10 years	14 000				14 000
1.1.2 Complete a study on seabob import demand potential (volumes, product attributes (e.g. sizes), options for value added products, consumer demands regarding sustainability standards/certifications) in US and the European Union markets	25 000				25 000

1.1.3 Facilitate the development of the industry-level export marketing plan <u>2023-2033</u>) with GATOSP members		12 000			12 000
1.2.1 Review SWG research plan with GATOSP and FD to identify research gaps/consolidate industry research priorities	12 000				12 000
1.2.2 Facilitate the development of the updated SWG research plan with research partners and potential funding sources identified		12 000			12 000
1.3.1 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for industrial fishers		2 500			2 500
1.3.2 Develop training materials for industrial fishers on sustainable fishing practices with FD and BDS providers		20 000			20 000
1.3.3 Integrate training of industrial fishers (boat captains, boat staff) on sustainable fishing practices with MSC training program and other FD's extension programs			15 000	5 000	20 000
1.4.1 Conduct a study to assess the existing OHS conditions and plans across the three firms	15 000				15 000
1.4.2 Facilitate the development of a draft national OHS plan for the seabob industry		15 000			15 000
1.4.4 Revision and finalisation of the OHS plan based on implementation experience			10 000		10 000
2.1.1 Identify Chinese seine fishers in Regions 2, 3, 4, 5 and 6 who wish to participate in the working group	5 000				5 000
2.1.2. Facilitate the establishment of the Chinese seine working group	5 000				5 000
2.1.3 Develop an inventory (data base) of Chinese seine vessel characteristics to keep record of engine types and fishing practices	5 000	5 000			10 000
2.2.1. Design and conduct a baseline study on Chinese seine fishing's impacts on stock levels and by-catch to identify improved fishing practices needed	25 000	5 000			30 000

2.3.1 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for artisanal fishers		2 500			2 500
2.3.2 Develop training materials for artisanal fishers on sustainable fishing practices with FD and BDS providers		25 000			25 000
2.3.3. Integrate training for fishers on sustainable fishing practices into FD's extension programmes		10 000	7 000	3 000	20 000
2.4.1 Identify suppliers of sustainable (e.g., climate smart) technologies/equipment and finance for fishers		3 000			3 000
2.4.2 Facilitate linkages between artisanal fishers and input suppliers/financers (e.g. through match-making forums, business plan development support)		19 000	16 000		35 000
2.4.3. Purchase of equipment/inputs required for sustainable fishing practices		35 000	25 000		60 000
3.1.1 Develop the draft communication strategy with FD staff and artisanal and industrial representatives		15 000			15 000
3.1.3. Revise and finalize FD's communication strategy based on implementation experience		5 000			5 000
3.2.1. Develop the draft design of an improved system for catch data collection and monitoring with FD	25 000				25 000
3.2.2. Purchase equipment required for piloting the draft improved system in one region		10 000			10 000
3.2.3. Train FD staff, industrial captains and second mates, and Chinese seine fishers to pilot the draft improved system		10 000			10 000
3.2.4. Pilot the improved system in one region		15 000			15 000
3.2.5. Revise and finalize the improved system for catch data collection and monitoring based on pilot experience		10 000			10 000
3.2.6. Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the improved system			15 000		15 000

3.2.8. Train FD staff, industrial captains and second mates, and Chinese seine fishers on the revised, improved system			30 000	5 000	35 000
3.3.1 Review and propose drafts of revised fisheries regulations			25 000		25 000
3.3.2. Facilitate the government's adoption of the draft revised regulations			7 000	3 000	10 000
3.4.1. Support FD staff in regional offices with purchase of improved equipment/tools for monitoring, control, surveillance, and inspection (e.g., software, drones)		30 000			30 000
3.4.2. Train FD staff in regional offices on the use of improved equipment/tools			15 000		15 000
3.4.3. Draft the revised ToRs and propose the expanded membership base of the Artisanal Fisheries Advisory Committee	12 000				12 000
3.4.4. Facilitate the endorsement of the draft revised ToRs and membership base of the Artisanal Fisheries Advisory Committee		12 000			12 000
3.4.5. Draft the revised ToRs and propose the expanded membership base of the SWG	12 000				12 000
3.4.6. Facilitate the endorsement of the draft revised ToRs and membership base of the SWG		12 000			12 000
4.1.1. Conduct a study on domestic market potential for seabob to identify needed upgrades	30 000				30 000
4.2.1. Identify potential buyers on higher-value markets	2 000				2 000
4.2.2. Facilitate match-making forums to connect vendors and buyers		13 000	7 000		20 000
4.3.1. Conduct a feasibility study to identify/design infrastructural upgrades required in strategic wharfs/ landing sites		32 000			32 000
4.3.2. Conduct a gender-specific study to identify the upgrades specifically required by women in wharfs/landing sites		10 000			10 000
4.3.3. Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the infrastructural upgrading plan		15 000			15 000

