Food and Agriculture Organization of the United Nations

**FISH4ACP**

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

SUMMARY REPORT

# The mahi-mahi value chain in the Dominican Republic

September 2023

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# Contents

## LIST OF FIGURES



## LIST OF TABLES

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# Acronyms and abbreviations

| | |
|---|---|
| ANAMAR | National Maritime Authority (Dominican Republic) |
| BMZ | Federal Ministry for Economic Cooperation and Development (Germany) |
| CODOPESCA | Dominican Fisheries and Aquaculture Council |
| COVID | Coronavirus disease |
| FAD | Fish aggregating device |
| FAO | Food and Agriculture Organization of the United Nations |
| FEDA | Special Fund for Agricultural Development (Dominican Republic) |
| GDP | Gross domestic product |
| IATTC | Inter-American Tropical Tuna Commission |
| IDB | Inter-American Development Bank |
| IDECOOP | Institute for Development and Cooperative Credit (Dominican Republic) |
| ILO | International Labour Organization |
| MEPyD | Ministry of Economy, Planning and Development (Dominican Republic) |
| MT | Metric ton |
| NOAA | National Oceanic and Atmospheric Administration (United States) |
| OACPS | Organisation of African, Caribbean and Pacific States |
| ONE | National Statistics Office (Dominican Republic) |
| OSPESCA | Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus |
| Promipyme | National Council for the Promotion and Support of Micro, Small and Medium-sized Enterprises (Dominican Republic) |
| SICA | Central American Integration System |
| SIUBEN | Single System of Beneficiary Selection (Dominican Republic) |
| SWOT | Strengths, weaknesses, opportunities, and threats (analysis) |
| UNODC | United Nations Office on Drugs and Crime |
| USD | United States dollar |


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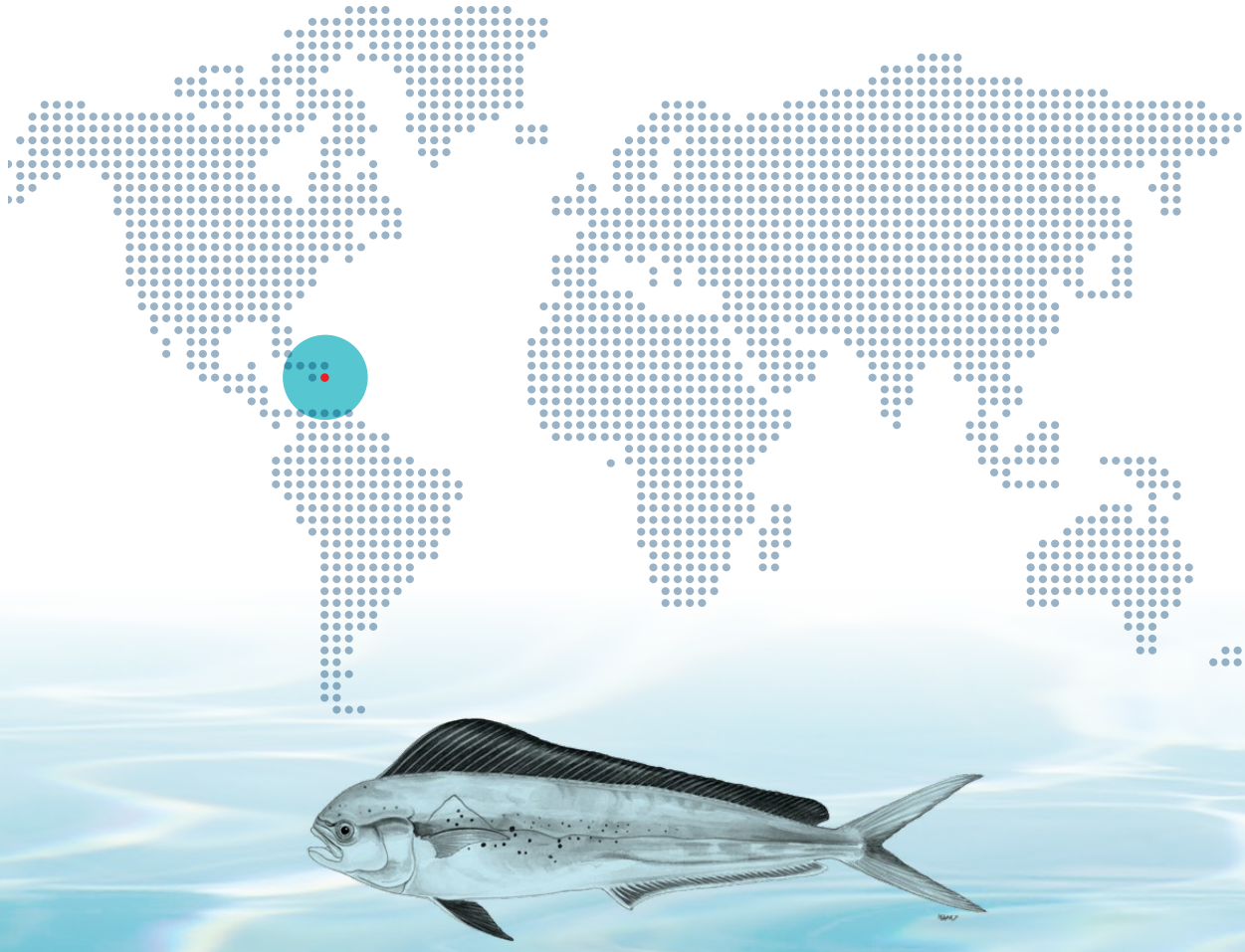
# 1. Introduction

Mahi-mahi (*Coryphaena hippurus)*, dolphinfish or, as it is known locally, dorado is a fisheries resource of high economic interest. It is an important source of employment and income for the coastal communities of the Dominican Republic that process and trade it. Mahi-mahi is regularly consumed by the country's population and is also in high demand in restaurants and hotels that cater to foreign visitors.

FISH4ACP is an initiative of the Organization of African, Caribbean and Pacific States (OACPS) that supports the sustainable development of fisheries and aquaculture value chains (VCs). FISH4ACP contributes to food and nutrition security, economic prosperity and job creation, ensuring the economic, social and environmental sustainability of fisheries and aquaculture in Africa, the Caribbean and the Pacific. The Food and Agriculture Organization of the United Nations (FAO) is implementing the FISH4ACP project with financial support from the European Union and Germany's Federal Ministry for Economic Cooperation and Development (BMZ).



**Mahi-mahi**
*(Coryphaena hippurus)*

FISH4ACP intends to raise the productivity and competitiveness of 12 fisheries and aquaculture VCs in 12 OACPS member countries, while ensuring that economic improvements go hand in hand with environmental sustainability and social inclusiveness. The project pays special attention to small and medium-sized businesses, because of their potential to stimulate inclusive growth and bolster food security for women and young people.

In 2021 and 2022, an assessment was conducted of the mahi-mahi VC using the FISH4ACP project's methodology, underpinned by those of FAO and Agrinatura (FISH4ACP, 2021). Technical meetings were held with various authorities and fieldwork (interviews, surveys and focus groups) was carried out. Some 600 VC actors and key respondents from five fishing villages (Barahona, Boca de Yuma, Palmar de Ocoa, Pedernales and San Pedro de Macorís) and three cities (San Cristóbal, Santiago de los Caballeros and Santo Domingo) participated. Universidad ISA — the national partner in this project — carried out the fieldwork, tabulated the findings and helped prepare this report in conjunction with the FISH4ACP project's local team.

In the second half of 2022, the mahi-mahi VC upgrading strategy was formulated. This strategy identifies thematic areas in which changes should be made to maximize the VC's capacity to contribute to feeding the Dominican population, generate income and jobs for VC participants, drive domestic economic growth and promote the proper governance of the fishery of this species. It also includes a specific action plan to implement the upgrading strategy and pinpoints potential risks to its execution.

# 2. Functional analysis

Mahi-mahi is a highly migratory pelagic fish. It is found in tropical and subtropical waters of the Atlantic, Pacific and Indian Oceans and in the Caribbean Sea and lives at depths of up to 85 m below sea level, although it is normally found at depths of between 5 and 10 m.

**Figure 1. Mahi-mahi (*Coryphaena hippurus*)**

Source: Food and Agriculture Organization of the United Nations, Original Scientific Illustrations Archive.

Sea fishing in the Dominican Republic is artisanal or small-scale. The resources with the greatest commercial interest are the Caribbean spiny lobster (*Panulirus argus*), the queen conch (*Strombus gigas*), various pelagic fishes (mahi-mahi, tuna, marlin, swordfish, mackerel and other scombroids, carangids and other smaller pelagics), demersal fishes and shrimps (primarily of the family of the *Penaeidae*).

Mahi-mahi is an important resource that is popular among domestic consumers and foreign visitors. Dominican experts indicate that the fishery may have formed in the 1980s and 1990s.

Rafts are fish aggregating devices (FADs) of artisanal construction built by fishers to capture pelagic fish. These structures are made of high-density recycled foam and are tied to floats and covered with palm leaves to provide shade. They are tethered to the seafloor with anchors made of cement, steel rods and ropes discarded by merchant ships. The anchor is joined to the raft's surface structure (bed) with a nylon or propylene rope of varying thickness or section (5/6/8 mm), type (standard/special) and rupture strength (385/575/600/1100 kg). Close to where the bed is tethered, the rope is reinforced with a galvanized steel cable. The rafts are anchored to the seafloor at various depths, and remain in the same location during their entire useful life (close to one year), unless they are lost beforehand because of ocean currents or extreme weather events. Fishers use lines with hooks and live bait around the rafts.

