

Dried fish exportation in Príncipe island

Value Chain Assessment

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EXECUTIVE SUMMARY

São Tomé and Príncipe is a small island state in the Gulf of Guinea. Its population is ~8,000 in Príncipe and ~180,000 in São Tomé. Approximately 20% of its population is employed in the artisanal fisheries sector, and the fishing effort of both islands is concentrated in their narrow continental shelves.

Fish caught by artisanal fishers in São Tomé is traded fresh or salt dried. In Príncipe, smoked fish is only used for consumption. In São Tomé, smoked fish can be commodified and sold at the markets, although in smaller quantities than the fish that is sold dried or fresh.

Fresh fish is normally retailed or wholesaled by traders called “*palaiês*” (a Santomean word that means “trader”). Fish traders (*palaiês de peixe*) are women and they normally have defined roles in the value chain (vending, distributing, salt-drying, etc).

Most fresh fish in Príncipe is sold at the main market in the city of Santo Antonio by palaiês. Two types of transactions are involved in the transfer of fish from the fisher to the trader: 1) **payment of services**, in which the trader distributes and sells the fish in exchange of a set retribution from the fisher; and 2) **purchase and resale**, in which the trader buys the fish to sell it at a higher price. Two options of payment exist in the latter: upfront (*cara-a-cara*) or upon completion of sale (*fiado*).

Value chain for dried fish

The artisanal fishing fleet in Príncipe catches more fish than its population consumes, and a significant part of this catch are salt dried and exported to São Tomé in cargo boats. Dried fish exportation is mostly practised by fishers, fish traders, and boat owners. Fishers mostly export the fish they catch, whereas fish traders buy fresh fish from the fishers to salt dry and export. Boat owners generally obtain the fish they dry from their corresponding share of the catch (normally 50%), which is paid by the fishers who use their boat, engine, and/or net. Although there is a market for dried fish in Príncipe, this market is small, so most of the dried fish is sent to São Tomé.

Flying fish (family Exocetidae) is the most traded type of fish in these exports from Príncipe. It is captured in surface drift gillnets and one of the most abundant types of fish in the total catch. *Palaiês* normally purchase it at 6.6 DBS (€0.26) per fresh fish, to resell it at 10 DBS (€0.4) per dried flying fish in São Tomé. Larger fish sold by kilogram (“*peixe grosso*”) is purchased by the *palaiês* at 60 DBS (€2.4) per kilo of fresh fish, to be sold at 100 DBS (€4.0) per kilo of dried fish in São Tomé. Blue runner (*Caranx crysos*) is, together with the flying fish, the most landed species in terms of biomass and is caught using various hook & line techniques. Dried blue runner can be sold per kilo (within the *peixe grosso* category) or per unit, due to its low size variation.

Techniques for salt drying fish are the same in both Príncipe and São Tomé islands. The fish is cut in half dorsoventrally, leaving the ventral side intact to keep the left and right side together. After eviscerating it, the fish is washed with abundant water to remove the excess of blood, and its internal and external surfaces are manually rubbed with abundant granular salt. The salted fish is stored in closed buckets for several days to increase the salt content in the fish. Finally, the salted fish is dried in the open air, normally using drying racks called “*quialos*”. In the drying process, the fish will lose weight as its water content diminishes.

Salt drying techniques used in São Tomé and Príncipe are similarly used in other parts of the world. Empirical studies on these techniques reveal that the maximum weight loss of the fish ranges from 50% to 80% of the weight of the fresh eviscerated fish. However, most respondents explained removing the fish from the drying racks after the fish has lost 30% of its weight, as a higher weight loss would reduce the selling price of the fish sold by kilogram.

The production and exportation of dried fish is costly and therefore only feasible in large quantities (normally, at least one cargo bag of 100 kg of dried fish is sent to São Tomé at a time). Production costs include the purchase of salt (and transport of salt to the community, in some cases) and purchase of fish (in the case of *palaiês*). Exportation costs include transport of the dried fish to/from the port on either side of the shipment, tarpaulin cargo bags, customs fees, shipping fees and costs associated with loading and unloading the cargo.

Palaiês which produce dried fish normally have fish trade as their only income-generating activity. Their profit margins are much tighter than fishers and boat owners who export dried fish, as they must purchase the fresh fish. Therefore, *palaiês* normally have a more restricted access to this market than fishers and are more vulnerable and likely to abandon the activity if the cargo is lost or unpaid.

Most of the fish exported from Príncipe is sent to distributors in São Tomé, who collect the fish from the boat. The distributors are normally dried fish vendors (*palaiês*) themselves, who wholesale the fish at cost price to other vendors, keeping a part of the fish for themselves to sell on to the final customer.

The type of transaction involved in the export and distribution of fish is payment upon completion of sale or *fiado*. The fish is bought by the distributors at a certain price, but only paid to the producer upon completion of sales. Likewise, the fish that is distributed to other dried fish vendors is only paid to the distributor after the completion of sales. Distributors sell the fish to the dried fish vendors at cost price, obtaining no profit in the transaction. Instead, distributors obtain their profit from: 1) a set retribution paid by the producer; and 2) the amount of dried fish they keep to retail at a higher price to the final customers.

Most of the dried fish produced in Príncipe and São Tomé is sold to dried fish vendors at the main Bobo Forro market in the capital city of São Tomé. The vendors in turn sell most of this fish to the final customers in the market. In São Tomé, the main production centres of dried fish are Neves, Santa Catarina, and Porto Alegre. Dried fish vendors at Bobo Forro market, interviewed as part of this value chain assessment, reported that Príncipe produces more dried fish than these three production centres together.

Further inland, dried fish is sold to the final customer via food retailers, shop owners or street pedlars. Most of these vendors source their fish at the main Bobo Forro market, buying it personally in the capital and transporting it to their selling points. These vendors may be employed by larger agricultural companies and obtain the fish *fiado*, to be paid upon receipt of salary at the end of the month - a custom commonly practiced among business all over São Tomé and Príncipe.

The large amounts of fish that need to be sent by the producers, in combination with the *fiado* system, create a major risk for both producers and vendors. Vendors who receive the fish cannot assume the sale of such large amounts independently, nor do they have the cash needed to pay the fish upfront, which forces them to distribute the cargo between several traders. As a result, the debt that is owed to the producer is divided amongst several traders, thus increasing the risk of losses (through damage, loss, theft, or non-payment).

Finally, the current selling price of the dried *peixe grosso* (large fish sold by kilogram) forces *palaiês* to dry fish only partially. *Palaiês* buy fresh fish at 60 DBS per kilogram and sell it dried in São Tomé at 100 DBS per kilo, which makes a weight loss higher than 30% financially unfeasible. This causes losses on the vendors' side, as the fish continues to lose weight in storage and thus decreases in value. In addition, this practice poses a potential health risk for the consumer, as higher moisture contents facilitate pathogen growth. This initial evidence suggests that dried *peixe grosso* is probably

undervalued, which promotes unsanitary practices and creates conflicts between producers and vendors. A re-assessment of the selling prices, based on empirical evidence on weight loss for different species, should be considered at national level.

Recommendations

A facilitated exportation system was identified as an area of intervention for the Blue Action Fund project, with the potential to minimise risks associated with dried fish exports for producers and vendors. The proposed system consists of a trader purchasing dried fish in Príncipe and paying half of the cost in advance, to fund the purchase of additional fresh fish to be salt dried by selected groups of palaiês. Large amounts of fish could thus be purchased from informal groups of traders in the fishing communities, and the product collected at its source in bulk to minimise associated transport costs. This would then be sent to a dried fish vendor at the main market in São Tomé, who would store the fish in a locked room at the Bobo Forro market, wholesaling the fish to other vendors in the market daily from 6 AM to 6:30 AM and receiving the payment upfront.

Dried fish exportation in Príncipe island

Value Chain Assessment

1. RESEARCH RATIONALE AND OBJECTIVES

Dried fish exports to São Tomé island are an essential income-generating activity practised by fishers (men) and fish traders (women) in communities of artisanal fishers on Príncipe island. Furthermore, this activity is one of the few income-generating activities that women can access and is one of the few sources of external fund injection into the coastal communities on Príncipe (*Guillermo Porriños, 2020, unpublished research*).

In June 2020, *Fundação Príncipe* conducted a telephonic survey to understand the impacts of the COVID-19 pandemic on the livelihoods of 22 rural communities on Príncipe (n=132, snowball sampling). The results revealed that the value chain for both fresh and dried fish had been strongly impacted by the pandemic. Unemployment and the collapse of the tourism industry had dramatically reduced the demand for fresh and dried fish on the island, forcing fishers and traders to sell at lower prices. Moreover, disrupted boat transport had greatly restricted the ability to export dried fish, due to reduced frequency of shipments and a travel ban that prevented traders from going to São Tomé to sell fish. Finally, traders - who obtain the fish they export directly from fishers - reported not having enough funds to buy fish and salt it in sufficient quantities for export due to the COVID-19 induced financial crisis.

Therefore, dried-fish trade between Príncipe and São Tomé was identified as a potential area of intervention for the Blue Action Fund project, and a market intervention to facilitate dried fish exports was proposed. The aim of the present study is to inform such an initiative, with the following objectives:

- **Value Chain Assessment (VCA) for fish:** Characterise the processes, types of transactions, and actors involved in Príncipe's value chain for fish, with emphasis on dried fish and its export.
- **Understanding women's access to fish trade:** Explore factors affecting women's access to fish trade (with emphasis on dried fish exportations), defining access as "the ability to benefit from a resource"¹. Identify the main factors constraining this access, and potential interventions to improve it.
- **Exploring functions and capacities of traders' associations:** Explore the current functions and capacities of the existing traders' associations and their capacity to act as sources of funding.
- **Exploring traders' preferences towards potential interventions:** co-design a potential system to facilitate dried fish exports from Príncipe to São Tomé, based on traders' preferences.

¹ Wosu, A., 2019. "Access and institutions in a small-scale octopus fishery: a gendered perspective." *Marine Policy* 108 (2019): 103649.

2. BACKGROUND

2.1. SÃO TOMÉ AND PRÍNCIPE'S MARINE ENVIRONMENT

São Tomé and Príncipe (STP) are two volcanic islands in the Gulf of Guinea, located approximately at 250 km from the African mainland. They are true oceanic islands, separated from the African mainland and from each other by a sea that is over 2000 metres deep. São Tomé has an area of 865 km² and a population of ca.180,000; and Príncipe has an area of 136 km² and an estimated population of 8,000. The islands have narrow continental shelves that are shallower than 100 metre-deep, after which depth increases sharply from 100 to 1000 metre-deep at 2 to 7 km from its edge. São Tomé's shelf is smaller (485 km²) and extends 3-7 kilometres from the shore, whereas Príncipe's shelf is larger (1,085 km²) and extends up to 7 km to the north and 27 km to the south, to two small islets called *Tinhosas*.

2.2. ARTISANAL FISHERIES IN SÃO TOMÉ AND PRÍNCIPE

Most fishing activities in São Tomé and Príncipe are artisanal, and approximately 20% of the population of the archipelago is involved in the artisanal fisheries sector². Industrial fishing is exclusively practiced by foreign vessels of countries that have fishing agreements with STP (such as the European Union). This industrial fishing is practiced in STP's Exclusive Economic Zone, and beyond the area reserved for artisanal fishers (within 12 nautical miles from the shore). A small semi-industrial fleet exists, and it is comprised by 15 boats, based in São Tomé, and owned by Santomean companies³.

Most of the artisanal fishing effort on São Tomé and Príncipe occurs close to the shore, on the islands' continental shelves⁴. Only a small number of fishers on São Tomé adventure 10-20 km offshore, to fish pelagic fish, such as tuna, using surface handlines. The fishing effort per community on São Tomé is three times higher than in Príncipe, and the total fishing effort is estimated to be between 60 and 80 times higher (*Porriños, 2020, unpublished*). Since this high fishing effort is concentrated in a smaller continental shelf area, it is likely to be having a detrimental impact on coastal fish stocks. This is further supported by the fact that the Catch Per Unit Effort of several gear types is significantly lower in São Tomé compared to Príncipe, and large carangids such as Longfin yellowtail (*Seriola rivoliana*) and Horse-eye jack (*Caranx latus*) are virtually absent from São Tomé's landings, while in Príncipe they constitute 6-10% of catch of certain gear types (*Porriños, 2020, unpublished*).