4.3.4. Implement the infrastructural upgrading plan			60 000	10 000	70 000
4.4.1. Develop best management/operational model for wharfs/landing sites (e.g. direct management by cooperatives, PPP, women groups, or hired managers) and assess management/operational capacity gaps		30 000			30 000
4.4.2. Prepare and deliver programme on capacity building/business management training for wharf/landing site managers and users		8 000	14 000	5 000	27 000
4.5.1. Identify fishers, processors and vendors who want to adopt improved seabob-handling practices to increase food safety and quality		4 000			4 000
4.5.2. Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on improved seabob-handling practices		3 000			3 000
4.5.3. Develop training materials on improved seabob-handling practices with FD and BDS providers		30 000			30 000
4.5.4. Integrate training for fishers, processors and vendors on improved seabob-handling practices into FD's extension programmes		8 000	8 000	4 000	20 000
4.6.1. Identify suppliers of improved seabob-handling technologies/equipment and finance for processors and vendors		2 000			2 000
4.6.2. Facilitate linkages between processors/vendors and input suppliers/financers (e.g. through match-making forums, business plan development support)		20 000	10 000		30 000
4.6.3. Purchase of equipment/inputs required for improved technologies		3 000	1 000		4 000
4.7.1. Identify female processors and vendors who want to form into groups/networks		4 000			4 000
4.7.2. Train women on organization/collective action and how to form and manage groups		25 000			25 000
4.7.3. Train women on women's rights, leadership, business and management			15 000	5 000	20 000
Total	187 000	516 000	280 000	40 000	999 000

5.3. The FISH4ACP project design

For some of those activities detailed above which involve the FISH4ACP project, additional information is provided in the table below on the non-financial resources required, the partners, and pre-conditions that will be required. Those activities not involving the FISH4ACP project are excluded. Activity numbering uses the same numbering as in the list of upgrading activities (in section 5.2).

TABLE 48. FISH4ACP PROJECT ACTIVITIES PLAN

Outputs and Activities	Resource required (non-financial)	Potential partners	Pre-conditions
Output 1.1. Strategic vision and marketing plan for export developed			
Activity 1.1.1. Facilitate guided strategic planning sessions with GATOSP members to develop mission and vision statement for GATOSP for next 10 years	Strategic planning/ development expert	GATOSP	Industrial firms' confirmed interest in developing a joint mission and vision for the next 10 years
Activity 1.1.2. Complete a study on seabob import demand potential (volumes, product attributes (e.g. sizes), options for value added products, consumer demands regarding sustainability standards/ certifications) in US and the European Union markets	Economic/ marketing expert	GATOSP, buyers in US and the European Union markets	Industrial firms and international buyers are willing to collaborate on the conduct of the study.
Activity 1.1.3. Facilitate the development of the industry-level export marketing plan (2023–2033) with GATOSP members	Economic/ marketing expert	GATOSP	Seabob stock is stabilised at sustainable levels
Output 1.2. Industrial research priorities identified, and research plan developed to stabilize stock levels			
Activity 1.2.1 Review SWG research plan with GATOSP and FD to identify research gaps/consolidate industry research priorities	Expert with multidisciplinary background, including fisheries, social, economic,	GATOSP, FD	Industrial firms are interested in developing and funding (or co-funding) a research plan to address the industry's priorities

	environmental, and resilience		
Activity 1.2.2 Facilitate the development of the updated SWG research plan, with research partners and potential funding sources identified	Expert with multidisciplinary background, including fisheries, social, economic, environmental, and resilience. Finance expert	GATOSP, FD, University of Guyana	Industrial firms are interested in developing and funding (or co-funding) a research plan to address the industry's priorities.
Output 1.3. Industrial firms and their workers trained on sustainable fishing practices in line with MSC recommendations and research findings			
Activity 1.3.1 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for industrial fishers	Training expert, Fisheries expert	FD, BDS providers	BDS providers are available and willing to participate in the project. Fisheries Department is interested in participating the Training-of-Trainers.
Activity 1.3.2 Develop training materials for industrial fishers on sustainable fishing practices with FD and BDS providers	Training expert, Fisheries expert	FD, BDS providers	BDS providers are available and willing to participate in the project. Fisheries Department is interested in participating the Training-of-Trainers and co-developing training materials.
Activity 1.3.3 Integrate training of industrial fishers (boat captains, boat staff) on sustainable fishing practices with MSC training program and other FD's extension programs	Training expert, Fisheries expert	FD	Fisheries Department is willing and capable to incorporate training on sustainable fishing practices with MSC training program and other FD's extension programs.
Output 1.4. OHS plan developed and workers trained in industrial processing plants			
Activity 1.4.1 Conduct a study to assess the existing OHS conditions and plans across the three firms	OHS expert	Industrial seabob firms, FD, Ministry of Labour and Social Security	Industrial firms are interested in improving OHS conditions in their operations.
Activity 1.4.2 Facilitate the development of a draft national OHS plan for the seabob industry	OHS expert	Industrial seabob firms, FD, Ministry of	Industrial firms are interested in developing a national OHS plan for the whole industry. Support

		Labour and Social Security	from FD and Ministry of Labour and Social Security.
Activity 1.4.4 Revision and finalisation of the OHS plan based on implementation experience	OHS expert	Industrial seabob firms, FD, Ministry of Labour and Social Security	The draft OHS plan is implemented by industrial firms and implementation experience confirms its relevance.
Output 2.1. Chinese seine vessel working group established			
Activity 2.1.1 Identify Chinese seine fishers in Regions 2, 3, 4, 5 and 6 who wish to participate in the working group	Social/organization expert	FD, GNFO, cooperatives	Chinese seine fishers' interest in joining the working group
Activity 2.1.2. Facilitate the establishment of the Chinese seine working group	Social/organization expert	FD, GNFO, cooperatives	Chinese seine fishers' interest in joining the working group
Activity 2.1.3 Develop an inventory (data base) of Chinese seine vessel characteristics to keep record of engine types and fishing practices	Fisheries expert	FD, GNFO, cooperatives	Chinese seine fishers are willing to collaborate and share data
Output 2.2. Impact of Chinese seine fishing on stock levels and by-catch identified, and sustainable fishing practices determined			
Activity 2.2.1. Design and conduct a baseline study on Chinese seine fishing's impacts on the seabob stock and by-catch to identify improved fishing practices needed	Fisheries expert, Environmental expert	FD, GNFO, WWF, and other partners (e.g., University of Guyana)	Chinese seine fishers are willing to collaborate and share data
Output 2.3. Fishers trained on sustainable fishing practices and climate smart technologies			
Activity 2.3.1 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on sustainable fishing practices for artisanal fishers	Training expert, Fisheries expert	FD, BDS providers	BDS providers are available and willing to participate in the project. Fisheries Department is interested in participating in the Training-of-Trainers.
Activity 2.3.2 Develop training materials for	Training expert, Fisheries expert	FD, BDS providers	BDS providers are available and willing to participate in