The volume of mahi-mahi catches in the Dominican Republic is usually high; indeed, during some periods there is even oversupply. Nevertheless, refrigeration capacity for storing catches that cannot be sold locally is limited. In fact, one of the VC's recurring problems is the interruption of fishing activity when production is high owing to the lack of refrigeration capacity and the drop in prices.

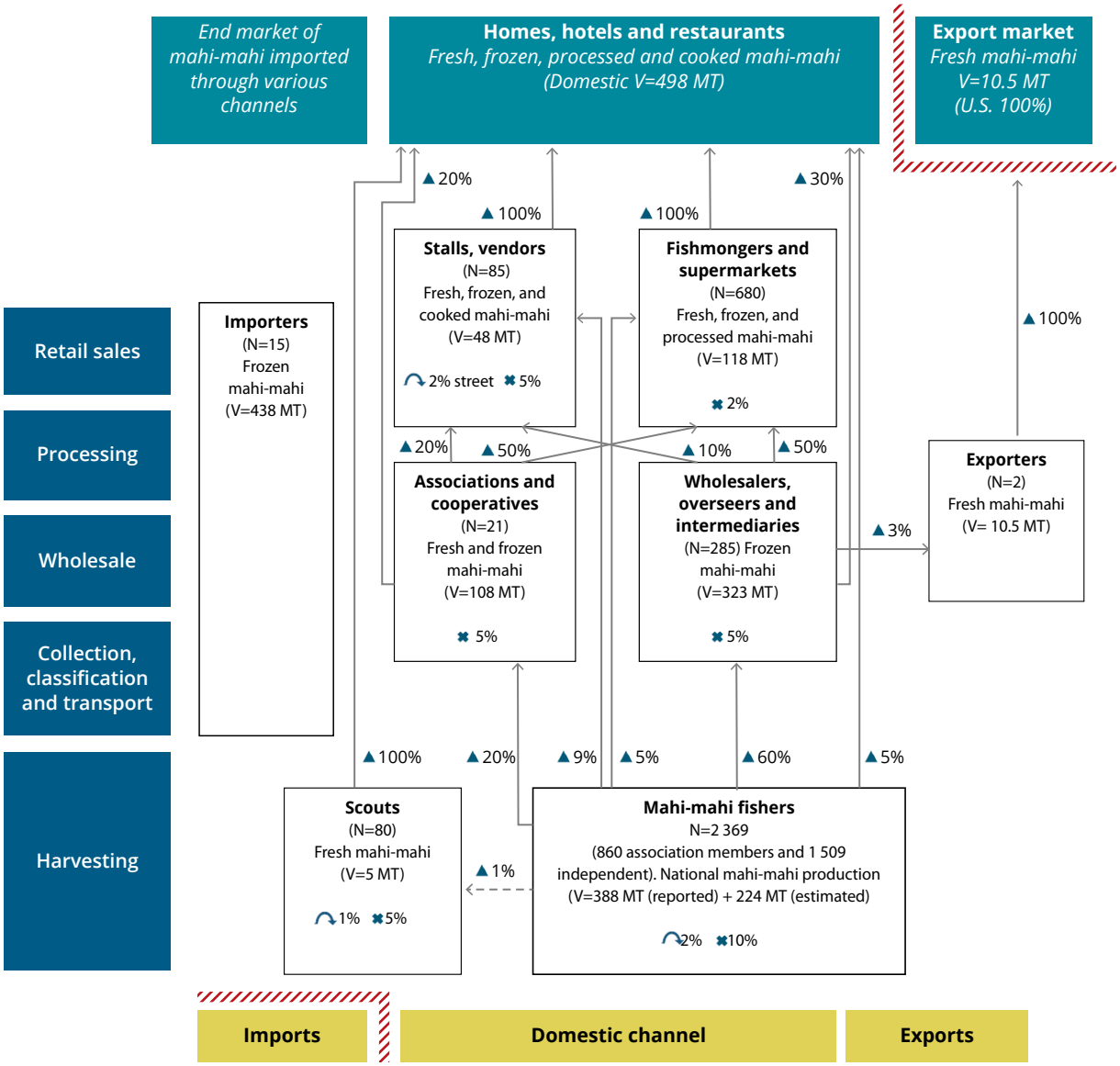
## Figure 2. Geographic map of the target localities for upgrading the mahi-mahi value chain


Source: UN, 1980.

The mahi-mahi VC map (figure 3) was prepared by estimating the number of actors and the production volumes in each stage. This estimate is based on available information and the knowledge acquired from the assessment of the 2022 FISH4ACP project. There is a lack of precise data on the chain primarily because:

- The Dominican Fisheries and Aquaculture Council (CODOPESCA) is responsible for the registry of vessel owners, fishers, processing plants and traders. Although some producers are formally organized, workers are predominantly informal and are not registered or have not renewed their permits. CODOPESCA and the National Statistics Office (ONE) have found it difficult to regularly compile information because of the logistic, financial and technical challenges to conducting a census.
- CODOPESCA has insufficient human, financial and logistic resources to keep a complete record of landings and volumes sold nationally. This information becomes diluted as fisheries products move from wholesalers to retailers. In addition, not all production is sold, as fishers and traders use a small part of the production for self-consumption. Another portion of production becomes damaged, is used to pay support personnel or is given away.
- The Dominican Republic's fisheries are multispecific, comprising up to 400 species, including fishes, crustaceans and molluscs. Nevertheless, FADs mainly target some 12 pelagic species. The mahi-mahi's precise share cannot easily be determined. This is primarily because of logistics and human resources limitations that impede analysing the composition of catches and recording biological and morphometric information relating to the mahi-mahi.

## Figure 3. Map of the mahi-mahi value chain in the Dominican Republic




Source: Beltrán C. et al., 2022

On the left of the map, the main successive functional stages along the VC, from harvesting to retail sale, are identified:

a) **Harvest or catch stage.** Artisanal fishers, helpers in embarkation and landing ("scouts") and small vessel owners, shipowners or overseers participate in this phase. There are four categories of fishers: (a) self-employed fishers who own or lease, or are workmates of the owners of, the means of production (small vessels, motors, fishing and navigation equipment); (b) fishers linked to associations or cooperatives where their catches are sold

and who receive income with which to totally/partially finance their fishing trips; (c) fishers who work on vessels of an owner/overseer, do not defray the costs of the fishing trips (other than their own food) and receive a percentage of the profits; and (d) owners of means of production who have sale commitments with the overseer, who pays only for the fuel. An estimated 16 per cent of domestic mahi-mahi fishers go out to sea and return the same day. They sell their products to wholesalers, who transport the fish from the shore to the centres where it is collected (fishing enterprises, associations and cooperatives) and stored and where the first sale is made.

b) **Collection, classification and transport stage.** The overseers – a term which also includes the owners of the warehousing businesses, wholesalers and retailers, intermediaries, associations and cooperatives – take part in this stage. These actors are all warehousers, classifiers and transporters. They are the main suppliers of the retailers and of a segment of the end-consumers. In addition to maintaining close ties with the fishers — their primary suppliers — they negotiate among themselves when their product is insufficient to meet demand. Importers also play a role in this stage by importing frozen mahi-mahi. Although traders and consumers prefer fresh mahi-mahi, the frozen product can be used to make fillets, which are subsequently sold through hotels and restaurants.

c) **Processing stage.** The availability of mahi-mahi products depends on the target market. The supply of whole, eviscerated mahi-mahi, fillets, and slices and heads — for making soup — depends on the processing (export) plants, fishing companies, importers, associations and cooperatives and supermarkets. The Dominican Republic has only two mahi-mahi processing plants, the production of which is exported to the United States. For their part, fishing companies, importers and associations and cooperatives supply mahi-mahi products to retailers, hotels, restaurants, market stalls, street vendors and end-consumers. Supermarkets also process and package mahi-mahi products in order to sell them.

d) **Wholesale stage.** Fishing companies, associations, cooperatives, intermediaries and importers are the wholesalers for the domestic market, while processing plants (exporters) supply the external market. Wholesalers and fishers supply mahi-mahi to the retail channel. Nevertheless, those merchants and consumers who are able to prefer to buy from wholesalers, where the quantity/price ratio is more favourable and where they have greater confidence that the products are fresh.

e) **Retail stage.** Fishmongers, supermarkets, hotels, restaurants, eateries, food stalls and street vendors buy mahi-mahi from the wholesaler channel, fishers and importers. Mahi-mahi is consumed primarily in the coastal areas of the southern part of the country as well as in Santo Domingo and Santiago de los Caballeros. The hotels in the eastern part of the country — those located in Bávaro, Bayahibe, Boca de Yuma and Punta Cana — buy large quantities of imported mahi-mahi fillets. Prices for mahi-mahi are lower at raw fish stalls and from street vendors than at fishmongers and supermarkets. The same is true of eateries and fish stalls, which offer simpler, more affordable mahi-mahi platters. This is because formal businesses (fishmongers, supermarkets, hotels and restaurants) have higher operating costs and cater to a clientele willing to pay a premium for higher quality and more visually appealing products. Some of these establishments even have areas where the products can be consumed at leisure.

