

ANALYSIS OF THE SEAFOOD SUPPLY CHAIN ON BONAIRE, SABA AND ST. EUSTATIUS

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Recommendations to improve the traceability and sustainability
of the seafood supply chain in the Caribbean Netherlands.



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EXECUTIVE SUMMARY

Fisheries on Bonaire, Saba and St. Eustatius (Caribbean Netherlands) are important for the local economy and food provision on the islands. In the Caribbean Netherlands, fisheries and (dive) tourism contribute significantly to the GDP, with 1% and >50% respectively. Whereas in the Netherlands, this is only 0,1% for fisheries and the fisheries industry (Agrimatie, 2020) and 4,4% for tourism (CBS, 2019).

Fisheries can have a negative impact on the health of a marine ecosystem. In the past, fishing activities have negatively affected the health of Caribbean coral reefs (de Graaf et al. 2015, de Graaf 2016 & de Graaf et al. 2017). The current impact of local fisheries in the Caribbean Netherlands on the marine ecosystem is largely unknown but is expected to be prevalent. Fisheries are regulated through outdated fisheries regulations (Ecovision, 2018). Fisheries monitoring on Saba and St. Eustatius is limited to the landings only. On Bonaire, no monitoring is being carried out. In addition, very limited information on fish stock health is available and no studies into the seafood market structure have been performed. For the Caribbean Netherlands, no reliable information is available on the import and export of seafood, seafood sales nor consumption statistics.

This market study was performed to analyze the local fisheries and seafood supply chain on Bonaire, Saba and St. Eustatius. The goal of this study is to provide recommendations to WWF-NL to enhance sustainable practices in the fisheries and seafood supply chain in the Caribbean Netherlands through market mechanisms. A total of 361 interviews were performed and additional information was acquired by a literature study and consulting local stakeholders and authorities. Interviewees were subdivided into four groups: professional fishermen, supermarkets/restaurants, consumers and importers/exporters. Interviews from the four categories were analyzed for each island separately.

On Bonaire, fishermen mainly catch pelagic species and they primary sell these to middlemen on the island. The vast majority of the restaurants on Bonaire serve locally sourced seafood (85%) while only few supermarkets sell local seafood (27%). Fishermen on Bonaire also indicated to fish on and/or source seafood, including conch and lobster, from Las Aves (Venezuela) indicating that not all 'local fish' is fished in the waters of Bonaire. Whether 'local' seafood sold on Bonaire originates from Las Aves or Bonaire itself is unknown and unmonitored, masking a potential shortage in local fish stocks. Fishermen on Saba mainly fish for lobster and redfish. Almost all lobster is exported to St. Maarten, part of which is shipped onwards to Hong Kong. Some fishermen also sell part of their catch to local restaurants and consumers. During this research, all restaurants on Saba said to serve local seafood, and 40% of the supermarkets sell local seafood. Fishermen on St. Eustatius primarily catch lobster and reef fish and indicated that they sell their catch to local consumers, restaurants or transport it to St. Barthelemy. However, according to the former data monitoring officer (DMO), a large part of the lobster catch is also exported to St. Maarten and St. Martin. This was not indicated by the interviewees. Of the interviewed restaurants 58% serve local fish and only 22% of the supermarkets sell local seafood on Saba.

We have found that, to stimulate sustainable practices, supermarkets and restaurants on Bonaire and Saba would consider promoting local sustainable species, boycott less sustainable species and/or would consider to implement an ecolabel. Boycotting less sustainable species is not a preferred option according to restaurants and supermarkets on St. Eustatius.

Consumers on Bonaire and St. Eustatius primarily buy local seafood directly from fishermen. However, during the interviews on Bonaire it became clear that many consumers are not aware that these fishermen are in fact middlemen. On Saba, consumers have no preference for buying local seafood at a certain location. Quality is indicated as the most important purchasing criterion, followed by origin (local vs non-local) and sustainability. Consumers indicated to be willing to pay more for sustainable species.

From this market study, it became clear that the seafood supply chains on Bonaire, Saba and St. Eustatius completely lack transparency. There are currently no central locations where consumers can buy local seafood. No information is available or provided on the species, origin and capture method.

On Bonaire, fixed prices of local seafood were implemented by the government in 1996 to ensure that local residents are able to buy locally sourced seafood (see Appendix 5). These fixed prices have not been revised since. Fishermen are still receiving the same price for their fish, whilst the costs of fishing and living have increased and catches have declined.

When trying to obtain information on the fisheries sector from local authorities, responsible agencies and/or international databases, it was found that structural, reliable and comprehensive data on import/export, number of fishermen, total landings and registered seafood selling locations is not available for Bonaire, Saba nor St. Eustatius. Because of this lack of information, we have not been able to draw quantitative conclusions from information gathered with the interviews. Therefore, we have not been able to give detailed recommendations on specific market mechanisms. However, we have formulated recommendations for qualitative improvements in the seafood sector in the Caribbean Netherlands. These recommendations are summarized below.

RECOMMENDATIONS

We recommend to implement a comprehensive fisheries management plan on Bonaire, Saba and St. Eustatius. This fisheries management plan must include a monitoring scheme in which at least the total landings per species, the bycatch levels, fishing gear, number of fishermen and fishing trips are monitored and registered for each island. With this information, together with fishery-independent data where required, fish stock assessments can be carried out which will provide insights into the effects of fishing activities on the fish stocks. This monitoring must be structural and will provide information to evaluate and adapt the management system when necessary. The fisheries management plan should also include mandatory fishermen registration, improved data collection on seafood trade flows, including the import and export of seafood and a traceability system.

In the past, both national and local fisheries regulations have been developed and implemented without participation of fishermen. This has resulted in unclarity about the responsibility of legislation as well as unfamiliarity with, lack of support for and non-compliance with the law. Fishermen, the local government and national park authorities should work together in updating and implementing marine park regulations when these affect or concern fisheries. This will

increase involvement, understanding and compliance and will improve collaboration between these stakeholders.

We recommend to increase the visibility of the fisheries on the islands through a visibility and awareness campaign targeting consumers, restaurants and other seafood buyers and resellers. This will improve the ability of consumers to find and recognize local fish and make sustainable choices, as well as becoming aware of the impact and role these fisheries have on the islands. Awareness on sustainability in the fisheries sector should include advice on which species to choose or which to avoid. This visibility and awareness campaign will also be beneficial for the fisheries as this will enable them to position themselves as a sustainable, economically and culturally important actor on the islands. This will enhance their sense of responsibility and recognition on the island and hereby increase the incentive to follow regulations and collaborate with fisheries authorities.

1. INTRODUCTION

Coral reefs are one of the most biologically diverse ecosystems on the planet. Besides their value in terms of biodiversity, coral reefs play an important role in providing food and other resources. Over 500 million people benefit from these ecosystems worldwide. Unfortunately, local and global stressors cause a decline in coral cover (Hoegh-Guldberg 2011). Coral reefs in the Caribbean also suffer from stressors which can be natural, like hurricanes, and anthropogenic such as fishing, pollution and habitat destruction. As a result of these stressors, the state of Caribbean coral reefs has been in decline for decades (de Graaf et al. 2016). This includes a decline in coral cover, a decline in apex predators (for example large groupers and sharks) and invertebrates and an increase in macro-algal cover (de Graaf et al. 2015; de Graaf 2016).

One anthropogenic stressor throughout the Caribbean region are fisheries. Fish are and have been a very important food source and fisheries are an important economic activity in the region. Fisheries in the Caribbean vary from local artisanal coastal fisheries to large scale industrial fishing fleets.

The coral reef ecosystems surrounding the islands of Bonaire, Saba and St. Eustatius (Caribbean Netherlands, also referred to as the BES Islands) are at a historical low point (Debrot et al. 2017). On St. Eustatius, coral cover is currently at a historic low and there is a dominance of macro algae cover (de Graaf et al. 2015). The coral cover of the Saba Bank has decreased significantly throughout the years (Debrot et al. 2017). Also on Bonaire, a decline in coral cover and increase in macroalgal cover is observed (de Graaf 2016; Debrot et al. 2017). However, the coral reefs on Bonaire are among the best preserved reefs in the Caribbean (Jackson et al. 2014). Open sea and deep sea habitats around the Caribbean Netherlands suffer from high nutrient levels, high sea surface temperatures and fish stocks of commercially important pelagic and coral reef fish species are overfished (Debrot et al. 2017). The Caribbean Netherlands are also home to seagrass beds. Seagrasses have a very important role in the ecosystem by providing food and a crucial habitat for juveniles of many commercially and ecologically important fish species. The status of these seagrass beds is concerning, especially on St. Eustatius and Bonaire (Debrot et al. 2017).

On Bonaire, Saba and St. Eustatius coral reefs and associated fisheries are an important driver for the local economy. In the Caribbean Netherlands, fisheries and (diving) tourism contribute significantly to the GDP, with 1% and >50% respectively. In the European part of The Netherlands, this is 0,1% for fisheries and the fisheries industry (Agrimatie, 2020) and 4,4% for tourism (CBS, 2019). There are no official figures available of the total fish consumption on each of the islands. However, fish consumption by local residents in the Caribbean is estimated to be 24 kg per person per year (Debrot & van den Burg 2019). This includes locally caught as well as imported species.

Healthy coral reef ecosystems are of utmost importance for these small island economies both by providing a local food source as well as attracting tourists. Despite this importance, predatory fish stocks have decreased significantly to a point where these are very rarely seen (Debrot et al. 2017). Sustainable fishing practices must be in place in order to ensure healthy coral reef ecosystems on Bonaire, Saba and St. Eustatius in the future. Sustainable fishing practices will ensure a fair income for fishermen, a positive effect on the local economy, sustained food source and healthy fish stocks.

Fisheries on Bonaire, Saba and St. Eustatius can be classified as small scale, artisanal fisheries. Most fisheries are shore or boat-based. None of the islands have industrial fishing fleets in operation. Apart from these similarities, the fisheries on Bonaire, Saba and St. Eustatius are organised very differently in terms of target species, fishing area, gears and structure of the seafood supply chain.

No information is available about the seafood trade from and to the Caribbean Netherlands. Imports must be officially documented, however these are not always registered or are registered incorrectly. Exports are also not monitored correctly and hence, it is unknown how much seafood and which species are leaving or entering the islands. Furthermore, it is unknown how much seafood is actually consumed on the islands or how much is sold by which parties and for what price. This information is important in order to regulate and manage seafood trade flows.

1.1 FISHERIES ON BONAIRE

Fisheries on Bonaire mainly target large pelagic species. Total landings of the coastal fishery was 103 tonnes in 2014. There are about 30–40 fishermen active on the island, and the fleet consists of in total 84 small vessels (<7m) and 26 larger vessels (>7m). Also, shore fisheries using handlines are active on Bonaire. Of the total catch of 103 tonne in 2014, 12 t was caught by shore-based handline fisheries, 30 t by small vessels and 60 t by larger vessels (de Graaf et al. 2016; Tichelaar 2015). The value of these fisheries is estimated at 0.7–1 million USD. Fisheries on Bonaire are managed by the fisheries act for the BES islands (Visserijwet BES, 2014) and additional local fisheries regulations in for example the Bonaire National Marine Park (BNMP). Here, fishing activities are restricted (e.g. fish traps are not allowed, several species cannot be landed) and two small No Take Zones have been designated.

Current fishing practices on Bonaire are shore-based coral reef fisheries and boat-based fisheries targeting mainly pelagic, but also coral reef species. Boat-based fisheries mainly fish relatively close to the shore (<400m) where steep slopes around the island enable fishing for pelagic species. Historical fishing statistics are lacking which complicates determining trends in stock status and fisheries landings. This study shows that fishermen and middlemen from Bonaire also sail out to Los Roques and Las Aves archipelagos (Venezuela) to fish for and/or buy seafood caught here. Sometimes fish is brought to Bonaire by Venezuelan fishermen or merchants.

Challenges for the boat-based fisheries on Bonaire are the current high fishing pressure on barracuda, graysby grouper and very low catch rates of dolphinfish (de Graaf 2016). Whether this indicates a trend has to be determined by fisheries monitoring.

Coral reef species are targeted by boat-based fisheries and shore-based fisheries. Shore based coral reef fisheries have a relatively small estimated total annual landing (12 t) (de Graaf et al. 2016). There are concerns about the abundance and size of many coral reef fish species around Bonaire, both for commercially and non-commercially important stocks. Due to an absence of historical abundance and fishing data, any positive or negative trends are impossible to determine (de Graaf et al. 2016). Fishing pressure on groupers (e.g. graysby) is high and can be considered as overfished (de Graaf et al. 2016). In addition, fishing pressure is high on barracuda and dolphinfish almost disappeared in the fisheries landings in 2014 (de Graaf et al. 2016). Parrotfish is still being landed, despite the ban on harvesting the species since 2010. Current fishing pressure on other reef fish species on Bonaire indicated that these are fully exploited (de Graaf et al. 2016).

Historically, fishing activities have led to a drastic decrease in fish species, sea turtles and other marine life in the Caribbean Netherlands. An analysis of the catch composition on the neighbouring island of Bonaire, Curaçao, has showed that the catch composition has drastically changed since the '50s (Vermeij et al. 2019, Meesters et al. 2019). Large predatory fish are almost completely absent. Smaller, herbivorous fish like parrotfish have increased in abundance, following the 'fishing down the food web' principle. This increase in lower trophic species is a direct result of overfishing on larger predatory fish species (Meesters et al. 2019). Because of the similar development of fisheries on Bonaire, the same effects are likely to have occurred here.

The current fishing pressure on groupers (large and small species), snapper and barracuda must be reduced to enhance the recovery of apex predators and the reef fish community. Further challenges for fisheries on Bonaire is the establishment of a fisheries monitoring program enabling determining trends in fishing effort, total landings, bycatch and eventually performing stock assessments.

1.2 FISHERIES ON SABA

Fisheries on Saba are mainly characterized by lobster fishing, using lobster traps. Fish species are targeted using traps and drop lines. Red fish is a term that refers to several species of snapper (*Lutjanus* sp., *Ocyurus* sp. and *Rhomboplites* sp.). A total of ten fishing vessels are active on Saba with a total catch of 135 t in 2015 (de Graaf et al. 2017). Commercial fishing grounds on Saba are mainly located on the Saba bank. Commercial fisheries on Saba are controlled by fishing licenses. In the red fish fishery, the spawning ground of red hind is controlled by a seasonal closing. A self-imposed fishery regulation in Saba includes regulations to protect redfish from over-exploitation by limiting the amount of gear and seasonal and spatial closures (de Graaf et al. 2017). However this regulation is no longer active since 2018.

There are currently no strong signs of overfishing in the lobster fishery on Saba (de Graaf et al. 2017, Brunel et al. 2018). Since its lowest levels in 2011, lobster landings increased steadily until 2017, reaching the levels before the decline started in 2007. According to Brunel et al. (2018), landed lobsters are relatively large (mean of 107 mm carapace length), indicating a healthy adult stock, which is favourable for further stock recovery. The bycatch of reef fish in lobster traps is a reason for concern.

Even though lobster landings have increased steadily from 2011 to 2017, reef fish bycatch in the lobster fisheries have levelled off in 2013 (Brunel et al. 2018). This indicates a low stock status of reef fish on the Saba bank threatening reef health. Another problem in the lobster fishery is the bycatch of sharks. The estimated annual number of discarded nurse sharks varies between 1712 and 2499 individuals (de Graaf et al. 2017).

Put into a historical context, the current status of the Saba Bank and its associated fish communities is far from what it used to be. Extensive overfishing in the 1970's, 80's and early 90's on the Saba bank by industrial vessels has resulted in drastic declines of reef fish species (mainly groupers) and queen conch (*Lobatus gigas*). This came to an end when the Netherlands Antilles fisheries regulation was enacted in 1993 and the exclusive fisheries zone of the Saba bank was claimed and enforced by the Dutch Caribbean Coast guard (de Graaf et al. 2017). Even though the Saba Bank has not recovered fully, recent stock assessments of lobster and snapper species stocks on the Saba Bank are developing favourably (Brunel et al. 2018). However, the stock status of other reef fish (Debrot & de Graaf, 2018) and groupers is still poor (de Graaf et al. 2017).

Further challenges for the current fisheries on Saba mainly concern the current lack of a coherent and effective fisheries management framework. A management framework including reference points, scientific stock assessments, monitoring of its effectiveness and feedback mechanisms for implementing new or relaxing existing measures is lacking. In addition, enforcement of the current regulations is weak.

1.3 FISHERIES ON ST. EUSTATIUS

The fishery sector on St. Eustatius counts of 15–20 small vessels (<10 m). About 200 traps are used, targeting spiny lobster and/or reef fish (de Graaf et al. 2015). Lobster is the main target species on the island ($\pm 70\%$ of total landings) (Kitson-Walters, 2017). Lobsters are mainly caught using lobster traps (68%) and a smaller proportion by free diving (14%) and scuba diving (14%). The total lobster landings in 2018 was 16.4 t (Brunel et al. 2020), which is low compared to previous years and follows the same variation as the variation in total fishing trips (Brunel et al. 2020). On average, 41% of the landed lobsters were below the legal size limit of 95 mm carapace length (Brunel et al. 2020).

Reef fish are mainly caught in lobster traps (47%), but also by free-diving using a spear gun (19%), handlines (23%) and scuba diving also using a spear gun (11%) (Brunel et al. 2020). Spearfishing is illegal when using scuba or Hookah diving equipment on St. Eustatius (Openbaar Lichaam St. Eustatius, Marine Environment Ordinance 1996).

Total reef fish landings in 2018 was 6 t (Brunel et al. 2020). Mainly surgeonfish and small grouper species were the dominant target group by weight. These species used to be dominant bycatch species, however nowadays, these are the most important commercial species targeted as the larger commercial interesting species like large bodied groupers and snappers have disappeared. This is a clear example of fishing down the food chain happening in St. Eustatius where less valuable species are targeted simultaneously when higher value species disappear from a system (Debrot et al. 2017). Pelagic species are caught as well on St. Eustatius, however to a far lesser extent (Kitson-Walters, 2017). Pelagic fish are caught by trolling and total landings were only 1.3 t in 2018 (Brunel et al. 2020).

At last, Queen conch is also targeted on St. Eustatius. Queen conch is harvested using free diving and scuba diving and landings have increased from 1754 individuals in 2014 to 12.201 individuals in 2018 (Brunel et al. 2020). It is reported that fishermen are using scuba diving to fish for conch. However, harvesting conch in the Statia National Marine Park with scuba gear is prohibited and the marine park runs up to 30 m deep surrounding the island (Statia National Marine Park regulations, 1996). All conch landed in St. Eustatius is fished at a depth between 18–30 m depth, thus by definition illegal (personal communication Erik Boman). In addition, there is a harvest control rule in force on St. Eustatius of 20 individual queen conch per year per person, which is only for personal use and all landings must be reported (Openbaar Lichaam St. Eustatius, Marine Environment Ordinance 1996). The reported total conch catch by Brunel et al. (2020) are therefore all illegally fished within the Statia National Marine Park and exceed the maximum allowable catch of 20 conch per person per year.

Total landings on St. Eustatius for lobster, reef fish and pelagic fish combined was 23.7 t in 2018 (Brunel et al. 2020). For the fisheries on St. Eustatius, there are reasons for concern regarding a high amount of lobsters being landed below the minimum legal size, low stock status of reef fish and high levels of sharks found in lobster traps. The current reef status is very poor and low catch levels of small fish indicates degraded reefs and ongoing overfishing (Debrot et al. 2017). Additionally like on Saba and Bonaire, a comprehensive fisheries management plan is lacking on St. Eustatius.

The St. Eustatius National Marine Park (SNPM) was established in 1996 and includes two marine reserves. In the marine reserves no fishing or anchoring is allowed (de Graaf et al. 2015). These measures are introduced by STENAPA, however these are not enforced under local legislation and the restrictions are frequently violated.

1.4 RESEARCH OBJECTIVE

WWF-NL wishes to enhance sustainable practices in the fisheries and seafood supply chain in the Caribbean Netherlands. Sustainable fisheries require collaboration and involvement of the entire seafood supply chain as well as management organisations and the local and national government.