artisanal fishers on sustainable fishing practices with FD and BDS providers			the project. Fisheries Department is interested in participating in the Training-of-Trainers and co-developing training materials.
Activity 2.3.3. Integrate training for fishers on sustainable fishing practices into FD's extension programmes	Training expert, Fisheries expert	FD	Fisheries Department is willing and capable to incorporate training on sustainable fishing practices with MSC training program and other FD's extension programs.
Output 2.4 Fishers connected to suppliers of inputs, finance and other services			
Activity 2.4.1 Identify suppliers of sustainable (e.g., climate smart) technologies/equipment and finance for fishers	Fisheries expert, Finance expert, Environmental expert	FD, GNFO, Input and finance providers	Providers of technologies/equipment and finance are available and willing to participate in the project.
Activity 2.4.2 Facilitate linkages between artisanal fishers and input suppliers/financers (e.g. through match-making forums, business plan development support)	Business development expert	FD, GNFO, Input and finance providers, BDS providers	As row above, plus fishers are interested in adopting improved technologies/ equipment.
Activity 2.4.3. Purchase of equipment/inputs required for sustainable fishing practices	Procurement expert, Legal expert	Input and finance providers	FISH4ACP, fishers and providers of inputs and finance agree on a mechanism for FISH4ACP to provide financial support.
Output 3.1. Fisheries Department communication strategy developed for partnering with both channels			
Activity 3.1.1 Develop a draft communication strategy with FD staff and artisanal and industrial representatives	Communication expert	FD, SWG, GNFO	FD, artisanal and industrial actors are all committed to improving the communication between them.
Activity 3.1.3. Revise and finalize FD's communication strategy based on implementation experience	Communication expert	FD	The draft communication strategy is implemented by FD and implementation experience confirms its relevance (although adjustments may be needed).

Output 3.2. Catch data collection and monitoring system improved across both channels			
Activity 3.2.1. Develop the draft design of an improved system for catch data collection and monitoring with FD	Data collection and management expert, Fisheries expert	FD, CRFM	FD is committed to and support the improvement of data collection and monitoring system.
Activity 3.2.2. Purchase equipment required for piloting the draft improved system in one region	Procurement expert, Legal expert	FD	As row above, plus improved system drafted, and agreement reached with FD regarding where to do the pilot.
Activity 3.2.3. Train FD staff, industrial captains and second mates, and Chinese seine fishers to pilot the draft improved system	Training expert, Data collection and management expert, Fisheries expert	FD, artisanal and industrial actors, cooperatives	As row above, plus confirmed willingness of industrial and artisanal fishers to participate in the pilot.
Activity 3.2.4. Pilot the draft improved system in one region	Data collection and management expert, Fisheries expert	FD, artisanal and industrial actors, cooperatives	As row above, plus training on the draft revised system is completed.
Activity 3.2.5. Revise and finalize the improved system for catch data collection and monitoring based on pilot experience	Data collection and management expert, Fisheries expert	FD, CRFM	The draft data collection and monitoring system is piloted by FD and pilot experience confirms its relevance (although adjustments may be needed).
Activity 3.2.6. Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the improved system	Finance expert, Legal expert, Fisheries expert	FD, other donors/partners (e.g. CRFM)	The improved data collection and monitoring system is finalized and endorsed by FD.
Activity 3.2.8. Train FD staff, industrial captains and second mates, and Chinese seine fishers on the revised, improved system	Training expert, Data collection and management expert, Fisheries expert	FD, CRFM	As row above

Output 3.3. Revised fisheries regulations drafted based on updated data (i.e., from Outputs 1.2, 2.2, and 3.2)			
Activity 3.3.1 Review and propose drafts of revised fisheries regulations	Policy expert, Fisheries expert	FD	Data from obtained from research and improved data collection/monitoring (i.e., activities 1.2.1 – 1.2.2, 2.2.1, and 3.2.4 – 3.2.9) are sufficient to inform policy proposals
Activity 3.3.2. Facilitate the government's adoption of the draft revised regulations	Policy expert	FD	Policy proposal drafted.
Output 3.4. Improved co-management system (industrial, artisanal and FD) for monitoring, control, surveillance, and inspection of seabob fishing activities			
Activity 3.4.1. Support FD staff in regional offices with purchase of improved equipment/tools for monitoring, control, surveillance, and inspection (e.g., software, drones)	Procurement expert, Fisheries expert	FD	Assessment study confirms the need for equipment/tools and the feasibility for Fisheries Department staff for using and maintaining the identified equipment/tools
Activity 3.4.2. Train FD staff in regional offices on the use of improved equipment/tools	Training expert, Fisheries expert	FD	Improved equipment/tools purchased.
Activity 3.4.3. Draft the revised ToRs and propose the expanded membership base of the Artisanal Fisheries Advisory Committee	Social/ organization expert, Fisheries expert	FD, GNFO, cooperatives	Confirmed interest and support of FD, GNFO and cooperatives on the revitalisation of the Artisanal Fisheries Advisory Committee and the needed to expand its membership base
Activity 3.4.4. Facilitate the endorsement of the draft revised ToRs and membership base of the Artisanal Fisheries Advisory Committee	Policy expert, Fisheries expert	FD	Draft revised ToRs and membership base of the Artisanal Fisheries Advisory Committee completed
Activity 3.4.5. Draft the revised ToRs and propose the expanded	Social/ organization	FD, GATOSP, SWG	Confirmed interest and support of FD and GATOSP on the need to review the