In addition to the actors listed above that take part in the five stages of the mahi-mahi VC, there are also **input and equipment suppliers**. These include fishing equipment and supply stores, hardware stores, outboard-motor and parts dealers, small-boat and fibreglass dealers, maintenance service providers, recycled-plastic buoy manufacturers and sellers, *inter alia*, of petrol, ice, food and medicine. Although there are fishing equipment stores in Santo Domingo, the hardware stores, small shops and independent merchants offering many of the materials needed by fishers, processors and traders are located in fishing villages. Two factories of small boats in Palmar de Ocoa build much of the artisanal fishing fleet.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# 3. Sustainability and resilience assessment

The fieldwork carried out by the FISH4ACP project found the following **economic situation:**

- Mahi-mahi harvesting is profitable, irrespective of seasonal fluctuations in catches. Eighty per cent of survey respondents indicated that earnings have been stable or have risen in recent years. Independent fishers have average monthly margins of 22 per cent. For associations/ cooperatives, the figure rises to 48 per cent, either because of the grants and soft loans they receive or because of their revenue from selling products to their members.
- Many self-employed fishers bear their own operating expenses; in other cases, fishers receive financing from overseers and repay them with their catches. Returns are highly dependent on fuel consumption, which accounts for up to 70 per cent of total costs.
- Except in the event of outings with exceptionally high or low catches, a fisher earns about USD 600 per month. Nevertheless, this income level does not necessarily translate into personal and family well-being, which depends on financial commitments and personal and household management of income.
- Processing and trading are more profitable than fishing. Average margins from fishing are 22 per cent, while those on intermediation can run as high as 30 per cent. Nevertheless, in the interviews/surveys, most fishers indicated that their profits had remained stable or risen, while merchants said that theirs had declined, even though demand had outstripped available supply.

There are 14 929 self-employed fishers or association members in the Dominican Republic. An estimated 2 369 fishers (16 per cent) catch mahi-mahi. According to CODOPESCA, there are also 21 associations and cooperatives, 15 importers and 2 processing and export plants. Figures are not available on the number of workers involved in processing, sales, transport, administration and customer service in supermarkets, hotels, restaurants and supplier businesses. Still, FISH4ACP estimates that small businesses and formally established enterprises employ some 1 050 persons. In addition to direct jobs, the mahi-mahi VC supports other, indirect sources of employment in financial services, petrol stations, ice shops and mechanical shops.

Other findings from the surveys:

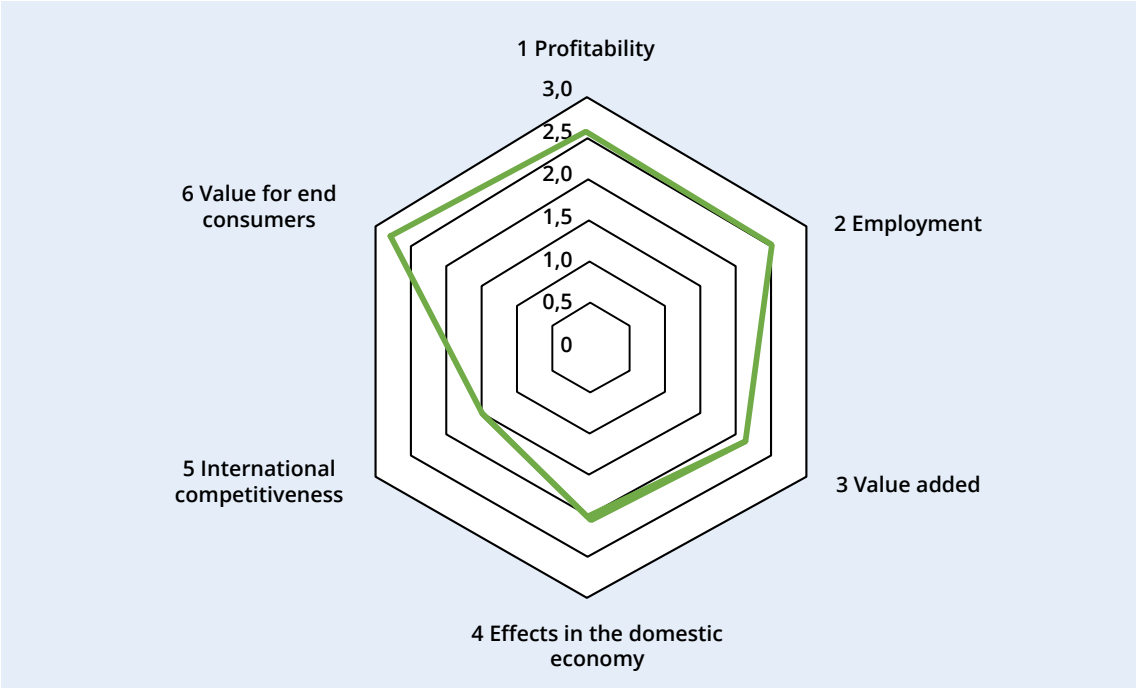
- In the mahi-mahi VC, 88 per cent of jobs are permanent and 12 per cent are temporary. These figures are irrespective of the whether there are formal employment contracts.
- Men make up 77 per cent of the workforce and women 23 per cent, although the gender breakdown varies according to the stage in the VC. Men predominate in the catch stage, while the processing and marketing stages have more women (processing plant workers, professionals and administrative and marketing support staff).
- Temporary workers make up 58 per cent of total fishmonger employees, given that they are hired when mahi-mahi is plentiful. Fishing enterprises also have temporary workers who take the fish and the inputs from the storerooms on the wharves to the cold stores and lorries.

Other indicators **of the mahi-mahi VC's role in the domestic economy:**

- **Contribution to GDP.** CODOPESCA statistics and FISH4ACP information place the value of domestic mahi-mahi production at USD 6.6 million per year. Based on available data (Banco Central de la República Dominicana, 2022a), mahi-mahi accounted for an estimated 0.34 per cent of the GDP of the livestock, silviculture and fishing subsector in 2021.
- **Revenue in foreign currency.** Between 2016 and 2021, exports of fresh whole mahi-mahi generated USD 92 546 in average annual revenue in foreign currency. Exports of agricultural and fish products were valued at USD 761.10 million in 2021 (Banco Central de la República Dominicana, 2022b), of which mahi-mahi accounted for merely 0.01 per cent.
- **International competitiveness.** Exports of fresh whole mahi-mahi to the United States of America account for 2.6 per cent of domestic production and generate little added value. Between 2016 and 2021, some 10 metric tons of mahi-mahi were exported per year, at an average price of USD 9.27 per kilo. According to recent data (NOAA, 2022), 29 countries exported mahi-mahi to the United States in 2022. The Dominican Republic's contribution was marginal (0.05 per cent), and the largest exporters were Costa Rica, Ecuador, Guatemala, Panama, Peru and Taiwan Province of China. Increasing the country's export capacity would require larger production volumes, a traceability scheme and, preferably, international certification. The domestic market is capable of absorbing production, even if unmet demand is taken into account. This, coupled with the need to comply with international requirements, makes it difficult to increase exportable volumes. Consequently, it is not advisable for the VC development strategy to focus on the external market.

Figure 4 summarizes the assessment of the economic sustainability of the mahi-mahi VC through different economic issues considered in the FISH4ACP project methodology. Low scores are negative, and high scores are positive (the maximum score is 3).

**Figure 4. Assessment of the mahi-mahi's economic stability**




Source: Beltrán C. et al., 2022

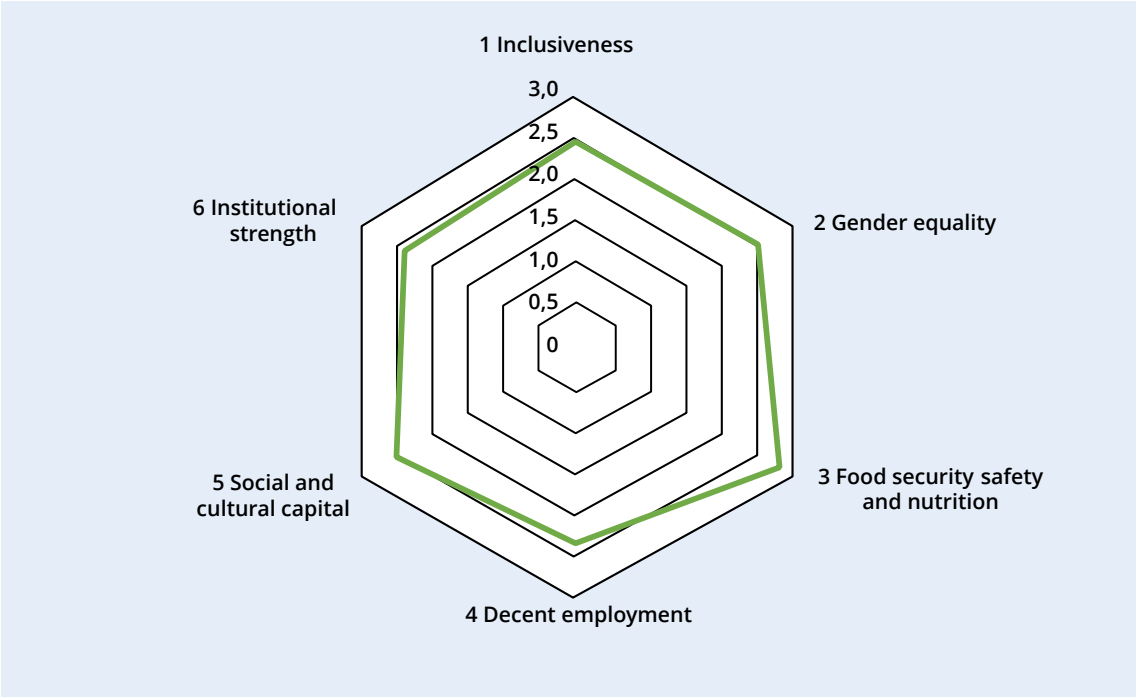
As for the **social analysis,** the findings of the FISH4ACP project's fieldwork were as follows:

- Monthly income of artisanal fishers ranges from USD 367 to USD 1 100, depending on the season. Given that the monthly minimum wage for 2022 was USD 216 at microenterprises and USD 235 at small enterprises, the analysis concluded that fishers' income should meet their basic needs. This depends, however, on their financial commitments, their spending and savings habits, the income of other members of the household and domestic inflation.
- The processing and trading stages usually involve temporary workers whose pay varies according to the production volume – from USD 14 to USD 109 per month, and in all cases less than 50 per cent of the monthly minimum wage in 2022. The informal nature of their employment and the high fluctuation in their income make these workers all the more vulnerable.
- Formally established enterprises (exporters, importers, supermarkets, some wholesalers, hotels and restaurants) have an adequate administrative and commercial structure. They hire employees on a permanent basis, and in accordance with legal requirements. More enterprises are located in San Pedro de Macorís, Boca de Yuma, Santo Domingo and Santiago de los Caballeros than in the other localities analysed.
- As a Caribbean island state, the Dominican Republic is highly vulnerable to natural phenomena such as hurricanes, tropical storms and sharp changes in ocean currents. Consequently, the mahi-mahi VC actors are also highly vulnerable, because of these natural phenomena as well as their limited capacity to quickly take the required measures.
- There is no evidence of restrictions on women receiving training because of their gender, although training sessions are rare. Companies give employees specific training when they are first hired, but they do not usually have regular training programmes.
- The informal nature of the VC reduces opportunities for self-employed workers to access public social security and protection programmes, although they may make contributions in order to receive a pension and healthcare. In addition, some permanent employees of small and medium-sized enterprises are ineligible for certain legal benefits, which puts them at risk in the event of illness, dismissal, disability, occupational accidents or when they reach old age.
- No evidence was found of child labour in any locality. All formal and informal workers are 18 years of age or older. Fishers and business owners normally teach their children their trade as a way of maintaining the family tradition, but without allowing them to work during school hours.
- With respect to the VC actors, no segregation or discrimination was found among the different ethnic groups of Dominican origin. However, between persons of Dominican origin and those of Haitian origin segregation or discrimination was perceived. This was more evident in Boca de Yuma, Pedernales and San Pedro de Macorís. This segregation is based on skin colour and relates to historical factors and religious syncretism.
- With respect to fishing sector financing, 56 per cent of loans were granted by private banks, 20 per cent by moneylenders/private parties, 9 per cent by cooperatives, 8 per cent by Banco Agrícola and 3 per cent by the Special Fund for Agricultural Development (FEDA), although the latter has the highest delinquency rates. These figures are in line with the information compiled by the FISH4ACP project. The actors indicated that their main source of financing are private banks, followed by moneylenders, friends and relatives.

The social analysis concludes with the following spider graph generated by FISH4ACP social tool (figure 5). After analysing the data compiled by the project, the experts score each social subdomain in the FISH4ACP tool. The tool automatically calculates an average subdomain score and generates

a final social domain score. The spider graph gives the scores of the six social domains analysed. It should be noted that an average score in a specific domain could be concealing a low score in one of its subdomains offset by a good score in another subdomain. The sustainability heat map (figure 7) shows all the subdomains analysed. Low scores are negative, and high scores are positive (the maximum score is 5).

**Figure 5. Social stability assessment scores for the mahi-mahi value chain**




Source: Beltrán C. et al., 2022

The findings of the FISH4ACP's fieldwork for the **environmental assessment were as follows:**

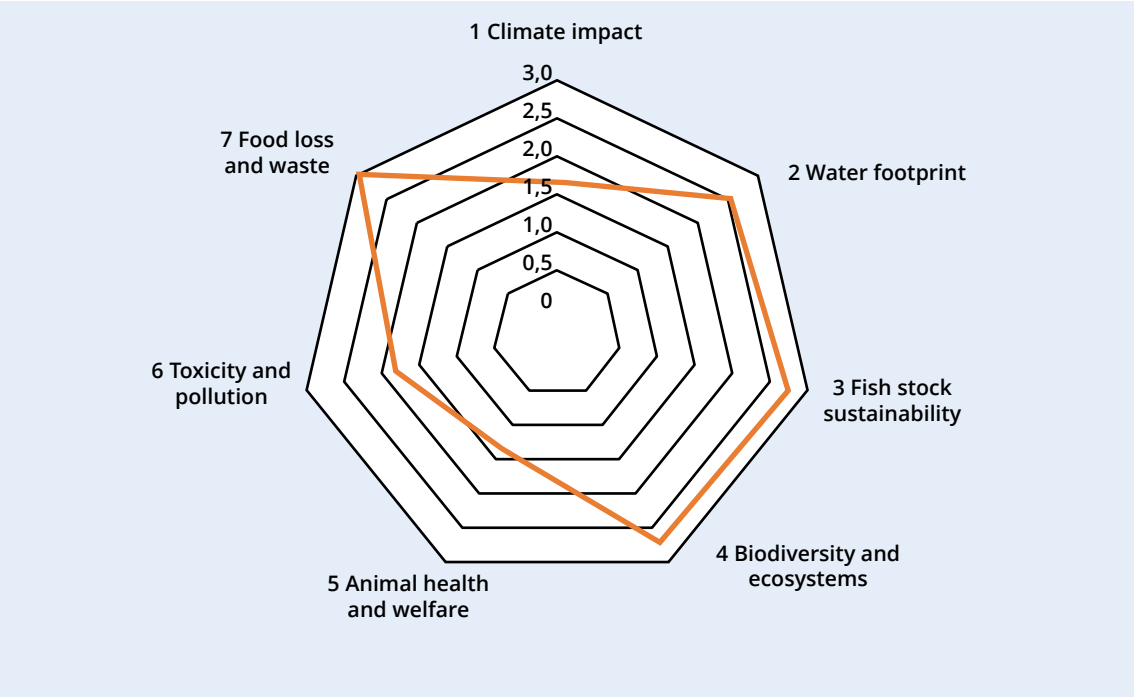
- The FISH4ACP project surveys indicate that the mahi-mahi VC consumes a large amount of electricity, especially for the cold chain (ice production and fish freezing and conservation). Wholesalers consume 58 per cent of the total. Many VC actors have back-up generators for electricity outages. This raises production costs, as VC actors must purchase generator fuel, in addition to paying for electricity.
- Outboard motors and vehicles for transporting fish, inputs and equipment by land account for the largest share of fossil fuel consumption. The breakdown by fuel type is 92 per cent petrol and 8 per cent gas oil. Some companies, associations and cooperatives use natural gas, although this consumption is negligible.
- Unfortunately, not all fishers, processors and traders customarily use ice. Some apply their traditional know-how, even if it is not technically advisable to do so. As a result, on average 0.68 kg of ice is consumed for each kilo of fish. Half of all fisheries and half of all wholesalers use cold stores, freezers or refrigerated trucks, among other equipment with more effective refrigerants for maintaining the cold chain, rather than ice.
- Available information is insufficient to analyse the dynamics of the mahi-mahi population. This would require a statistical system on fishery production capable of generating the required

data, given that the available information is based on commercial rather than ecological or biological criteria. To better understand mahi-mahi populations, regional data such as that compiled by the Inter-American Tropical Tuna Commission (IATTC) or the Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus (OSPESCA) is needed to standardize forms for gathering fisheries information in member countries.

- Although mahi-mahi productivity is high, current harvesting levels could affect its future availability, which continues to show signs of declining. The FISH4ACP project's fieldwork compiled the responses of 162 fishers on changes in the sizes and the volumes of catches of this species. Forty-seven percent stated that sizes had diminished, 40 per cent that they remained unchanged and 13 per cent that they had increased. Sixty-two per cent stated that production had increased or was similar to 2017.
- As for fishing with FADs (rafts), 61 per cent of catches using this technique involve mahi-mahi. The remaining 39 per cent target other pelagic species such as tunas (*Thunnus* sp); marlins (*Istiophoridae*); southern red snappers *(Lutjanus purpureus*) and yellowtail snappers (*Ocyurus chrysurus*), of the family of the *Lutjanidae*; jacks (*Caranx* spp.); squirrelfish (*Holocentridae* spp.); mackarels (*Scomberomorus* sp.); scads nei (*Decapterus* spp.), of the family of the Scombroids; and lesser amberjacks, of the family of the *Carangidae*. Because fishing gear that uses hooks is highly selective, by-catch is negligible, especially because rafts are also highly selective.
- Regarding inorganic waste, 53 per cent of fishers construct rafts and buoys with recycled bottles, foam, hard plastic containers, cords and nets. Hence, they help retrieve marine debris and save money on fishing gear, although this practice also increases the amount of plastics and microplastics in the marine environment. The surveys indicate that 79 per cent of rafts are manufactured with plastic and other synthetic materials, and 51 per cent of fishers have at least four rafts.
- Guts represent between 8 and 14 per cent of the total weight of captured mahi-mahi, depending on the type of preservation (fresh/frozen). When mahi-mahi is filleted, 55 per cent of the live weight is utilized and the remaining 45 per cent (organic waste) is discarded. On the consumption side, 39 per cent of buyers use the head and 26 per cent use the tail; the skin and the guts are generally discarded.