In Príncipe island specifically, all fishing activities are artisanal. Most vessels are 5-10-metre-long dugouts (which may or may not be motorised), although 5-7 metre outriggers or 10m x 1.5m fibre-glass motorised boats can also be used. Hook & line fishing techniques are the most used, including set bottom longlines (200-800 hooks) or jigging handlines (10 to 20 hooks). Drifting surface gillnets comprise ~30% of all fishing trips and are mainly used to catch flying fish species, using nets that are 1000 to 2000 metres long. Five percent of the fishing trips in Príncipe island use 800-metre-long, purse-seine nets to catch shoals of species such as the West African halfbeak (*Hemirhamphus balao*). Finally, 8% of the fishing trips consist of free divers practising spear fishing⁵.

² Belhabib, D. "Fisheries of São Tomé and Príncipe, a catch reconstruction 1950–2010. Fisheries Centre Working Paper 67", Fisheries Centre, University of British Columbia Vancouver (2015): 13 p. (available [here](#)).

³ Tous, P. "Consulta para a avaliação dos recursos de peixes demersais", Report to the Fisheries Department, Ministry of Economy and International Co-operation, São Tomé and Príncipe (2015): 60 p.

⁴ Data from GPS trackers collected by the projects **Omali Vida Nón** (see [here](#)) and **Kike da Mungu** (see [here](#)).

⁵ Porriños, G. "Characterising Sao Tomé and Principe's artisanal fisheries through participatory, smartphone-based, landing surveys", Consultancy report for the Blue Action Project "Creating a network of Marine Protected Areas in São Tomé and Príncipe through a co-management approach" (2020): 51 p. (available [here](#)).

2.3. FISH TRADE ON SÃO TOMÉ AND PRÍNCIPE

Palaiê is a Santomean word that means “trader”. *Palaiês* are typically women, and the term is normally associated to vendors selling their products at the markets, door to door, or at food stands. However, “*palaiê*” can also refer to traders performing other roles in the value chain of different products (such as processing or wholesaling). In the case of the fish value chain in STP, men are responsible for fishing and women are responsible for trading fish⁶. *Palaiês de peixe* are fish traders who normally take care of processing (smoking or drying), distributing, and selling fish.

Fish in São Tomé and Príncipe can be traded fresh, dried, or smoked. Salting and drying fish is the most common method of preservation, since many households lack fridges and electricity may be intermittent or unavailable, depending on the community⁶. The process of salting and drying fish is called “*salga*” and salt dried fish is a commercially important product, sold in shops and markets on both islands. In Príncipe, fish smoking is practiced exclusively for consumption, while in São Tomé, traders can also smoke fish to sell.

In Príncipe, fish landings are higher than the local consumption of fish, and a significant part of the total catch is salt dried and sent to São Tomé. Although it is not currently known how much fish is exported to São Tomé, people in the coastal communities on Príncipe report that this is an economically important activity and one of the few sources of external fund injection (*Porriños 2020, unpublished research*). Both *palaiês* (women) and fishers (men) engage in these exportations. In this study, the different roles in the value chain of dried fish exportations will be explored and described.

2.4. FISH DRYING AS A PRESERVATION METHOD

Fish drying is a common system for fish preservation used in artisanal fisheries worldwide. Techniques and devices for drying fish vary, and salt can be applied or not. These variations will give the final product different properties. However, as a rule, lower moisture contents will inhibit pathogen growth better. The fish loses weight as it dries, and this weight loss will depend on the drying time, the type of fish and its size, the device used, and the weather conditions⁷. In warm humid environments, such as the case of STP, the weight loss of marine fish dried in racks for three days ranges from 50 to 70%, reaching 90% in some cases⁸. The maximum weight loss is dependent on the humidity content of the air, and a dried fish might slightly rehydrate in storage if kept in a humid environment. This study will describe the fish drying techniques employed in São Tomé and Príncipe.

3. DATA COLLECTION

Acknowledging the complex, dynamic, and diverse nature of small-scale fisheries and associated value chains, a qualitative approach was considered more appropriate. Data was collected from August to September 2020, and the study combined Focus-Group Discussions (FGD) and semi-structured interviews with Key Informants (KI). Information on catches, fuel consumption, fish and fuel prices were obtained from a landing database from 10 communities on Príncipe island between August 2019 to August 2020.

⁶ Nuno, A., Metcalfe, K., Godley, B.J., & Broderick, A.C. “Marine Conservation Priorities São Tomé and Príncipe” *Scoping Report. University of Exeter* (2015) 41 p. (available [here](#)).

⁷ Waterman, J. J. “The production of dried fish” *FAO* (1977) (available [here](#)).

⁸ Hossain, M. A. R., Akan, K. H., Islam, S., Belton, B., & Thilsted, S. H. “From fresh fish to dried fish: how much weight is loss?” *Fisheries and aquaculture news - Bangladesh* (2014) 31-37 (available [here](#))

On Príncipe island, the study focused on traders and fishers in six fishing communities (Abade, Hospital Velho, Santo António, Campanha, Lapa, and Praia das Burras) and two inland communities (Sundy and São Joaquim). In each community, 2-6 semi-structured interviews were conducted with KI, totalling 22 interviews. KI were identified by *Fundação Príncipe* focal points, and included: active traders, active fishers, and boat owners who did not fish (boat owners were only interviewed in Praia das Burras and Abade).

During interviews, KI were asked about the types of transactions involved in fish trade in their community, as well as techniques for fish processing and the problems associated with these activities. Interviews with KI were followed by FGDs with 5-7 people, disaggregating by traders (women) and fishers (men). In addition to questions about fish trade and fish processing practices, participants of the FGDs were offered different scenarios of potential interventions on dried fish trade and asked to consider the positive and negative aspects of each of these and how they could work in a way that benefited the producers. In two cases, interviews with KI (traders) evolved naturally into FGDs, as the interview in progress attracted the attention of other traders in the community.

On São Tomé, the study targeted different stakeholders. FGDs were conducted with producers in the main dried fish production sites of Santa Catarina, Neves, and Porto Alegre, to shed light on the dynamics of dried-fish trade in São Tomé. These FGDs targeted groups of 3-7 traders who produced dried fish and were also involved in the trade of fresh fish. During the interviews, traders were asked about their practices of drying fish, the dynamics of fresh and dried fish trade (including seasonality, costs, prices) and the main problems of these activities. Unlike Príncipe, salt-drying fish in São Tomé is an activity predominantly practised by women, and fishers are rarely involved in it. Therefore, due to time restrictions, interviews with fishers were not conducted. Interviews with fish traders selling both fresh and dried fish at the markets were also conducted, targeting the inland markets of Guadalupe and Trindade and the market of Santana (a coastal town with fishing activity). Two shop owners in the capital of São Tomé were also interviewed, as well as two traders who received fish from Príncipe (in the communities of Oqué del Rei and Bobô Cativo). Traders were asked about their distribution routes, their sources of fish, and the dynamics of fish trade in their communities and shops. Finally, a FGD was held with 7 vendors at São Tomé's main Bobô Forró market. During the FGD, vendors were asked about their sources of fish, market dynamics (clients, seasonality, prices, costs, distribution routes), and current challenges faced by dried-fish vendors at Bobô Forró. Finally, potential interventions to facilitate dried fish exports from Príncipe to São Tomé were discussed.

All interviews were conducted in Portuguese by the author of this report. In Príncipe, the presence of a facilitator was not deemed necessary, given the previous research conducted by the author in the targeted fishing communities. However, focal points were present in some of the meetings and interviews. In São Tomé, interviews and FGDs were facilitated by Arminda Rolim and Sinaida Espírito Santo (MARAPA), and fieldwork was conducted in the presence of a member of the Fisheries Department as an observer. Although Portuguese was spoken and understood by all the interviewees in São Tomé, some of them expressed feeling more comfortable speaking the local Forro language, so questions and responses were translated to Forro when necessary.

All interviews and FGDs were recorded for further transcription. Recordings will be transcribed changing the names of the respondents to ensure anonymity and the recording will be destroyed after the transcription. Notes on the interviews and FGDs were written immediately after, using the questions as an outline, and used to inform this report. The objectives of the activity were explained at the beginning of the interviews and FGDs. Participants were verbally asked for consent, and interviews and FGD lasted 35-60 minutes, with one FGD lasting 120 minutes.

4. RESULTS

4.1. ROLES IN THE VALUE CHAIN

In São Tomé and Príncipe, the main actors of the fish value chain are *palaiês* (typically women) and fishers (typically men). Although all traders are called *palaiês*, they normally have distinct roles in the value chain. To provide a better understanding of these roles, I am defining the categories below, acknowledging that this classification is a conceptual construction, and that at times these categories might be blurred by the complex dynamic of local fish trade: 1) producer, a *palaiê* invested in transforming the fish product (buying fish to salt-dry or smoke) and selling it in large quantities; 2) main-market fish vendor, a *palaiê* who sources most of her fish from producers, and retails or wholesales fish at the main markets; 3) fish or food retailers, traders who obtain fish from producers or vendors and retail it to the final customer in markets, shops, food stands, or door to door, carrying the fish in a bucket on her head; and 4) distributor, a *palaiê* who distributes the producer's fish to the vendors or retailers.

It must be noted that, while transforming and selling fish can be considered a trader's main occupation, distributing fish is not an income-generating activity and is generally practised in parallel to other trade arrangements. While some traders are more invested in either selling or producing dried fish, most traders practise (or have practised) distributing activities to some extent.

On the other hand, fishers are always responsible for the catch in both islands. In São Tomé, fishers rarely engage in fish processing, which is exclusively practised by *palaiês*. In Príncipe, however, fishers may also be producers, salt-drying and exporting their catch, typically to São Tomé.

4.2. TYPES OF TRANSACTIONS

Two main types of transactions exist in the value chain for São Tomé and Príncipe: *payment for services* and *purchase and resale*. In the **payment-for-services system** the fish is passed onto the next person in the value chain, who sells it or distributes it in exchange of a set retribution. This system is normally referred to as "*pagar maçada*" or "*gratificar*" - both expressions meaning "to give a retribution to someone in acknowledgment of their effort". In this case, the ownership of the fish remains of the first person, who also sets the value of the retribution ("*maçada*"). In the **purchase-and-resale system** the fish is bought by the next person in the value chain, to be resold at a higher price. In this system, the payment can be upfront ("*pagar cara a cara*"), or after completion of sale ("*dar/tomar fiado*", 'to give/take in trust').

4.3. OWNERSHIP OF FISHING MATERIALS

The first step in the value chain on both Príncipe and São Tomé islands is the division of fish between the fisher and the owner of the fishing materials. Fishing lines and hooks normally belong to the fisher, are never rented, and must be renewed every few weeks. Nets, on the other hand, are expensive to build and maintain, can last several years, and might be owned by fishers, non-fishers or retired fishers. Likewise, boats and engines are usually owned by fishers or former fishers, although not exclusively. Fishers normally rent the engine, boat, and net from the same owner, to avoid conflicts relating to the distribution of the profit.

Owners refer to the fishers who use their materials as "their crew" (*marinheiros*). Boat owners might be fishers themselves and go fishing with the rest of the crew members or might exclusively rent the boat and not engage in the fishing activity. Although several fishers might work with the same boat

owner, it is common that an owner works with one or more regular crew members, who have priority on boat usage and, in some cases, manage payments and select non-regular crew members. Other boat owners choose to work exclusively with a specific group of fishers.

Boat owners are normally responsible for providing fuel, as well as assuming the costs of maintenance of materials. In return, fishers must give a share of their profit to the owner. This payment can be in cash (after the fish has been sold) or in fish. The amount to be paid depends on the agreements between the owner and the fisher, and different systems exist. In all cases, the cost of the fuel is subtracted from the value of the total catch and returned to the owner. In the most common system, the owners request half of the profit, regardless the number of fishers in the boat. In the other systems, the profit of the trip is divided by a number of equal parts, depending on the number of fishers and the various materials rented from the owner. Fishers always take one part, and the remaining part(s) are paid to the owner. Some owners consider the engine one part and the net plus the boat another part, so the profit of the catch is divided by two plus the number of fishers. More rarely, some owners consider all fishing materials (boat, engine, and net) as single parts, so the total profit is divided by one plus the number of fishers. In practice, boat owners receive a third or a half of the catch, regardless of which system is used. When the catch is not enough to cover the costs of fuel, it is customary that the amount of fuel is discounted from the catch of the next fishing trip. However, these debts are not always paid, and during the interview process an owner explained that *“in those cases, it is normally the owner who loses money. In the past, we would try to fight for the past debts, but nowadays fish is scarce, and many fishers do not pay... It is better to just leave it because the fisher is also at a loss”*.