Many approaches to enhance sustainable fishing practices have been implemented in fisheries around the world. Which approach fits best is determined by local factors such as the management system, the size of the fleet, community involvement and the organisation of the seafood supply chain.

To achieve a more sustainable fisheries and seafood supply chain, all fishermen must be fully committed to change their fishing practices. Therefore, bringing about change in fisheries and the entire supply chain must involve the fishing community directly or indirectly, like in a collaborative management scheme. In general, three main approaches can be distinguished to stimulate fisheries towards more sustainable practices: through regulation, through market mechanisms or by increasing awareness. These approaches can be implemented simultaneously and can strengthen each other. Increasing awareness in the fishing community and consumers will stimulate initiatives from the fisheries community to adopt sustainable fishing practices.

A study carried out by WWF-NL (2019) has identified the criteria for implementing a co-management system as a tool to enhance fisheries management in the Caribbean Netherlands. However, the study found that a majority of the critical principles for co-management are currently not being met. Some of the critical principles currently lacking on the islands are rather basic fisheries monitoring and management schemes. In interviews with the researchers, many fishermen on the islands have indicated to be willing to participate in a co-management system.

This report will explore and elaborate on the different possibilities to enhance sustainable practices in the fisheries and seafood supply chain of Bonaire, St. Eustatius and Saba. The objective of this study is to gather information on the perspectives of the different parties involved in the seafood supply chain in the Caribbean Netherlands. In addition, this study aims to document, and where possible estimate total volumes of, the seafood trade flows active on Bonaire, St. Eustatius and Saba. This information will be fed into a broader WWF-NL roadmap aiming to achieve sustainable fisheries in the Caribbean Netherlands.

This report will briefly describe the study method followed by an analysis of the interviews for each of the islands separately. Following these results, the possible approaches to implement sustainable practices will be explored. Recommendations are provided to enhance sustainable practices in the seafood supply chain in the Caribbean Netherlands. Finally, a roadmap is presented to WWF-NL to follow up on this study.

2. METHOD

2.1 STUDY REGION

This study was conducted in the islands of the Caribbean Netherlands; Bonaire, St. Eustatius and Saba which are located in the Lesser Antilles. Bonaire is part of the Leeward Antilles, southerly islands group in the of the Lesser Antilles and close to the coast of Venezuela. Saba and St. Eustatius are located in the main Lesser Antilles island group, also referred to as Leeward Islands (Figure 1).

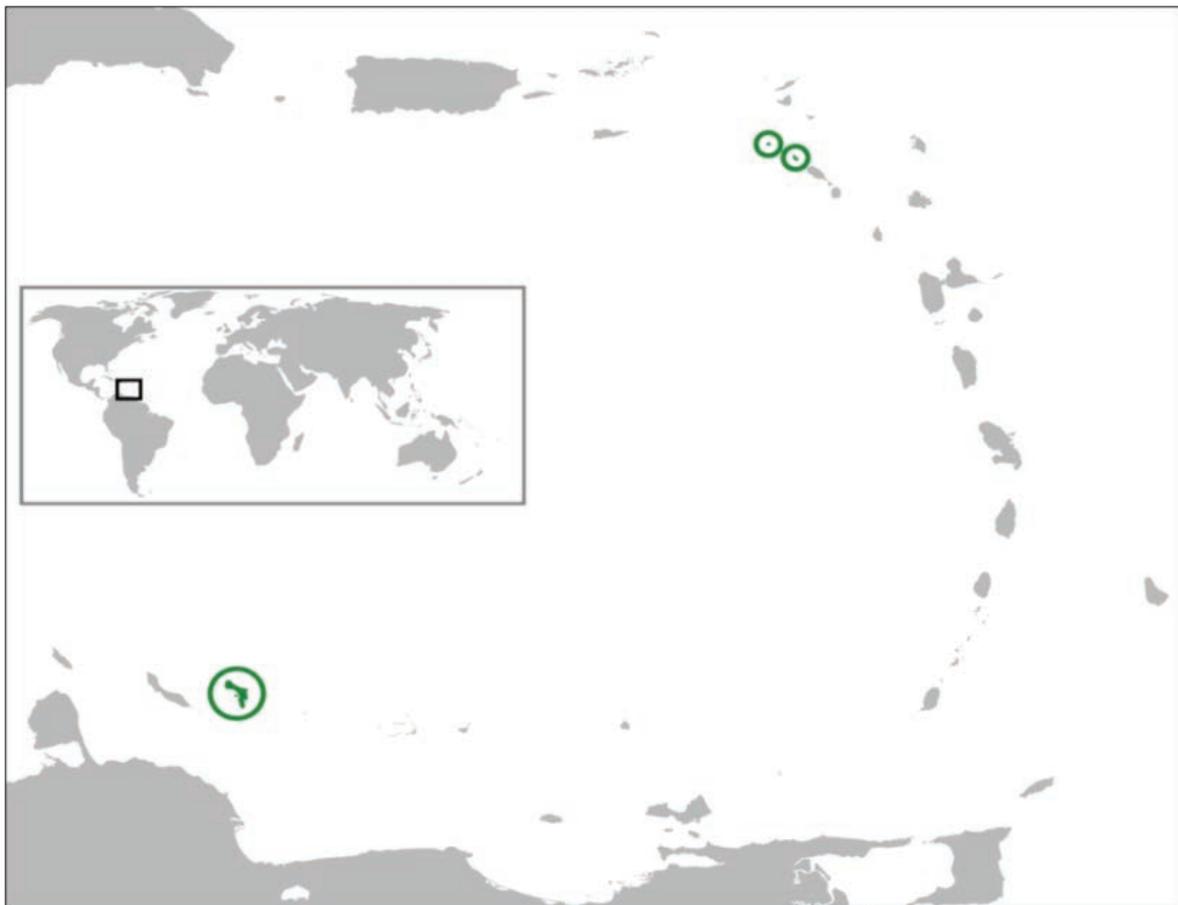


Figure 1 Location of the Caribbean Netherlands. Encircled in green, bottom left: Bonaire, upper right: Saba, lower right: St. Eustatius.

2.2 DATA COLLECTION AND ANALYSIS

Four target groups were identified to be interviewed for this research on each island. These include: consumers, professional fishermen, restaurants/supermarkets and exporters/importers. Professional fishermen on these islands can all be classified as local, artisanal fishermen.

For each of these parties, questionnaires were set up to gather information on their perspective on the island's fisheries, seafood supply chain, fish consumption, trade and sustainability. The interview templates used are attached to this report. The template for consumers in Appendix 1, fishermen in Appendix 2, supermarkets and restaurants in Appendix 3 and importers/exporters in Appendix 4. Each of these target groups were interviewed between June 2018 and May 2019. The interviews were conducted by staff and/or contacts of WWF-NL.

In total, 361 interviews have been conducted of which 197 on Bonaire, 97 on St. Eustatius and 67 on Saba (Table 1).

	Saba	St. Eustatius	Bonaire	Total
Consumers	44	51	159	254
Exporters/importers	2	0	1	3
Restaurants/supermarkets	17	33	25	75
Professional fishermen	4	13	12	29
Total	67	97	197	361

Table 1 Number of interviews conducted per target group on each island.

The results presented in this report are obtained from on-island interviews, literature studies and additional information obtained from WWF-NL and local experts working with fisheries and/or nature protection. Results and estimates from the interviews should be treated with care as the information provided here represents the view and estimates of the interviewees and will not be comparable to official scientific data. Furthermore, the interviews were conducted right after the passing of 2 major hurricanes destroying the seafood markets of Saba and St. Eustatius which might have influenced the outcome of the interviews, not representing the 'normal' situation.

In order to obtain additional information on the seafood trade flows, several local offices, responsible authorities and external databases were consulted.

To get a full register of the different businesses involved in the seafood supply chain in the Caribbean Netherlands, the Chamber of Commerce of Bonaire and the one for Saba and St. Eustatius have been approached by email, telephone and personal visits. We have requested a list of restaurants and supermarkets on the island where seafood is or can be sold. For a fee, two lists of seafood related businesses have been obtained with names, addresses and contact information. The lists have been composed by the Chambers of Commerce based on specific activity codes to select businesses. For Bonaire, we have combined the information retrieved from the Chamber of Commerce with information obtained from the Tourist Cooperation Bonaire

After our request for data on the total seafood import and export from Bonaire, Saba and St. Eustatius the Central Bureau of Statistics (Centraal Bureau voor de Statistiek, CBS) published the total seafood import and export data for the islands on their website (CBS, 2020) and is attached in Appendix 8. However, only information of the total import value (in US dollar) was available. The CBS retrieves their data from import declarations at the local customs. Businesses declare their total import and export and CBS receives this information from the customs every 3 months. These declarations are obligatory for all businesses trading commodities with other countries (CBS, 2020).

Another method to retrieve information on import and export data used was the International Trade Centre (ITC) (ITC, 2020). From this database, import and export data from various countries can be retrieved. For the Caribbean Netherlands, only combined data is available, not for each island separately. The database does not indicate any seafood export from the Caribbean Netherlands, only total import is given. The data acquired through the International Trade Center database for the Caribbean Netherlands is given in Appendix 9.

3. RESULTS BONAIRE

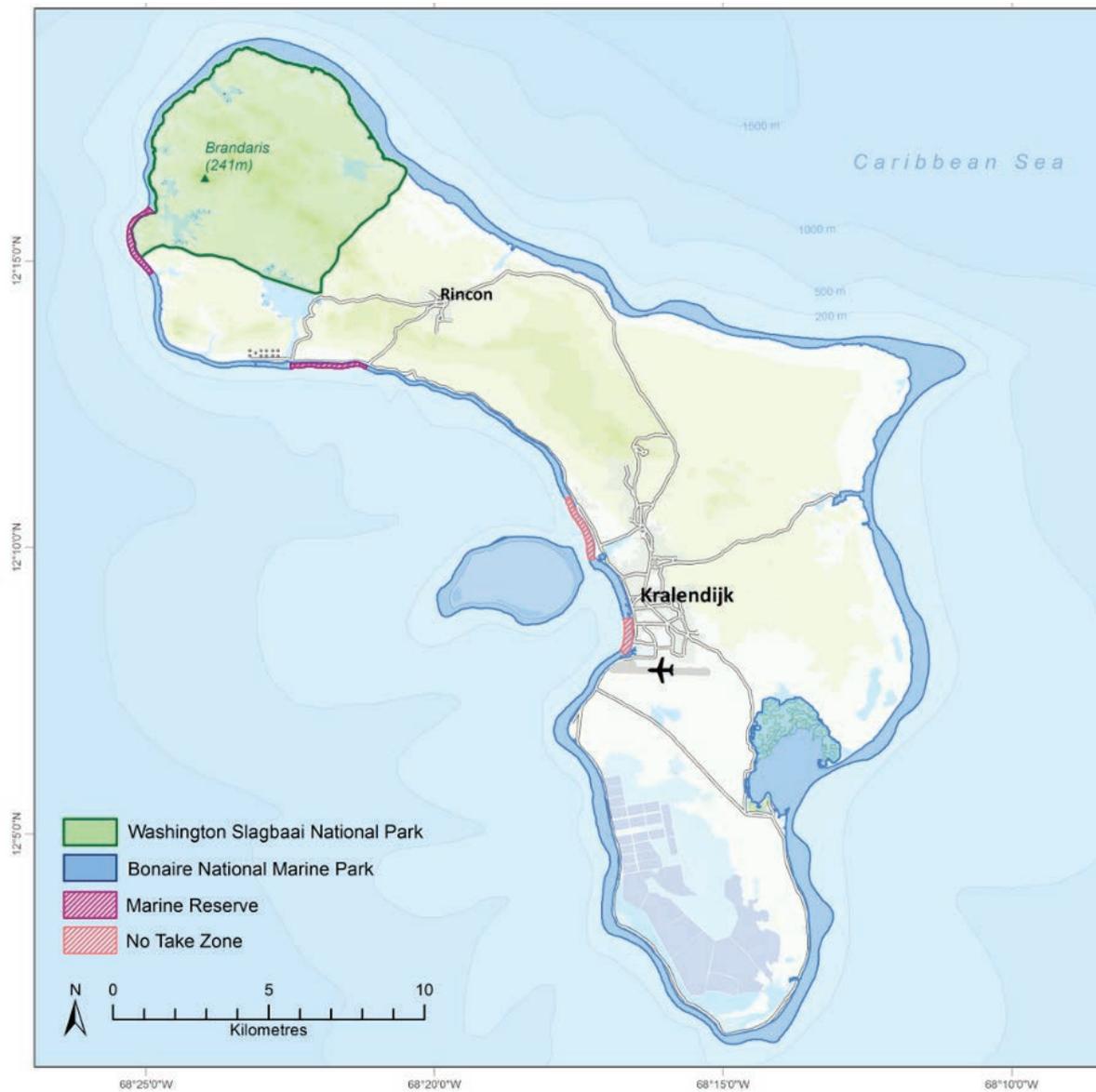


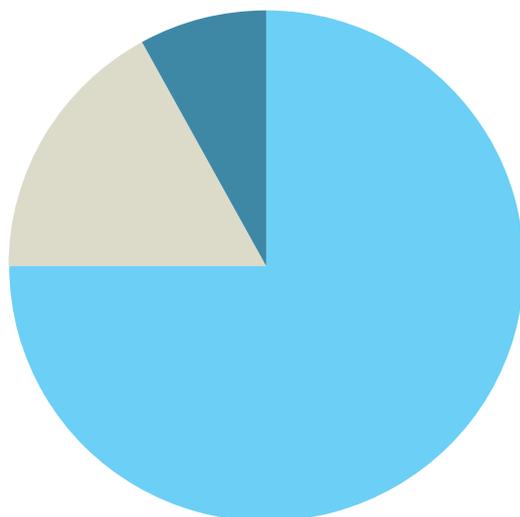
Figure 2 Map of Bonaire indicating the Bonaire National Marine Park area, Marine Reserve and No Take Zone's. Retrieved from: Dutch Caribbean Nature Alliance (DCNA) (<https://www.dcnanature.org/islands/bonaire/>).

3.1 FISHERMEN

Buyers, species and delivery

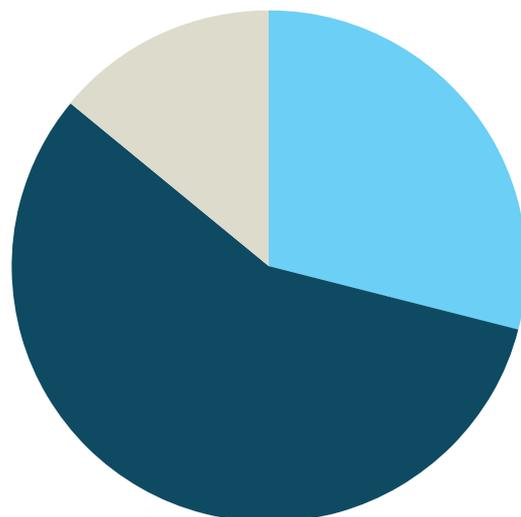
On Bonaire, 14 fishermen were interviewed in total, of which three fishermen filled in one interview together. This comes down to 12 analysed interview forms. It is unclear how many professional fishermen are active on Bonaire in total as there is no obligatory registration, but this is estimated to be around 30-40 professional fishermen. Nine fishermen interviews indicated that they sell their seafood primarily to middlemen. It appears that there are five major middlemen operating on Bonaire who are buying and reselling seafood. Walk-in individual consumers are the second most important customer for the fishermen. Only four fishermen directly sell their catch to restaurants. From the interviews, it can be concluded that fishermen on Bonaire generally do not export their catch. The three fishermen that were interviewed together export 'masbangu' (bigeye scad) to Curaçao when the total demand on Bonaire is met. It is unclear whether the middlemen mentioned by the fishermen also export fish from Bonaire.

Primary location where fishermen on Bonaire sell their seafood



75% Middlemen
17% Restaurant
8% Personal use

Second most important location where fishermen on Bonaire sell their seafood



29% Middlemen
57% Walk-in consumers
14% Restaurant
0% Personal use

Figure 3 First and second most important locations/persons where fishermen on Bonaire sell their seafood.

A total of nine species are mentioned as being sold by the fishermen on Bonaire. These are mainly red snapper (23%), fish/piska (species not specified) (14%), tuna (14%), mahi mahi (14%) and barracuda (14%). Other species include lobster, masbangu, amberjack and wahoo.

Most fishermen primarily sell their seafood to middlemen because this is the easiest way of selling their catch. In this way, they have only one buyer and quick sales. Moreover, most fishermen have long and trustworthy relationships with their middleman. The few fishermen who primarily sell their catch to restaurants indicate that they have good relationships with these customers and therefore these are their first point of sale. Fish is transported by the fishermen themselves to restaurants, the fish shop and other buyers by pick-up truck. Walk-in consumers are the second

most important group to which the fishermen sell their seafood. Every fisherman sells at least a small part of the total catch to local consumers who visit the fishermen at home or at the dock.

All fishermen deliver their fish whole and mostly gutted. Some fishermen remove the scales. One interviewed fisherman will also clean, portion/fillet the fish upon request by the customer for an extra fee.

Most fishermen indicated that they apply the fixed prices implemented by the government (Appendix 5), and this is the same price for all buyers. Few fishermen apply a price difference between the type of buyers: middlemen - locals - restaurants. Some fishermen only have one buyer (one middleman) and thus charge the fixed price conform governmental regulations. Prices specified by the fishermen only differ slightly between species. Apparently, the prices charged by the fishermen are largely determined by the fixed government price rather than the type of customer.

Species landed and sold by the fisherman on Bonaire

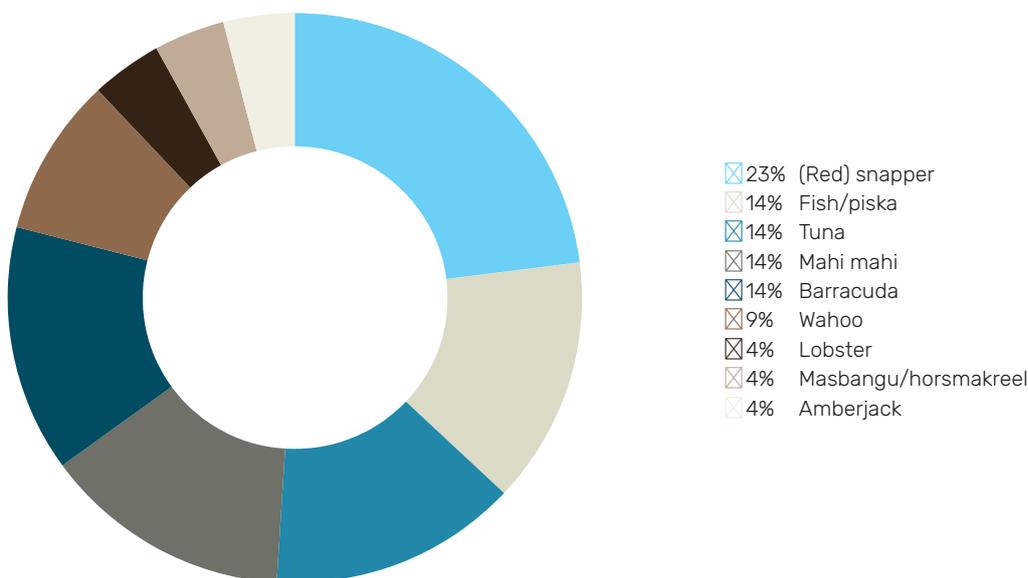


Figure 4 Species landed and sold by the fisherman on Bonaire

Sales statistics

Only eight fishermen were able to provide yearly sales statistics in the interviews. These should be regarded as rough estimates because this information was not given for all target species and the fishermen were only able to give an indication of their total catch. From these estimations, red snapper is the most caught and sold species by weight (7195 kg/year). Second is barracuda with 6400 kg /year. Other most caught and sold species by weight are wahoo (2530 kg/year) and mahi mahi (1125 kg/year). Based on the given sales statistics, a total of 33.720 kg fish is sold per year by these eight fishermen on Bonaire.