The environmental assessment concludes with the following spider graph generated with the FISH4ACP environmental tool (figure 6). After analysing the data compiled by the project, the experts score each environmental subdomain in the FISH4ACP tool. The tool automatically calculates an average subdomain score and generates a final environmental domain score. The spider graph shows the scores of the seven social domains analysed. It should be noted that an average score in a specific domain could be concealing a low score in one of its subdomains offset by a good score in another subdomain. The sustainability heat map (figure 7) shows all the subdomains analysed. Low scores are negative, and high scores are positive (the maximum score is 3).

**Figure 6. Environmental stability assessment scores for the mahi-mahi value chain**




Source: Beltrán C. et al., 2022

The FISH4ACP methodology interprets the economic, social and environmental sustainability and resilience indicators of the mahi-mahi VC by defining three levels of severity and need for action in accordance with the following colour code: (a) green: no significant reasons for concern; (b) yellow: a concern that should be addressed in the medium-term; (c) red: reasons for high concern or a situation requiring immediate attention.

**Figure 7. Heat map of the mahi-mahi value chain in the Dominican Republic**

| Economic sustainability | Social sustainability | Environmental sustainability |
|---|---|---|
| Net income | Wage and employment distribution | Electricity use |
| Trend in net income | Poverty and vulnerability | Fuel consumption |
| Return on sales | Discrimination | Carbon footprint |
| Number of full-time jobs | Women's economic involvement | Renewable clean energy use |
| Number of part-time jobs | Gendered division of labour | Water and ice consumption |
| No. of family/self-employed jobs | Gendered access to productive resources | Water pollution |
| Average wage for hired workers | Women's decision-making and leadership | Stock status and dynamics |
| Average wage proxy family labour | Availability of food | Fishing pressure |
| Total value of net wages | Utilisation of food (nutrition, safety) | Associated species |
| Value added at VC level | Stability of food (trends) | Vulnerable ecosystems |
| Contribution to trade balance | Respect for labour rights | Deep water species |
| Public finances impact | Child and forced labour | Biosecurity measures |
| Private investment | Job safety and security | Animal welfare |
| Investment loans | Job attractiveness | Drugs and chemicals use |
| Formal indebtedness | Social cohesion | Air pollution |
| Food safety | Policies, regulations and standards | Inorganic waste pollution |
| Consumer evaluation | Access to finance | Organic waste pollution |
| Consumer preference | Access to natural resources | Food loss |
| Price relative to substitutes | Access to Information | Food waste |
| **Resilience** | | |
| Redundancy | Diversity | Connectivity |
| Collaboration | Learning and adaptation | Participation and inclusion |

Source: Beltrán C. et al., 2022

Not concerning  Concerning  Highly concerning

# 4. Upgrading strategy

The strengths, weaknesses, opportunities and threats (SWOT) analysis defines the baseline of the current state of the VC and the action plan for implementing the upgrading strategy.

### Figure 8. SWOT analysis of the mahi-mahi value chain

**Strengths**

- Mahi-mahi has high reproduction rates, is a fast-growing species and fishers do not complain of scarcity or of few catches.
- The mahi-mahi is a highly nutritional and healthy fisheries product, and ranks high in consumer tastes.
- Small- and medium-scale fishers and traders are able to turn a profit and their businesses are stable.
- Small- and medium-scale fisheries and traders have good rapport and cooperate with one another, facilitating interaction.
- Domestic producers and importers have the capacity to provide VC actors with the equipment, materials and inputs they need for their businesses.
- Women participate in the different stages of the VC and could maximize their roles with the appropriate training and the development of emplo

**Weaknesses**

- The cold chain — on-board and on land and the fleet of refrigerated lorries — is insufficient to store and transport the fish, especially when catches are large.
- Poor fish handling practices diminish product safety.
- Fisher training in various relevant topics — safety at sea, high seas fishing, business development, proper post-capture practices and financial education, among others — is insufficient.
- The vessels and motors are not appropriate for offshore fishing, or for fishing trips lasting more than one day.
- Information from the statistical and biological-fisheries assessment system is insufficient for better understanding the mahi-mahi's plentifulness and dynamics.
- CODOPESCA lacks the resources to achieve excellence in research, management and supporting the VC actors.
- The lack of management measures may pose a risk for the mahi-mahi's renewal capacity and the fishery's long-term sustainability.
- Deficiencies are perceived in terms of inter-agency coordination that could hinder the integrated management of fishery resources and timely support for VC actors.
- Compared to other marine fish in high demand, consumers find that prices for mahi-mahi products are high.
- Persistent conflicts between commercial fishers and recreational/sports fishers may intensify, ultimately giving rise to future government decisions favouring one sector over the other.
- Plastics and microplastics come loose from lost FADs and may have an adverse impact on the marine environment.

**Opportunites**

- Domestic and tourist demand is high beyond the catch areas, even including unmet domestic demand partially covered with imports.
- E-commerce may broaden business opportunities for VC actors and create new market niches at the national level.
- The existence of various fishing seasons to the south of the country could facilitate designing a mahi-mahi trade route.

**Threats**

- Insufficient access to renewable energies continues to affect the cost structure of fish storage and transport.
- Informal fishers and traders and/or those not permanently employed lack access to the social security/social protection system (healthcare and pensions).
- The sale of fish with fictitious names (e.g. "merobasa") undermines fair competition with mahi-mahi caught by domestic artisanal fishers.

Source: Beltrán C. et al., 2022

Based on findings from the VC analysis and the SWOT analysis, a 10-year vision for the mahi-mahi VC has been devised, in close coordination with national authorities, partner agencies and VC actors.

**Vision for the development of the mahi-mahi VC**

By 2033, the techniques for catching, processing and selling mahi-mahi products in the Dominican Republic have been modernized with efficient, eco-responsible methods, providing greater socioeconomic benefits to all VC actors, enhancing the management of public agencies and the organization of sectoral associations and offering excellent, environmentally sustainable products to consumers.

To realize this vision by 2033, a theory of change (figure 9) has been formulated and validated in collaboration with stakeholders, structured around the three core areas set out below:

a) **Core area 1. Governance of the mahi-mahi fishery for its management.** This involves formulating the National Mahi-mahi Fishery Management Plan, which will incorporate management measures; improvements to the fisheries statistics system; improvements to fishing methods so as to maintain efficiency and reduce environmental impact, with the smallest possible repercussion on fishers' finances; the designing of new vessel prototypes that put a premium on safety at sea and proper cold storage of catches; and the explicit inclusion of the fishing sector in disaster prevention, mitigation and response systems.

b) **Core area 2. Improvement in the mahi-mahi-product production, trading and consumption process.** To overcome the lack of refrigeration equipment on-board and on land — equipment which is needed to ensure the safety and quality of fisheries products — the status of the cold chain in the five localities studied by the FISH4ACP project must be assessed in greater detail. This involves implementing an upgrading strategy, which includes pilot projects and combines clean and conventional energies, depending on energy needs and the technological possibilities available on the market.

   The main needs with regard to (re)constructing, adapting or expanding public-use infrastructure that supports the capturing, processing and trading of mahi-mahi will be identified. This will make it possible to formulate the upgrading plan and work with the authorities on including it in their national investment programmes.

   A technical assistance programme on good practices in handling mahi-mahi and mahi-mahi by-products will be designed. The programme will provide training sessions and manuals on this subject and basic material to ensure that these practices are properly implemented.

   To increase the availability of domestic mahi-mahi and reduce the dependence on imports, a national mahi-mahi trading route will be designed. This trading route will benefit fishers, merchants and buyers, given that fishing seasons on the south-east and south west coasts of the country are different, as are the periods during which dolphin fish catches are the most plentiful. In addition, steps will be taken to increase supply. Demand will be incentivized through a strategy to promote consumption and to educate the public on topics relating to responsible consumption, allowing buyers to differentiate fish products, avoid purchasing small fish and recognize misleading advertising.

c) **Core area 3. Strengthening the economic and social environment for the VC actors.** Although some small and medium-sized enterprises, associations and cooperatives in the mahi-mahi supply chain operate legally, a considerable number of informal businesses generate employment and income but lack access to financial or social security services or to other benefits intended for registered micro, small and medium-sized enterprises and community organizations.

A programme will be developed to promote business management and entrepreneurship and strengthen associations and cooperatives so as to support their economic development and ability to interact with the State. A programme to encourage financial education and the establishment of formal links to the banking system has also been considered, along with actions to incentivize registering in the public social security system in order to improve health coverage and increase contributions for pensions.