4.4. TRADE OF FRESH FISH ON PRÍNCIPE

On Príncipe, fresh fish is normally sold the same day and most of it is sold at the market of Santo António (although some fish may also be sold directly at the landing sites). Fish is always sold whole, although large fish might be cut into smaller portions at the request of the customer. Only exceptionally large species are eviscerated and divided into portions before being sold at the market (i.e. sailfish, blue marlin, tuna).

For most species, fresh fish is sold to the public at 60 DBS per kilo (€2.4), but the price can fluctuate depending on abundance of fish, availability of fuel and demand. In the case of smaller species with small size variation, fish is sold by unit price (i.e. 3 fish for 25 DBS, €1). This is the case of flying fish species (family Exocoetidae), West-African halfbeak (*Hemirhamphus balao*), and flying gurnard (*Dactylopterus volitans*). Other species (i.e. goatfishes of the family Mullidae) can also sometimes be sold like this.

Normally, the value chain for fresh fish has a single trader node: the fish passes from the fisher to a retailer (*palaiê*), who sells the fish to the final customer. Most of the fish is sold at the main market in the city of Santo António, although sometimes, the trader might walk to inland communities with the fish on her head, selling it door to door. The fish is carried in a plastic bucket and covered with a piece of fabric to protect it from the sun. The costs of the sales include 1) transporting the fish to the market by motorbike, 2) plastic bags for packaging fish 3) purchasing ice and 4) lunch of the retailer. Two types of transactions are involved in the transfer of fish from the fisher to the retailer, namely *payment of services* or *purchase and resale*.

4.4.1. Transaction I: Payment for services

In this type of transaction, the retailer sells and distributes the fish and receives a set retribution from the fisher in exchange (see section 4.2). This system is used by the communities surrounding the city (Santo António and Hospital Velho). The amount paid is set by the fisher and depends on the amount of fish to be sold. In interviews this value was reported to be between 100 and 150 DBS (€4 to €6) but changes from fisher to fisher, as it depends on “their conscience”.

In the payment-of-services system, the fisher remains the owner of the fish which is subsequently returned if unsold. Although some households act as closed units (in which the retailer only sells the fish that her partner catches), it is common that retailers work with multiple fishers. When these are from outside the retailer’s household the practice is called “*furar*”. Some retailers work exclusively with fishers from other households, as they might not have a partner, or their partners might not fish. It is customary that fishers pay the retailer for her work, even when they are from the same household. However, during interviews a fisher explained not paying his partner because the revenue from sales go into the household money, so other systems for distribution of money might exist.

In households that act as closed units, the costs of selling fish, such as transport to the market, are normally assumed by the fishers, and discounted from the fish sales. However, retailers who sell fish from several fishers will normally pay these costs from their retribution.

4.4.2. Transaction II: purchase and resale

In this system, the retailer will buy the fish from the fisher and resell it at a higher price (see section 4.2). The price at which the fish is purchased by the retailer is set by the fisher, and the retailer adds 10 DBS to this price to sell it to her customers. This is the system practised at the communities of Abade, Praia Burra, Campanha, and Lapa. In this case, the ownership of the fish passes to the retailer, and she must assume the cost of the transport, ice, and plastic bags. Therefore, retailers must gather at least 30-40 kg of fish from several fishers to make profit from a trip to the city of Santo Antonio. When the amount of fish is not enough to justify the trip, retailers will carry the fish in a bucket on their head rather than paying for transport to the market in the city centre and sell the fish door to door. When the demand for fish at the market is low, traders might also retail the fish door to door, sell it at a lower price, or salt the unsold fish (either at the market or in their community).

In Praia Burra, Abade, and Lapa, it is customary for the fish to be paid upfront, although fishers might allow for payment after the completion of sale when the amount of fish is too large for the retailers to pay for it from the outset. During interviews, a trader in Abade explained that sometimes retailers lack funds to buy the fish, so fishers transport the fish to the market themselves, to sell it to fresh fish retailers from other communities.

Campanha is the only community where sale with postponed payment is customary. In Campanha, the fish is given *fiado* to the trader. However, in this case, the price of the fish is not set by the fisher but by the trader, who sets the price at the market according to the demand and the abundance of fish. The retailer will take 10 DBS for each kilo of fish sold, giving the rest to the fisher. The costs of transport, ice, and plastic bags are taken from the retailer’s share.

4.4.3. Export of fresh fish to São Tomé

Fresh fish can sometimes be exported to São Tomé in cooling boxes with ice. However, given the irregular boat transports, this is not practised extensively. Both fishers, traders, and people unrelated to the artisanal fisheries sector engage in this activity. In some cases, the fish might be sent to São Tomé frozen. This has for example been observed for *Dactylopterus volitans* (concom), a species

frequently sold in restaurants. In other cases, the fish might be purchased right before the departure of the boat and sent fresh to São Tomé (eviscerated or whole).

4.5. TRADE OF FRESH FISH ON SÃO TOMÉ

Trade of fresh fish in São Tomé was not studied as extensively as in Príncipe, and the study only included the fishing communities of Porto Alegre, Neves, and Santa Catarina (<1.5 hours from the capital city), as well as Santana (~20 min from the capital city). Interviews were not conducted in the landing sites in or close to the capital (such as Pantufo). Fresh fish vendors at the main market or other marketplaces were not interviewed, as it fell outside the objectives of the assessment.

In contrast to Príncipe, most fresh fish in São Tomé is sold by unit. The system used is called “*boca a boca*”, in which the fisher sets a price to the individual fish according to its size and type, without weighing it. Therefore, in São Tomé, only fish with a standard size (such as flying fish species or *Dactylopterus volitans*) have a regular price, while species with more variable sizes do not.

In São Tomé, as on Príncipe, the fresh fish passes from the fishers to the *palaiês de peixe* (fish traders). The type of transaction involved in this trade is ‘purchase and resale’, in which the traders buy the fish from the fishers upfront and resell it at the main market. Fishers will only give the fish *fiado* when the amount of fish is too large for the traders to pay for it. When traders lack funds to pay for the fish, fishers may transport the fish themselves, selling it to fresh fish vendors at the main market. It must however be noted that landing sites close to the city were not studied and that other systems may be in place at these sites.

Traders based in the coastal towns of Santana, Porto Alegre, Neves and Santa Catarina (see Figure 1) buy the fish from several fishers at the landing sites and transport the fish to the city using collective transport⁹. The cost of the trip depends on the distance to the city, varying from 20 - 50 DBS per person (€0.8 – €2). In addition, traders must pay for their luggage paying 15-30 DBS (€0.6 – 1.20) per bucket of fish. Given these costs, transporting fish to the city is only profitable if traders manage to gather a large amount of fish (corresponding to 60 kg or more in some communities). Traders have found different solutions when catches are too low to justify an individual trip to the city. In Santa Catarina, traders explained they freeze the fish for a day or longer and then travel to the city with it, once they have obtained enough to justify the transport costs. They either use their own freezer, or somebody else’s at a cost of 5 DBS (€0.2) per night. In Porto Alegre, when catches are low, groups of traders pool their fish together and take turns to go to the city to sell the fish. In addition, the schedule of Porto Alegre’s transport strongly conditions the traders’ activities, as the only available transport leaves the city at 5 AM and returns to Porto Alegre at noon. Therefore, only fish that is landed before 5 AM is sold fresh, while fish that is landed afterwards must be salted. In Santana, a large coastal town, fish is normally sold at the local market and only taken to the city if the amount is too large.

Traders use ice to preserve the fish during the transport to the city. This can either be ground ice bought at the landing site for 5 DBS (€0.2) or blocks of ice made in 5 litre plastic packages and sold in the community for 15-20 DBS (€0.6 – 0.8). In Porto Alegre, due to the intermittent supply of electricity, traders explained buying ground ice at the city market after selling their fish, and then bringing it back to the landing site to preserve the next day’s fish.

Once at the city market, the traders can either 1) retail the fish themselves, or 2) wholesale it to a fresh fish retailer and collect the money after the sale is completed (*fiado*). Traders from different communities have different strategies when the fish is left unsold. For example, if the fish has been

⁹ Collective transports in São Tomé are vans with three rows of seats called “*hiaces*” after the van’s model – Toyota Hiace)

given *fiado* by a fisher to a trader, the trader might retail it at a cost price in order to pay the debt: “fishers will want the money at the end of the day, otherwise they cannot buy fuel and they do not like this. A lot of times we go to the market and we lose money”. In other cases, traders explained leaving the fish at the market’s cooling facilities and going back to sell it the next day. However, many other traders explained the fish may get stolen at these facilities, so they preferred to eviscerate, clean, and dry salt the unsold fish at the market at the end of the day.

Traders based inland obtain their fish from different sources. For example, fresh fish traders at Guadalupe town explained buying the fish from the fishers of the landing sites of Gamboa, Morro Peixe and Micoló. In this case, traders travel to the landing sites early in the morning using collective transport, buy the fish and travel back to the local market where the fish is sold fresh. Although Guadalupe’s market has a freezer that produces ground ice, the frequent water shortages prevent ice production locally, so they must buy bags of ice from shops. Due the lack of cooling facilities at the local market, the fish that is not sold at the end of the day is eviscerated and salted. On the other hand, fresh fish retailers at the market of Trindade, reported sourcing their fish from the market in the capital to resell it at the local market. In Trindade, all the fish that is not sold the same day is kept in a fridge at the market at a cost of 15 DBS (€0.6) per day.

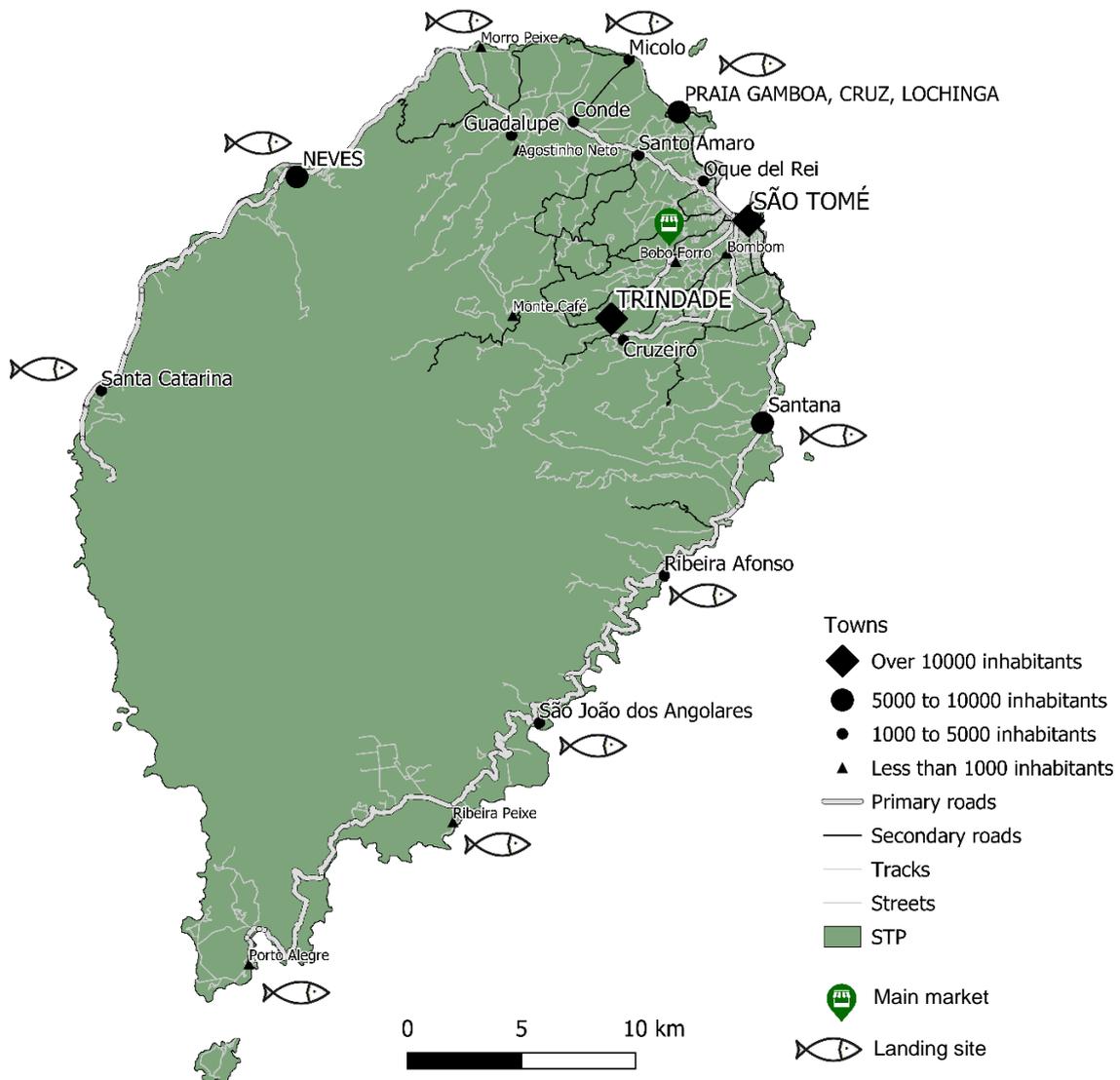


Figure 1: Map of the main towns in São Tomé.