Demand

Most fishermen interviewed do not encounter problems selling their catch on Bonaire. Whether fishermen go out fishing does not depend on the demand but mainly on weather conditions. The three fishermen in the combined interview sometimes have problems selling their catch, mainly

masbangu, on Bonaire because the market demand is met very quickly. They therefore export most of their catch to Curaçao even though they wish to sell their fish more locally. The main problem encountered by the fishermen on Bonaire is the low price received for their fish. Some would like to see higher catches so they can sell more.

Questions consumers

None of the fishermen receives questions from their buyers on the origin of the fish, the capture method or sustainability. One fisherman indicates that some of his customers occasionally ask if the fish offered by him is sourced locally.

Change in catches

Overall, 71% (10) of the interviewed fishermen state that they observe declining catches. Species mentioned to be in decline are tuna, mahi mahi, marlin, wahoo and snapper. Two fishermen indicated to observe dramatic declines in total catch. Two fishermen state that catches have been stable over the years. One fisherman sees an increase in catches of sharks. The perception of the fishermen on why catches are changing varies. Most fishermen indicate natural causes (35%) like natural variation, changing ocean currents and global warming. Overfishing is mentioned by three fishermen (15%) as primary cause. Fishing activities in general and pollution are both mentioned twice (10%) as primary cause. Other causes that are mentioned by the fishermen include hurricanes, diving tourism, coral bleaching, sun lotion pollution, the presence of foreign fishing vessels in the waters around Bonaire and fewer floating objects on the surface (like driftwood, pallets) to attract fish.

Fisheries management measures

The fishermen mentioned size limits, and spatial and seasonal protection as the current main fisheries management measures implemented on Bonaire. However these measures are in place for lobster fisheries only. Only a few fishermen indicated to have taken voluntary measures such as restriction in the number of gears, size limits and catch limits. These voluntary measures are not specified further. Therefore, it is not clear if these are also (partly) included in official fisheries regulations. Generally, fishermen on Bonaire do not feel restricted by the current regulations, with the exception of one individual fisherman.

The interviewed fishermen rated the suggested fisheries management measures very differently. On average, gear adaptation is rated the highest, e.g. most desirable measure (four out of five), followed by seasonal and spatial protection, introduction of an eco-label and restrictions in de number of gears. Overall, catch limits, restriction in the number of fishermen, a seafood guide and change in target species are on average regarded as the least desirable measure (two out of five). However, the rating of management measures differs strongly between fishermen. For example, gear restrictions and size limits are equally rated as the most and least desirable measure.

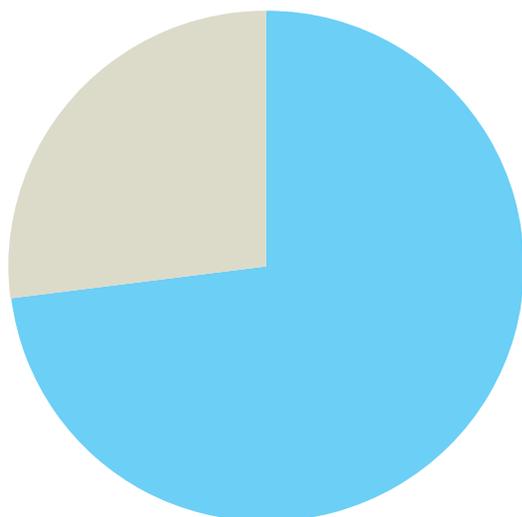
About half of the interviewed fishermen would change their target species if this would be feasible and/or more sustainable. About the same number of fishermen would not change target species for any reason. According to them, this is not possible because their fishing practice/gear is not selective enough or changing their target species is regarded as unnecessary.

The most mentioned reason for discarding species were to give the fish a chance to grow (e.g. size limit) and when these are protected or endangered species. Hereafter come sustainability and low demand as indicated reasons to discard.

3.2 RESTAURANTS & SUPERMARKETS

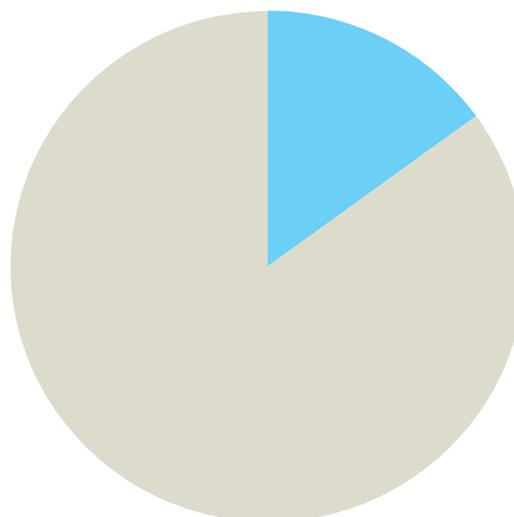
A total of 25 restaurants and supermarkets were interviewed on Bonaire. Of these, 11 were supermarkets/shops and 13 were restaurants/bars. Of all 13 restaurants interviewed, two restaurants do not sell local fish at all and 11 restaurants do source at least part of their seafood on their menu locally. Of the 11 supermarkets on Bonaire, eight supermarkets do not sell any local fish and three supermarkets source part of their seafood offer locally.

Local / non local fish in supermarkets on Bonaire



73% No local fish
27% Local fish

Local / non local fish in restaurants on Bonaire



15% No local fish
85% Local fish

Figure 5 Left: percentage of interviewed supermarkets selling local and non-local seafood on Bonaire. Right: percentage of interviewed restaurants serving local and non-local seafood on Bonaire.

No local seafood

Of the 25 interviewed restaurants and supermarkets, a total of two restaurants and eight supermarkets do not sell any locally caught fish or seafood. In six of these supermarkets, no fish or seafood is sold at all. The remaining four businesses only sell imported seafood because of the low demand of local seafood is too low as customers buy seafood directly at the fishermen. Also, importing seafood is easier and cheaper. Some buy their seafood from larger supermarkets to store and then sell them in their own smaller shop. Other arguments indicated not to buy local seafood are: local seafood is not frozen and packed correctly, the supply is irregular and there are concerns around the quality and hygiene standards.

Restaurants and supermarkets indicated three main reasons to start sourcing local seafood. This includes a higher demand by consumers for local seafood, better prices and a constant supply. Some businesses are not interested in sourcing local seafood at all.

None of the interviewed businesses that do not source local seafood, receive questions from consumers on the origin, capture method or sustainability of the seafood offered. Some businesses indicate that they do have this information available, others have to rely on the label information from imported seafood.

Sourcing local seafood in restaurants/supermarkets

Most of the businesses that sell local seafood (ten out of fifteen), source a large share (76-100%) of their total seafood assortment locally. Some businesses (four, mainly supermarkets) source only a small portion of their total seafood assortment locally. All interviewed businesses on Bonaire that sell local seafood, indicated to buy this directly from fishermen. However, these are probably middlemen of which restaurant and supermarket owners assume to be fishermen.

Species

The top-4 most bought local species by restaurants and supermarkets are respectively, mahi mahi, tuna, wahoo and barracuda. However, it is unclear whether these species are sourced locally at all times. One of these business indicated, for example, to buy his tuna from local fishermen and all other fish species from Bonaire Food Group (wholesaler).

Restaurants who provided information pay on average \$8,00 per kg for locally caught barracuda, wahoo, mahi mahi, jack and tuna. Red snapper and grouper are with \$9,00 per kg slightly more expensive and lobster is on average \$21,00 per kg. The price for imported seafood is much higher, with \$28,00 per kg for salmon (one restaurant) and on average \$29,00 per kg for shrimp.

Most of the local fish is delivered whole or filleted. Most (ten out of fifteen) businesses indicated to be happy with the way the fish is delivered and do not wish to change this. In general, there is no seasonal price difference, prices may vary between fishermen and upon availability. Seasons do influence the availability of certain species, mainly for wahoo, tuna and mahi mahi.

Of the given purchasing statistics by fifteen restaurants/supermarkets on Bonaire, tuna is bought most by weight (approx. 20.000 kg per year), followed by wahoo (approx. 15.000 kg per year) and mahi mahi (15.000 kg per year). However, these are rough estimates and many businesses were not able to give detailed statistics. Only one restaurant imports mahi mahi and another imports tuna. Other pelagic species are bought locally. Species that are being imported are mainly shrimp, salmon, pollock, 'seafood mix' and pangasius. The fifteen restaurants and supermarkets that provided purchasing statistics estimated to buy (locally and imported) a total of approximately 61.000 kg seafood per year on Bonaire.

Supply of local fish

Businesses sourcing local seafood experience purchasing problems mainly caused by the irregular supply and species availability. Also, insufficient supply and undersized fish are problems encountered with local fish.

There are different views on the price fluctuations and price developments of local versus imported seafood. About half of the interviewed business, indicated that they have experienced a price increase of local seafood. The other half has not experienced a price increase. Some business say that local seafood is more expensive than imported seafood.

Most businesses (ten out of fifteen) experience more difficulty in sourcing seafood locally compared to previous years. According to them, this is because of lower catches by the fishermen and more competition on the island between buying parties. As a substitute for local fish, the majority of the businesses will import frozen fish directly or via supermarkets. About half (seven out of fifteen) of the businesses are concerned about the supply of local seafood on Bonaire. One is very concerned and relates dwindling fish stocks to the many anthropogenic pressures on Bonaire's reef. About half of the interviewed businesses are not concerned about the local seafood supply.

There is not a lot of seasonality in the demand for seafood. Some have irregular demand in general and some experience an increased demand around Easter.

Customers and sustainability

The interviewed businesses sourcing local seafood have a fairly equal division in type of costumers. On average 33% are local, 27% are expats and 43% are tourists. Most (fourteen out of fifteen) businesses never receive questions on capture method or sustainability. A majority of the businesses (ten out of fifteen) have indicated that customers only ask about the origin of the seafood offered. Restaurants and supermarkets indicated to have the information provided by the fishermen available.

Almost all businesses are very satisfied with the revenues generated from local seafood. A majority has indicated that they would sell even more local seafood if this becomes available.

Demand is the determining factor for most business when putting a certain type of fish on the menu. Availability is also an important aspect. Most businesses (ten out of fifteen) indicate that they would promote sustainable species, boycott unsustainable species and/or implement an ecolabel. Only three businesses indicate not to consider any of these methods in their shop or restaurant. Promoting sustainable species is mentioned most often as the preferred option. Least desirable is boycotting unsustainable species.

3.3 CONSUMERS

Of the in total 159 consumers that were interviewed on Bonaire, more than half (52%) indicated that they buy seafood less than once a week. A smaller fraction, 34%, said that they buy seafood more than once a week, while 14% never buys seafood. Consumers on Bonaire mostly purchase their seafood directly from the fishermen (51%), followed by restaurants (39%) and supermarkets/shops (32%). Here too, seafood is probably bought from middlemen but consumers assume them to be fishermen.

When comparing the type of consumer (expat, tourist or local), we found that locals source their seafood directly from fishermen. Tourists mainly buy seafood at restaurants, but 38% of the tourists also indicated to buy seafood from fishermen directly. This can possibly be middlemen perceived as fishermen by the tourists.

When people were asked what type of seafood they consumed most often, most of them indicated to eat 'fish' most often, followed by shrimp and lobster. The most popular fish species amongst consumers on Bonaire are snapper and tuna. Surprisingly, someone even had shark in his/her top-3 of most eaten species. The majority never knows the origin of the seafood they buy (35%), while others say to be sometimes aware of where their seafood comes from (34%) and about the same share of consumers (33%) indicates to always know the origin of their seafood. More than one-third (39%) of the consumers on Bonaire have no idea how their seafood is caught. However, still 36% sometimes know what fishing gear is used. Only 24% says to know the capture method at any time. Whether the received information on origin and capture method is correct is uncertain.

When asked about the most imported criteria upon buying seafood, consumers rate quality, price, sustainability, convenience and local (origin) the same on average: 4 out of 5. Quality is rated slightly higher (4.4 out of 5) compared to origin/local (3,9 out of 5) and sustainability (3,8 out of 5). Most consumers (75%) indicate to be willing to pay more for a product of which they know it

is caught sustainably. Many consumers (69%) would also consider not buying a product knowing it harms the local environment. Consumers on Bonaire prefer to be informed by the government about the sustainability of their seafood.

3.4 EXPORTERS/IMPORTERS

Middlemen

Five exporter/importer interviews were carried out on Bonaire. These are all middlemen, selling fish from local fishermen and reselling this to other parties on the island. These parties mainly include restaurants and local individual consumers. Species traded include reef fish (red snapper, grouper, jack), lobster, and pelagic species (wahoo, mahi mahi, bigeye scad, tuna and barracuda). The most important criteria for seafood selection indicated are freshness and appearance (average score five out of five). Sustainability is also regarded as an important criteria by three middlemen (average score four out of five). One of the interviewed middlemen indicated that sustainability is important but not on Bonaire 'because all fish caught are migratory species'. Another middleman indicates that sustainability is not an important purchasing criteria for him because there is not enough information available on sustainability.

Not all middlemen on Bonaire are able to meet the demand for seafood. One middleman indicates that this is because there is not enough fish left to catch around Bonaire. Another middlemen can mostly meet the demand however, he used to own three fishing boats which is now down to two. In the high season (tourist season), he is not able to meet the demand with two boats. Also, it is said by one middleman that he is only able to meet the demand because of a boat coming from Los Roques, Venezuela, to supply fish.

About half of the seafood sold by middlemen on Bonaire is sold to restaurants, and about half is sold to local/walk-in consumers. This confirms that supermarkets, restaurants and consumers who have said that they buy seafood directly from fishermen, actually buy it from middlemen. Three middlemen receive questions on the origin of the fish of which one indicates that mainly locals ask him if the fish is coming from Las Aves or from Bonaire. Only two middlemen receive questions on the capture method, mainly from tourists. All middlemen indicate to be able to provide information on origin and capture method of the products they sell.

When it comes to sustainability, only one middleman receives questions on this, mainly from tourists. When asked if middlemen would import more sustainable seafood if the demand for sustainable seafood increases, two of the middlemen indicate that sustainability is not an issue for fisheries on Bonaire so this will not be the case. One middleman will find his solution on Las Aves (see below) where he would go if there is not enough fish left on Bonaire. Only two middlemen would work with ecolabels when these are introduced on Bonaire, however the other two middlemen believe that this will not work on the island.

Only one middleman also exports his/her fish. This middleman only exports less than 25% annually. The destination is Curaçao. This middleman brings the fish gutted on ice (not scaled or filleted) by boat and does one shipment per year of 50 kg. Transport costs are only for gasoline for the boat, of \$75-100. This middleman wishes to also transport to the Netherlands (lobster and tuna) but this is very difficult to arrange.

The purchase and selling statistics from the middlemen give some insights in the price differences between seafood bought and sold. For pelagic species and reef fish, middlemen add \$2 to the purchasing price. For lobster and imported seafood species (octopus, whelks) the added price is more (around \$5).

Las Aves and Los Roques archipelago

From the interviews with the middlemen and fishermen it has become clear that seafood is caught and/or imported from the Las Aves archipelago to Bonaire which is part of Venezuela. The archipelago is accessible by boat. Four of the five middlemen have indicated to buy fish from Las Aves. One middleman even catches fish around Las Aves himself. This includes reef fish (red snapper, grouper), conch and lobsters. Also three fishermen indicated to be active around Las Aves and indicated that a lot of the seafood on Bonaire is actually sourced from Las Aves. Also, sporadically, merchants from Venezuela bring fish from Los Roques to Bonaire.

The interview showed that middlemen charge a \$2 price increase on fish from waters around Bonaire. Middlemen are able to buy fish from Las Aves for a lower price, but the selling price on Bonaire for each species stays the same. Therefore, the middlemen makes an extra revenue from fish bought on Las Aves. It is not clear how much this extra revenue is however, in one of the interviews it is indicated that fish is bought for 5 \$/kg on Las Aves and sold on Bonaire for 25 \$/kg. This extra revenue makes up for extra fuel costs made to get to Las Aves. One middleman indicates that fishermen go to Las Aves because this is easier compared to going out and fish for themselves in Bonairian waters.

Wholesaler

The largest wholesale company of Bonaire is Bonaire Food Group (BFG). BFG owns multiple large supermarkets and supplies fresh products, including seafood to Bonaire, Aruba and Curaçao. No interview was conducted with this company. However, through email contact with WWF-NL, BFG explained that they do not source any local seafood. This is due to the restricted supply and availability. In addition, local seafood does not meet the hygiene standards set by BFG.

Imports

No large seafood importers were interviewed on Bonaire in this market study using the designed interview template for importers and exporters. However, seafood is being imported to the island in two ways. The main channel being wholesalers, supermarkets and restaurants importing seafood. This import consists of species that are not locally available such as salmon, shrimp and scallop and local species of which the demand cannot be met, are not available year round due to seasonality or for which consumers have certain comfort preferences such as being portioned or filleted. Some serve a mixture of local and imported seafood and some, mainly supermarkets, only sell imported seafood. This was confirmed by this study indicating that many supermarkets and restaurants that do sell seafood, do not source these locally or only for a small part. Apart from this, we have found that fresh seafood is unofficially being imported from the Venezuelan islands of Las Aves by fishermen and middlemen. These imports are not being registered by the customs office. They also include illegal species such as Queen conch (harvest is forbidden in Venezuela, see Appendix 6) as well as species harvested outside the season (Caribbean spiny lobster, see Appendix 6). Moreover, it is forbidden to trade conch between countries without a permit issued by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Additionally, Bonairian fishing vessels also fish in Venezuelan waters. According to the national fisheries Act (Visserijwet BES, 2014. See Appendix 7) fishing in waters of a foreign nation or even undertaking trips into waters of a foreign nation without a permit is illegal.

3.5 THE SEAFOOD SUPPLY CHAIN ON BONAIRE

Information from the results above is used to generate a flow chart of the seafood supply chain on Bonaire (Figure 6).

Fishermen on Bonaire mainly catch red snapper or pelagic species. Possibly, a lot of the red snapper (and other species) 'caught' on Bonaire is actually imported from Venezuela, Las Aves archipelago. Fishermen on Bonaire primarily sell their seafood to middlemen. This is different than indicated by consumers, supermarkets and restaurants saying that they buy their seafood directly from fishermen. This is indicated with a dotted line in the figure below (Figure 6).

Of all interviewed restaurants, 85% serves local seafood directly bought from fishermen. However, probably some restaurants also source local seafood from middlemen as only a few fishermen sell directly to restaurants. Most supermarkets (73%) on Bonaire do not sell any local seafood. A smaller part (27%) does sell some local seafood in their shop. Seafood species mainly sold on Bonaire by restaurants and supermarkets are mahi mahi, tuna, wahoo and barracuda.

Consumers on Bonaire mainly eat 'fish', shrimp and lobster, whereas 'fish' mainly refers to snapper and tuna. Local residents mainly buy their seafood directly from fishermen, tourists from both supermarkets and restaurants as well as directly from fishermen. Tourists also buy seafood in restaurants and supermarkets. The largest wholesaler on the island, Bonaire Food Group does not sell any local seafood.