membership base of the SWG	expert, Fisheries expert		ToRs' of the SWG and to expand its membership base
Activity 3.4.6. Facilitate the endorsement of the draft revised ToRs and membership base of the SWG	Policy expert, Fisheries expert	FD, GATOSP, SWG	Draft revised ToRs and membership base of the SWG completed
Output 4.1 Domestic market potential for expansion of seabob consumption (fresh/value added) confirmed and upgrades identified			
Activity 4.1.1. Conduct a study on domestic market potential for seabob to identify needed upgrades	Marketing expert	VC actors	VC actors are willing to collaborate in sharing data for the study
Output 4.2 Market linkages facilitated between vendors and higher-value markets			
Activity 4.2.1. Identify potential buyers on higher-value markets	Marketing expert	VC actors	Confirmed opportunities on domestic market (e.g., which market segments or locations have untapped potentials)
Activity 4.2.2. Facilitate match-making forums to connect vendors and buyers	Marketing expert, Communication expert	Market vendors, potential buyers (e.g., supermarkets, hotels)	Confirmed interest of market vendors and potential buyers to be connected to each other
Output 4.3 Physical upgrading works proposed, and financing partners identified			
Activity 4.3.1. Conduct a feasibility study to identify/design infrastructural upgrades required in strategic wharfs/ landing sites	Landing site/ wharf engineer, Financial analyst	FD, GNFO, wharf management, wharf users	Selection of the strategic wharfs/landing sites for potential upgrades confirmed by FD and GNFO
Activity 4.3.2. Conduct a gender-specific study to identify the upgrades specifically required by women in wharfs/landing sites	Social/gender expert	FD, GNFO, wharf management, wharf users, women groups	As row above
Activity 4.3.3. Engage partners, draft and agree on a mechanism to collaborate on the funding and implementation of the infrastructural upgrading plan (including gender-	Finance expert, Procurement expert, Legal expert	FD, Ministry of Public Infrastructure	Required infrastructural upgrades in strategic wharfs/ landing sites are identified, and a draft infrastructural upgrading plan, including funding mechanism, is prepared

specific infrastructural upgrades)			
Activity 4.3.4. Implement the infrastructural upgrading plan	Landing site/ wharf engineer, Procurement expert, Legal expert,	FD, Ministry of Public Infrastructure	The draft infrastructural upgrading plan, including funding mechanism, is endorsed by FD, Ministry of Public Infrastructure and other donors. FISH4ACP and other funders agree on a mechanism for FISH4ACP to provide financial support.
Output 4.4 Management capacity of landing sites improved			
Activity 4.4.1. Develop best management/operational model for wharfs/landing sites (e.g. direct management by cooperatives, PPP, or women groups) and assess management/operational capacity gaps	Landing site/ wharf management expert, or institutional management expert	Fisheries Department, GNFO, cooperatives, women networks/groups	Wharf managers and wharf users are amenable to adopting proposed best management/operational model
Activity 4.4.2. Prepare and deliver programme on capacity building/ business management training for wharf/landing site managers and wharf users	Training expert, Landing site/ wharf management expert, or institutional management expert	Fisheries Department, GNFO, cooperatives, women networks/groups	As row above, plus wharf management team and wharf users willing to participate in trainings
Output 4.5 Fishers, processors and vendors at wharfs/landing sites trained on improved seabob-handling practices to increase food safety and quality			
Activity 4.5.1. Identify fishers, processors and vendors who want to adopt improved seabob-handling practices to increase food safety and quality	Fisheries processing expert, Food safety and quality expert	FD	Fishers, processors and vendors are interested in adopting improved seabob-handling practices to increase food safety and quality.
Activity 4.5.2 Identify Business Development Service (BDS) providers to provide Training-of-Trainer services to FD on	Training expert, Fisheries processing expert, Food safety and quality expert	FD, BDS providers	BDS providers are available and willing to participate in the project. FD is interested in participating in the Training-of-Trainers.

improved seabob-handling practices			
Activity 4.5.3 Develop training materials on improved seabob-handling practices with FD and BDS providers	Training expert, Fisheries processing expert, Food safety and quality expert	FD, BDS providers, Ministry of Health	BDS providers are available and willing to participate in the project. FD is interested in participating in the Training-of-Trainers and co-developing training materials.
Activity 4.5.4 Integrate training for fishers, processors and vendors on improved seabob-handling practices into FD's extension programmes	Training expert, Fisheries processing expert, Food safety and quality expert	FD, BDS providers, Ministry of Health	FD is willing and capable to incorporate training on improved seabob-handling practices with other FD's extension programs.
Output 4.6 Processors and vendors connected to suppliers of inputs, finance, and other services			
Activity 4.6.1 Identify suppliers of improved seabob-handling technologies/equipment and finance for processors and vendors	Training expert, Fisheries processing expert, Food safety and quality expert	FD, GNFO	Providers of technologies/equipment and finance are available and willing to participate in the project.
Activity 4.6.2 Facilitate linkages between processors/vendors and input suppliers/financers (e.g. through match-making forums, business plan development support)	Business development expert	FD, GNFO, Input and finance providers, BDS providers	As row above, plus processors and vendors are interested in adopting improved technologies/equipment.
Activity 4.6.3. Purchase of equipment/inputs required for improved technologies	Procurement expert, Legal expert	Input and finance providers	FISH4ACP, fishers and providers of inputs and finance agree on a mechanism for FISH4ACP to provide financial support.
Output 4.7 Networks of women processors and vendors established at wharfs/landing sites			
Activity 4.7.1. Identify female processors and vendors who want to form into groups/networks	Social/gender expert	FD, GNFO, cooperatives	Female processors and vendors are interested in forming into groups/networks
Activity 4.7.2. Train women on organization/collective	Training expert, Social/gender expert,	FD, GNFO	As row above