4.6. FISH PROCESSING

As explained in section 2.3, salt-drying fish is the most common system of preservation in STP and fish processing techniques are the same across both islands. In São Tomé, fish can also be smoked and sold at shops and at the main market, and some traders specialise in this activity. On Príncipe, however, traders explained during interviews that, given the small market for these products, smoking fish is only practised for household consumption and it is never sold.

4.6.1. Fish salt-drying technique

The first step of this process is to open the fish from the dorsal side and eviscerate it, leaving the ventral side intact to keep the right and left halves sides together. The spines are kept in place and, in the case of large fish, longitudinal cuts are made on the inside to allow for the salt to penetrate the flesh. In the case of small fish (sold by unit) the gills are removed, but in the case of large fish (sold by kilogram) gills are left intact. Once opened, the fish is washed with abundant water (often in the river) and the blood is removed using a hard brush. When the number of fish is high, it might be necessary to request help to eviscerate and clean the fish. It is customary that the person or persons helping with this is paid 50-100 DBS (€2-4) each. However, in some cases, it can be someone from the household or a friend within a group of people who regularly dry fish.

Once eviscerated and washed, the fish is kept in a bucket or a basket to drain excess water. The fish is then dry salted immediately, or within the next 24 hours. A generous amount of granular salt is rubbed onto the internal and external surfaces of the fish and spices, garlic and lemon might be added to the salt for flavour. The dry-salted fish is then kept in a closed bucket for 2 to 5 days, where the salt and condiments mix with the fish fluids creating a dense brine (*salmora*). The fish in the brine bucket can be kept for several days without spoiling.



Figure 2: A) and B) A fisher and a *palaiê* rubbing granular salt on a fish (Pictures by Nina Da Rocha, *Fauna & Flora International*). C) Buckets with fish in brine (Pictures by Lodney Nazaré, *Oikos, Cooperação e Desenvolvimento – STP*).

Once the weather conditions are appropriate, the fish is exposed to the sun to dry using a drier. The most common type is the *quialo*: a drying rack risen 1.5 metres above the ground, built out of a wooden frame with a mat in the middle to put the fish on. The mat might be made of a thick net, palm leaves or even a surface of bamboo. Plastic was reported to be an inappropriate material for this, as it does not allow the water to drain from the fish properly and it overheats, cooking the fish and

generating a poor-quality product that soon becomes unsuitable for consumption. The shape of a *quialo* is often a four-metre-wide square, with a hole in the middle to access the central part of the drying rack. Alternatively, the fish might be dried directly on the floor on a mat of palm leaves or a rocky surface. In some cases, this was reported to be the only way of drying fish, due to lack of funds to build a *quialo* or lack of open space. Recently, a new type of solar drier has been introduced by local organisations and the government. This drier is referred to as “*secador*” (drier) and is built of a wooden frame with a squared base, 3-4 metres tall, encased in a tent of transparent plastic that protects the fish from rain and animals (Figure 2C). This solar drier has two drying racks made of wooden poles, one on top of the other.



Figure 3: A) *Quialo* drying rack built with a net (Picture by G. Porriños). B) *Quialo* drying rack built with bamboo poles (Picture by Lodney Nazaré, *Oikos, Cooperação e Desenvolvimento*). C) Solar drier (Picture by Cileine Fernandes, *Fundação Príncipe*).

People who dry fish normally use their own *quialo* or solar drier, and these devices are not generally shared. While there was a consensus that drying fish on the floor is unsanitary, participants expressed different opinions regarding the solar drier and the *quialo*. The problems of the *quialo* are mostly related to the fact that the fish is unprotected from the rain and insects. When it rains, it is necessary to remove the fish from the drying racks. However, the *quialo* allows for the drying of large quantities simultaneously and the process is quick when weather conditions are favourable. One day was reported to be enough to dry small fish (such as flying fish); and two to three days for larger fish. The solar drier was reported to be better to protect the fish from the rain and insects, as well as to prevent

theft. This allows users to leave the fish in the drier for several days, without having to remove the fish. However, the current model of solar drier was reported to be too small to dry fish in large quantities and users reported that the fish placed in the lower rack does not dry properly, as it does not receive enough sun.

The weight loss of the dried fish was not tested empirically in this study. However, respondents explained that the weight loss was different depending on the type of fish. For small fish sold by unit, the fish was left to dry entirely. However, in the case of large fish which is sold by weight rather than unit, the fish was removed from the rack after losing 20 to 30% of its initial weight at the start of the drying process. All respondents explained that, if they let this type of fish dry entirely, they would not make any money. It must be noted that, as explained in section 2.4, the water content of a fish ranges from 50 to 80%, so a fish that has only lost 30% of its weight has a high moisture content.

4.6.2. Product selection and quality parameters

Four main types of fish are traded dried in STP: flying fish (*Exocoetus volitans*), blue runner (*Caranx crysos*), West-African halfbeak (*Hemirhamphus balao*) and “*peixe grosso*” (big fish) of various types. Flying fish and West African Halfbeak are sold by unit, *peixe grosso* is sold by kilogram, and blue runner can be sold by kilo or by unit. Flying fish is the most important type of fish to be traded dried, and it is exclusively caught by surface drifting gillnets. Blue runner is caught by several line fishing gears, and is the most landed species, together with the flying fish. West African halfbeak is exclusively caught by purse seiners. Barracudas, snappers, and seabreams caught with a variety of gear types (mostly hook & line) are some of the species found in the “*peixe grosso*” category. Only in São Tomé, the puffer species *Lagocephalus laeviagatus* is also an important species in the dried fish trade, as it is caught seasonally and in large quantities and is exclusively traded salted and dried.

In São Tomé and Príncipe, dried fish is considered to be of good quality when the colour of the meat is white. If the fish has not been dried properly, it exudates fats and fluids, acquiring a red colour. While “red” fish is still good for consumption, it is unappealing to the customers and does not sell. The importance of drying fish while still fresh was stressed during interviews, as otherwise the product would be unsafe for consumption and “sting the mouth”. Indeed, some traders explained eviscerating the fish immediately after the landing, to prevent the fish from losing quality. Additionally, dried fish vendors in São Tomé remarked the importance of drying fish entirely, as a fish that has been dried only partially will keep on losing weight in storage, thus reducing the sale price of fish sold by kilogram.

4.6.3. Drying fish at temporary settlements in Príncipe island

In Príncipe, it is common that fishers and traders from several communities migrate seasonally to temporary settlements in the north or in the south to dry fish (this practice has not been observed in São Tomé). By doing so, communities are closer to fishing grounds with more favourable weather conditions throughout the seasons. The main temporary communities on Príncipe are *Praia Seca* and *Cabinda*¹⁰ in the South (occupied from September to May) and *Praia Seabra* and *Mocotó* in the North (occupied from May-September). These communities are normally only accessible by boat. The settlements normally consist of wooden houses, or houses built out of palm leaves on a wooden frame, depending on the amount of time spent at the temporary site (Figure 4). In some cases, such as *Praia Seca*, the settlements are always occupied by the same families and new fishers or traders cannot use the site without their agreement.

¹⁰ *Cabinda* disappeared in 2019, in a landslide with no casualties, and the users of that settlement moved to a nearby beach called *General Fonseca* (also known as *Praia Cemitério*).

Fishers may also go on 1-2 week-long fishing trips to landing sites in the South (such as Lapa, Maria Correia, Novo and Cará). Furthermore, some groups of fishers also rent a fibre-glass boat and camp at Tinhosas islets for a week at a time. Fishers visiting Tinhosas normally take one or two smaller boats (normally outriggers) with them, which they use for fishing, and use the fibre-glass boat to carry the buckets of fish in brine upon their return.



Figure 4: A) Tent used by fishers camping at Tinhosas during their fishing trips. To the left, a 25-litre drum of drinking water and buckets with fish in brine, where the fish is stored salted until their return to Príncipe, where it will be sun-dried (Picture by Frazer Sinclair, *Fauna & Flora International*). B) Quialo and houses used at the temporary settlement of Praia Seca (Picture by Marion Tafani, *Birdlife International*).

4.7. VALUE CHAIN OF DRIED FISH IN SÃO TOMÉ AND PRÍNCIPE

As explained in section 4.1, the following roles have been observed in the dried fish value chain: 1) the producer is a palaiê/fisher who process the fish that she/he purchases/catches, producing and wholesaling salt dried fish in large quantities; 2) the distributor (typically a *palaiê*) transfers the fish from one trader to the next in the value chain; 3) the main-market vendor palaiê sells fish in various quantities (wholesale or retail) at the city market; and 4) the retailer, a palaiê or a shop owner who sells dried fish to the final consumer, either door to door (*venda ambulante*), a shop, town market, or their own house. Although some traders are more invested in one of these activities, it is normal for traders to practise - or have practised- all these activities to some extent.

As in the value chain for fresh fish, three types of transactions have been observed. In the purchase-and-resale system, the payment can be upfront (*cara a cara*) or after completion of sale (*fiado*). A payment-of-services system can also exist, in which the fish is entrusted to the next person in exchange of a set retribution ("*gratificar*" or "*pagar maçada*").

4.7.1. Dried fish production in Príncipe

Salting and drying fish, and exporting it to São Tomé, is an activity practised by both men and women in coastal communities, but also by people further inland. This activity is regularly practised by fishers (men), palaiês (generally women), and boat owners. However, it is also common that people unrelated to the artisanal fisheries sector dry fish as a side activity. In São Tomé and Príncipe, women typically do not fish. Therefore, *palaiês* who salt dry fish to export must purchase it from fishers. Only two types of fishing are practised by women: line fishing from the shore (a subsistence activity) and mosquito-net fishing at the river mouths (a seasonal activity that targets fish of around 3 cm). While mosquito-net fishing can be an income-generating activity, these two activities are not used to catch fish that is then dried.

Most fishing materials within the coastal communities are owned by fishers. Nevertheless, boat owners might also be wealthier traders, or people with formal employment, who do not engage and have never engaged in fishing activities themselves.

4.7.1.1. Fishers and boat owners

Boat owners involved in the dried fish business get most of the fish from their corresponding share of the catch. However, they might also buy fish from other fishers or *palaiês* to meet a production goal or to obtain certain species. Some owners might also go to the temporary communities with their crew to dry the fish at the temporary landing sites.

Most fishers sell their catch both fresh and dried. On the one hand, fresh-fish trade has a quick return (normally on the same day), which is used for the household’s daily subsistence and fuel consumption (if they are paying for their own fuel). On the other hand, dried-fish trade is considered a more lucrative endeavour, although it has a longer return. Therefore, drying fish is normally used to fund the acquisition of more expensive goods. During interviews, a fisher also explained that drying fish is a way of accumulating money: *“when you have cash in your hands, you spend it on this and that, and then you have no money left... Investing in dried fish is a way of not spending that money”*.