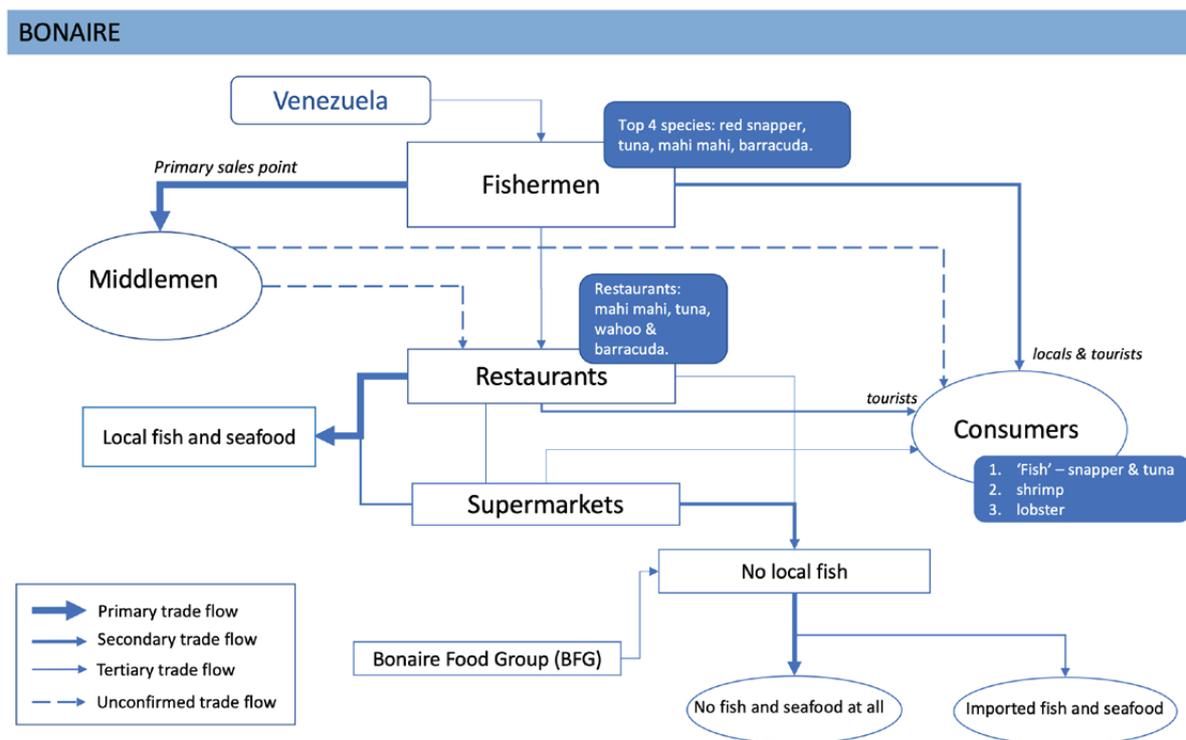


Figure 6 Visualization of the seafood supply chain on Bonaire. Arrows indicate primary, secondary and tertiary seafood trade flows identified during this study. Dashed lines indicate non-confirmed trade flows.

4. RESULTS SABA

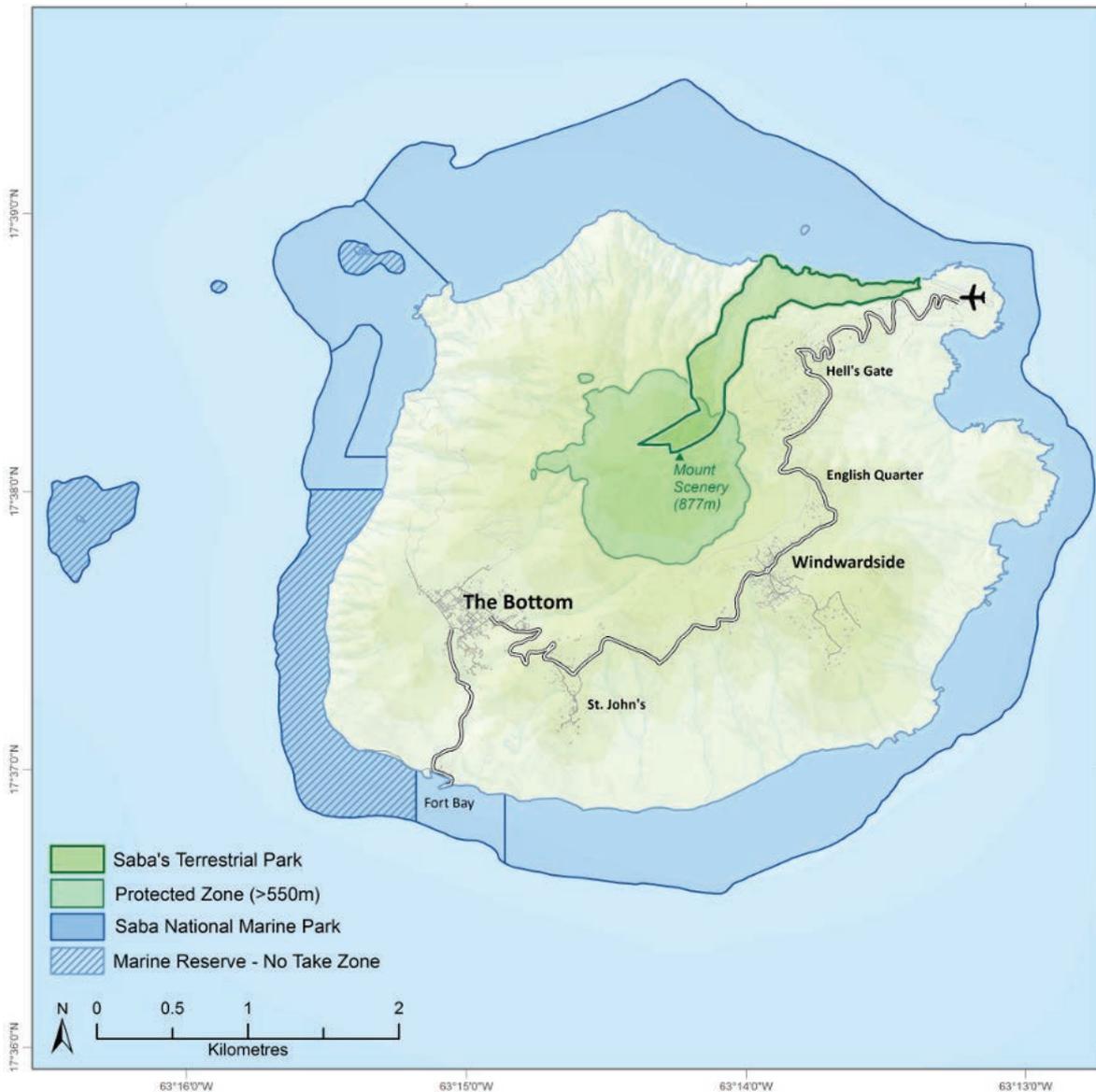


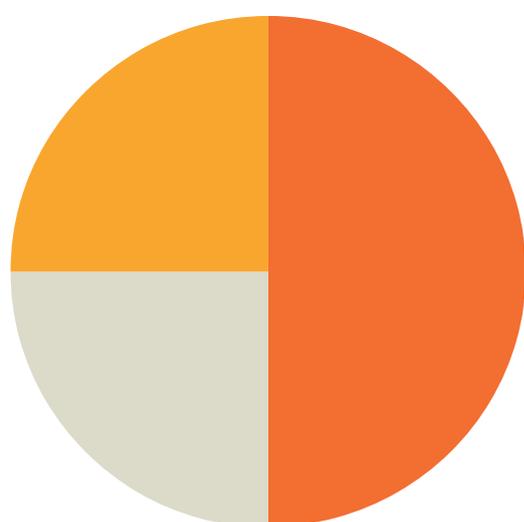
Figure 7 Map of Saba indicating the Saba National Marine Park area and Marine Reserve - No Take Zone's. Retrieved from: Dutch Caribbean Nature Alliance (DCNA) (<https://www.dcnanature.org/islands/saba/>).

4.1 FISHERMEN

Buyers, species and delivery

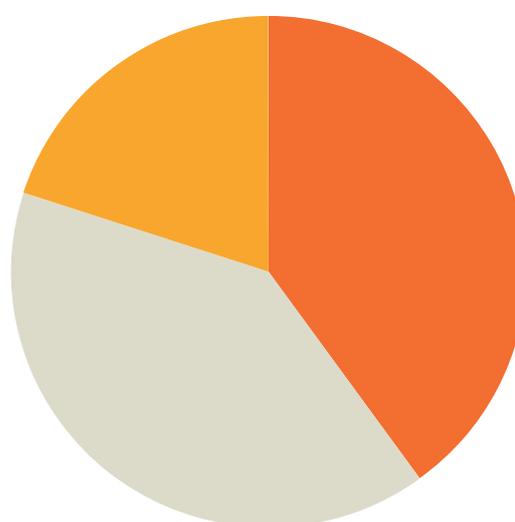
On Saba, four fishermen were interviewed of the approximately ten active fishermen on the island with a total landing of 135 t in 2015 (de Graaf et al. 2017). All fishermen interviewed in this research have their primarily sell their seafood to St. Maarten. Two fishermen indicated that buyers on St. Maarten are also their second most important customers. Types of buyers include middlemen, individuals, restaurants and a lobster importer. All fishermen provide some fish to local restaurants and provide some lobster to a large lobster importer. Two of the fishermen have a middleman they work with and others have local individual customers which they provide with fresh fish.

Primary location where fishermen on Saba sell their seafood



- 50% Middlemen
- 25% Restaurant/supermarkets
- 25% Individual/local
- 0% Lobster exporter

Second most important location where fishermen on Saba sell their seafood



- 40% Middlemen
- 40% Restaurant/supermarkets
- 20% Individual/local
- 0% Lobster exporter

Figure 3 First and second most important locations/persons where fishermen on Saba sell their seafood.

The catch of the interviewed fishermen on Saba mainly consists of lobster. Fishermen have indicated to sell their lobsters mainly to the lobster importer or middlemen on the island. Some lobster is also sold to local restaurants. Other species caught are 'fish', red snapper and lionfish.

The fishermen indicated that personal relations with buyers is the primary reason for selling their seafood to their current costumers. Lobsters are delivered whole and alive, fish is gutted. Most fishermen deliver their catch to St. Maarten with their own boat. Presumably, fish is also sent off with the ferry between Saba and St. Maarten. Sales on Saba are delivered by truck. One fisherman has local customers who pick up the catch at his home. Prices vary slightly between fishermen. For lobster (depending on the size) the price indicated in the interviews is between 6-10\$ per lbs, redfish and pelagics are 10-11\$ per kg.

Sales statistics

Sales statistics were provided by only two of the four interviewed fishermen. Therefore, these are not complete. In addition, these numbers should be regarded as rough estimates. The two fishermen have given a total catch of 44.000 kg/year (approx. 96.000 lbs/yr). The most sold species (by weight) of these fishermen on Saba is lobster with approx. 24.000 kg per year (approx. 54.000 lbs per year). Pelagic species (approx. 9000 kg per year/ 20.000 lbs per year) and red snapper (approx. 8000 kg per year/ 17.500 lbs per year) are the second and third most sold fish by weight by the interviewed fishermen on Saba.

Demand

None of the fishermen on Saba encounter problems selling their fish. The fishing trips are demand driven, especially for lobster. There is a big demand for lobster from St. Maarten. The fishermen on Saba supply this market. Two of the four fishermen would like to sell more locally but do not see any possibilities for this. According to them, all buyers already have close relationships with fishermen. The local market is too small and already fully supplied.

Questions consumers

Only one fisherman sometimes receives questions by consumers/buyers on the origin, capture method or sustainability of their fish. One fisherman experiences an increased awareness on the importance of sustainability in fisheries on Saba in general. However, he does not receive direct questions about sustainability of his catch. According to him, sustainability is not an issue as he knows there is more than enough fish.

Change in catches

Of the four fishermen interviewed on Saba, one fisherman notices an increase in catches over the years, two fishermen observe a decline and one fisherman experienced stable catches over the years. Three fishermen regard overfishing as one of the main reasons for the decline in catches. Natural factors and fishing activities are regarded as the reason for increased catches by two fishermen. One fisherman indicates all factors as contributors to his observed stable catches. Hurricanes (Irma specifically) are also mentioned as an important natural factor influencing catches.

Fisheries management measures

The most mentioned current management measures are gear restrictions and size limits. Also, spatial protection and seasonal protection are mentioned. No voluntary management measures are indicated by the fishermen on Saba. Only one fisherman feels restricted by the current regulations.

Of the suggested management measures, gear restrictions, change in target species and catch and size limits are on average regarded as least desirable (one or two out of five). The introduction of an eco-label is scored most desirable on average (four out of five). The four fishermen have different views on which management measures would be more or less desirable. For example, gear adaptations, restrictions in the number of fishermen, seafood guide and spatial protection is both scored as least desirable by some fishermen and most desirable by others.

Most fishermen interviewed would not change target species if feasible or more sustainable. Most probably because of a low demand and/or because this requires switching fishing gears and area. One fisherman indicates that he does not have any alternative target species to fish for, according to him the population of other species like mahi mahi and other pelagics are not in a good state. One fisherman will shift target species if he needs to create an alternative income. Other fishermen indicate not to have any alternative income if they would be forced to stop

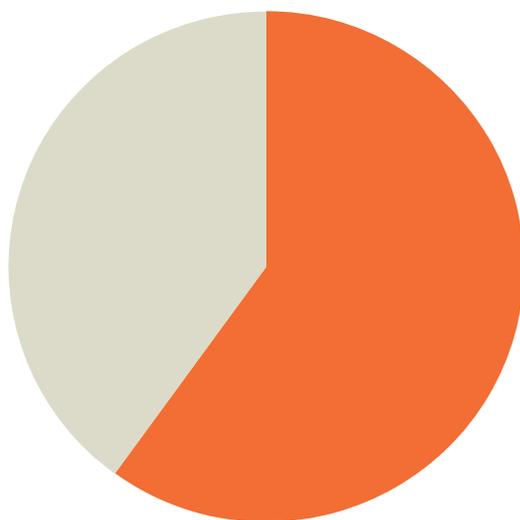
fishing. The interviewed fishermen on Saba mainly discard fish species when demand or value is low.

4.2 RESTAURANTS & SUPERMARKETS

A total of seventeen restaurants and supermarkets were interviewed on Saba. Of these, five (29%) are supermarkets and twelve (71%) are restaurants. On Saba, all interviewed restaurants (100%) have indicated during our interviews that they serve local seafood on their menu. However, the proportion of locally sourced seafood compared to imported seafood is unknown.

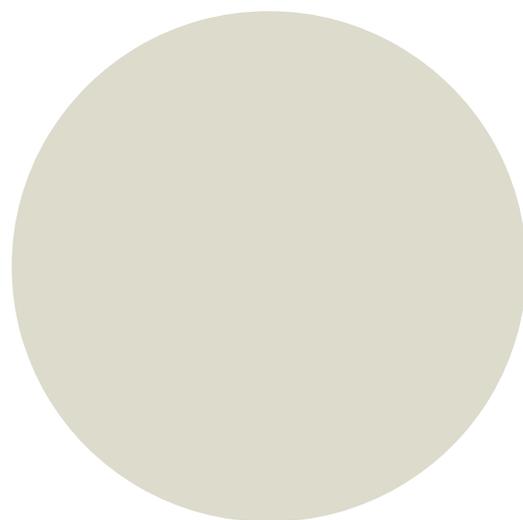
Of the interviewed supermarkets on Saba, 40% sells locally sourced seafood and 60% does not sell any local seafood. These supermarkets do sell imported seafood.

Local / non local fish in supermarkets on Saba



60% No local fish
40% Local fish

Local / non local fish in restaurants on Saba



0% No local fish
100% Local fish

Figure 9 Left; percentage of interviewed supermarkets selling local and non-local seafood on Saba. Right: percentage of interviewed restaurants serving local and non-local seafood on Saba.

No local seafood

Only three (18%) businesses interviewed on Saba do not source local seafood. All of these are supermarkets that do import seafood. Two supermarkets declare that they do not source local seafood because they do not have the possibility to source directly from fishermen. One supermarket does not have a demand for local seafood from customers and therefore does not source locally. To start sourcing local seafood, the products must be cleaned, filleted and prepacked appropriately and the supply must be constant. None of the supermarkets receive questions on the origin, capture method or sustainability from customers. They also do not have this information available.

Sourcing local seafood in restaurants/supermarkets

Of the restaurants and supermarkets that sell local seafood, only 1-25% of their total seafood assortment is locally sourced. An equal share of the interviewed business source the majority (76-100%) of their total seafood assortment locally. All these businesses buy their local seafood directly from fishermen. One restaurant explains why only a small proportion of his seafood offer is sourced locally: the local fishermen cannot guarantee a stable supply and will only deliver when they haven't sold all of the catch. The restaurant owner works with special dishes with local seafood in order to avoid shortage when using a fixed menu with local species.

Species

The most bought local species by restaurants and supermarkets on Saba is mahi mahi, followed by lobster, red snapper and lionfish. Almost all local seafood is delivered whole or filleted. Most businesses are happy with the way the fish is delivered. Some wish mahi mahi and wahoo to be filleted. Most businesses have no seasonal price, some charge seasonal prices for mahi mahi and wahoo.

Nine restaurants provided purchase statistics of their seafood. In total, about 770 kg/month (1700 lbs/month) is purchased by these restaurants and supermarkets. Red Snapper (130 kg or 300 lbs per month) and lobster (120 kg or 280 lbs per month) are the most bought local species by weight by the restaurants and supermarkets on Saba. Second most bought local species on Saba are mahi mahi (110 kg or 250 lbs or per month) and lionfish (50 kg or 120 lbs per month). Tuna is mainly imported (100 kg or 220 lbs per month) while local tuna is purchased less often (40 kg or 90 lbs per month). Also a large amount of mahi mahi is imported, 58 kg per month (130 lbs/month) compared to 110 kg per month (250 lbs/month) of local mahi mahi. A total of 28 different species were mentioned (imported and local) by the restaurants and supermarkets on Saba. However, purchase statistics were provided for only 16 species and not by every supermarket or restaurant. Therefore the numbers should be regarded as a rough indication. Based on the statistics given, about 9500 kg (21.000 lbs) seafood is sold each year by the nine interviewed restaurants and supermarkets on Saba who gave this information.

Little information was provided on the prices that restaurants and supermarkets pay for the seafood purchased. Local mahi mahi is on average \$12,00 per kg and lobster is on average \$15,00 per kg. For imported shrimp, businesses pay on average \$16,00 per kg.

Supply of local fish

Problems with purchasing local seafood encountered by businesses are mainly an insufficient supply, irregular supply and small sizes.

Some (four out of fourteen) businesses have experienced a price increase of local seafood over the years. Others (eight out of fourteen) have not. Most of the businesses do not see a price difference in local seafood compared to other (non-local) similar seafood. Some businesses (two out of fourteen) say that importing seafood is cheaper, some (three out of fourteen) say that local seafood is cheaper compared to import. A far majority of the businesses do not experience more difficulty in sourcing local seafood, three out of fourteen do experience that it is harder to source local seafood now compared to some years ago. These restaurants believe that fishermen do not sell their catch directly to restaurants as selling in bulk (to middlemen) or exporting to St. Maarten is more profitable and easier. For these restaurants, it is difficult to source local seafood because not enough is being left behind on Saba for local restaurants.

As a substitute for local seafood, six out of fourteen businesses say they would import seafood instead, six out of fourteen would not substitute local seafood for any seafood and prefer not to serve any fish instead.

Most restaurants/supermarkets (five out of ten) are not concerned about the future supply of local seafood on Saba.

Customers and sustainability

On average, an equal share of tourists (36%) and locals (32%) visit the interviewed restaurants and supermarkets. Expats (20%) and 'others' (19%) represent a smaller share of the customers. Seasonality in demand is experienced by some (five out of fifteen) businesses in the tourist season when there is a higher demand. Others do not really experience seasonal demand.

Most customers only ask for the origin of the seafood they buy. Only few businesses have customers asking about the catch method and the sustainability of the fish. Restaurants and supermarkets only have information available about the origin and catch method of local fish. They receive this information from the fishermen. Most businesses have never asked their supplier for this information for imported seafood.

Most of the businesses (twelve out of fifteen) are satisfied with the income generated from local seafood. Various reasons were given for which owners will switch between type of seafood offered; including a better price and higher and more constant availability. When a species is endangered or red listed it will not be bought.

Businesses will consider promoting sustainable species, will boycott unsustainable species and are willing to implement an eco-label to increase sustainability. Some restaurants indicate only to participate in a boycott of unsustainable species if the entire island agrees, or only for specific species such as groupers.

4.3 CONSUMERS

A total of 44 consumers were interviewed on Saba. More than half of the consumers interviewed on Saba (58%) indicated to buy seafood less than once a week, 30% of the consumers buys seafood more than once a week, while only 12% never buys seafood. They buy their seafood at the supermarket, the restaurant and directly from fishermen. When comparing the type of consumer (expat, tourist or local), it was found that mainly tourists buy their seafood in restaurants while locals source seafood directly from fishermen.