The mahi-mahi VC and each actor's businesses will be strengthened by creating or strengthening commercial and cooperative ties. To this end, the Mahi-mahi Platform will be established, promoting business meetings, trade fairs, discussion forums and concerted action on topics of mutual interest. In addition, other outreach strategies will be implemented, making it possible to consolidate the Mahi-mahi Platform and promote its long-term autonomy and sustainability.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## Figure 9. Theory of change for the mahi-mahi value chain in the Dominican Republic

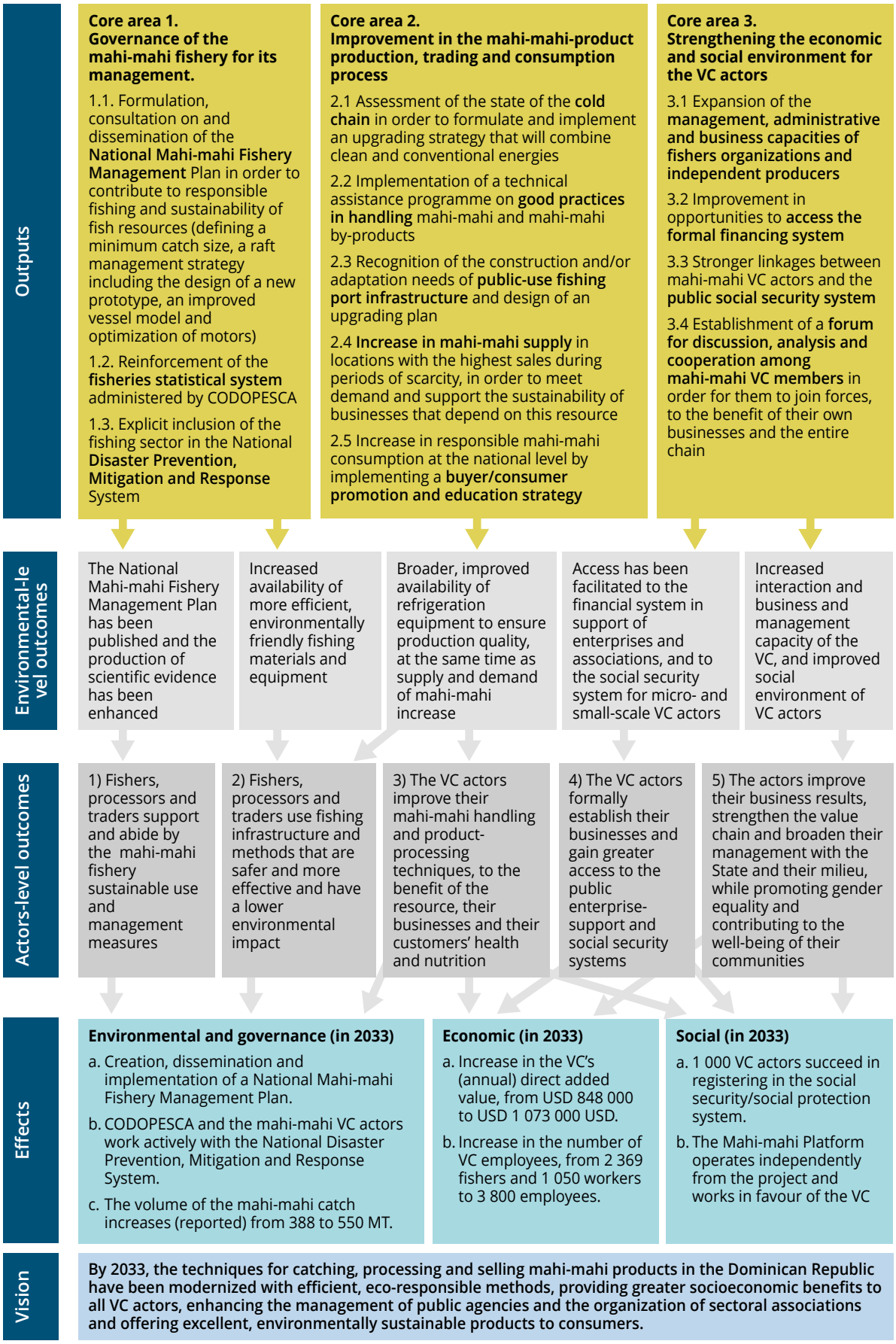

Table 1 gives the expected economic, social and environmental effects of implementing the upgrading strategy.

### Table 1. Key economic, social and environmental indicators in USD

| | Baseline (2021) | 2025 | 2033 |
|---|---|---|---|
| **Economic and functional indicators** | | | |
| Direct value added (annual) from the VC | 848 000 | 933 000 | 1 073 000 |
| Number of jobs created along the VC | There are an estimated 2 369 mahi-mahi fishers and 1 050 workers in the processing and selling stages | 3 500 jobs | 3 800 jobs |
| Number of improvements incorporated into the VC | Businesses that sell fish lack sufficient refrigeration equipment to preserve the mahi-mahi | A technical study with proposals to upgrade the cold chain has been completed. Acquisition or upgrading of 4 cold rooms, 8 ice machines and 10 solar/hybrid freezers in priority areas identified and defined by the study | Each of the main mahi-mahi landing areas (of an estimated 10) has at least 1 refrigerated lorry, 4 ice machines and 2 cold rooms |
| Number of actors in the cold chain who follow good handling practices in processing mahi-mahi products and by-products | An estimated 1 050 persons work processing and trading mahi-mahi products, but data on the number of VC actors who follow good handling practices is not available | 280 VC actors follow good handling practices | 400 VC actors follow good handling practices |
| **Social and resilience indicators** | | | |
| Number of VC actors with access to the social security/social protection system | An estimated 1 000 mahi-mahi fishers lack access to the social security/social protection system | 800 VC actors succeed in registering in the social security/social protection system | 1 000 VC actors succeed in registering in the social security/social protection system |
| Number of inter-agency coordination actions and agreements with the National Disaster Prevention, Mitigation and Response System | There are no current inter-agency coordination actions or agreements with the National Disaster Prevention, Mitigation and Response System | CODOPESCA and fishing sector representatives are incorporated into the National Disaster Prevention, Mitigation and Response System | CODOPESCA and the mahi-mahi VC actors work actively with the National Disaster Prevention, Mitigation and Response System |

(cont.)

| | Baseline (2021) | 2025 | 2033 |
|---|---|---|---|
| **Environmental indicators** | | | |
| Volume of national mahi-mahi catch | 388 MT (reported) + 224 MT (estimated) = 612 MT | 500 MT (reported) | 550 MT (reported) |
| Formulation of, consultation on and dissemination of the National Mahi-mahi Fishery Management Plan | A National Mahi-mahi Fishery Management Plan has not been formulated | After consultations were conducted, the National Mahi-mahi Fishery Management Plan has been formulated and disseminated | The National Mahi-mahi Fishery Management Plan has been disseminated and implemented |


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# 5. Action plan to implement the upgrading strategy

The proposed strategy has been designed in close coordination with national authorities, partner agencies and VC actors. This is a 10-year strategy encompassing the entire mahi-mahi sector, and it extends beyond the end of the FISH4ACP project. To achieve the expected objectives, the FISH4ACP project, partner agencies, national authorities and the private sector must combine their technical and financial efforts.

Table 2 summarizes the upgrading activities and investments needed to bring about the vision for developing the mahi-mahi VC by 2033. The investment amount is an estimate, and it will be revised as the participation of the partners and the execution of the activities materialize.

### Table 2. Summary of the required upgrading activities and investments

**Outcome 1. Mahi-mahi fishery management has improved thanks to the implementation of the National Mahi-mahi Fishery Management Plan, capacity building at CODOPESCA and the plan's inclusion in the National Disaster Prevention, Mitigation and Response System.**

| Outputs | Activities | Main funding source | Total investment (in USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 1.1. Formulation, consultation on and dissemination of the National Mahi-mahi Fishery Management Plan in order to contribute to responsible fishing and sustainability of fish resources | 1.1.1. Define a minimum mahi-mahi catch size | CODOPESCA | 55 736 | Training, infrastructure | 2024-2033 |
| | | FISH4ACP | 54 133 | Technical assistance | |
| | | Private sector | 7 734 | Facilitation | |
| | 1.1.2. Formulate a raft management strategy including the design of a new prototype | FISH4ACP | 120 065 | Technical assistance, equipment | 2023-2033 |
| | | CODOPESCA | 52 144 | Facilitation | |
| | | Private sector | 6 999 | Facilitation | |
| | 1.1.3. Design an improved vessel model and optimize motors | FISH4ACP | 143 745 | Technical assistance, equipment | 2023-2033 |
| | | CODOPESCA | 38 571 | Facilitation | |
| | | Private sector | 9 442 | Facilitation, equipment | |
| | | ANAMAR | 9 200 | Technical assistance, equipment | |
| | 1.1.4. Formulate, hold consultations on, validate and disseminate the National Mahi-mahi Fishery Management Plan | FISH4ACP | 39 632 | Technical assistance | 2024-2033 |
| | | CODOPESCA | 10 000 | Training | |
| | | Private sector | 2 578 | Facilitation | |
| | 1.1.5. Acquire eco-sustainable rafts | Private sector, donors | 1 200 000 | Equipment | 2026-2033 |
| | 1.1.6. Acquire small vessels and on-board material to improve safety at sea and product quality | Private sector, donors | 7 500 000 | Equipment | 2026-2033 |

(cont.)