Fuel and material costs are variable. In the case of the drifting gillnets, used to catch flying fish, the main cost is the fuel. The extra costs of maintaining the net (assumed by the boat owner) were not estimated in this study. The average fuel consumption of a drifting net fishing trip is 5.6 litres (SD = 3.6, N = 262), and the average and median price of the fuel is 35-36 DBS (~€1.4) per litre (although it can rise to 60 DBS per litre when scarce). Fuel expenditure is, therefore, relatively constant, and 80% of the fishing trips have a fuel cost of 100 – 300 DBS (€4 -12). On the contrary, the catch of the drifting gillnet is highly variable (see Figure 5) and is one of the main factors controlling the cost of the fish. The average and median catch is 107 and 70 flying fish, respectively (SD = 123, N = 262), with only 10% of the trips catching 250 flying fish or more. In terms of fuel expenditure per fish, 70% of the fishing trips have a cost of less than 4 DBS (€0.16) per fish, with 43% of the fishing trips catching flying fish at a cost of less than 2 DBS (€0.8) per fish (see Figure 6).

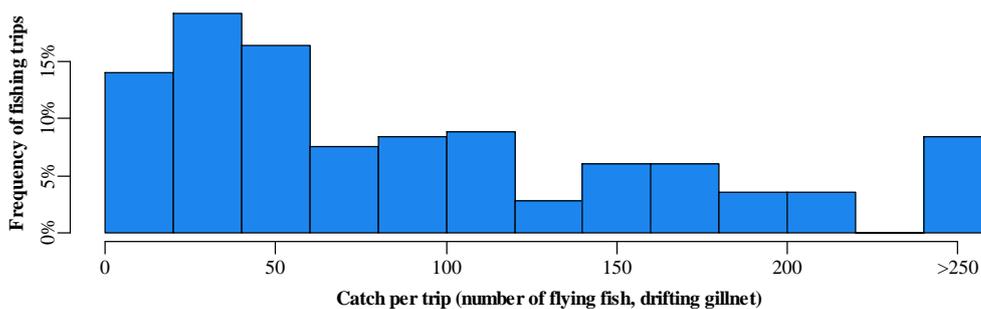


Figure 5: Catch variation of the drifting gillnet

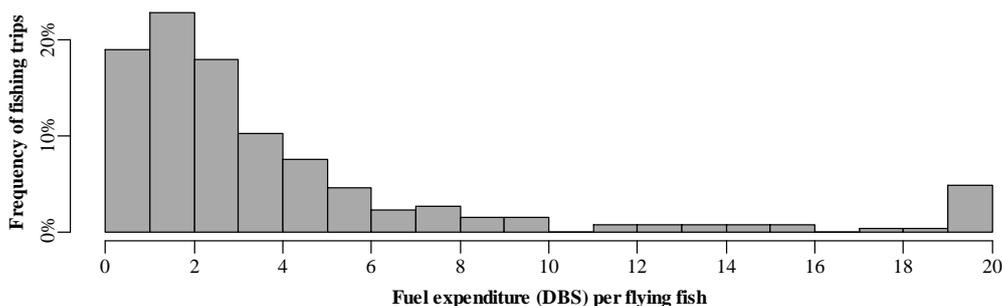


Figure 6: Cost variation of an individual flying fish, expressed in fuel expenditure divided by number of fish caught in the drifting gillnet

The catch and fuel consumption of line fishing gears is highly variable and dependent on the fishing technique. An exhaustive description of the different techniques (and their catch and fuel expenditure) falls outside the scope of the present study. Vessels used for hook & line fishing can be motorised or not. When not motorised, fuel cost is zero, but catches are generally lower (average = 15 kg per trip, SD = 14, N = 338, see Figure 7A). When motorised, the average weight of the catch is 28.5 kg per trip (SD = 26, N = 934, see Figure 7B), with an average fuel consumption of 9.4 litres (SD = 6.7, N = 934). The median fuel expenditure per kilo of fish caught using hook and line on motorised vessels is 13 DBS (€0.52), and 77% of the fishing trips have a fuel expenditure of 25 DBS (€1) of fuel per kilo of fish (see Figure 8).

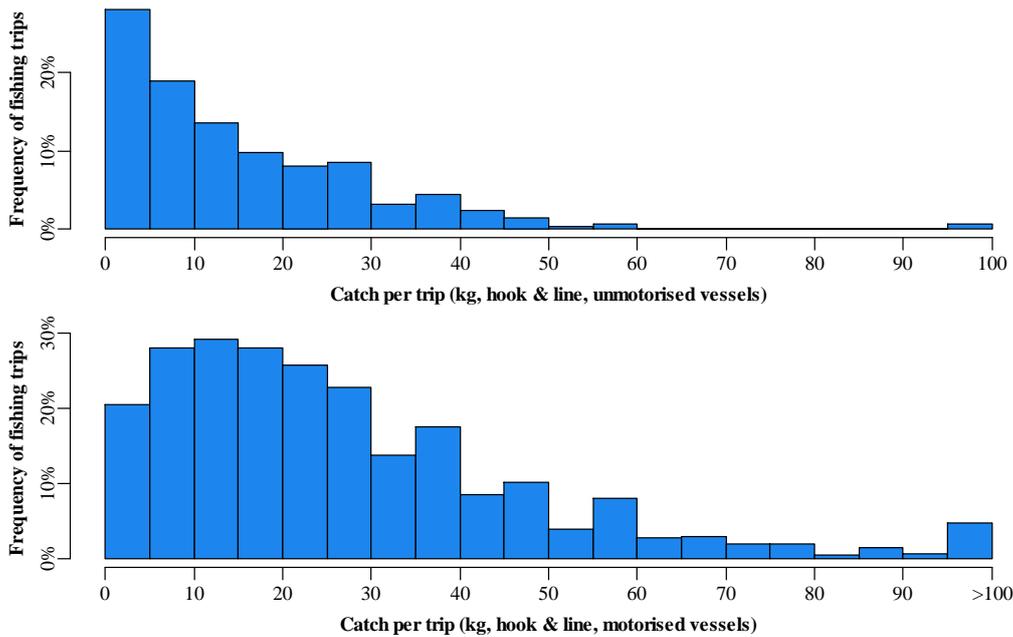


Figure 7: Catch per trip of motorised (n=934) and unmotorised (n=33vessels) using hook and line gears.

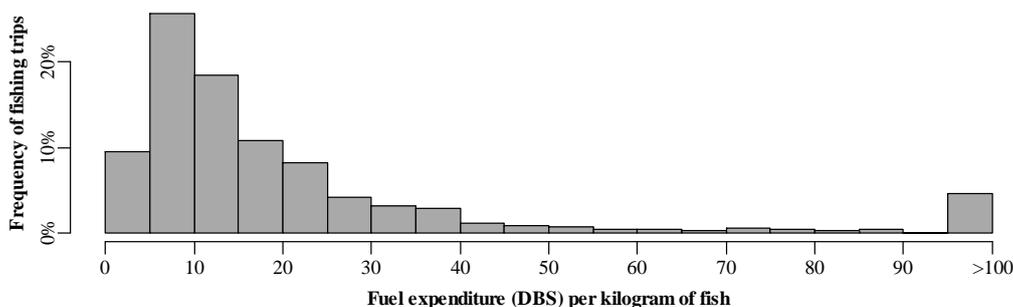


Figure 8: Fuel expenditure per kilogram of fish of motorised vessels. The median fuel expenditure per kilogram of fish is 13 DBS and 77% of the fishing trips have a fuel expenditure of 25 DBS of fuel per kilo of fish.

When accounting for catches and fuel expenditure of both motorised and non-motorised vessels (total fish landings divided by total fuel expenditure), the average fuel consumption per kilo fish in Príncipe island is 10 DBS (€0.4). Nevertheless, in remote communities such as Lapa, the use of non-motorised vessels is more prevalent due to the distance from the city, so these costs will differ amongst sites.

The other costs incurred by the fishers are the hooks and lines, which must be renewed regularly. For example, during interviews, fishers reported that the demersal longline (*palanque*, 100-500 hooks) must be renewed every 20 days, approximately (see Table 1). Although some fishers might need to hire someone to help them eviscerate the fish, most fishers explained not needing to hire someone, as they received help from their partners.

4.7.1.2. *Palaiês*

The first step of this value chain is the transfer of fish from the fisher to the producer *palaiê* (who salt-dries the fish for wholesale). In this case, the producer *palaiê* purchases the fish from the fisher and the ownership of the fish passes to her. It is customary that this transaction is paid upfront, and fishers do not accept the *fiado* system (paying the fish upon completion of sale), as the dried fish trade has a much longer return. Having funds to buy fresh fish is one of the constraints on women's access to the dried fish export market, as fish trade is the only income-generating activity for many *palaiês*. *Palaiês* whose partners are fishers might have more access to fish, as their partners might accept payment upon the completion of sale. For example, during interviews, a producer *palaiê* explained that “*only my husband gives me fish fiado and I pay him after my mother has sold the fish in São Tomé. Fishers from outside the household are not going to accept this, no. They want the money in their hands*”. Nevertheless, buying fish ‘in trust’ is not the norm in the dried fish trade and most fish sent to São Tomé is paid for upfront. Traders in the community generally lack access to credit, and the existing sources of credit are regarded as expensive, with an excessive interest rate (see section 4.7.7 for more information on existing sources of funding in Príncipe).

Producer *palaiês* normally buy fish from several fishers, and do not normally have a regular provider. Most active *palaiês* might buy fish at several landing sites, sometimes building temporary or permanent dwellings at remote landing sites (such as *Lapa* or *Mocotó*), where they can spend several weeks exclusively dedicated to drying fish. Producer *palaiês* normally establish small business at the temporary communities, taking fuel and food to the landing site, which they exchange for fish.

In some communities, producer *palaiês* reported difficulties in finding fishers willing to sell them fish to dry. As explained by a trader during interviews “*fishers in [this community] are palaiês too: they don't want to sell the fish to the traders, and they prefer to send it to São Tomé themselves*”. *Palaiês* from households that own fishing materials have priority over buying fish from the fishers who use those fishing materials (the crew). On the contrary, *palaiês* whose partners do not own fishing materials reported struggling to find fish for sale when landings are low.

The main cost incurred by the producer *palaiês* is the purchase of the fish (see Table 1). Although the price of the fish changes depending on abundance of fish and fuel availability, most of the fish in Príncipe is sold by kilogram at 60 DBS (€2.4) per kilogram. In the case of *peixe grosso*, (large fish sold by kilogram), the dried product is sold at 100 DBS (€4) to the traders in São Tomé. With a reported weight loss of approximately 30%, the profit margin of the *palaiês* (without considering the rest of the costs) is 10 DBS (€0.4) per kilogram of *peixe grosso*. Alternatively, fresh flying fish is purchased from the fishers at 20 DBS per 3 or 4 fish (5 - 6.3 DBS per fish, €0.2 – 0.3) and sold to the traders in São Tomé once dried at 10 DBS (€0.4) per fish. Although blue runner (*Caranx crysos*) can be sold by kilogram, many traders sell it by unit. For example, a blue runner of 300 g per fresh fish can be sold for a unit price of 25 DBS (€1) per dried fish.

During interviews, *palaiês* explained that they normally hire 2 to 4 people from outside their household to help with fish evisceration, paying a retribution of 50-100 DBS (€2 - 4) per person.

For most *palaiês*, the exportation of dried fish was reported as their only income-generating activity. However, all *palaiês* reported that the production and exportation costs were too high (see Section 4.7.3 and Table 2), leaving a very small profit margin. During interviews, many *palaiês* reported obtaining no income out of this activity, explaining: “*we only do this to avoid being idle, because in terms of income... You do not get any money out of this. Sending fish to São Tomé [only serves] to not spend the money. You send fish to São Tomé, so you do not eat the money*”.

Table 1: Costs of consumable materials used by palaiês and fishers to produce dried fish

TYPE	MIN. COST	MAX. COST	UNIT	PRICE VARIATION
PALAIÊS (women)				
Flying fish	5 DBS	8.3 DBS	Fish	Variable (abundance, cost of fuel)
Blue runner	45 DBS	70 DBS	Kg	Variable (abundance, cost of fuel)
W.A. Halfbeak	1.2 DBS	2 DBS	Fish	Variable (abundance, cost of fuel)
Peixe grosso	60 DBS	70 DBS	Kg	Variable (abundance, cost of fuel)
FISHERS (men)				
Fuel	32 DBS	50 DBS	Litre	Variable (fuel availability)
Hooks	1 DBS	10 DBS	Hook	Constant for hooks of same sizes
Line	30 DBS	120 DBS	Roll	Constant for lines of same thickness
FISHERS AND PALAIÊS				
Salt	250 DBS		25 kg of salt	Constant

4.7.2. Distribution and sale of dried fish in Príncipe

The sale of salt-dried fish happens slowly and the market for salted fish in Príncipe is small, so the bulk of the dried fish produced on Príncipe is sold in São Tomé. Indeed, during interviews, most producers reported not selling any dried fish on Príncipe. Nevertheless, some producers have established distribution networks in Príncipe, which they use to sell small quantities of fish. Normally, selling prices for dried fish in Príncipe are 8.3 DBS per flying fish and 80 DBS per kilogram of *peixe grosso*.