The most consumed seafood is lobster, followed by wahoo, mahi mahi, lionfish and tuna. Surprisingly, snapper and shrimp are not bought that often on Saba. Consumers seem to be aware of the origin of the seafood they buy, 95% of them is mostly aware of the origin of the seafood, while only 5% said that the origin of their seafood is always unknown to them. Also, when it comes to awareness of how their seafood is caught, the people from Saba seem to be quite aware; 60% says that they are sometimes aware of the way their seafood is caught and 31% even mentioned to always know the capture method. Just a few people (9%) are never aware of the way their seafood is caught.

Regarding characteristics of the seafood they buy, quality is rated as most important (on average 4.5 out of 5), hereafter come origin/local (4.2 out of 5) and sustainability (4.1 out of 5). Convenience of seafood is a characteristic that is considered less important. Most consumers on

Saba (72%) would consider not buying certain seafood if they know it harms the local ecosystem. A far majority of the consumers (82%) would also consider paying more for a product of which they know is sustainable. Consumers on Saba prefer social media as the communication tool to find out if seafood is sustainable or not.

4.4 EXPORTERS/IMPORTERS

Two exporters were interviewed on Saba using the interview template for importers/exporters. Of these, one is a lobster exporter and one is an exporter of reef fish, pelagic fish and lobsters. Both ranked freshness, sustainability, size and price as the most important criteria for their choice of seafood. No importer was interviewed using the designed interviewed template, however like on Bonaire and St. Eustatius, supermarkets and restaurants import seafood themselves.

A market for the exported lobsters is mainly on St. Maarten from which it is shipped onwards to Hong Kong. The interviewed lobster exporter, estimated to export 25.000-56.000 kg per year (25-56 t or approx. 55.000-123.000 lbs/year). The importer/exporter will not seek other markets because of the good fixed current business relations and the high mark-up received. More trade is desired, however they are limited by supply. According to one of them, there is no control on quality or sustainability of the traded products.

4.5 THE SEAFOOD SUPPLY CHAIN ON SABA

Information from the results above is used to generate a flow chart of the seafood supply chain on Saba (Figure 10).

The fishermen of Saba mainly catch lobster and red fish species. Red fish include snapper species, red hind and coney. Also, mixed reef fish is often indicated as species caught by fishermen on Saba, these are reef fish species caught as bycatch in lobster pots/traps. Fishermen on Saba primarily sell their seafood to middlemen on St. Maarten. Lobsters brought to St. Maarten are mainly exported to Hong Kong or used for local consumption. The remainder of the catch is either sold to local consumers directly, restaurants or lobster traders, exporting the lobster.

All interviewed restaurants on Saba source at least part of their seafood locally. The species mainly served are lobster, mahi mahi, red snapper and lionfish. Of the interviewed supermarkets, 60% imports all the seafood they offer. The remainder is bought from fishermen directly. Consumers on Saba mainly consume lobster, mahi mahi and wahoo. Locals source their seafood directly from fishermen whilst tourists buy local seafood either through restaurants or in supermarkets.

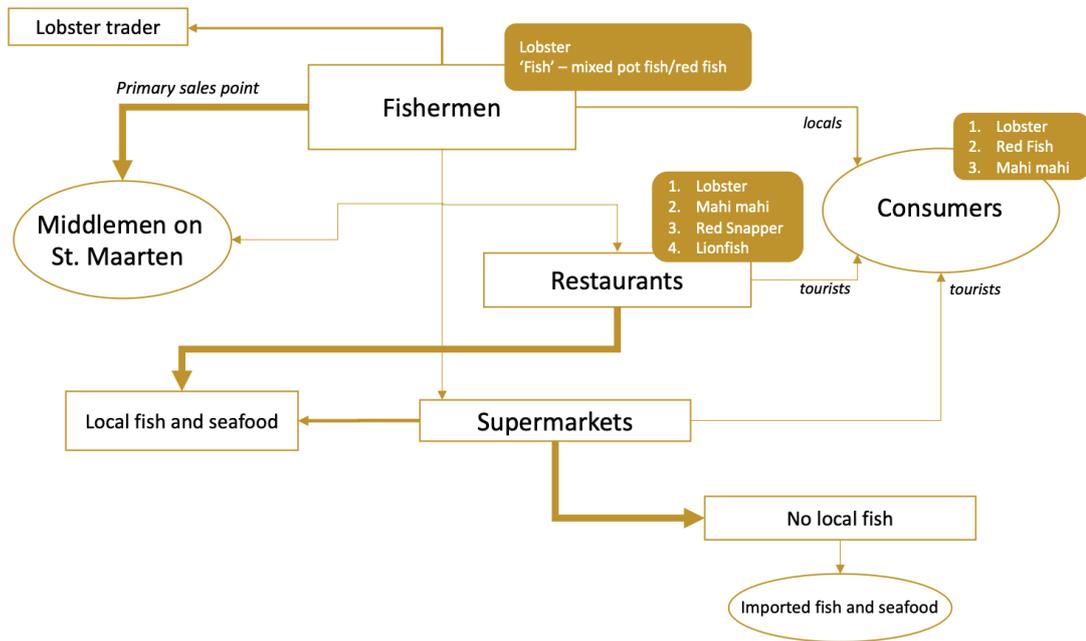


Figure 10 Visualization of the seafood supply chain on Saba. Arrows indicate primary, secondary and tertiary seafood trade flows identified during this study.

5. RESULTS ST. EUSTATIUS

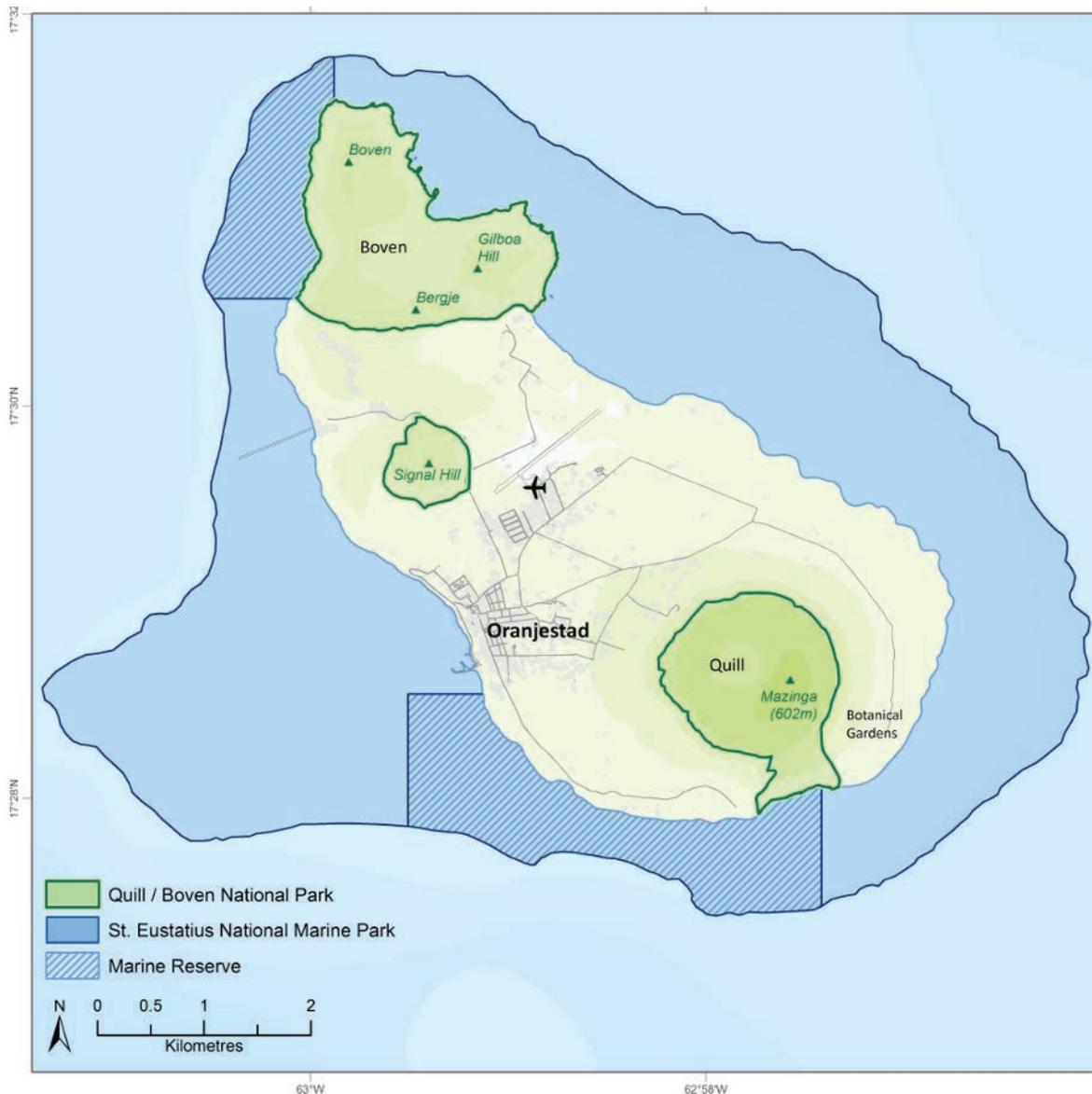


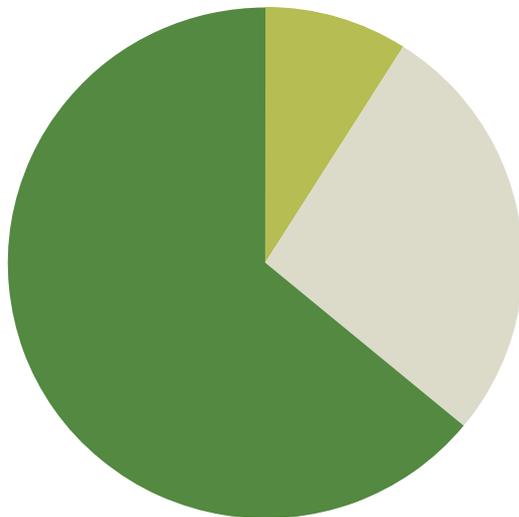
Figure 7 Map of St. Eustatius indicating the St. Eustatius National Marine Park area and the established Marine Reserves. Retrieved from: Dutch Caribbean Nature Alliance (DCNA) (<https://www.dcnanature.org/islands/st-eustatius/>).

5.1 FISHERMEN

Buyers, species and delivery

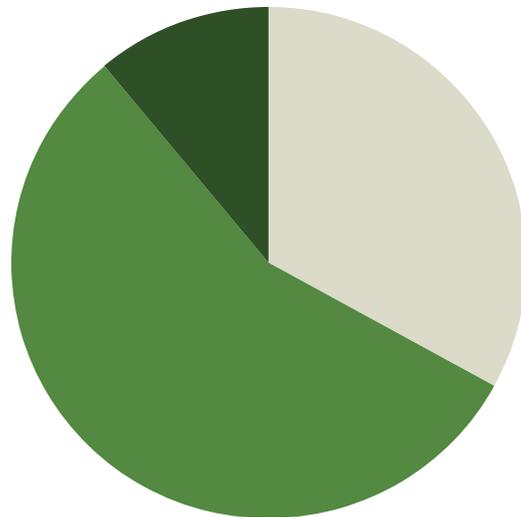
A total of thirteen fishermen have been interviewed on St. Eustatius. There are thirteen registered fishermen active on the waters of St. Eustatius with twelve active fishing vessels (Kitson-Walters, 2017). Most of the interviewed fishermen on St. Eustatius primarily sell their seafood to individuals/locals and restaurants. Fishermen sell their catch locally; in town, at the harbour or from home. Fishermen deliver their catch directly to restaurants. Only one fisherman has indicated to also occasionally export lobster to St. Maarten. However, presumably all fishermen on St. Eustatius occasionally export to St. Maarten through other fishermen or middlemen, but this was not specified nor indicated in the interviews.

Primary location where fishermen on St. Eustatius sell their seafood



9% Middlemen/wholesaler
27% Restaurant
64% Locals /individuals
0% Export

Second most important location where fishermen on St. Eustatius sell their seafood



0% Middlemen/wholesaler
33% Restaurant
56% Locals /individuals
11% Export

Figure 12 First and second most important locations/persons where fishermen on St. Eustatius sell their seafood.

The primary species caught and sold by fishermen on St. Eustatius is lobster followed by 'fish'. It is unclear which species are regarded as 'fish'. Mixed reef fish and snapper are also indicated as species that are often sold. In addition, Queen conch is reported by some fishermen. However, harvesting queen conch is prohibited within the Statia National Marine Park waters, which run up to a depth of 30m (Statia National Marine Park regulations, 1996). In addition, a maximum of 20 conch may be taken per person per year for personal use (Statia National Marine Park regulations, 1996). One fishermen indicated in the interviews to harvest 300 lbs of conch per month.

Fishermen sell their seafood to their current customers because of their personal contacts, business relations and good experiences. Lobsters are sold whole and alive. Most fishermen sell fish whole and gutted. Few do not gut their fish before selling. Most deliver their fish on the island by car, lobsters are transported by boat or plane to St. Maarten.

Most fishermen do not charge different prices for different buyers. Fishermen who do differentiate prices between buyers, charge a lower price for locals compared to restaurants and exported fish or lobsters.

Species landed and sold by the fisherman on St. Eustatius

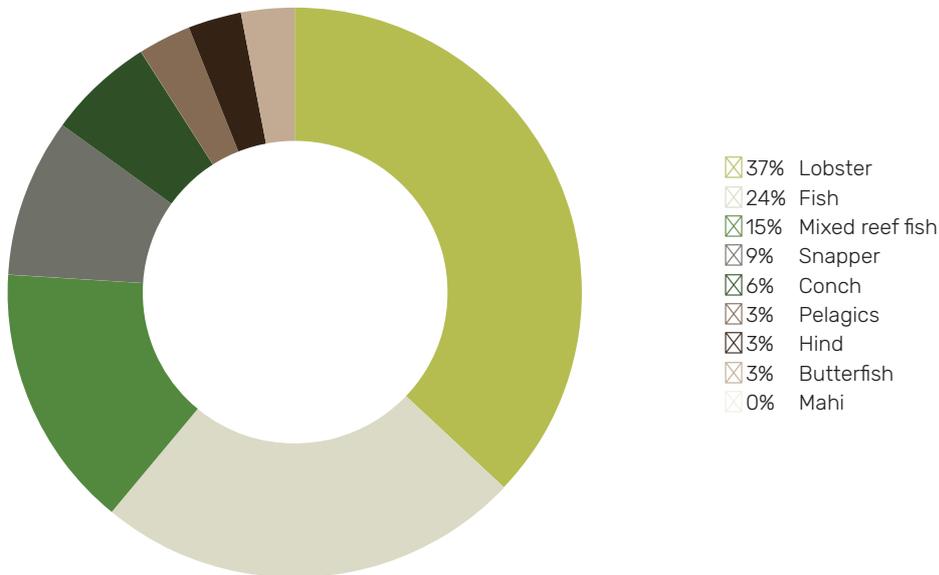


Figure 13 Species landed and sold by the fisherman on St. Eustatius.

Sales statistics

Not all fishermen were able to provide catch data/selling statistics. Still 11 out of the 13 interviewed fishermen provided some data, however these estimates should be regarded as a rough indication. The interviewed fishermen altogether have estimated to sell a total of 16.000 kg seafood per year (16 t/yr). Of this, 8000 kg lobster is sold per year. This is the most sold species of all species mentioned by the fishermen by weight. Second, is mixed reef fish (2500 kg /year) and red fish (2400 kg /year). Also, queen conch is sold by the fishermen and is estimated at 2000 kg/year. However, it should be noted that usually conch are individually reported rather than by weight. It is not clear from the interview forms whether the fishermen reported total conch catch by number of individuals or by weight.

Demand

All interviewed fishermen sell most of their catch locally. When the local demand is met, the remainder of the catch is exported. Fishermen on St. Eustatius would like to be able to sell everything locally because this is easier than exporting. Some fishermen experience difficulties selling their catch locally due to competition with other fishermen for local buyers. In general, none of the fishermen have trouble selling their catch (locally or exporting).

Questions consumers

According to the fishermen, customers never ask about the origin, capture method or sustainability of the seafood sold.

Change in catches

Fishermen on St. Eustatius either experience a decline in catches (46%) or stable catches (38%) over the years. From the perspective of the fishermen, this is because of natural factors or fishing. Some fishermen mentioned natural factors such as a larger number of sharks, hurricanes and the lionfish population. Also boat traffic, large fishing vessels and an increase in fishing activities by local fishermen is mentioned.

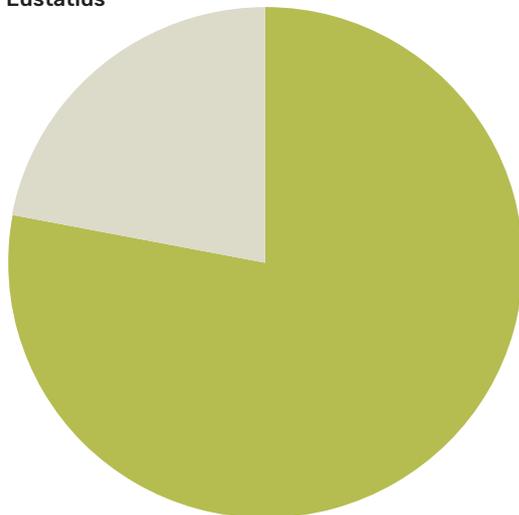
Fisheries management measures

Current fisheries management measures indicated by the fishermen on St. Eustatius are spatial protection of fishing grounds and size limits. Size limits are indicated as a voluntary measure as well as a non-voluntary management measure, species for which these size limits are in place are not further specified. Five of the interviewed fishermen feel restricted by regulations in general, spatially by the marine park or species specific (queen conch). The other eight fishermen do not feel restricted by the current regulations.

The interviewed fishermen rated the suggested management measures very differently. Mainly size limits is rated as least desirable on average (two out of five). Introduction of a seafood-guide and changing target species are rated as most desirable on average (four out of five). All other suggested management measures received different ratings (on average, three out of five).

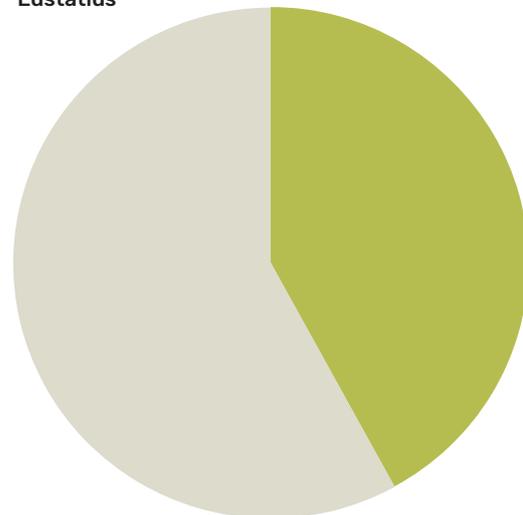
Most of the interviewed fishermen would consider changing their target species if feasible and more sustainable. Most fishermen do not have options for an alternative income if they would have to stop fishing. Some fishermen have other sources of income to rely on if needed.

Local / non local fish in supermarkets on St. Eustatius



78% No local fish
22% Local fish

Local / non local fish in restaurants on St. Eustatius



42% No local fish
58% Local fish

Figure 14 Left; percentage of interviewed supermarkets selling local and non-local seafood on Saba. Right; percentage of interviewed restaurants serving local and non-local seafood on Saba.

During the interviews, fishermen indicated to mainly discard species to give them a chance to grow or because they find them too small. Official size limits are only in place for lobster and queen conch. Fishermen seemed not to be aware of the catch limit of queen conch on St. Eustatius. Other reasons for discarding indicated are when it concerns protected species, egg bearing lobsters and species with a low demand. Even though fishermen have indicated these reasons for discarding, it is uncertain whether this is actually the case. It is known that fishermen do take egg bearing lobsters and also size limits for lobsters and other species are not always followed by the fishermen.

5.2 SUPERMARKETS & RESTAURANTS

On St. Eustatius, 33 restaurants and supermarkets were interviewed. Of these, nine (27%) are supermarkets and 24 (73%) are restaurants. Of the 24 restaurants interviewed, 42% does not sell any locally sourced seafood and 58% has local seafood on their menu. Of the nine interviewed supermarkets, 78% does not sell any local seafood and 22% does sell some locally sourced seafood.