action and how to form and manage groups	Organization expert		
Activity 4.7.3. Train women on women’s rights, leadership, business and management	Training expert, Social/gender expert, Business expert	FD, GNFO	As row above

5.4. Risk analysis.

The risk analysis (table below) reflects on the risks that can prevent the achievement of the envisioned impact and develops associated mitigation strategies affecting both the overall and project-specific action plans. The major risks include insecure, or lack of funding to implement and maintain effective, regular data collection/monitoring and training/extension over time, and to upgrade the infrastructure and facilities in strategic wharfs. Apart from funding, there are also management and/or human resource capacity constraints (e.g., political influences, lack of FD staff) that may be difficult, or take a long time, to resolve. Other major risk relates to the decline of seabob stock and artisanal actors’ ability to adopt in improved technologies/practices. Whilst these risks are difficult to fully mitigate, options have been provided to reduce the potential negative impact upon the project.

TABLE 49. RISKS ASSOCIATED WITH THE UPGRADING STRATEGY

Risk Name	Risk Nature	Risk Likelihood (1-5)	Risk Impact (1-5)	Overall risk level (1-25)	Mitigating Options
The improved system for data collection and monitoring is not effectively used and/or maintained over time	Improved data collection and monitoring is key to sustainable fisheries management. However, it is now uncertain whether Fisheries Department (FD) can secure the financial and human resources required to conduct regular data collection/monitoring over time.	4	4	16	FISH4ACP works closely with FD to seek reliable sources of funding for data collection/monitoring activities
Decline of seabob biomass	It takes time to see the impacts of improved management measures and fishing practices on seabob stock. In the meantime, seabob stock can decline due to weak	4	4	16	FISH4ACP facilitates the effective implementation of Guyana fisheries management plan, artisanal fisheries management plan,

	management, persistent overexploitation, the impact of climate change, and pollution (e.g., oil spill). The value chain will be negatively affected by any stock decline.				and various recommendations from MSC reports. This will be accompanied by training, financial and livelihood support for VC actors to comply with regulations (e.g., longer closed season).
Upgrading of landing sites/ wharfs is not implemented or delayed	The upgrading activities related to support to cottage processors and market vendors (mostly women) use landing sites/wharfs as focal areas for interacting with and supporting VC actors through improved provision of services. However, it is now uncertain how to finance the high costs associated with these upgrades.	4	4	16	FISH4ACP works closely with FD and Ministry of Public Infrastructure to seek funding for the upgrades.
The provision of extension services to VC actors and their workers remains inadequate	Training and extension are necessary to build the capacity of VC actors to effectively adopt improved techniques and to maintain and scale up adoption over time. However, it is now uncertain whether FD will be able to secure the financial and human resources required for training and extension.	3	4	12	FISH4ACP seeks to build capacity for FD through collaboration with BDS providers and other partners (e.g., University of Guyana, CRFM), who can continue supporting/ collaborating with FD on providing extension services to VC actors after project ends.
Wharf management capacity remains weak even after	The management of wharfs/landing sites may be affected by factors that are difficult to change (e.g., political influences that favour	3	4	12	FISH4ACP provides management and business capacity building for wharf managers and users. The design of

training/ support	certain groups/ individuals, or low level of literacy of wharf users that prevent them from effectively defending their rights)				best wharf management model will be openly discussed with wharf users and managers ensure transparency and buy-in.
Banks do not provide loans or loans are not taken up by artisanal fishers, processors or vendors	The upgrading strategy is reliant on the adoption of improved practices/ techniques. Most of the artisanal actors have low income and may not be able to satisfy borrowing requirements.	3	4	12	FISH4ACP seeks other funding models such as matching grants or loan guarantees with banks/donors
Still insufficient incentives for artisanal fishers to properly report data	Effective data collection is largely attributed to timely and precise reporting by fishers. However, fishers may be deterred from reporting when they do not see sufficient benefits of doing so.	3	3	9	FISH4ACP works with FD to design and offer incentives for fishers to report data, as well as improve the communication between FD and fishers about the need for data collection and how data are used.
VC actors are not willing to participate in groups	Many upgrading activities rely on artisanal actors' forming into groups. However, actors may not be interested in/willing to do so due to past experience with non-functioning groups or cooperatives.	2	4	8	FISH4ACP provides training on the benefits of forming into groups and how to manage groups to ensure representation and transparency. The design of group formation will be discussed with artisanal actors to ensure their buy-in.
The inputs/ equipment required for improved practices are	The upgrading strategy is reliant on the adoption of improved practices/ techniques, many of which requires inputs/	2	3	6	FISH4ACP seeks to connect VC actors with suppliers of inputs/ equipment and through