One of the ways of distributing fish in Príncipe is sending it to retailers inland, who sell the fish to the final consumer at a price set by the producer in exchange of a set retribution (payment-of-services system). It is common that these retailers store the fish in their homes and people in the community go to them when they want fish. The inland market for fish is small, so this system has a slow return, taking up to three months for the producers to receive their payment. Another route for the producers to distribute their dried fish is to sell it to vendors, who might be food retailers at the market or owners of food shops/supermarkets. The third distribution route is retailing to the final consumers, either directly from the producer's house in the community or in the city. This retail is normally advertised through word-of-mouth and it is a common practise to give fish 'in trust' (*fiado*) to customers with formal employment, who pay the fish upon receipt of their salary at the end of the month. It is also common for several different customers to buy fish in bulk for it to be sent to the city in a single trip.

In addition, producers in Príncipe might sell their dried fish to exporters. Exporters are people who buy salt dried fish from producers (fishers or *palaiês*) on Príncipe to export to São Tomé. They have the resources to pay for the fish upfront and send it in large quantities to São Tomé and often buy fish from several producers to obtain a better price. Exporters might wander the coastal communities to buy dried fish or buy it at shops in the city. Exporters might also be businessmen who travel to Príncipe to buy dried fish in large quantities to sell at their shops in São Tomé.

4.7.3. Exportation of fish to São Tomé

There are several routes for sending fish to São Tomé. Most of the fish is sent via boat from Príncipe to a trader in São Tomé, who will wholesale, retail, or distribute the fish from Príncipe to other traders or to the final customer. However, many producers (fishers and *palaiês*) choose to travel to São Tomé themselves when they accumulate large quantities of fish and sell it directly to dried-fish vendors at the main market in the city of São Tomé.

Apart from the production costs, sending fish to São Tomé has a series of transport costs that start at the community (see Table 2). First, the fish is packed into tarpaulin bags, purchased at a cost of 100

DBS (€4) each and capable of containing 90-120 kg of fish. Secondly, the fish must be transported to the city by car or *moto carrinha*, which has a cost of 300-600 DBS (€12 - 24). Producers must pay a customs fee of 100 DBS (€4) per bag and a transport fee of 100 DBS (€4) per bag to the boat company. If they are travelling to São Tomé themselves, the boat ticket is 1000 DBS (€40) for a one-way trip. In addition, producers must pay the *monangambas* (dock workers), who load and unload the boat's cargo, totalling 60 - 120 DBS (€2.4 - 4.8) per trip. Finally, the cargo must be transported by car from the harbour to the market or to the storage point, which has a variable cost depending on the distance. These costs total 1100 to 2500 DBS (€ 44 - 100, see Table 2), which only makes the exportation of fish to São Tomé profitable when the fish is sent in large quantities. Producer *palaiês* thus normally send 1-3 cargo bags at a time, with approximately 100 kg of fish per cargo bag. The costs incurred in São Tomé will be paid by the trader who receives the cargo and will be subtracted from the payment of the fish to the producer. Besides these costs, producers reported security issues during boat transport, explaining that the cargo was frequently opened, or the bags ripped, and some fish stolen during the transport.

4.7.3.1. Travelling to São Tomé

Producer *palaiês* might travel to São Tomé when they accumulate large amounts of dried fish to sell. For example, during interviews, a producer *palaiê* reported travelling to São Tomé once a year after finishing the fish drying season at the temporary settlement. In São Tomé, producers explained selling the dried fish to vendors or food retailers, who then resell it a higher price. Normally, a single cargo is sold to several dried fish vendors at the city market through the *fiado* system and the money collected after 8 to 15 days. Although some producer *palaiês* might buy products in São Tomé to resell in Príncipe, most of them explained that they travelled exclusively to sell the dried fish. They also explained that they had no other livelihoods nor income-generating activities while in São Tomé. Aside from the cost of the boat transport, traders must pay for their subsistence costs in São Tomé, which are higher than in Príncipe. Although most traders stay with friends or relatives, they normally pay some money (*contribuição*) to contribute towards their costs in the house. Since boat transport is intermittent between the islands, producers might find themselves stuck on São Tomé for several weeks or months. A producer from Príncipe that was interviewed in São Tomé explained “*I came to São Tomé at the beginning of the pandemic. With the boat [transport] problems, I had to stay here for months, while my kids were in Príncipe. I spent all my money and now I cannot buy the ticket to go back, nor can I bring my kids here. I am now selling fish from Neves, to try to make money to go back*”.

In some cases, *palaiês* might travel to São Tomé to sell their partner's dried fish. This system is more prevalent in households that act as closed units, in which the *palaiê* only - or mostly - sells the fish that her partner catches. In this case, the ownership of the fish remains of the fisher, who sets the price and the *palaiê* will obtain a set payment in exchange for her work. As in other 'payment-of-services' systems, the value of the payment is set by the fishers. In such cases, the *palaiê* does not act as a producer but as a distributor of her partner's fish.

4.7.3.2. Sending fish to São Tomé

Due to the costs and risk associated with travelling to São Tomé, most of the fish produced by fishers and *palaiês* on Príncipe is sent via boat to a trader in São Tomé and payment is received upon completion of the sale (*fiado* system) via bank transfers at a date agreed beforehand. If the sales are low, the trader in São Tomé might agree to pay half of the amount on the agreed date and send the other half later. The trader in São Tomé will also be the person collecting the fish at the harbour and distributing, wholesaling, and/or retailing it.

Table 2: Cost benefit analysis of dried fish exportation for flying fish and *peixe grosso*. The minimum and maximum costs represent the normal cost variation of individual expenses, and the maximum and minimum total costs represent the theoretical limits of the total expenses. Since individual expenses are probably not always incurred at the maximum or minimum cost, the total costs are probably in between the upper and lower estimated limits.

COSTS OF PALAIÊS AND FISHERS								
Type	Item	Individual price (DBS)			Amount per export	Price per export (DBS)		
		Min.	Max.	Unit		Min.	Max.	
COST	Salt	-250		Package	1	-250		
COST	Transport of salt	-80	-140	Package	1	-80	-140	
COST	Eviscerating fish	-50	-100	Person	1	-50	-100	
COST	Cargo bag	-100		Cargo bag	1	-100		
COST	Transport to the city	-100	-300	Export	1	-100	-300	
COST	Customs	-100		Cargo bag	1	-100		
COST	Boat transport	-100		Cargo bag	1	-100		
COST	<i>Monangamba</i> Príncipe	-30	-60	Export	1	-30	-60	
COST	<i>Monangamba</i> São Tomé	-30	-60	Export	1	-30	-60	
COST	Transport	-100	-150	Export	1	-100	-150	
COST	Retribution for distributor (after subtraction of transport in ST)	-200	-250	Export	1	-200	-250	
COST TOTAL						-1180	-2530	
PALAIÊS								
Type	Item	Individual price (DBS)			Amount per export	Price per export (DBS)		
		Min.	Max.	Unit		Min.	Max.	
FLYING FISH EXPORTS								
COST	Salt, transport, fish processing						-1180	-2530
COST	Fresh flying fish	-5	-7.1	Fish	600	-3000	-4260	
RETURN	Dried flying fish sales	10		Fish	600	6000		
PROFIT PER FLYING FISH EXPORT						1820	130	
PEIXE GROSSO EXPORT								
COST	Salt, transport, fish processing						-1180	-2530
COST	Fresh <i>peixe grosso</i>	-50	-60	kg	140 ¹¹	-7000	-8400	
RETURN	Dried <i>peixe grosso</i> sales	100		kg	100	10000		
PROFIT PER PEIXE GROSSO EXPORT						1840	-930	
FISHERS								
Type	Item	Individual price (DBS)			Amount per export	Price per export (DBS)		
		Min.	Max.	Unit		Min.	Max.	
FLYING FISH EXPORTS								
COST	Salt, transport, fish processing						-1180	-2530
COST	Fresh flying fish	-1	-4	Fish	600	-600	-2400	
RETURN	Dried flying fish sales	10		Fish	600	6000		
PROFIT PER FLYING FISH EXPORT						4220	1070	
PEIXE GROSSO EXPORT								
COST	Salt, transport, fish processing						-1180	-2530
COST	Fresh <i>peixe grosso</i>	-10	-30	kg	140 ⁵	-7000	-3000	
RETURN	Dried <i>peixe grosso</i> sales	100		kg	100	10000		
PROFIT PER PEIXE GROSSO EXPORT						7420	4470	

¹¹ Assuming a weight loss of 30%, as reported by producers of dried fish in Príncipe (traders and fishers)

The traders who receive the fish are normally dried fish vendors themselves, and most of them base their activities at the main market in the city of São Tomé (see Figure 10). Since the amount of fish is too large to be retailed by a single trader, most of the fish is distributed to other vendors at cost price and the 'distributor *palaiê*' does not profit from this transaction. The vendors pay the distributor in cash upon the completion of sales (*fiado* system) and the distributor normally collects the payment from all vendors at once (normally 8 to 15 days after distribution) to minimise transport costs. The distributor will normally keep a part of the fish for herself, selling it to the customer at a higher price (110 DBS per kilogram or 50 DBS per 4 flying fish). Although most of the fish is distributed to vendors at the main market, other distributors work with their own network of food retailers, normally based in the capital city or its outskirts.

It is customary that producers pay a certain amount to the distributors to cover the costs and effort associated with distributing and receiving their fish. This value, known as *maçada*, is set by the producer and discounted from the amount to be paid by the distributors to the producer upon completion of the sale.

Producers in Príncipe might have different degrees of involvement in the sale of their product in São Tomé. Some producers give specific instructions to the distributors in São Tomé that the fish should be sold to other vendors at a lower price, to ensure a quick sale. In this case, the system works as a 'payment-for-services' system, in which the producer might pay a higher *maçada* to the distributor or add in extra fish at no cost (i.e. 50-100 flying fish) which the trader in São Tomé can resell. Nevertheless, most producers on Príncipe explained not getting involved in the distribution or sale of their product in São Tomé, explaining: "*I send a certain value [of fish]. If the trader in São Tomé wants to sell it at a different price, it is their problem*". In this case, the distributor in São Tomé is expected to obtain their profit from the sales of the fish and the value of the *maçada* normally only covers transport costs plus a small amount in acknowledgement of their effort and contribution. It must be noted that, in both cases, most of the fish is distributed at cost price to other vendors. Therefore, for the distributors, the profitability of the dried fish importation depends on: **1)** the value of the *maçada*, which is set by the producer; and **2)** the capacity of the distributor to retail the fish they keep within the agreed time (which will depend on the demand for dried fish at that moment).

Producers and distributors might be friends, kin or have an exclusively commercial relationship. Many producers work exclusively with family members (eg. mother, aunts, siblings), while others prefer not working with family members. In most cases, producers and distributors have an exclusively commercial relationship, which is either established through visits or through recommendations. Having trustworthy distributors in São Tomé was reported to be one of the crucial points for the producers, explaining that the distributors often do not pay for the fish. A producer *palaiê* in Príncipe explained: "*People are everything! For example, I have a big problem now because the palaiê I work with in São Tomé just told me she cannot work anymore. I do not know who I am going to send the fish to!*"

Although most of the fish is sent to distributor *palaiês* (normally working at the main market), other distribution routes exist. For example, shop owners in São Tomé might buy fish in large quantities directly from producers in Príncipe, paying for the fish upfront. These shop owners retail the fish directly to the final customers and can safely store the fish at no additional cost. In other cases, the fish might be bought by wealthier traders, who pay for it upfront and wholesale it at a higher price to retailers further inland. In this case, the trader owns a vehicle (normally a motorbike) that allows them to travel inland, where the fish can be sold at a higher price. The transaction involved in the wholesale to retailers is *fiado* (payment upon completion of sale).