No local seafood

All businesses that do not sell local seafood, do sell imported seafood. Several reasons are given by these businesses not to source local seafood. These include a lack of availability of certain species, or fishermen who sell their catch to other parties or export to St. Maarten. Also, businesses do not have the equipment to sell fresh fish or to clean and fillet themselves. Other reasons are a low demand for local seafood, inconsistent and irregular supplies and price differences with imported products. Businesses mentioned that they would consider to start sourcing local seafood when there is a more consistent supply of the right species and when fish can be delivered packaged and cleaned. Also, the price should be lower and demand for fresh fish from customers must be higher. Some businesses (two out of seventeen) would not start selling local seafood at all as they do not trust the local fishermen.

In some restaurants and supermarkets, customers ask for the origin of the fish. Only one business also receives questions on the capture method and sustainability. Most businesses do not have this information available and are only able to provide the information from the seafood labels.

Sourcing local seafood in restaurants/supermarkets

Most of the businesses that sell local seafood on St. Eustatius are restaurants, about half of these businesses source 67-100% of buy their seafood locally. About the same amount sourced only 1-25% of their seafood locally. All businesses buy their seafood directly from the fishermen.

Species

On St. Eustatius, approximately 16.600 lbs of seafood is purchased by the interviewed restaurants and supermarkets yearly. A total of nine restaurants have provided purchase statistics, this estimate includes local and imported seafood. These figures should be regarded as rough estimates and are only an indication of the total seafood consumption on the island. The most bought fish by weight are snapper (3800 lbs/year) and lobster (3500 lbs/year). Hereafter come mahi mahi and wahoo (2200 lbs/year each). Conch (1900 lbs/month) and shrimp (1000 lbs/month) are also often purchased on St. Eustatius by restaurants and supermarkets.

Lobsters and snappers are mostly delivered whole, lobsters are still alive. Queen conch can be delivered whole, cleaned and uncleaned. Most businesses are satisfied with the way the fish is delivered. Some would prefer portioned or filleted fish. Most businesses have no seasonal price.

Seasonal availability is experienced in mahi mahi, jack, lobster, red snapper and wahoo.

Only few restaurants and supermarkets provided information on the price of seafood bought. Lobster and red snapper are on average \$13,00 per kg and restaurants pay on average \$12,00 per kg for queen conch.

Supply of local fish

Difficulties encountered in sourcing local seafood by restaurants and supermarkets on St. Eustatius are mainly an irregular and insufficient supply. Businesses cannot always fulfil the demand from customers with only local seafood.

About half of the businesses have not seen an increase in price of local seafood. However, the other half does have seen a price increase. Some (five out of sixteen) experience more difficulties with sourcing local seafood compared to few years before. As a substitute for local seafood, most businesses will import seafood from St. Maarten or other islands. Only four out of sixteen restaurants will stop selling seafood if it cannot be locally sourced.

Most businesses are mostly or very satisfied about their income generated from local seafood. A change in price, availability, demand and different preparation are indicated as reasons to change to local seafood or change between species. A total of seven out of sixteen indicate that they will not change the species of seafood they offer. Additional costs associated with buying local seafood are ground transport and cleaning and cutting the fish.

Customers and sustainability

Most of the interviewed supermarkets and restaurants have locals as their primary customers. Tourists are the second most important customer group for these restaurants and supermarkets. Only few customers ask about the origin, capture method or sustainability of the seafood they buy on St. Eustatius. Most businesses declare that they do not have this information available. Some can only provide information about the origin and/or capture method.

Most interviewed supermarkets and restaurants would prefer to promote sustainable species or implement an ecolabel to inform customers. Boycotting unsustainable species is not a preferred suggestion for sustainability. However, the most mentioned reason not to put a certain species on the menu is the status of the species; whether it is sustainable or not and/or red listed.

5.3 CONSUMERS

On St. Eustatius, 51 consumers were interviewed in total. Comparable to Bonaire and Saba, on St. Eustatius most of the people (53%) also buys seafood less than once a week, 33% buys seafood more than once a week while 14% never buys seafood. Almost half of the people buy their seafood directly from the fishermen (47%). Second most popular place to buy seafood is the supermarket (27%), followed by restaurants (27%). Most of the people that filled in the questionnaire were locals (60%). When comparing the type of consumer (expat, tourist or local), it was found that locals mainly buy their seafood directly from fishermen. Only a few tourists were interviewed, these tourists mostly buy their seafood in restaurants.

The most popular seafood to eat is snapper, followed by lobster and jacks. Although 41% of the interviewed consumers know the origin of their seafood (always or sometimes), 31% is never aware of the origin of their seafood. Most of the interviewed consumers, 43% is never aware of the capture method of the seafood bought. Whether the received information on origin, capture

method and sustainability is correct is uncertain.

Consumers on St. Eustatius regard quality as the most important characteristic when buying seafood (average score 4.4 out of 5), hereafter come sustainability (3.9 out of 5) and price (3.7 out of 5). Most consumers (60%) indicate that they would consider not to buy a product if they know it would harm the ecosystem. Also, the majority of the consumers (56%) is willing to pay more for a product if it is produced sustainably. Consumers wish to be informed by NGOs when it comes to sustainability of their seafood.

5.4 EXPORTERS/IMPORTERS

Several exporters (fishermen) and importers (supermarkets/restaurants) were interviewed on St. Eustatius. However, these have not been interviewed as such with using the importer/exporter interview template. In Caribbean Netherlands a lot of fishermen export the catch themselves and thus can be considered exporters, besides fishermen. The same for supermarkets and restaurants, of which a lot import their own seafood. With regards to exports, one fisherman on St. Eustatius mentioned to export 95% of his catch to the neighbouring island van St. Barthelemy. However, according to the former data monitoring officer (DMO), a large part of the lobster catch is also exported to St. Maarten and St. Martin although this was not indicated during the interviews.

5.5 THE SEAFOOD SUPPLY CHAIN ON ST. EUSTATIUS

Information from the results above is used to generate a flow chart of the seafood supply chain on St. Eustatius (Figure 12).

Fishermen on St. Eustatius mainly catch lobster, queen conch and mixed reef fish. Most fishermen mainly sell their catch directly to restaurants or consumers. Fishermen also export to St. Maarten and St. Barthelemy.

About half of the restaurants on St. Eustatius (54%) sell local seafood. The other half of the interviewed restaurants imports the seafood they offer. The majority of the supermarkets (78%) also import their seafood. The remainder of the supermarkets (22%) sell some local seafood, bought directly from fishermen. Consumers on St. Eustatius mainly eat snapper, lobster and jack. Locals source their seafood directly from fishermen whilst tourists buy local seafood mainly in restaurants.

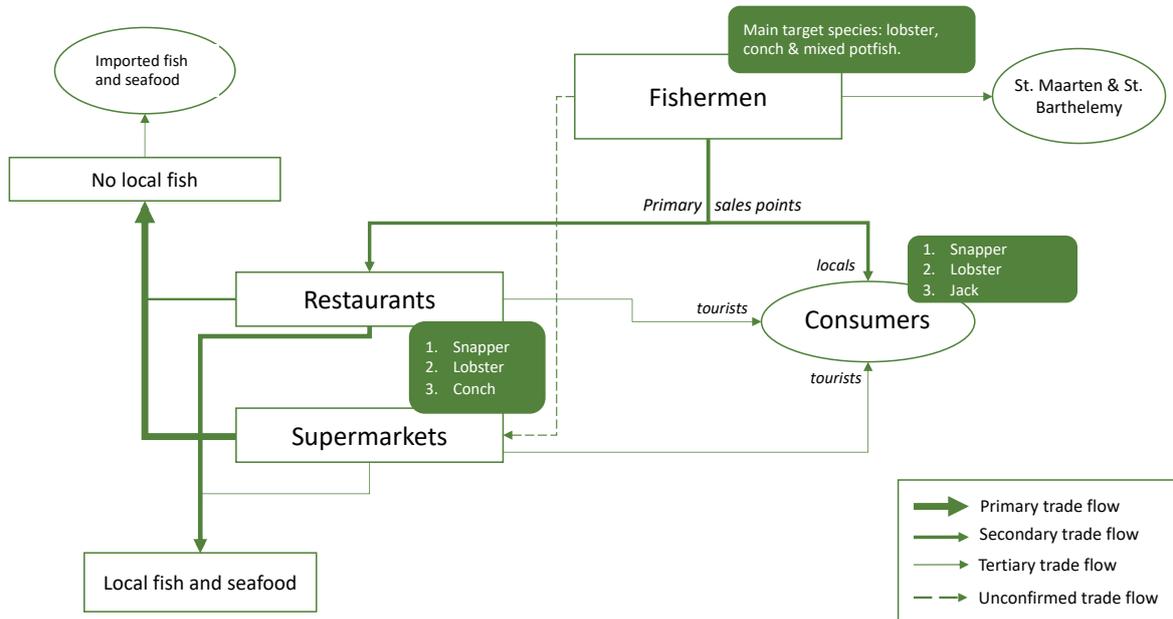


Figure 15 Visualization of the seafood supply chain on St. Eustatius. Arrows indicate primary, secondary and tertiary seafood trade flows identified during this study. Dashed lines indicate non-confirmed trade flows.

6. CURRENT AND POTENTIAL RISKS IN THE SEAFOOD SUPPLY CHAIN

From the results described above, it can be concluded that there are differences in the fisheries and the structure of the seafood supply chain between Bonaire, Saba and St. Eustatius. However, we found similarities in the problems and risks facing the fisheries and seafood supply chain in the Caribbean Netherlands. These are described below.

Fisheries management, data collection and data accessibility

This study has confirmed that there is not only a lack of data and information on the fisheries itself, but also basic information on the seafood supply chain on the islands is lacking. We have found that almost every aspect of fisheries data monitoring and registration of fisheries and seafood related business is not or not adequately implemented in the Caribbean Netherlands.

We have not been able to retrieve reliable information on the total seafood import and export for any of the islands. Data from the Central Bureau of Statistics (CBS) is only given in values (see Appendix 8), and only provided a year after the request was submitted. Additionally, according to CBS, the data in weight is unreliable because the local customs are not receiving reliable information by the business themselves that are filling in the required import declarations. The international trade database Trade Map (see references) does not distinguish between Saba, Bonaire and St. Eustatius and it is unclear what the source of the data is on that website.

Providing a reliable estimate of the total seafood consumption and total seafood sales by supermarkets and restaurants based on interviews was not possible either in this study. Only part of the interviewed restaurants and supermarkets provided information on the amount of seafood sold, and this information was often incomplete. In addition, the received lists of the Chambers of Commerce of Bonaire, Saba and St. Eustatius were not up to date and contained errors. Issues encountered were, amongst others, that companies are registered under incorrect codes such as inland fisheries which do not exist in the Caribbean Netherlands. In addition, the number of restaurants on the list is approximately twice the number of restaurants that we have found to actually operate, companies were registered under codes not related to seafood and contact information for the companies was lacking or not up to date. Because of this, we have not been able to carry out reliable extrapolations. Information on total seafood consumption is also not available for the Caribbean Netherlands. Without information on total seafood trade, consumption and locations where seafood is sold, it is impossible to accurately manage the seafood supply chain.

Finally, we attempted to extrapolate the information given by the fishermen on their yearly total landings and seafood sales. Also here we encountered difficulties. Official catch and landings registrations from fisheries monitoring are not available. Every couple of years, scientific reports on the status of the reefs and fisheries for the Caribbean Netherlands are published. These reports contain some information on amongst others, fishing effort and fisheries landings based on sample based fishery surveys. For this market study, we aimed to gather information on total catch through interviews with fishermen. Unfortunately, only a few fishermen provided information and some of this information was incomplete or not specified enough. In order to extrapolate this data, an official list of active fishermen on the islands would be needed. However, even this basic information proved to be very difficult to obtain. Due to the incomplete data

provided during the interviews and a lack of information on the total number of fishermen, we were not able to carry out this extrapolation.

Efforts by research institutes and universities, supported by the ministry of Agriculture, Nature and Food Quality and the public entities, have resulted in some information on the current fishing practice, fisheries landings and state of fish communities, sea turtles, sharks and other endangered threatened or protected (ETP) species. However, due to a lack of historical data and comprehensive fisheries monitoring, scientific researchers have refrained from giving any statement about long-term trends in fisheries, fisheries landings and stock status of many commercially exploited species (Brunel et al. 2020, de Graaf 2016). Not only the scientists from Wageningen Marine Research who developed the monitoring protocols but also the authorities on the islands carrying out fisheries monitoring on St. Eustatius and Saba have indicated that current monitoring efforts are insufficient to adequately determine trends (Debrot, Kitson-Walter, Kuramae, personal communications). The reasons for this insufficiency are varied and differ according to involved parties, but all involved parties agree these issues would be largely solved if a strict monitoring protocol is developed that should:

1. Be executable
2. Collect sufficient scientifically sound data in such a manner that it is suitable to inform management decisions
3. Be reviewed and approved by all stakeholders
4. Sufficient budget is allocated

Furthermore continues catch monitoring only takes place on Saba and St. Eustatius. On Bonaire the landings have only been monitored for 1 year during 2014.

Fisheries monitoring that is currently being done on St. Eustatius and Saba is not linked to the current fisheries regulations. Fisheries regulations are not being tested for their effectiveness based on monitoring and, the other way around, fisheries regulations are not being adjusted based on the changes in the marine ecosystem. This feedback system is absolutely necessary to achieve sustainable fisheries.

Transparency in the supply chain

An important aspect for supply chain management is transparency. This is currently lacking on Bonaire, Saba and St. Eustatius. Fishermen sell their catch directly at the dock or to customers at their home address. On Saba, a significant part of the total catch is exported by the fishermen themselves. This practice is easy and relatively cheap for both the fishermen and customers. However, this practice also entails risks in terms of sustainability, implementation of fisheries regulations and registration of export and trade. Most fishermen were not able to give information on their total landings or income per year, indicating that most do not keep records of their fishing activities and landings. Without detailed sales records and no knowledge on where seafood is sold, there is a risk of illegal sales of forbidden species or undersized individuals. This also facilitates recreational catches to end up in the commercial supply chain. In addition, enforcement and control of hygiene regulations and regulations concerning the sales of fish and fish species becomes more complicated when seafood is sold at many different and dispersed locations and sales are not recorded. For consumers, it is difficult to know where they can buy local fish when they do not know the fishermen personally. There are no central locations where seafood is sold, making local seafood largely inaccessible for consumers, especially tourists and expats.

Risks of importing fish from Las Aves

The fact that fish is being bought on Las Aves, and to a lesser extent on Los Roques, and brought to Bonaire is problematic for multiple reasons.

Consequences for Los Roques and Las Aves archipelago

Firstly, this practice is illegal in several ways. According to the national fisheries act BES, fishing in waters of a foreign nation or even undertaking trips to waters of a foreign nation without a permit is illegal (Article 13 Visserijwet BES, 2014. See Appendix 7). In addition, fishermen have indicated to import several species, including conch and lobster. Fishing for Queen conch is prohibited in Venezuela year-round and lobster has a designated fishing season (Schweizer & Posada, 2006. See also Appendix 6). Considering the information given in the interviews, fishermen do not seem to be aware of or follow these restrictions.

Studies on the reef community of Los Roques show that this island has healthy fish populations with less fishing pressure compared to elsewhere in the Caribbean (Debrot, Yranzo, & Arocha 2019). It is unknown whether this is also true for Las Aves. However, there is no formal nature conservation regime on Las Aves (Debrot, Yranzo, & Arocha 2019). This is worrisome considering that fish is frequently being brought to Bonaire, including conch and lobster. If the demand for fish from Las Aves increases, so might the fishing pressure on the fish communities in this archipelago. Without proper management and lack of information on the current status of the fish communities, this can become a threat to health of the marine ecosystem of Los Roques and Las Aves archipelago.

Consequences for Bonaire

Not only for Las Aves, but also for Bonaire, the import of fish from Las Aves is worrisome for multiple reasons. Firstly, since imports from Las Aves provide a continuous supply of fresh fish for consumption on Bonaire, there is no sense of urgency with consumers or policy makers regarding declining local fish stocks. When a decline in local catches is compensated through fish supplied from Las Aves, declining fish stocks will not be noticed and there will be no sense of urgency to improve local fishing practices on Bonaire. Secondly, the effects of fishing pressure on fish communities around Las Aves can also impact local fish communities around Bonaire through ecological connectivity between the islands. Modelling results of Butler (2017, personal communication) showed that >50% of the lobster larvae on Bonaire are self-recruited locally or from Venezuela. Even though the ecological connectivity of fish larvae between the Los Roques and Los Aves archipelago and Bonaire has not been demonstrated yet, the Caribbean and Antilles currents ensure larval transportation among islands and it is reasonable to suspect that these east-to-west flows play a role in the transport of the pelagic larvae of many marine organisms, including fish and coral species (Debrot, Yranzo, & Arocha 2019). Thirdly, consumers on Bonaire think that they are eating fish from Bonaire whilst this is actually originating from Las Aves. Fishermen do not communicate the origin of the fish and there is no price difference for the consumer; the price of cheaper seafood from Las Aves is balanced out by middlemen mark-up. Many consumers, including foreign restaurant owners, tourists, expats and local consumers assume that the fresh 'local' seafood they buy is from Bonaire. Only one middleman sometimes receives questions from local consumers on the origin of the fish and whether they are from Las Aves or Bonaire. This indicates that some locals might know that fish is coming from Las Aves. However, the majority of consumers are not aware of this. Lastly, due to the price difference, fishermen that do stay in the waters of Bonaire face unfair competition as fish from Las Aves is bought in for a lower price and sold with a higher revenue compared to locally caught fish.

Fisheries registration

Fishermen are not centrally organised and operate individually. Quite recently, a fishermen's cooperative has been set up on Bonaire (PISKABON). On St. Eustatius a similar initiative is currently working towards building a fishermen's cooperative. On Saba, a Saba Fisherman Association was formed only last year.

Fishermen on Bonaire and St. Eustatius do not have to be registered in order to fish commercially. Without registration, it is difficult to monitor fisheries and enforce fisheries regulations. More importantly, without a cap on the number of licenses, fishing effort can increase considerably when there is an increase in the number fishermen in a short period of time. An uncontrolled growth of fishing effort will result in an increase in fishing pressure on target stocks, impacting sustainable fishing practices.

The fixed prices for seafood on Bonaire (Appendix 5) must be evaluated on effectiveness and potential negative side-effects for the fishermen and consumers. This regulation was enacted in 1996 and has not been revised since, whilst the costs of living and fishing have increased. According to the fishermen, the current prices received for their fish are way too low to sustain an income. They currently have serious difficulties to maintain their family, their boats or even having a car.

Impact of recreational fisheries

The current study is limited to commercial fisheries only. Recreational fisheries and fishing charters on the islands are not included. The share of these types of fisheries in the seafood supply chain and their impact on the fish stocks are largely unknown. However, it is likely that the impact is substantial, also in relation to the commercial fishermen. On Bonaire for example, recreational fishermen and fishing vessels far outnumber the professional fishermen. For a full survey of the fisheries on Bonaire, Saba and St. Eustatius, the position, impact and role of recreational fisheries both on stock development and seafood market dynamics should be included.

Information provision

From the interviews with the restaurant and supermarket owners as well as consumers, it became clear that information on capture method, origin and sustainability of the seafood sold or bought is rarely requested nor provided. Restaurants and supermarket owners are generally only able to provide information on the origin of the seafood received from the fishermen or provided on the label (imported seafood). Some do not have this information available at all. Consumers in general rarely ask for the origin, capture method and sustainability of the product when buying seafood. Therefore, restaurants and supermarkets do not see the need to check on these three pillars when buying seafood from the fishermen/middlemen or when importing seafood. A lack of information exchange between different parties in the supply chain reduces transparency within the supply chain and knowledge of consumers, restaurants and supermarkets on the seafood sold or bought.

In the Netherlands, restaurants and supermarkets are taking a leading role in the provision of sustainability information. Also, for seafood products, the awareness and knowledge of consumers has grown and consequently also the demand for sustainable products and information availability. Consumers are becoming more informed and critical.