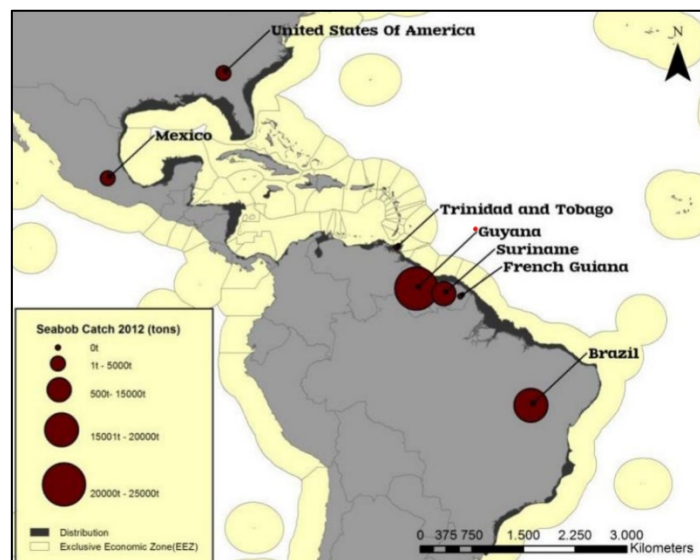
unavailable or unaffordable for artisanal actors	equipment that are currently unavailable or available at high costs in Guyana.				training and pilots, builds up the demand for these inputs/ equipment to be strong enough to stimulate supply.
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Note: Overall risk calculated by multiplying risk likelihood with risk impact.

Annex

Annex 1 – Secondary data collection

FIGURE 35. DISTRIBUTION OF SEABOB SHRIMP ALONG THE ATLANTIC COAST



Source: (Richardson, 2019)

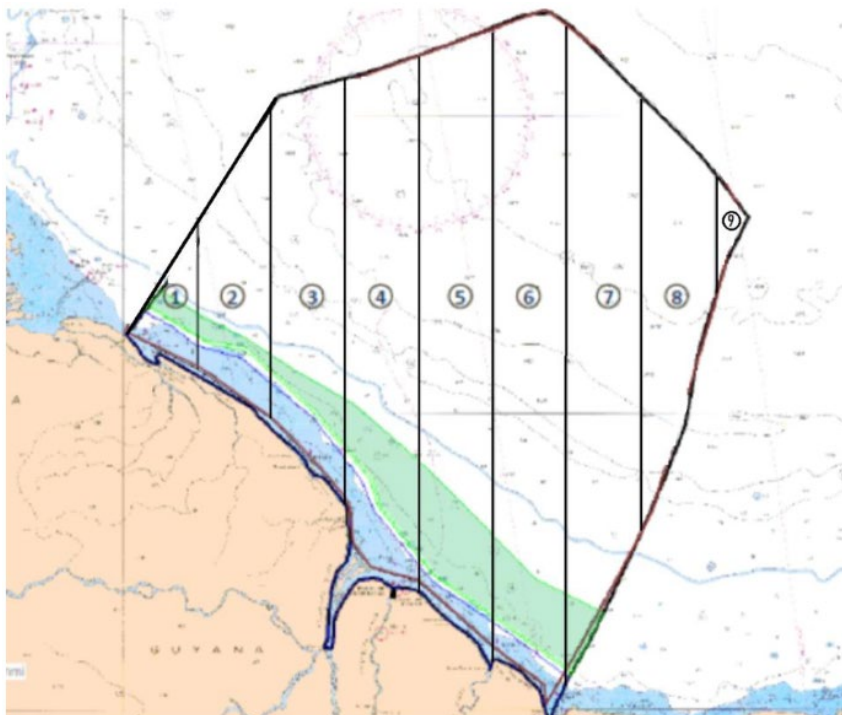
FIGURE 36. GUYANA MAP, WITH REGION NUMBERS AND EEZ



Note: The coastline of Guyana is 432 km and it has a continental shelf of 48 665 km². The average width of the continental shelf is 112.6 km while the area of the EEZ is 138 240 km².

Source: Ministry of Agriculture (2022), Figure 1

FIGURE 37. THE STATISTICAL FISHING ZONE FO GUYANA (THE GREEN ZONE INDICATES SEABOB FISHING ZONE)



Note: Guyana's EEZ, for statistical purposes, has been divided longitudinally into nine fishing zones, each separated by 30-minute intervals.

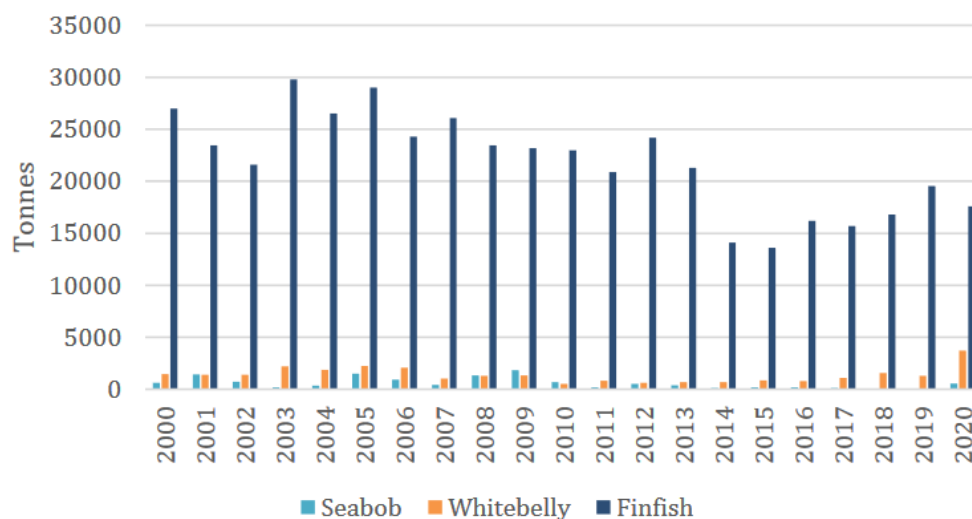
Source: Ministry of Agriculture (2022), Draft Guyana Fisheries Management Plan 2022–2027.