| Outputs | Activities | Main funding source | Total investment (in USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 1.2. Strengthening of the fisheries statistical system administered by CODOPESCA | 1.2.1. Provide technical assistance to CODOPESCA in order to generate statistical, biological-fishing and commercial information on the mahi-mahi fishery and associated resources | CODOPESCA | 91 931 | Facilitation, equipment | 2023-2033 |
| | | FISH4ACP | 52 680 | Technical assistance, equipment | |
| | | Private sector | 23 202 | Facilitation | |
| | | OSPESCA | 11 000 | Technical assistance | |
| | | ANAMAR | 2 200 | Technical assistance | |
| 1.3. Explicit inclusion of the fishing sector in the National Disaster Prevention, Mitigation and Response System | 1.3.1. Manage the explicit inclusion of the fishing sector in the National Disaster Prevention, Mitigation and Response System and train actors in using related digital tools | FISH4ACP | 24 297 | Facilitation, equipment | 2023-2033 |
| | | CODOPESCA | 18 455 | Facilitation | |
| | | Private sector | 6 600 | Equipment | |
| | | Civil defence | 16 048 | Training | |
| | | FAO (Hurricane Fiona) | 3 845 | Technical assistance | |
| **Budget (Outcome 1)** | | | **USD 9 500 236** | | |

**Outcome 2. Improvements have been incorporated into the process of producing, trading and consuming products derived from the mahi-mahi VC.**

| Outputs | Activities | Main funding source | Total investment in (USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 2.1. Assessment of the state of the cold chain in order to formulate and implement an upgrading strategy that will combine clean and conventional energies | 2.1.1. Conduct a comprehensive study on the state of the cold chain in the five project target localities, as well as recognise the availability of technology and technical assistance in the country in order to implement the relevant improvements | FISH4ACP | 10 616 | Technical assistance | 2023-2024 |
| | | CODOPESCA | 4 561 | Facilitation | |
| | | Private sector | 2 578 | Facilitation | |
| | 2.1.2. Implement the recommendations of the study on upgrading the cold chain by executing pilot projects in selected localities | FISH4ACP | 147 951 | Equipment | 2023-2033 |
| | | CODOPESCA | 84 012 | Facilitation | |
| | | Private sector | 2 578 | Facilitation | |
| | 2.1.3. Acquire refrigerated transport vehicles and refrigeration equipment and adapt the current equipment for renewable/mixed energy use | Private sector, donors | 2 220 000 | Equipment | 2026-2033 |

(cont.)

| Outputs | Activities | Main funding source | Total investment in (USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 2.2. Implementation of a technical assistance programme on good practices in handling mahi-mahi and mahi-mahi by-products | 2.2.1. Design and execute a training and technical assistance programme on good practices in handling and processing mahi-mahi products and selected by-products | FISH4ACP | 147 134 | Technical assistance, equipment | 2023-2033 |
| | | CODOPESCA | 16 000 | Facilitation | |
| | | Private sector | 2 578 | Infrastructure | |
| | 2.2.2. Organize a pilot project to implement good processes for handling and processing mahi-mahi products at selected businesses in the five target fishing villages | CODOPESCA | 48 331 | Technical assistance | 2023-2033 |
| | | FISH4ACP | 43 989 | Training, equipment | |
| | | FAO-UNOCC | 8 510 | Equipment | |
| | | Private sector | 21 273 | Infrastructure | |
| | 2.2.3. Acquire and maintain processing equipment to implement good handling practices | Private sector, donors | 190 000 | Equipment | 2026-2033 |
| 2.3. Recognition of the construction and/or adaptation needs of public-use fishing port infrastructure and design of an upgrading plan | 2.3.1. Assess the current availability and the improvement/construction needs of public-use fishing port infrastructure in the five target villages, and manage the execution of the work with the authorities and potential cooperation agencies | FISH4ACP | 13 510 | Technical assistance | 2024 |
| | | CODOPESCA | 5 641 | Technical assistance | |
| | | Private sector | 2 578 | Facilitation | |
| | 2.3.2. Upgrade the fishing port infrastructure | Government, donors | To be confirmed following the study | Infrastructure | 2026-2033 |
| 2.4. Increase in mahi-mahi supply in locations with the highest sales during periods of scarcity, in order to meet demand and support the sustainability of businesses that depend on this resource | 2.4.1. Design the national mahi-mahi trading route in order to increase supply in locations and during seasons with periods of scarcity | FISH4ACP | 71 938 | Technical assistance | 2023-2033 |
| | | CODOPESCA | 23 586 | Technical assistance | |
| | | Private sector | 12 893 | Facilitation | |

(cont.)

| Outputs | Activities | Main funding source | Total investment in (USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 2.5. Increase in responsible mahi-mahi consumption at the national level by implementing a buyer/consumer promotion and education strategy | 2.5.1. Design and implement a promotion strategy to increase domestic mahi-mahi consumption, including buyer education on responsible consumption | FISH4ACP | 17 294 | Technical assistance | 2023-2033 |
| | | CODOPESCA | 9 228 | Technical assistance | |
| | | Private sector | 8 255 | Facilitation | |
| | | ProConsumidor | 8 024 | Technical assistance | |
| **Budget (Outcome 2)** | | | **3 123 058** | | |

**Outcome 3. Progress has been made in strengthening the economic and social environment for the mahi-mahi VC actors.**

| Outputs | Activities | Main funding source | Total investment (in USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 3.1. Expansion of the management, administrative and business capacities of fishers organizations and independent producers | 3.1.1. Develop and execute a business management and entrepreneurship programme targeting independent producers, to ensure the sustainability and improve the of their businesses | FISH4ACP | 51 900 | Facilitation | 2023-2033 |
| | | CODOPESCA | 12 806 | Facilitation | |
| | | Private sector | 5 929 | Facilitation | |
| | | Promipyme | 13 222 | Technical assistance, training | |
| | 3.1.2. Develop and execute a programme to strengthen fishers associations and cooperatives so as to promote their economic development and ability to interact with the State and other stakeholders | FISH4ACP | 32 100 | Technical assistance | 2023-2033 |
| | | CODOPESCA | 11 185 | Facilitation | |
| | | Private sector | 5 929 | Infrastructure | |
| | | IDECOOP | 12 301 | Training | |
| 3.2. Improvement in opportunities to access the formal financing system | 3.2.1. Implement a financial literacy programme and formal linkages with the banking system | FISH4ACP | 13 800 | Facilitation | 2023-2033 |
| | | CODOPESCA | 6 967 | Facilitation | |
| | | Banco Agrícola | 10 496 | Technical assistance | |
| | | Banreservas | 10 496 | Technical assistance | |
| 3.3. Stronger linkages between mahi-mahi VC actors and the public social security system | 3.3.1. Help VC actors and the authorities expand access to the public social security system | CODOPESCA | 44 947 | Technical assistance | 2023-2033 |
| | | FISH4ACP | 31 777 | Facilitation, technical assistance | |
| | | SIUBEN | 8 254 | Technical assistance | |
| | | Private sector | 56 736 | Facilitation | |

(cont.)

| Outputs | Activities | Main funding source | Total investment (in USD) | Investment type | Start and end date |
|---|---|---|---|---|---|
| 3.4. Establishment of a forum for discussion, analysis and cooperation among mahi-mahi VC members in order for them to join forces, to the benefit of their own businesses and the entire chain | 3.4.1. Create and consolidate the Mahi-mahi Platform to promote and/or strengthen commercial and cooperative ties among the VC actors | FISH4ACP | 48 275 | Facilitation | 2023-2033 |
| | | CODOPESCA | 27 000 | Facilitation | |
| | | Private sector | 32 715 | Facilitation | |
| **Budget (Outcome 3)** | | | **436 835** | | |
| **TOTAL BUDGET OF THE STRATEGY** | | | **13 060 129** | | |

**Activities financed by:**

- FISH4ACP
- CODOPESCA
- Private sector and donors
- Government and donors

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Table 3 includes an overall estimate of the investments required to realize the vision for developing the mahi-mahi VC and the planned financing.

### Table 3. Investments required to realize the vision for developing the mahi-mahi value chain

| Financing sources (in USD) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Investment type | FISH4ACP | CODOPESCA | Private sector and donors | OSPESCA | Other national authorities | FAO Dominican Republic | Total (by investment type) | Share |
| Equipment | 147 951 | 0 | 11 116 600 | 0 | 0 | 8 510 | 11 273 061 | 86.3% |
| Facilitation | 170 049 | 363 633 | 174 217 | 0 | 0 | 0 | 707 899 | 5.4% |
| Infrastructure | 0 | 0 | 29 780 | 0 | 0 | 0 | 29 780 | 0.2% |
| Technical assistance | 702 847 | 131 732 | 0 | 11 000 | 61 892 | 3 845 | 911 316 | 7.0% |
| Training | 43 989 | 65 736 | 0 | 0 | 28 349 | 0 | 138 074 | 1.1% |
| Total (by funding source) | 1 064 836 | 561 101 | 11 320 597 | 11 000 | 90 241 | 12 355 | 13 060 130 | |
| Share | 8.2% | 4.3% | 86.7% | 0.1% | 0.7% | 0.1% | | 100.0% |

Execution of the action plan is expected to require USD 13 million. Of this amount, 86.7 per cent would come from potential donors and the private sector, especially VC actors and suppliers of related goods and services. Regarding investment type, 86.3 per cent will be used to acquire and upgrade equipment.

During the action plan's execution, some foreseeable threats may arise. There may also be unforeseen environmental, economic, social or institutional circumstances. In either case, the normal conduct of activities and the possibility of achieving the objectives and the vision projected for 2033 could be hampered. Table 4 recognizes and identifies these risks and lists prevention and mitigation measures.