In the interviews in this study, consumers on Bonaire, Saba and St. Eustatius indicated that sustainability is one of the most important determining factors when buying seafood, after quality and origin (local). A majority of the consumers also indicate to be willing to pay more for

sustainable species and would consider avoiding species the consumption of which may harm the local environment. This indicates that consumers are motivated to some extent to prefer sustainable products over less sustainable products. Restaurant owners and supermarkets selling sustainable and/or local fish can use this to stand out and promote themselves. By providing information on the origin, catch method and sustainability of the seafood offered, consumers will be more informed and involved with the products they buy. This will have a positive effect on the reputation of the fisheries on the islands and on the perception of consumers of restaurants and supermarkets.

Only a small fraction of restaurants serves local seafood. This is mostly because of the irregular supply, low availability of certain species and low demand by consumers. However, restaurants in the Caribbean Netherlands do have the potential to serve locally sourced, sustainable fish if they know what to base their purchasing requirements on.

7. CONCLUSIONS AND RECOMMENDATIONS

To enhance sustainable fisheries practices on Bonaire, Saba and St. Eustatius through market mechanisms, we recommend the following.

Data collection and fisheries management

Fisheries are economically important for Bonaire, Saba and St. Eustatius. Yet, there is an almost complete lack of any information about the fisheries and seafood supply chain on these islands at the moment.

We have not managed to retrieve reliable information on the total seafood import and export, seafood consumption, locations where seafood is sold or registered businesses selling seafood. This information is crucial to manage and control the seafood sector. It is recommended to improve the current registration and implement new monitoring and registration requirements of the total seafood import, export and selling locations.

For the CBS specifically, we recommend to yearly register the total seafood import and export for the Caribbean Netherlands, both in value and in numbers. When this is accurately tracked, it will become possible to monitor and determine trends in the seafood products imported and exported from the Caribbean Netherlands.

The current registration of restaurants and supermarkets and other businesses selling seafood documented by the local Chamber of Commerce is incomplete and the information is not correct. We recommend to improve the method of registration for new and existing companies by checking whether the current registered companies are documented under the correct code. When it is unknown which seafood is sold and where, it is not possible to map and therefore manage the seafood sector adequately. During the writing of this report, the Chamber of Commerce on Bonaire indicated to already have a review of the coding system planned.

Fisheries monitoring and registration is at the basis of an adequate fisheries management plan. We recommend to implement a comprehensive fisheries management plan on Bonaire, Saba and St. Eustatius. A coherent and adaptive management plan is needed to ensure sustainable fisheries for the future and to ensure recovery of the reefs surrounding the islands. This monitoring starts with proper documentation of the fisheries as a whole; registration of the number of fishermen, their fishing boats, gears, fishing areas, total catch and landings including among others, total weight and size of the landed species and catch location.

The fishing community must fully understand the importance and goals of the fisheries monitoring schemes to ensure their collaboration. We recommend involving the fishermen from the start and develop these plans in a participatory process. This will be more effective when the fishing community is united through a fishermen's cooperative and when these cooperatives are supported by local governments to participate in fisheries management.

Fixed prices on Bonaire

Concerning the fixed prices for seafood on Bonaire (Appendix 5), this regulation should be evaluated on effectiveness and potential negative side-effects for the fishermen and consumers.

Improving traceability

Currently the seafood supply chain on Bonaire, Saba and St. Eustatius is non-transparent and seafood products are not traceable. Traceability encompasses documentation of every seafood product from the source (fishermen) to end-consumer. This documentation should at least include the species name, fishing area (local/imported) and capture method. We recommend to implement a system to ensure the traceability of seafood products on Bonaire, Saba and St. Eustatius. Traceability is achieved when (batches of) seafood products are labelled and remain labelled throughout the supply chain up to the point where it is sold.

Various traceability systems have been developed, varying from basic labelling to more complicated and robust blockchain technologies. However, for Bonaire, Saba and St. Eustatius implementing a basic labelling system for seafood products with information on the species, weight, price, capture method and location is a first step in improving the traceability and data provision on seafood products. Implementing such a system can be facilitated by establishing official landing points and seafood selling locations, such as fish shops. With a transparent seafood supply chain, information on the seafood flows in terms of selling statistics, pricing and import or export data become available. This information can in turn be used in (re)shaping management and monitoring schemes which will ultimately favour the sustainable management of fisheries.

Facilitating catch documentation, transparency and seafood processing

On Bonaire, there are currently no central landing points where fishermen land their catch. This is dispersed over a few docks on the islands. On Saba and St. Eustatius, landings are more centralized. However, on none of these islands documentation, measuring and weighing of total catches is facilitated. We recommend to set up central facilities on each island together with the fishermen's cooperatives and the local government. Here, fishermen can land all their catch and directly measure, weigh and document this officially. In addition, landed seafood can immediately be labelled with the information recommended before. This label will accompany the product throughout the supply chain which increases traceability of locally caught seafood as the end consumer has access to this information. To increase the attractiveness of these facilities for the fishermen, these can also be attributed with cleaning, filleting, icing and storage stations.

Visibility and knowledge of local fisheries

The seafood supply chain on Bonaire, Saba and St. Eustatius is very dispersed over the islands. It is unknown which species are sold at which location. Fishermen distribute their catch on their own or through an individually operating middleman. Information provision is poor and therefore many consumers are not even aware of the origin of the fish bought. Another route to buy local seafood for consumers is directly from the fishermen. This brings risks of fraud in prohibited species and/or undersized specimen (Caribbean spiny lobster, queen conch). Because the locations where seafood is sold are not visible or officially registered, controls on management measures are very hard to perform.

For market-based incentives, awareness campaigns and fisheries management measures to be successful, local fisheries must be visible on the islands. It is recommended to increase the visibility of the local fisheries on Bonaire, Saba and St. Eustatius through a local awareness campaign. Informing consumers on the fisheries and their role in the economy and the ecosystem will improve their reputation. This also offers the opportunity for fishermen to position themselves as an important part of the local economy. By becoming more visible and understanding their role on the island economically and ecologically, fishermen will feel more respected, recognized and responsible for their impact. This will lead to more involvement and collaboration of the fishermen in monitoring, registration and management measures. Consumers

will become more aware of the fishing activities on the island, which species to eat and which to avoid and where they can find local, sustainable fish.

Fisheries as part of nature conservation schemes

Currently, the primary responsibility for fisheries management in the Exclusive Economic Zone (EEZ, 12-200 nautical miles) of the Caribbean Netherlands is the Ministry of Agriculture, Nature and Food Quality (Ministerie van LNV). The ministry works together with the local public entities through the Fisheries Commission BES. In the Territorial Zone (TZ, 0-12 nautical miles) of the Caribbean Netherlands, there is a shared responsibility by both the ministry as well as the public entities. Surveillance and enforcement on sea is generally carried out by the Dutch Caribbean Coastguard while on land this is the task of the police. Furthermore the customs also have tasks when it comes to the Fisheries Act BES, the Fisheries Decree BES and local ordinances. For instance with regards to the import and export of protected and prohibited species and fishing gear. But also with regards to fishing in or undertaking trips to waters of foreign states. On Bonaire the Directorate Surveillance and Enforcement has powers in the field of fisheries regulations, but in practice they do very little with these powers. To a certain extent the local park authorities also have authority. From a formal point of view this is a surveillance authority. They can, for example, issue warnings and the rangers/staff that have an extra ordinary police officer (BAVPOL) that can draw up official reports but not issue fines. On Bonaire this has been arranged through a designation decree.

Fisheries are often regarded as a threat to the marine ecosystem and conservation goals. Consequently, fisheries are often excluded from management plans aiming to restore and protect these areas. However, fisheries are an inevitable part of the management of marine ecosystems and fisheries can certainly co-exist with a healthy marine ecosystem, if these fisheries are well-managed. It is in the interest of fishermen to collaborate with park management authorities to address threats to the habitat that produces their livelihoods. We recommend to include local fishermen's cooperative in the decision making process of new marine park management regulations that concern fisheries. This can improve its effectiveness and at the same time increases collaboration from the fishing community.

When sustainably and adequately managed, fisheries can be very valuable for national parks and their conservation goals. Fisheries can help with monitoring programs, by monitoring and documenting target species as well as non-target species. Fishermen can also help in the fight against illegal fisheries and poaching by being the eyes and ears on the sea. If empowered to do so, fishermen can support the marine parks in fighting other threats to the marine ecosystem on the islands such as plastic pollution or sewage dumping.

When the fisheries sector is included in the marine park management schemes, they become an essential part in the protection and conservation of their own fishing grounds. This will bring about a sense of responsibility and ownership and incentivises to take care of these areas. This in turn will favour the understanding and implementation of fisheries management measures and involvement from the fishing communities. The development of fisheries management plans should therefore be integrated with nature conservation goals and management plans.

8. ROADMAP

Based on our recommendations, we have listed the following steps that should be considered to follow up on this study for Bonaire, Saba and St. Eustatius.

This study has confirmed the complete lack of data and information on the local fisheries and the seafood supply chain in the Caribbean Netherlands. Therefore, priority must be given to the drafting and implementation of a comprehensive fisheries management framework.

The other practical steps are divided in recommended implementation on the short-term (1-3 years), short-term (5-7 years) and long-term (10-15 years) and are also listed below.

Comprehensive fisheries management framework

A comprehensive fisheries management framework for the Caribbean Netherlands should be implemented. Data collection on the seafood sector is crucial in order to understand, control and sustainably manage the seafood trade flows and local fisheries. A comprehensive management framework should include at least the following:

- **A continuous fisheries monitoring program.** This fisheries monitoring program should not only include registration of total catch and landings but also amongst others, bycatch rates, gear use, sizes of the seafood landed and fishing effort. Information from this fisheries monitoring should specifically aim to inform management decisions, with benchmarks, defined measurable objectives and reference points and fisheries independent data. Fisheries monitoring should be carried out continuously and should be specifically tailored to allow evaluation and adaptation of management measures when needed.
- **Mandatory registration of commercial fishermen on St. Eustatius and Bonaire.** This should be implemented within the coming 3 years. Information on the total amount of fishermen is essential basic information required to inform fisheries management decisions and should be part of a fisheries management scheme.
- **Data collection and registration in the seafood supply chain.** This data collection should at least contain basic elements such as information on the total sales of local and non-local seafood, information on the different species sold, the location where these are sold, prices, middlemen and other parties involved. Based on this information, it can be assessed which market mechanisms can be encouraged or discouraged to achieve a more sustainable seafood supply chain in the Caribbean Netherlands.
- **Information on the total import and export of seafood.** Customs and the Central Bureau of Statistics (CBS) should closely monitor the import and export of seafood products for the Caribbean Netherlands, both in numbers and values. Information provided by businesses should be checked and corrected when necessary to

build a reliable database. The import and export statistics should be recorded and published on a yearly basis to be able to determine any trends.

- **A detailed action plan to achieve full traceability of seafood product and transparency in the seafood supply chain.**

Traceability encompasses documentation of every seafood product from the source (fisherman) to end-consumer. This documentation should at least include the species name, fishing area (local/imported) and capture method. Traceability is achieved when (batches of) seafood products are labelled and stay labelled throughout the supply chain up to the point where it is sold. With transparency in the seafood supply chain, information on the seafood flows in terms of selling statistics, pricing and import or export data become available. This information can in turn be used in (re)shaping fisheries management and monitoring schemes which will ultimately favour the sustainable management of the fisheries.

Short-term practical steps; 1-3 years:

- 1 The fixed governmental pricing of seafood on Bonaire must be evaluated.** This was established in 1996 (Appendix 5) and has not been revised whilst the costs of fishing and living have increased.
- 2 An awareness campaign should be developed on each island to inform local residents as well as tourists about local fisheries.** The aim of this campaign is to increase awareness on the role and importance of fisheries on the island, their impact on the marine ecosystem and which management measures have been taken to minimize these. Information about which species to avoid (protected species or endangered species) and sustainable species for consumption must be included to help consumers make responsible seafood choices. This can be a simplified form of a fish guide explaining why certain species are a better choice than others.
- 3 A restaurant program to increase the visibility and market value of sustainable local seafood should be implemented.** Most restaurants serving locally sourced seafood do not communicate this to their customers. Promotion of sustainably sourced, local fish in restaurants can benefit local fishermen and how they are perceived on the island. Additionally, restaurants can provide information on how and where the seafood is caught and why a certain species is a recommended species for consumption, increasing the visibility of the fisheries and transparency of the supply chain. However, this is only possible when a basic traceability system is implemented. A 'sustainably and locally caught' label or sticker can be developed for restaurant

or supermarkets owners to indicate the local and sustainable seafood options on their menu or display. A special program can be developed for restaurants serving local, sustainable fish with a similar setup as the restaurant program currently being run by Good Fish Foundation in the Netherlands.

- 4 Sustainable, locally caught species (like lionfish) should be promoted on the islands.** A (small) campaign indicating why this species is sustainable can boost consumption, increase awareness and improve the fisheries' reputation. Ultimately this can create a shift in species targeted by the fishermen and decrease the fishing pressure on less sustainable species. Some of these species are already known and preferred by consumers but are, like lionfish for example, not widely available on the market because harvesting these species is challenging. It is recommended to put more effort in developing a methodology for harvesting certain local sustainable species, in collaboration with fishermen, in order to improve access to these species for fishermen and consumers.
- 5 A system needs to be implemented to document seafood imports from Las Aves to Bonaire.** This can be a separate control system incorporated in the recommended comprehensive fisheries management plan or better enforcement of the current customs declaration system.
- 6 Fisheries (individual fishermen or fisherman's cooperative), the local government and national park authorities should collaboratively draft,** understand, and agree on marine park regulations affecting or concerning fisheries. This will increase the involvement, understanding and compliance of the marine park management scheme and improve the communication between stakeholders. Ideally, this can lead to a consortium of parties, including fishermen, who collaboratively advocate for healthy coral reefs.

Mid-term ; 5-7 years

- 1 A real-time and easy to use information system on the actual catches and seafood demand should be implemented.** With such a system, seafood supply and demand can be aligned. On St. Eustatius, a smartphone application (Statia Blue App) is developed and implemented in which this is already being done. The use and success of this system on St. Eustatius is yet to be evaluated. If this or a similar system is used correctly, fishermen can register details of their catch (species, weight, length etc.) which is sent to a database. The estimated price of the fish is reported back, based on the market demand and total reported catch of that day. Based on this information, a fisherman can decide to continue fishing or not. This will encourage directed fishing efforts. In addition,

the catch data collected through this system will complement fisheries data gathered through the fisheries monitoring scheme if this is in place. Based on the provided catch data, measures can be taken to prevent overfishing on certain species if needed. Such an information gathering system needs to be coupled with a compelling incentive for fishermen to use it.

Long-term; 10-15 years

- 1 Central landing facilities must be installed and be officially registered on Saba, St. Eustatius and Bonaire on the long term.**

On Saba, St. Eustatius and Bonaire, there is no central facility where all catches are measured, weighed and documented. Such a facility can provide different services, including a central catch documentation centre where fish is brought in, weighed, measured and documented. This will facilitate fisheries monitoring. From here on, seafood can be labelled with catch details to improve the traceability throughout the supply chain. These locations can also facilitate the processing of fish by the fishermen or buyers, by for example providing cleaning, filleting and icing stations. Implementation of these stations might be complicated on these island and should be regarded as a long term aim. Ideally, these central landing and selling locations are run by the local fishermen's cooperative and supported by the local government.
- 2 Mandatory seafood labelling to achieve full traceability of seafood products must be implemented.**

A mandatory labelling system for seafood should be implemented to improve traceability in the seafood supply chain. Such a system can facilitate achieving traceability targets in the fisheries management system. Seafood labels should at least contain the following information: batch or product number, species name in Latin, capture area (location) and method. This will provide the necessary basic information to be able to trace back certain products. Subsequently, mandatory copying of the label with every step in the supply chain will ensure that no information is lost.

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Appendix 1

INTERVIEW TEMPLATE CONSUMERS

FOR RESEARCH PURPOSES IT WOULD BE OF GREAT HELP IF YOU COULD ANSWER THE FOLLOWING QUESTIONS

What is your status on the island?

Local Expat Tourist, if so, from which country?

How often do you buy seafood (including in restaurants)?

Never Less than once a week More than once a week

Where do you buy seafood on this island?

Supermarket/shop Restaurant/bar Fishermen Other :

Which species of seafood do you buy most often?

1. 2. 3.

When you buy seafood, are you aware of its origin (catch area) ?

Never Sometimes Always

When you buy seafood, are you aware of the way it is produced/caught (catch method) ?

Never Sometimes Always

How important are the following factors when buying seafood

Quality	not important	<input type="checkbox"/>	very important				
Price	not important	<input type="checkbox"/>	very important				
Sustainability*	not important	<input type="checkbox"/>	very important				
Convenience	not important	<input type="checkbox"/>	very important				
Locally caught	not important	<input type="checkbox"/>	very important				

Would you consider not buying a product knowing it harms the local ecosystem?

Absolutely not definitely

Would you consider paying more for a product of which you know that is caught sustainable*?

Absolutely not definitely

How important do you find sustainability* in general?

Not important very important

How would you like to be informed about the sustainability* of your seafood?

Social media (eco) label Local conservation foundation
 Seafood guide/tool At point of sale Government

To improve the sustainability* of local fisheries, what would you change and how?

THANK YOU VERY MUCH FOR YOUR COOPERATION !!

* Sustainable = in a way that preserves natural resources for the future, without harming the environment

INTERVIEW TEMPLATE FISHERMEN

INTERVIEWER:

INTERVIEW NUMBER:

DATE OF INTERVIEW:

LOCATION OF INTERVIEW:

QUESTIONNAIRE FOR FISHERMEN

Goal:

To understand the relationships and linkages between fishers, buyers, sellers and exporters. To identify opportunities and challenges for to improve the local fisheries and seafood trade in the Dutch Caribbean.

Introduction to respondents:

- Introduce yourself and who you work for
- Explain the survey will take about 30 minutes
- State that information will be confidential

SECTION 1. Personal Information

1. Name:
Boat:

2. Age Category in years (tick one):

<input type="checkbox"/>	20 - 30	<input type="checkbox"/>	31 - 40	<input type="checkbox"/>	41 - 50	<input type="checkbox"/>	51-60	<input type="checkbox"/>	> 60
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3. Group (tick one):

Local	<input type="checkbox"/>
Neighbouring island	<input type="checkbox"/>
Other (Specify)	<input type="checkbox"/>

4. Provide name of village where you live

4a. How many years have you lived there?

SECTION 2: Sales

4. Which different buyers do you have and for how long have you been selling to them?

Type of Buyer (restaurant/middlemen...)	Product	Percentage of total sales	Location of buyer	Years

5. Is there a specific reason you work with these buyers?

6. In what form do you sell your products? (gutted, whole, steaks, frozen) Why?

7. Do you deliver your products to your costumers? How?

8. Do the different types of buyers pay different prices? If yes which?

Buyer	Species/group	Price per KG	Reason

9. If the price differs (in time or between people), what is it based on?

In time	Between buyers

10. How many KGs of seafood do you sell per year?

Species	KG per year	LBS per year
Lobster		
Red fish		
Red hind		
Mixed potfish/reef fish		
Pelagics		

11. Would you like to sell more locally if possible?

12. Do you ever have problems selling your fish? Why?

13. Does the demand for seafood influence whether you go fishing or not?

14. Do buyers ask questions about catch method, origin or sustainability?

SECTION 3: Sustainability

14. In your experience have your typical catches changed within the last 10 years or so (i.e. catch per daily trip)

Increasing Stable Declining Gone

15. If the catches have changed, can you briefly explain the likely reason? SELECT THE MAJOR REASON

Tick applicable	Reason	Comments
	Natural changes	
	Fishing changes	
	Overfishing	
	Pollution	
	Other (specify)	

16. What management measures are in place now or do you take voluntarily?

Can tick more than one choice

Tick applicable	Reason	Voluntary?	Comments
	Gear restrictions		
	Gear adaptations		
	Size limits		
	Catch limits		
	Limits to number of fishermen		
	Seasonal protection		
	Spatial protection		
	No protection		
	Other (specify)		

17. Do you feel restricted by regulation?

18. If you would rate the following measurements / adaptations on a scale from 1-5, how comfortable would you feel?

Rating	Reason	Comments
	Gear restrictions	
	Gear adaptations	
	Size limits	
	Catch limits	
	Limits to number of fishermen	
	Seasonal protection	
	Spatial protection	
	Sustainability rating system (seafood guide)	
	Eco label	
	Change of target species	

20. Would you consider shifting to another target species/fishery if feasible and more sustainable?

21. If you could no longer collect your target species which source of income would become more important?

22. What drives your choice to discard? (Price, demand, sustainability)

INTERVIEW TEMPLATE SUPERMARKETS/ RESTAURANTS

INTERVIEWER:

INTERVIEW NUMBER:

DATE OF INTERVIEW:

LOCATION OF INTERVIEW:

QUESTIONNAIRE FOR SUPERMARKETS, RESTAURANTS AND HOTELS

Goal:

To understand the relationships and linkages between fishers, buyers, sellers and exporters. To identify opportunities and challenges for to improve the local fisheries and seafood trade in the Dutch Caribbean.