TABLE 50. FISHERIES PRODUCTION IN GUYANA 2011–2019 (IN MT)

Year	Prawns	Seabob industrial	Seabob artisanal	Whitebelly (artisanal)	Finfish industrial	Finfish artisanal	Red Snapper	Tuna
2011	368	19 433	196	830	1 890	20 889	758	0
2012	512	24 362	521	603	1 950	24 192	952	0
2013	653	23 023	377	685	2 440	21 288	1 109	0
2014	423	16 574	108	695	2 933	14 107	1 106	0
2015	500	17 476	165	856	2 151	13 592	1 095	0
2016	411	20 131	161	805	3 281	16 201	814	0
2017	600	21 659	106	1 086	2 188	15 688	950	417
2018	421	19 879	49	1 574	2 204	16 802	1 016	284
2019	478	13 988	52	1 290	930	19 549	1 736	363

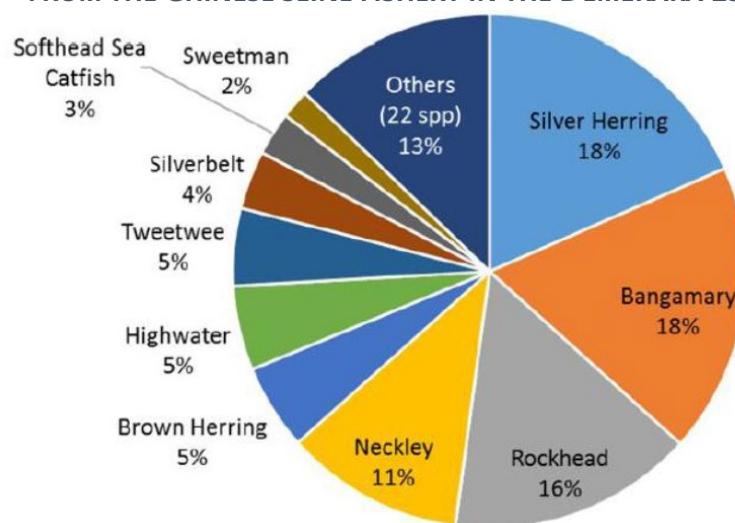
Source: Fisheries Department

FIGURE 38. ARTISANAL LANDINGS



Source: Ministry of Agriculture (2022), Figure 8, p.17

FIGURE 39. RELATIVE ABUNDANCE (% BY NUMBER) OF FINFISH BYCATCH DISCARDS SUB-SAMPLED FROM THE CHINESE SEINE FISHERY IN THE DEMERARA ESTUARY



Source: Kalicharan & Oxenford (202), cited in Ministry of Agriculture (2022)

TABLE 51. NATIONAL GDP DURING 2015–2020

Year	GDP (GYD million)	Agriculture, forestry and fishing GDP (GYD million)	Fish GDP (GYD million)
2015	814 813	224 863	10 112
2016	851 820	188 720	11 643
2017	896 455	223 142	12 102
2018	894 874	194 277	11 291
2019	962 773	189 806	11 216
2020	1 060 043	192 229	9 308
Averages 2015–2020 (GDY million)	913 463	202 173	10 945
Averages 2015–2020 (USD)	4 552 723 521	1 007 634 697	54 551 828

Source: Ministry of Finance. 2021. Estimates of the public sector – Current and capital revenue and expenditure for the year 2021. Volume 1. (also available at <https://finance.gov.gy/wp-content/uploads/2021/02/Budget-Estimates-2021-Volume-1.pdf>), p.703.

Annex 2 – Assumptions overview

TABLE 52. ASSUMPTIONS RELATED TO THE VC MAP

Actor type	Number of actors	Average volume of seabob produced or procured during 2015–2020, in fresh equivalent weight (in kg)	Sources/notes
Industrial firms	3	17 018 976	3 firms: PSI, NHS and GII. The volume is calculated based on Fisheries Department recorded data.
Artisanal fishers	305	183 610	The number of fishers is the number of artisanal Chinese seine fishers, according to the Artisanal Fisheries Management Plan 2019–2024. The volume is calculated based on Fisheries Department recorded data, then triangulated with the volume of fresh seabob that artisanal fishers capture according to Economic interviews with fishers.
Aggregators	4	27 216	The number of aggregators is estimated based on discussion with fisheries experts. The volume is estimated based on Economic interviews with aggregators, then triangulated with the volume of fresh seabob that artisanal fishers sold to aggregators according to Economic interviews with fishers.
Cottage processors	9	9 018	The number of aggregators is estimated based on discussion with fisheries experts. The volume is estimated based on Economic interviews with processors, then triangulated with the volume of fresh seabob that artisanal fishers sold to processors according to Economic interviews with fishers.
Market vendors	107	154 342	The number of aggregators is estimated based on discussion with fisheries experts. The volume is estimated based on Economic interviews with vendors, then triangulated with the volume of fresh seabob that artisanal fishers sold to vendors according to Economic interviews with fishers.