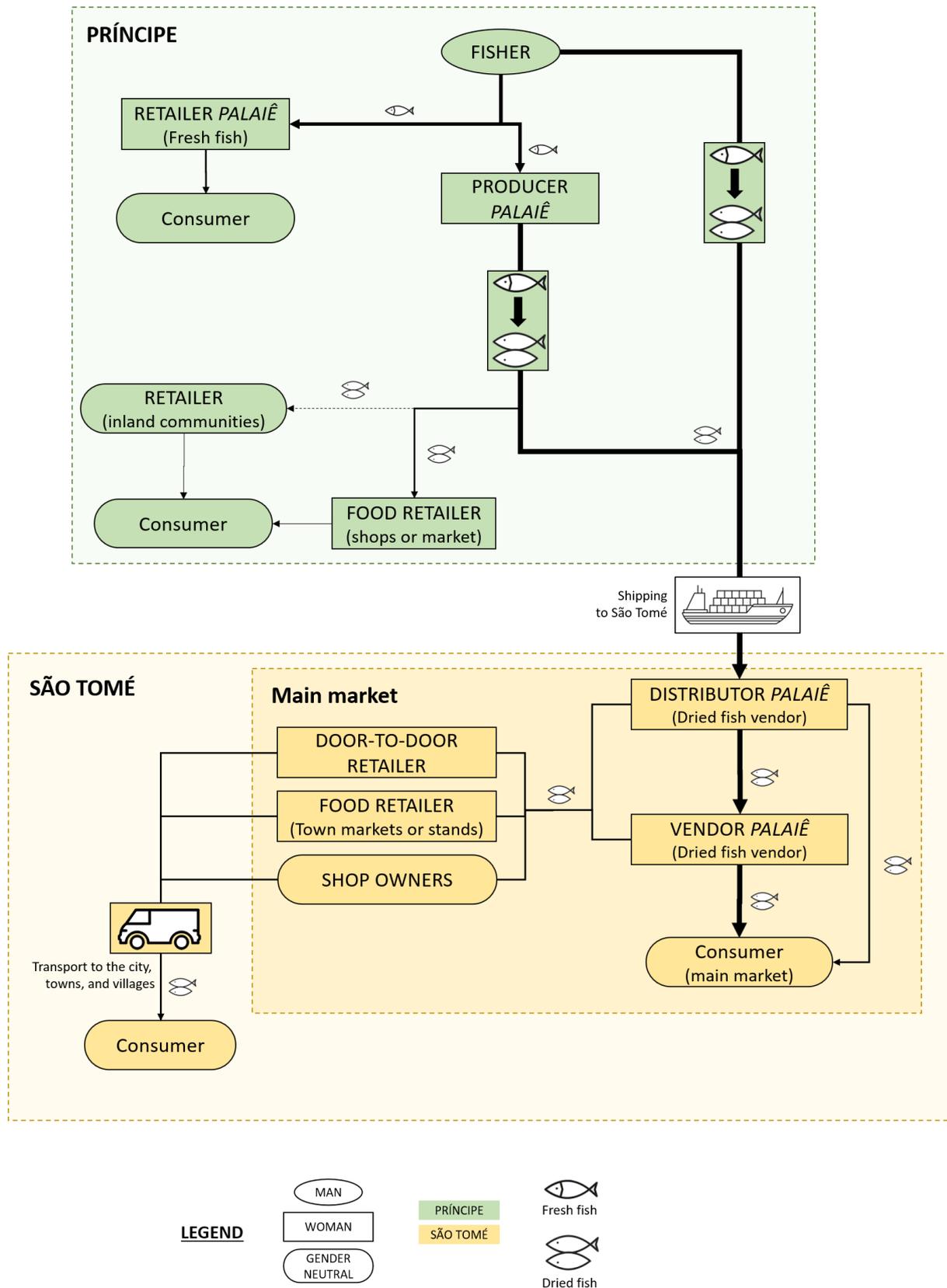


Figure 9: Schematic indicating main commodity paths sourcing from Príncipe island. Thicker lines indicate main commodity flow and thinner lines indicate secondary commodity flows. Dashed lined indicate minor commodity flows.

4.7.4. Dried fish production, distribution, and sale in São Tomé

The main market in São Tomé acts as the primary distribution centre for food products from all over the country (including Príncipe). It used to consist of two markets in the city centre, but these have been decommissioned and vendors transferred to Bobo Forro Market (a new market in the outskirts of the city). At Bobo Forro, food products are retailed to final customers or sold to retailers from various locations. The market is populated by *palaiês* who specialise in selling different types of products.

Most of the fish sold at Bobo Forro, is from Príncipe or from the communities of Porto Alegre, Santa Catarina and Neves, located on São Tomé. Vendors explained that Príncipe produces more salt-dried fish than these three communities together. Producer *palaiês* in Santa Catarina, Neves, and Porto Alegre reported buying fish from the fishers and paying for the fish upfront, and explained that, unlike Príncipe, fishers in São Tomé do not engage in the dried fish trade. Salt is bought at the communities at a price of 200-230 DBS (€8-9) per 25kg bag. The fish is sent from the production centres to the main market, where it is given to dried fish vendors, to be paid upon completion of sale.

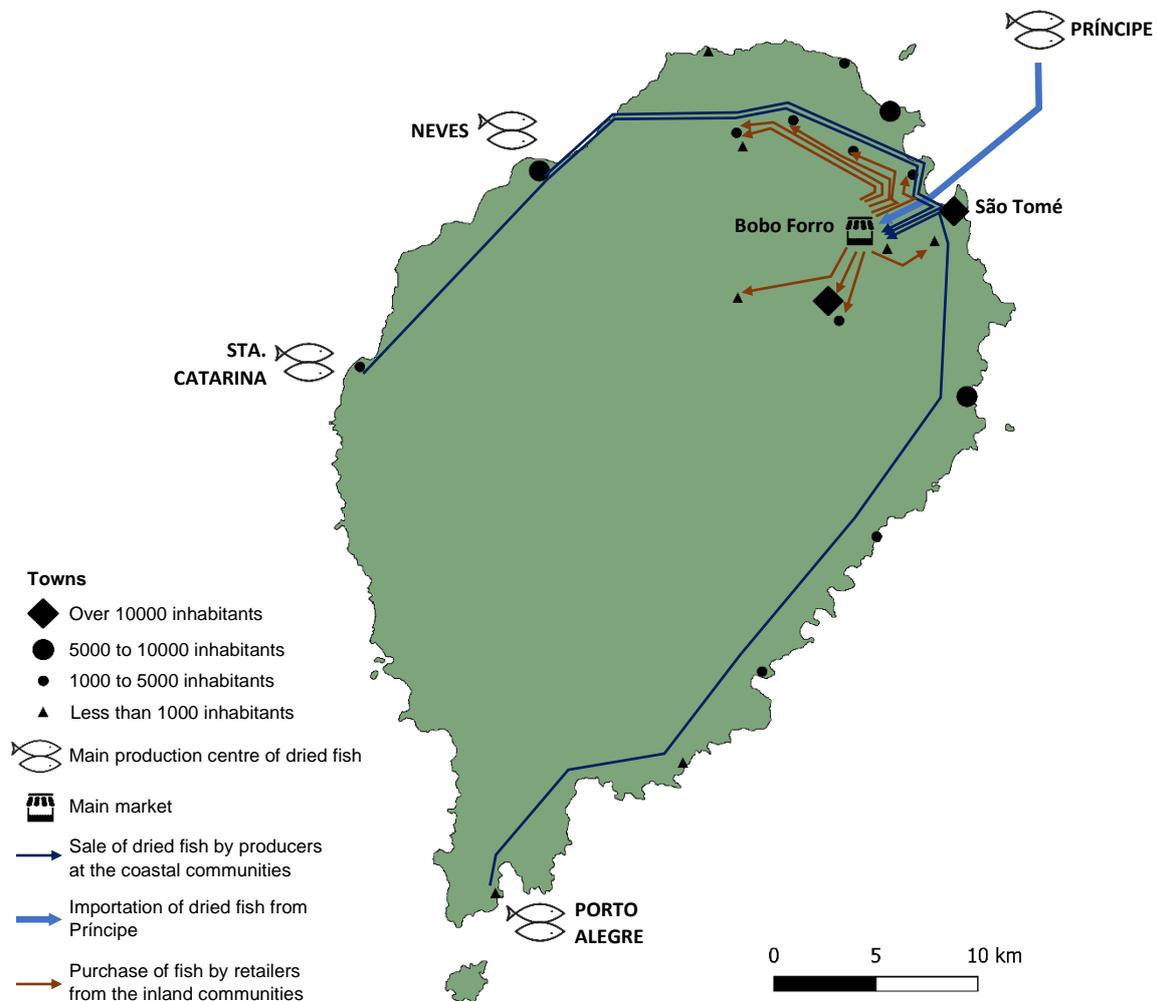


Figure 10: Main distribution routes of dried fish in São Tomé. Most of the dried fish is sent from Príncipe, Neves, Santa Catarina and Porto Alegre to Bobo Forro Market, where it is purchased *fiado* (paid upon completion of sale) by fish vendors at the market. Food retailers from the inland towns and villages travel to Bobo Forro market, where they buy the fish and transport it to their selling points.

The demand for dried fish in São Tomé is seasonal. Landings are higher during *gravana* (June to September), so prices for fresh fish during this period are lower and the more expensive dried fish does not sell. This period is mostly used by the *palaiês* in São Tomé to purchase fresh fish to salt dry. During the rainy season (September to December) the price of fresh fish rises, increasing demand for dried fish. Demand for dried fish falls from January to February (due to favourable conditions for fishing) and rises again from March to May (during the rainy season).

Fish vendors at the Bobo Forro specialise in either fresh fish sale or dried fish sale. Although dried fish vendors often salt dry the fish they sell, most of the fish is bought from producer *palaiês* in São Tomé, or fishers or *palaiês* on Príncipe. Costs associated with selling dried fish at the main market include daily commuting, plastic bags to sell the fish and disinfectant aerosol. The fish is normally stored in a closed room at the Bobo Forro market at no cost, covering the fish with a fabric or plastic and spraying the disinfectant aerosol into the air to avoid the presence of insects.

Vendors at Bobo Forro retail most of the fish to the final consumer, although they might also wholesale the fish to food retailers and shop owners. It is also frequent that Santomeans living abroad (normally in Angola and Portugal) buy 10-20 kg of dried fish at the main market to take with them in their checked luggage. Traders explained that such sales were a regular source of income for some of them, which had disappeared due the travel restrictions imposed during the Covid-19 pandemic.

Most of the fish sold by retailers in the capital city, its outskirts, and inland towns and villages on São Tomé is sourced from the Bobo Forro market. Retailers might be 1) market food retailers (who normally sell a variety of food products), 2) shop owners, 3) people who retail the fish to their neighbours from their home, or 4) *palaiês* who sell the fish door to door. Retailers typically travel to the Bobo Forro market every week or two weeks to buy 500-1000 DBS (€20-40) worth of fish. Most of the fish sold inland is flying fish sold by unit, as large fish sold by kilogram is less affordable. Retailers might also be food producers themselves and might use their trips to the city to sell their own livestock, agriculture, and/or horticulture products. Vendors at the main market explained that it is common that the fish is given 'in trust' (*fiado*) to these buyers until their salary is paid, as many of them are employed by agricultural companies. Vendors also explained that, as in other cases, the fish that is given *fiado* is sometimes not paid.

4.7.5. Interisland fish trade: opportunities, risks, and vulnerability

Dried fish produced on Príncipe is always sold to the vendors at 10 DBS per dried flying fish or 100 DBS per kilogram of dried *peixe grosso*. In comparison, dried fish produced in São Tomé is often wholesaled at a lower price (for example, 25 DBS per 3 dried flying fish) and therefore preferred by vendors. Nevertheless, São Tomé does not produce enough dried fish to supply the market, so vendors buy fish from Príncipe to meet demand. Dried fish from Príncipe also offers potential business opportunities to São Tomé's vendors, as Príncipe exports dried fish of valuable species that have become rare in São Tomé such as large seabreams (*Pagrus caeruleostictus*) and large snappers. Although these products can be sold at 120-130 DBS per kilo or more, vendors and retailers reported that demand is low, as they are only affordable to wealthier customers. A shop owner explained the need of properly advertising these products in places frequented by such customers. She explained that she had a showcase of dried *peixe grosso* at the front of her shop, so commuters driving to the city would see it. Nevertheless, the COVID-19 financial crisis has dramatically reduced the demand for high end products.