Introduction to respondents:

- Introduce yourself and who you work for
- Explain the survey will take about 30 minutes
- State that information will be confidential

SECTION 1. Personal Information

1. **Name:**
Company:

2. **Age Category in years (tick one):**

<input type="checkbox"/>	20 - 30	<input type="checkbox"/>	31 - 40	<input type="checkbox"/>	41 - 50	<input type="checkbox"/>	51-60	<input type="checkbox"/>	> 60
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3. **Background (tick one):**

<input type="checkbox"/>	Local	<input type="checkbox"/>	Dutch	<input type="checkbox"/>	US	<input type="checkbox"/>	Other (specify	<input type="checkbox"/>
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4. **What is your position/responsibilities in the company?**

5. **How long have you operated your restaurant?**

SECTION 2: Business and buying locally caught seafood

6. Do you sell seafood?

Yes. Go to Q7

No. Why not?

7. Approximately what proportion (%) of the seafood you buy is locally (Saban/Statian) caught?

0% 1-25% 26-50% 51-75% 76-100%

|

Only if 0%:

7a. Why do you not sell local seafood?

7b. What would be necessary for you to start selling local seafood?

7c. When ordering seafood, do costumers ask questions about:

Origin

Catch Method

Sustainability*

7d. Do you have this information available? Have you ever asked your supplier?

8. Who does your company buy local (Saban/Statian) seafood from? (tick all that apply)

- Fisherman/woman
- Local Trader/ Middleman
- Own supply
- Other (Specify)

9. What is your top 5 most bought species? And in what form (whole, fillet, steak)

10. Would you like to buy them in another form?

11. Is there a difference in price between seafood availability low season and high season, for which species?

Species	Form (canned/ fillet/whole)	Local/Import	How often do you buy (days a week)?	Pound per month	Price per kg
Mahi Mahi					
Tuna					
Lobster					
Wahoo					
Lionfish					
Snapper					

12. Is there a difference in availability between low season and high season, for which species?

13. Are there any purchasing problems with local (Saban/Statian) seafood conditions or quality or supply? If YES, what are these? (tick all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Too big | <input type="checkbox"/> Too expensive |
| <input type="checkbox"/> Too small | <input type="checkbox"/> Not preferred species |
| <input type="checkbox"/> Appearance not good | <input type="checkbox"/> Irregular supply |
| <input type="checkbox"/> Insufficient supply | <input type="checkbox"/> Other (specify) |

14a. Has locally (Saban/Statian) caught seafood become more expensive over the years?

If YES, explain.

14b. Is locally (Saban/Statian) caught seafood more expensive than other similar seafood?

15. Is locally (Saban/Statian) caught seafood getting harder to source now compared to in the past?

If YES, explain.

16. If you cannot buy locally caught seafood, what substitute seafood do you use, if any?

17. Are you concerned at all about sufficient supply of locally caught seafood for your company into the future?

If YES, what is your concern? And what is the solution?

SECTION 3: Selling local seafood

18. If there is seasonality to the DEMAND by consumers for local seafood in your company, when is HIGH demand?

19. Who are your costumers? (express in percentages)

	%
Locals	
Expats	
Tourists	
Other (Specify)	

20. How many KG of locally (Saban/Statian) caught seafood products do you estimate you sell in a week in HIGH and LOW season (if relevant) and what is your net income?

Season	Volume/week	Net income/week
High Season	KG	
Low Season	KG	

21. What price do you pay per KG of the seafood you purchase?

Species	Price/KG
---------	----------

INTERVIEW TEMPLATE EXPORTER/IMPORTER

Introduction to respondents:

- Introduce yourself and who you work with.
- Explain the survey will take about 30-35 minutes
- State that information will be confidential

INTERVIEWER:

INTERVIEW NUMBER:

DATE OF INTERVIEW:

LOCATION OF INTERVIEW:

SECTION 1. Personal Information

1. Name:

2. Age Category in years (tick one):

<input type="checkbox"/>								
	20 - 30		31 - 40		41 - 50		51-60	> 60

3a. Name and location of the company you work for or own:

3b. What year did you start your company?

SECTION 2. Supply

Group	Specifics
Reef fish	
Pelagic fish	
Lobster	
Conch	
Other	

5. What criteria do you use to select seafood?

Size: not important very important

Why?

Size	Not important	Very important
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Freshness	Not important	Very important
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Appearance	Not important	Very important
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Price	Not important	Very important
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Any other physical conditions?	Not important	Very important
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	Not important	Very important

Freshness: not important very important

Appearance: not important very important

Why?

Any other physical conditions?

(egg bearing, molding, etc)

#1 egg bearing: not important very important

#2 missing legs: not important very important

#3 white stuff on the back of lobsters makes them slightly less sellable: not important very important

#4 moulting. If too soft they don't last in the tank: not important very important

Price: not important very important

Do you prefer a certain catch method? yes no

Why?

Sustainability*: not important very important

6. Are there HIGH and LOW seasons in terms of supply?

6a only if 6 is yes: which months are high and which low?

6. Are there HIGH and LOW seasons in terms of demand?

6a only if 6 is yes: which months are high and which low?

7. Are you always able to buy enough seafood to meet demand? NO (If NO, please explain)

8. What is the most important factor that influences the price you pay or ask for seafood?

SECTION 3. Export

11. Please indicate if you export, import, process or sell locally?

* Sustainable = in a way that preserves natural resources for the future, without harming the environment

12. Only if you both export and sell seafood domestically, approximately what proportion (by value) of your seafood trade do you export (annually)?

13. Only if you export your seafood product, how do you transport it?

14. What are the routes and which companies do you use for transportation?

15. How do you process/prepare your product for export?

16. Why do you select this form of processing for export? Please explain:

17. On average, how many export shipments do you have per year?

18. What is the average size are your shipments?

19. What are other costs associated with importing/exporting?

20. What are the average costs of transport?

21. Do you always sell to the same costumers?

22. Would you like to export to other destinations/markets? Which, why and what are the limitations?

SECTION 4. General Questions

Product	Country of origin (catch area)	How often do you buy (days a week)?	Kg per month	Price per kg (USD)

23. Are the customers you sell your product to, in general the end point of sale? If not, which other parties are involved?

24. Do you get questions from customers about the origin (catch area) of your product?

25. Do you get questions from costumers about the catch method of your product?

26. Do you, or are you able to provide information on origin and catch method?

27. Do you get questions from costumers about the sustainability of your product?

28. If the demand for sustainable seafood increases, would you consider trading more sustainable seafood?

29. Would you like to buy/sell eco labels? Why? Why not?

1. Which sources do you buy from?

(Note that it is not necessary to list every individual supplier but rather every source e.g. Live lobster – Saba, Tilapia – Vietnam etc.)

3. In addition to the price of Saban-Statian seafood, are there any other costs to collect this or have them delivered to your business?

Item	Cost (\$)	Item	Cost (\$)

4. Who do you sell to?

(Note that it is not necessary to list every customer but rather every product destination e.g. Wahoo-Restaurants – St.Martin, Tilapia – Supermarkets-Saba etc.)

Item	Cost (\$)	Item	Cost (\$)

FIXED GOVERNMENTAL PRICES FOR SEAFOOD ON BONAIRE

Prejs di piska entrante 15 di Januari 1996

<i>Tipo di piska</i>	<u>Benta ku publiko</u>
Tribon	f. 5,50
namungo	- 5,50
Sochie-Gaetoo	- 5,50
Buní	- 7,50
Balaú	- 7,50
Caribe	- 8,00
Korkobá	- 9,00
Jaro	- 9,00
Grastelchi piedra/ laman afó	- 9,00
Pikú/Pikudito	- 9,00
Purunchie/Gatu	- 9,00
Dradu/Mulá	- 9,00
Kabeljouw	- 10,00
Jakupeper	- 10,00
Jeanpou	- 10,00
Piská Korá	- 10,00
Konofish	- 10,00
Piská salu (buní/balau)	- 10,00
Piskarai	- 7,50
Gepi	- 7,50
Buladó	- 7,50
Aas	- 5,50

VISSERIJWET BES EILANDEN

Fisheries act BES islands, 'Article 13: concerning fisheries in the high seas or under the jurisdiction of another state'.

Full fisheries act BES islands available on: <https://wetten.overheid.nl/BWBR0028168/2014-01-25>

Visserijwet BES Geldend van 25-01-2014 t/m 31-12-2018

Hoofdstuk IIIA. Visserij op volle zee of wateren die vallen onder de rechtsmacht van een andere staat

Artikel 13a

Onder vissersvaartuig, afkomstig van Bonaire, Sint Eustatius of Saba wordt in dit hoofdstuk verstaan: schip dat is geregistreerd in Nederland, Bonaire, Sint Eustatius of Saba en in de uitoefening van beroep of bedrijf wordt of kan worden gebruikt voor de visserij op zee.

Artikel 13b

1. Het is verboden met een vissersvaartuig, afkomstig van Bonaire, Sint Eustatius of Saba op volle zee of in de wateren die vallen onder de rechtsmacht van een andere Staat, te vissen zonder, of in afwijking van een vergunning.
2. De vergunning, bedoeld in het eerste lid, wordt verleend door of namens Onze Minister.
3. Aan een vergunning kunnen voorschriften en beperkingen worden verbonden, onder andere met betrekking tot:
 - a. de visgebieden waar het vissersvaartuig kan vissen;
 - b. de vissoorten waarop het is toegestaan te vissen en indien van toepassing tevens de vissoorten waarop het niet is toegestaan te vissen;
 - c. het bijhouden van logboeken;
 - d. het aan boord nemen van waarnemers en
 - e. het rapporteren over de vangst.

Artikel 13c

1. Bij algemene maatregel van bestuur kunnen regels worden gesteld die in elk geval betrekking hebben op de:
 - a. vistuigen waarmee het is toegestaan te vissen;
 - b. te vangen vissoorten;
 - c. eisen waaraan een vissersvaartuig dient te voldoen, waaronder:
 - 1° het navigatiesysteem om de locatie van het vissersvaartuig vast te stellen;
 - 2° het markeren van het vistuig;
 - d. eisen waaraan de bemanning van een vissersvaartuig dient te voldoen.
2. Bij algemene maatregel van bestuur kunnen nadere regels worden gesteld ter uitvoering van internationale of regionale overeenkomsten met betrekking tot de visserij op volle zee of binnen de wateren die onder de rechtsmacht vallen van een andere Staat.
3. Het is verboden met een vissersvaartuig, afkomstig van Bonaire, Sint Eustatius of Saba een reis te ondernemen, dan wel te doen ondernemen indien niet wordt voldaan aan de krachtens dit artikel gestelde regels.
4. Van het verbod in het vorige lid, kan ontheffing worden verleend.

CBS IMPORT VALUES FOR THE CARIBBEAN NETHERLANDS, 2018-2019

Tabel 1. Invoerwaarde aan zeedieren Caribisch Nederland

 Bron: CBS, <https://www.cbs.nl/nl-nl/maatwerk/2020/26/invoerwaarde-zeedieren-caribisch-nederland-2018-2019>

	2018			2019		
	Bonaire	Saba	St. Eustatius	Bonaire	Saba	St. Eustatius
	1000 USD					
Totaal	1.319	133	94	1677	121	123
Achtarmige inktvissen, bevroren, gedroogd, gezouten of gepekeld	1	0	0	3	0	0
Achtarmige inktvissen, levend, vers of gekoeld	1	0	0	2	0	0
Ander visvlees, bevroren	32	0	1	140	0	0
Ander visvlees, visfilets, gerookt	5	0	0	12	0	1
Andere mosselen, bevroren, gerookt, gedroogd, gezouten of gepekeld	0	0	0	0	0	0
Andere ongewervelde dieren, levend, vers of gekoeld	0	0	0	0	0	0
Andere ongewervelde waterdieren, bevroren, gedroogd, gezouten of gepekeld	9	0	0	23	0	0
Andere Pacificische zalm, bevroren	34	0	2	49	0	3
Andere platvissoorten, bevroren	0	0	0	0	0	1
Andere platvissoorten, vers of gekoeld	1	0	0	0	0	0
Andere schaaldieren, meel, poeder en pellets van schaaldieren	0	0	0	1	0	0
Andere schaaldieren, meel, poeder en pellets, van schaaldieren	3	0	0	13	0	0
Andere tonijn- en bonietsoorten, bevroren	2	0	0	9	0	0
Andere tonijn- en bonietsoorten, vers of gekoeld	1	0	0	108	0	0
Andere vis, gedroogd, ook indien gezouten, doch niet gerookt	0	0	0	1	0	6
Andere vis, gezouten, doch niet gedroogd of gerookt, alsmede gepekeld	22	0	0	26	0	0

Andere vis, levend	1	0	0	0	0	0
Andere vissoorten, bevroren	15	0	11	85	0	26
Andere vissoorten, vers of gekoeld	43	0	0	9	0	0
Andere zalmsoorten, bevroren	4	0	0	23	0	0
Andere zalmsoorten, vers of gekoeld	143	0	0	103	0	0
Ansjovis, gezouten, doch niet gedroogd of gerookt, alsmede gepekeld	0	0	0	0	0	0
Atlantische zalm (<i>Salmo salar</i>) en Donauzalm (<i>Hucho hucho</i>), bevroren	0	0	0	0	0	0
Eetbare slakken, andere dan zeeslakken	0	0	0	1	0	0
Garnalen, bevroren, ook indien ontdaan van de schaal	382	0	5	439	0	2
Garnalen, niet bevroren, ook indien ontdaan van de schaal	0	0	0	0	0	0
Geelvintonijn (<i>Thunnus albacares</i>), bevroren	0	0	0	1	0	0
Geelvintonijn, vers of gekoeld	382	0	5	439	0	2
Haring (<i>Clupea harengus</i> , <i>Clupea pallasii</i>), gerookt	3	0	0	11	0	0
Haring (<i>Clupea</i>), bevroren, m.u.v. levers, hom en kuit	0	0	0	8	0	0
Haring (<i>Clupea</i>), vers of gekoeld	2	0	0	1	0	0
Haring, gezouten, doch niet gedroogd of gerookt, alsmede gepekeld	0	0	0	0	0	0
Inktvissen; pijlinktvissen, bevroren, gerookt, gedroogd of gepekeld	0	0	0	0	0	0
Inktvissen; pijlinktvissen, levend vers of gekoeld	2	0	0	2	0	0
Jakobsschelpen en andere schelpdieren, bevroren, gezouten, gedroogd of gepekeld	7	0	0	1	0	0
Jakobsschelpen en andere schelpdieren, levend, vers of gekoeld	31	0	1	32	0	0
Kabeljauw (<i>Gadus</i>), bevroren, m.u.v. levers, hom en kuit	1	0	0	0	0	0
Kabeljauw (<i>Gadus</i>), gedroogd, ook indien gezouten doch niet gerookt	27	0	0	3	0	0
Kabeljauw (<i>Gadus</i>), vers of gekoeld	116	0	0	87	0	0
Kabeljauw, gezouten, doch niet gedroogd of gerookt, alsmede gepekeld	7	0	0	4	0	0
Krabben, bevroren, ook indien ontdaan van de schaal	5	0	0	3	0	0

Langoesten, bevroren, ook indien ontdaan van de schaal	11	0	0	8	0	0
Lever, hom en kuit, vers of gekoeld	2	0	0	1	0	0
Makreel (Scomber), vers of gekoeld	0	0	0	0	0	0
Mosselen, levend, vers of gekoeld	10	0	0	7	0	0
Oesters, levend, vers, gekoeld, bevroren, gezouten, of gepekeld	12	0	0	19	0	0
Pacifische zalm, Atlantische zalm en Donauzalm, gerookt	0	0	0	0	0	0
Pacifische zalm, Atlantische zalm en Donauzalm, vers of gekoeld	0	0	0	5	0	0
Platvis, vers of gekoeld, m.u.v. lever, hom en kuit	0	0	0	1	0	0
Rode zalm (Oncorhynchus nerka), bevroren	0	0	0	0	0	0
Sardines, sardinellas en sprot, bevroren	0	0	0	0	0	0
Sardines, vers of gekoeld	1	0	0	4	0	0
Schol (Pleuronectes platessa), vers of gekoeld	0	0	0	0	0	0
Tong (Solea spp.), vers of gekoeld	67	0	0	0	0	0
Vis, lever, hom en kuit, bevroren	0	0	0	17	0	0
Vis, visfilets, gedroogd, gezouten of gepekeld, doch niet gerookt	61	0	0	86	0	0
Visfilets en ander visvlees (ook indien fijngemaakt), vers of gekoeld	80	0	0	71	0	0
Visfilets, bevroren	100	0	1	206	0	0
Witte tonijn (Thunnus alalunga), bevroren	0	0	0	0	0	0
Witte tonijn, vers of gekoeld	18	0	0	1	0	0
Wulken en andere zeelakken, levend, vers of gekoeld	0	0	0	3	0	0
Zalmachtigen (forel), vers of gekoeld, m.u.v. lever, hom, kuit	28	0	0	22	0	0
Zeebaars (Dicentrarchus labrax, Dicentrarchus punctatus), bevroren	2	0	0	0	0	0
Zeekeeft, bevroren, ook indien ontdaan van de schaal	1	0	0	0	0	0
Zeekeeft, niet bevroren, ook indien ontdaan van de schaal	0	0	0	1	0	0
Overige vis, schaaldieren, weekdieren en andere ongewervelde waterdieren	0	133	72	0	121	81

IMPORT DATA INTERNATIONAL TRADE CENTER

Data downloaded from: International Trade Center (link); Market Info & Tools, Market Analysis Tools, Trade Statistics, Yearly Trade by Commodity Statistics 2001-2019, by product group: imports or exports, imports.

List of supplying markets for a product imported by Bonaire, Sint Eustatius and Saba (Mirror)

Product: 03 Fish and crustaceans, molluscs and other aquatic invertebrates

Unit : US Dollar thousand

Exporters	Imported value in 2017	Imported value in 2018	Imported value in 2019
Total	171	200	288
Netherlands	170	200	288
Portugal	1	0	0

List of products imported by Bonaire, Sint Eustatius and Saba

detailed products in the following category: 03 Fish and crustaceans, molluscs and other aquatic invertebrates

Data based on the partner reported data (Mirror data) are shown in orange

Unit : US Dollar thousand

Code	Product label	Imported value in 2015	Imported value in 2016	Imported value in 2017	Imported value in 2018	Imported value in 2019
'0304	Fish fillets and other fish meat, whether or not minced, fresh, chilled or frozen	179	108	155	166	245
'0306	Crustaceans, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine, ...	22	13	8	4	29
'0307	Molluscs, fit for human consumption, even smoked, whether in shell or not, live, fresh, chilled, ...	3	3		1	7
'0302	Fish, fresh or chilled (excluding fish fillets and other fish meat of heading 0304)	13	52	7	28	6
'0303	Frozen fish (excluding fish fillets and other fish meat of heading 0304)		5		1	
'0305	Fish, fit for human consumption, dried, salted or in brine; smoked fish, fit for human consumption, ...	1	1	1		



Why we are here.

To stop the degradation of the world's natural environment and to build a future in which humans live in harmony with nature.

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PHOTOGRAPHY

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