Annex 3 – Detailed economic calculations

TABLE 53. ESTIMATION OF CURRENT DOMESTIC DEMAND FOR SEABOB

No.	Item	Value	Source/Note
1	Average consumption per household per year (in kg of end-products)	5.4	Estimated based on consumer survey
2	Share of fresh unpeeled seabob in household consumption	27.4%	Estimated based on economic actor interviews and consumer survey
3	Share of fresh peeled seabob in household consumption	72.0%	Estimated based on economic actor interviews and consumer survey
4	Share of fresh dried seabob in household consumption	0.6%	Estimated based on economic actor interviews and consumer survey
5	Number of households in Guyana	195 710	Based on Bureau of Statistics of Guyana (2021) and Ministry of Health (MOH), Bureau of Statistics (BOS), and ICF Macro (2010)
6	Share of Guyanese households who consume seabob	76%	Estimated based on consumer survey
7	National consumption of unpeeled seabob per year (kg)	221 833	(1) *(2) * (5) * (6)
8	National consumption of peeled seabob per year (kg)	582 918	(1) *(3) * (5) * (6)
11	National consumption of peeled seabob per year, in whole equivalent weight (kg)	1 147 330	Based on (8) and conversion rates. Seabob are either artisanally (manually) or industrially peeled. Industrially peeled seabob is the majority.
12	National consumption of dried seabob per year (kg)	4 858	(1) *(4) * (5) * (6)
13	National consumption of dried seabob per year, in whole equivalent weight (kg)	10 795	Based on (12) and conversion rates
14	National consumption of peeled, unpeeled and dried seabob per year, in whole equivalent weight (kg)	1 379 957	(7) + (11) + (13)

Note: Industrial conversion rate of peeled:whole fresh seabob (mechanically peeled) is 0.45. Artisanal conversion rate of peeled: whole fresh seabob (manually peeled) is 0.7. Artisanal conversion rate of dried:whole fresh seabob is 0.45.

TABLE 54. ESTIMATED INDIRECT VALUE ADDED (VC) IN THE VC (IN GYD/YEAR)

Cost item	Industrial firms			Artisanal fishers	Aggregators	Cottage processors	Market vendors
	Cost	Value of imports	Indirect VA	Indirect VA	Indirect VA	Indirect VA	Indirect VA
Physical inputs (other than raw materials)	1 865 961 300	1 865 961 300	0	20 496 000	less than 20%	544 320	less than 20%
Services	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost		< 20% of total cost
Interest (on loans)	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost		< 20% of total cost
Depreciation (of capital investment)	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost		< 20% of total cost
Rent (of land, equipment...)	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost	< 20% of total cost		< 20% of total cost
Total at functional level		1 865 961 300	0	20 496 000		544 320	
Total indirect VA at VC level	0 + 20 496 000 + 544 320 = 21 040 320						

Note: All artisanal actors source input/service locally; while industrial firms import them. Exchange rate USD 1 = GYD 200.641, obtained from OANDA (<https://www.oanda.com/rw-en/>) on 8 February 2022.

TABLE 55. EMPLOYMENT IN THE CORE VC

	Industrial firms	Artisanal fishers	Aggregators	Cottage processors	Market vendors	Core VC
Number of jobs, including family labour	798	488	12	27	321	1 646
Of which, women share	39%	0%	0%	67%	100%	39%
Number of jobs for women	310	0	0	18	321	649
Number of jobs in FTE, including family labour	843	301	9	11	242	1 406
Of which, women share	39%	0%	0%	79%	100%	41.1%

Number of FTE jobs for women	327	0	0	8.9	242	578.2
Number of full-time jobs	798	0	0	0	0	
Number of family labour in FTE	0.0	137.3	2.9	3.8	161.3	305.2
Number of wage/salaried (hired) jobs in FTE	843.1	163.2	5.8	7.5	80.6	1100.3
Average gross hourly wage paid to hired workers (GYD)	411	479	271	188	188	
Total value of gross wages (GYD/year)	614 784 600	310 002 000	4 368 000	1 728 000	83 460 000	1 014 342 600
Total direct tax on salaries and wages (GYD)	0	0	0	0	0	0
Total value of net wages (GYD/year)	614 784 600	310 002 000	4 368 000	1 728 000	83 460 000	1 014 342 600
Women's wages in total net wages (GYD/year)	165 993 300	0	0	1 152 000	83 460 000	250 605 300
Total value of net wages coming from seabob (GYD/year)	614 784 600	31 000 200	2 184 000	518 400	33 384 000	681 871 200
Women's wages coming from seabob (GYD/year)	165 993 300	0	0	345 600	33 384 000	199 722 900

Note: (1) For all VC actors except for industrial firms, the total value of net wages coming from seabob makes up a proportion of the total value of net wages for workers for all tasks, including those tasks unrelated to seabob. The shares of seabob-related wages in total net wages are the same as the estimated shares of seabob in VC actors' operations presented in table 12. (2) Exchange rate: USD 1 = GYD 200.641, obtained from OANDA on 8 February 2022.

Source: Own analysis based on economic interviews with VC actors.

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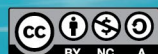
This report presents the results of the value chain analysis of the seabob value chain in Guyana conducted from 2021-2022 by the value chain development programme FISH4ACP. This report contains a functional analysis of the value chain, assesses its sustainability and resilience, develops an upgrading strategy and an implementation plan to which FISH4ACP will contribute.

FISH4ACP is an initiative of the Organisation of African, Caribbean and Pacific States (OACPS) aimed at making fisheries and aquaculture value chains in twelve OACPS member countries more sustainable. It contributes to food and nutrition security, economic prosperity and job creation by ensuring the economic, social and environmental sustainability of fisheries and aquaculture in Africa, the Caribbean and the Pacific.

FISH4ACP is implemented by FAO with funding from the European Union (EU) and the German Federal Ministry for Economic Cooperation and Development (BMZ).



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