## Table 4. Analysis of risks and mitigation measures

### Risks relating to the VC

| Risk | Description of the risk | Risk level | Mitigation measure |
|---|---|---|---|
| The National Mahi-mahi Fishery Management Plan is not defined and/or executed | The mahi-mahi fishery in the country has been exploited without the management measures being defined or executed. Although there are no indications of overfishing, there is a lack of scientific information for assessing the fishery's condition or future trends. | Medium. There are no signs of overfishing of the resource. Given that the species is highly migratory and is caught in various countries of the Caribbean region, it must be monitored, and statistical information must be compiled in a reliable and timely manner. In addition, management measures must be taken, and the species' behaviour in domestic waters and its management in other Caribbean countries must be analysed. | Defining, agreeing on and implementing the National Mahi-mahi Fishery Management Plan requires medium-term actions. First, the composition and size of the catches must be analysed, to determine the minimum catch size that will allow juveniles to be protected. This requires field assessments to help CODOPESCA formulate the plan to manage and upgrade its statistics collection and analysis system. |
| Vessels currently used as well as outboard motors — low horsepower and short range — are inappropriate for high seas fishing or fishing trips of more than a day. In addition, not all fishers apply appropriate safety-at-sea measures. | Depending on the distance of the fishing grounds and the range of the vessels and motors, fishers work within a range of 6 to 50 nautical miles from shore, although most work within 15 to 32 nautical miles. They often have to return to shore after catching two or three large mahi-mahi, due to their vessels' limited storage capacity. In addition, the risks of navigating in small, heavy vessels increase with swells, storms, heavy rain and strong wind. | Medium-high. The cost of fishing trips is offset by the volume of the catches. Fishers often cannot fish for large mahi-mahi because of insufficient storage capacity on their vessels. This is in addition to the risks stemming from inclement weather. Fishers can reduce their personal risk by adequately protecting their boats, increasing the horsepower of their motors and receiving safety-at-sea training. | Provide technical assistance on designing vessels appropriate for high seas fishing. Trials with outboard motors having sufficient horsepower for trips of up to 50 nautical miles, preferably with four-stroke or gas motors, making it possible to increase fuel efficiency and reduce marine pollution. Promote safety at sea and the use of safety equipment. |
| The rafts (FADs) currently in use are effective for fishing, but they entail an environmental risk given that microplastics can come loose. | These rafts can be used to catch large mahi-mahi. Raft costs are minimal because fishers construct them with plastic bottles, pieces of nets and high-density foam often retrieved from the ocean. These materials are not, however, biodegradable and they release microplastics that are detrimental to the marine environment and that become lodged in the digestive tracts of fish and other marine organisms. | Medium-high. Although fishers have not expressed concerns regarding the rafts' environmental effects — and they may even be reluctant to replace them, given their effectiveness and minimum/zero cost (as they are made of marine debris, which the fishers help collect) — they should be made aware of the importance of constructing their rafts with other materials while maintaining or improving the current design. | Provide technical assistance to design a new raft prototype with biodegradable, readily available, low-cost materials. To encourage fishers to accept such assistance, environmental awareness-raising workshops should be held to demonstrate the technical and economic advantages of the new prototype and ensure that it continues to be used on actual fishing trips. |

(cont.)

| Risk | Description of the risk | Risk level | Mitigation measure |
|---|---|---|---|
| Deficiencies in the cold chain in the mahi-mahi-product harvesting, processing, transport and trading stages. | Deficiencies in preserving the cold chain in one or more phases of the production process jeopardize the safety of the mahi-mahi products and hence puts consumers' health at risk. This situation also increases product loss and, in the event of deficient monitoring by health authorities, gives rise to the sale of products that have not been properly refrigerated. | Medium-high. The FISH4ACP project highlighted the widespread nature of this problem. The VC actors lack sufficient refrigeration services, and most of the services that they do have rely on conventional, high-cost power sources. Although the Dominican Republic has access to refrigeration equipment and technologies, many fishers and traders cannot afford them. | Provide technical assistance to identify the most efficient and most affordable refrigeration equipment that will meet cooling needs at each stage of the production process. Execute pilot projects that help solve the most serious problems with public refrigeration services and demonstrate to the beneficiaries the advantages of acquiring such services on their own, for private use. |
| Improper fish handling practices affect product safety and consumer health. | Deficiencies in fish refrigeration/freezing are not the only factor that jeopardizes product quality and consumer health. Improper handling practices — poor hygiene of handlers, the use of instruments not disinfected beforehand or in poor condition, or handling products in the sun or in places with insect or rodent pests, among other issues — are equally dangerous. | High. The FISH4ACP project assessment also highlighted the high incidence of this problem. The findings resulted primarily from observations by specialists on field visits, rather than testimonies or the awareness of fishers, processors and traders. | Hold training workshops for the VC actors in order to make them aware of the importance of correcting product handling deficiencies. Support the actors in this process by providing instruments and materials to certain beneficiaries, to encourage their acquisition on an individual basis. |
| Hurricanes and tropical storms. | The annual hurricane season (between June and November) jeopardizes human lives, property and infrastructure. These phenomena can be forecast a few days in advance: sufficient time to take rapid protection measures. | Medium-high if a hurricane makes landfall; low-medium if its path does not approach the country. | Activate the National Disaster Prevention, Mitigation and Response System. Support beneficiaries who have been directly affected by the FISH4ACP project. |

(cont.)

### Risks relating to the action plan

| Risk | Description of the risk | Risk level | Mitigation measure |
|---|---|---|---|
| Difficulties in securing the timely cofinancing of the project with funds from the national authorities. | Cofinancing from national authorities depends on the budget allocated by the Ministry of Finance. As the budget is drawn up a year in advance, the first funds might become available in 2024. | Medium-high. Obtaining cofinancing for the 2023 activities is a challenge, especially since various national authorities are involved in most of the activities in the action plan. | Request the counterpart from the national authorities in-kind (human, technical and logistics resources), with the FISH4ACP project and other development partners contributing the bulk of the financial resources. |
| Inter-agency coordination among national authorities linked to the action plan and the partners is deficient. | The involvement of the various agencies in executing the action plan requires precisely defining their responsibilities, the timetable and the required resources that each stakeholder commits to contribute. Deficiencies in this process may affect the efficacy of the joint work, compliance with the timetable and the final achievement of the expected outcomes. | Medium-high. Each entity's ordinary institutional commitments, the possible lack of certain resources and the lack of effective channels for dialogue and coordination with other authorities may hinder the timely execution of the action plan. | The FISH4ACP project should devise a strategy to open channels for inter-agency coordination and acknowledge the availability of the resources committed by the stakeholders. To this end, counterparts of the national authorities should be designated, principally of those authorities most involved in executing the action plan. |
| The activities and the outcomes of the project will not continue over the long-term | The use of the new vessel and raft prototype, the expansion of the cold chain, the widespread adoption of good handling practices, the acquisition of more suitable fish-processing equipment, the consumption promotion campaigns and the modernization of the fisheries statistics system are some of the measures that should be continue once the FISH4ACP project has concluded. Political will and institutional commitment are needed to move forward in strengthening the VC, both with agencies' own resources and with those of other project partners. | Medium. The action plan activities are necessary for the VC, and they have been prioritized with the approval of the authorities and beneficiaries. This increases these stakeholders' commitment to technical and financial continuity. Nevertheless, there is a risk that future budget allocations and the availability of personnel and technical resources from the authorities will be insufficient and/or will not arrive on time. | Collaborate with national authorities so that their annual work plans will include measures to give continuity to the progress made by the FISH4ACP PROJECT such that the project's long-term sustainability can be verified once it has ended. For its part, FAO might make follow-up visits for eight years following the conclusion of the assistance (2025-2033). |

(cont.)

| Risk | Description of the risk | Risk level | Mitigation measure |
|---|---|---|---|
| Insufficient commitment on the part of the VC actors to give continuity to actions that strengthen the VC and keep the Mahi-mahi Platform operational | VC actors normally continue those actions that benefit their own businesses. They have not yet adopted a collective work culture that looks after the interests of the entire VC. Such a work culture is expected to be fostered through the gradual consolidation of the Mahi-mahi Platform. | Medium-high. If the VC actors do not see that their commitment and collective work benefit the VC and their own businesses, the momentum for the FISH4ACP project to create and implement the Mahi-mahi Platform may be lost. | Consolidate the Mahi-mahi Platform, which requires individual and collective commitment and the collaboration of stakeholders, especially CODOPESCA, with periodic follow-up by FAO until 2033, when the action plan ends. |
| A new coronavirus disease (COVID-19) pandemic or other health crisis making it necessary to modify the planned execution of the action plan. | Various public health experts have stated that COVID-19 will become endemic in the future. Consequently, epidemiological surveillance must be maintained. In addition, other health crises may arise, jeopardizing interpersonal and work-related relations as we currently know them. | Although there is no certainty on the risk level, the elimination/reduction of personal safety measures (mask wearing, hand washing and social distancing) could lead to new COVID-19 outbreaks or the emergence of other health crises. | If health risks are perceived during the execution of the action plan, encourage all persons involved in the project (cooperation-agency staff and beneficiaries) to take extreme care and to adopt personal safety measures as they see fit. |

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This report presents the results of the value chain analysis of the mahi-mahi value chain in the Dominican Republic 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.

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