A common statement among producers on Príncipe is that "*people in São Tomé eat the money*", meaning that the exported fish is frequently not paid for or the paid amount is less than the agreed

value. These losses have a stronger impact on *palaiês*, who need a higher investment and have a much tighter profit margin to start with. Moreover, fish trade is the only income-generating activity for most *palaiês*, so payment delays have a large impact on their livelihood, as they are unable to buy more fresh fish until payment is received. Therefore, traders are more vulnerable and likely to abandon this activity. Several traders reported stopping the exports after not being paid and one trader explained that she lost all her savings after sending 10,000 DBS (250 EUR) worth of fish to São Tomé.

Given transportation costs (see Table 2), exporting dried fish is only profitable in quantities > 100 kg, which poses a great risk to both the producer and the distributor. As explained in section 4.7.3.2, distributors do not obtain any profit from distributing the fish to other vendors and report that the retribution paid by Príncipe's producers is only enough to cover their costs. The distribution of the product also creates a great risk for the trader in São Tomé, as the retailers involved might not pay and the fish might be lost, stolen or damaged during these transactions. Traders in São Tomé often lack the funds to cover the cost of the fish if the product or the money is lost, which places them in a position of strong vulnerability. This was exemplified by a trader who was forced to sell her house to pay for the debt of fish from Príncipe, after the money from the sales was stolen from her house.

Apart from the losses of capital and products involved in the distribution of dried fish, other factors might cause delays or lack of payment of the exported fish. Distributors explained that the dynamic nature of fish trade and the tight profit margin of dried-fish vendors hinders the accumulation of large amounts of cash. This, combined with the *fiado* system (in which the whole batch of fish is paid at once after the completion of sale), causes great delays in the payment of fish. During interviews, a dried-fish vendor explained: *"For example, I have the fish from Príncipe and I sell a bit. Then I have that money in my hands. If I see fish from Neves being sold at a cheaper price than the fish from Príncipe, I am going to buy that fish instead of saving to pay the debt, because I cannot afford being idle"*. Producers on Príncipe complained about this during interviews, explaining that these delays prevent them from continuing their activities.

Another problem reported by traders in São Tomé is that fish from Príncipe is often not dried entirely, stating that the product sometimes arrives "too wet". This creates conflicts amongst producers and vendors, as **1)** the fish might lose weight during the boat transport, so the amount of fish received by the trader will be less than the agreed amount; or **2)** the fish will lose water in storage if not sold quickly, so the vendor will not be able to sell the fish at the original price. Some traders explained that they further dried the fish received from Príncipe, adding salt and garlic to the product to increase its weight and not lose money. In addition, as explained in section 4.6.1, Príncipe's producers do not remove the gills from the *peixe grosso* which poses a problem to the vendors, since customers often request that the gills are removed before weighing the fish. During interviews, a dried-fish vendor explained *"when I work with traders from São Tomé, they are in front of me, so I can ask them to remove the gills or negotiate the price if the fish is wet. But when I receive fish from Príncipe... what can I do?"*.

4.7.6. Decommissioning of the city markets and move to Bobô Forro

Before April 2020, the markets in São Tomé city were the Municipal Market (the "Old Market") and Côco-Côco Market (the "New Market"), both located in the city centre, approximately 100 metres from each other. *Palaiês* selling food and clothes sold their products on the sidewalks and roads surrounding the markets, a practice that was considered unsanitary by the local authorities. These formed the main marketplace of São Tomé, where most of the food products were received and distributed from and to communities all over the island.

In April 2020, during the COVID-19 confinement, the city council decreed the decommissioning of the Municipal Market and transferred the food vendors from the city centre markets to a new market in Bobô Forro, located at 3.6 km from the city centre (Figure 11). Several facilities have been installed at the Bobô Forro fish market, including a ground-ice machine, a processing room and cooling facilities to store the fish. Bobô Forro market is also equipped with a room where dried fish can be stored (previously, it had to be stored at privately-owned shops which charged traders 5-10 DBS per night).

A representative of the city council explained the need of removing the old marketplace from the city centre, as the number of traders had surpassed the capacity of the area, with food stands clogging the roads and sidewalks. In addition, the accumulation of food waste and the practice of open urination had created strongly unsanitary conditions. The vision of the city council regarding the Bobô Forro market is to have a centralised market acting as a distribution centre that supplies food shops all over the country. However, during interviews, dried-fish vendors explained that most of their fish is retailed to their final customer and, after the move to the new market, sales have decreased. Due to the longer distance and lack of cheap and regular transports to the market from the city centre (currently, the main transport are motorbike taxis at 50 DBS per ride), the number of customers buying fish for their own consumption has greatly decreased. A vendor explained: *“At the old market, even in a bad day you would always sell something, even if it was 50 DBS of fish...but at Bobô Forro sometimes you go home without selling a single flying fish”*. Although the city council issued a decree forbidding the sale of food products within the city centre, vendors at Bobô Forro explained that pedlars illegally selling fresh and dried fish in the city centre are creating an unfair competition with them. Finally, despite the decommissioning of the Municipal Market, Côco-Côco is still open and food vendors keep on selling their products there.

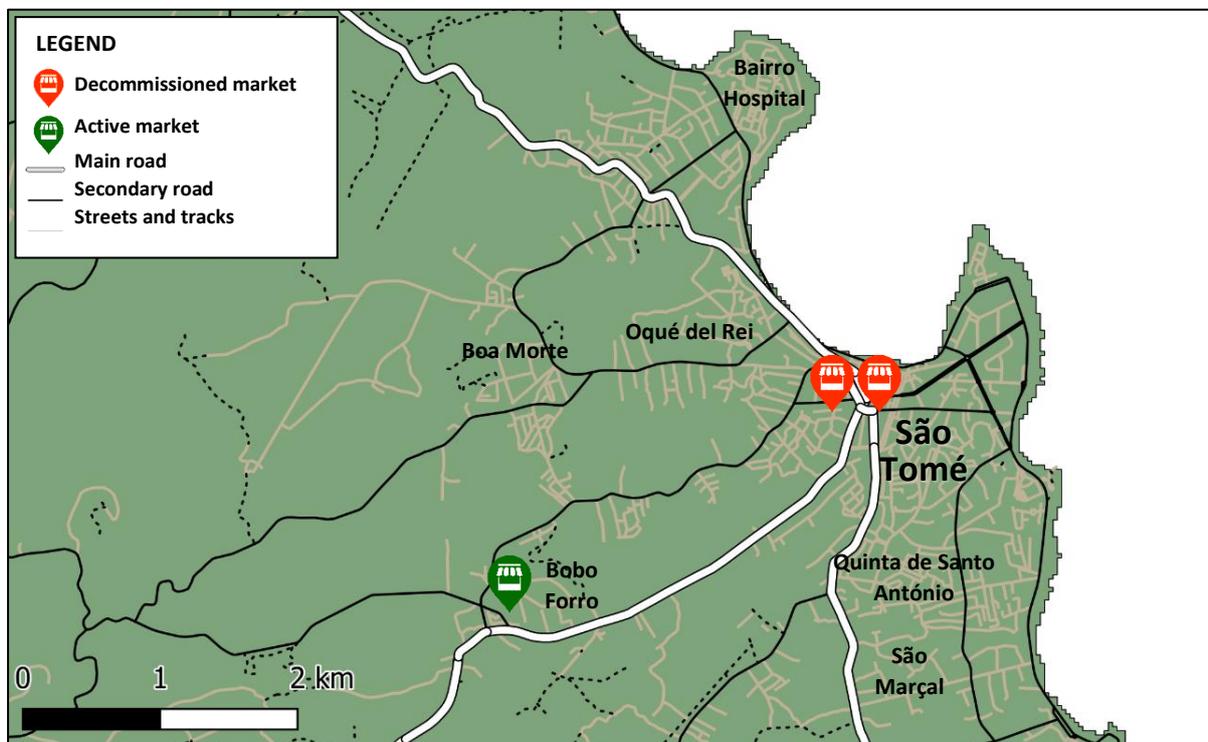


Figure 11: Location of the Municipal and Côco-Côco markets (in green) and the Bobo Forro market.

Table 3: Strength, Weaknesses, Opportunities, and Threats (SWOT analysis) of current inter-island fish trade.

<p style="text-align: center;">STRENGTHS</p>	<p style="text-align: center;">WEAKNESSES</p>
<p>Producers in Príncipe</p> <ul style="list-style-type: none"> • Knowledge of sanitary practices for salt drying fish. • Existence of locally sourced drying racks (<i>quialos</i>) to dry fish. • Availability of valuable species that have become rare in São Tomé. • Abundance of fish, capable of supplying São Tomé's market. • Existence of community-led rotational credit system traditionally used in both islands (<i>chiquila</i>, see section 4.7.7.2, page 31). <p>Distributors in São Tomé</p> <ul style="list-style-type: none"> • Knowledge of the quality parameters and recommended practices for handling, storing, and processing salt dried fish. • Knowledge of the market, products, and seasonality of sales. • Existing network of customers and producers that buy and supply salt dried fish. • Existing market for dried fish in São Tomé. <p style="text-align: center;">OPPORTUNITIES</p> <p>Producers in Príncipe</p> <ul style="list-style-type: none"> • Existence of project- or government-funded solar driers that are currently being tested as an alternative to <i>quialos</i>. • Lessons learnt from previous livelihoods interventions in Príncipe can be used to inform new interventions on dried fish trade (i.e. community ideas by <u>Omali Vida Nón</u> and <u>Blue Action Fund</u> projects, Bumbu d'lê project, etc) <p>Distributors in São Tomé</p> <ul style="list-style-type: none"> • New facilities at Bobô Forro market improve food safety and provide storage space at no cost. • Empty spaces at the Bobo Forro market that could be used to store dried fish from Príncipe. 	<p>Producers in Príncipe</p> <ul style="list-style-type: none"> • Large fish sold by kilogram not dried to the recommended levels, posing a potential risk to the consumer and losses on the distributors' side as the product further dries in storage. • <i>Palaiês</i> tight profit margins and lack of alternative sources of income lead to restricted market access due to lack of funds to buy fish and high vulnerability to losses. • Cargo sent to São Tomé and only paid upon completion of sale, posing a big risk to the producer. <p>Distributors in São Tomé</p> <ul style="list-style-type: none"> • Distributor's cashflow insufficient to pay for fish upfront, leading to a debt with the producer. • Exportation of fish is only profitable if done in quantities much larger than the distributors can assume (>100kg). • High risk, as fish is distributed to several vendors and paid upon completion of sale. • Low profit margins, as most of the fish is distributed at cost price to other vendors. <p style="text-align: center;">THREATS</p> <p>Producers in Príncipe</p> <ul style="list-style-type: none"> • Reduced demand for fresh and dried fish due to financial crisis generated by COVID-19¹². • Reduced income from fish sales due to COVID-19 prevent <i>palaiês</i> from buying fresh fish for salt-drying and exportation⁶. <p>Distributors in São Tomé</p> <ul style="list-style-type: none"> • Reduced demand for dried fish due to financial crisis generated by COVID-19. • Less customers at the main market, due to greater distance to Bobo Forro from city • Competition between dried fish vendors at the main market in São Tomé and street vendors in the city who have not moved their activities to Bobo Forro.

¹² Results from a telephonic survey in Príncipe (n=132), conducted by Fundação Príncipe.

4.7.7. Traders' associations and other sources of funding of Príncipe's *palaiês*

Most producer *palaiês* have fish trade as their only income-generating activity, which greatly constrains their access to dried-fish exports to São Tomé when they do not obtain enough funds to purchase fresh fish. Although some sources of funding exist, most traders reported these to be rare and using their savings as the only means of funding this activity. Traders might borrow some capital from friends or family, although this happens rarely. Although loans and credits can be obtained from banks (BISTP) or microcredit agencies (Credial Lda), interviewees reported they are rarely given to fund this activity and the interest rates are too high for the traders to make any profit.

4.7.7.1. Traders' associations

Associativism in the coastal communities in Príncipe has been promoted by external actors (such as nationals and international NGOs)¹³ and most fishers' or traders' associations offer or have offered microcredits to the members. These systems were set-up by external projects, which provided seed capital and initial training to relevant members, but only 3 traders' associations of the 7 associations surveyed reported to currently have an active microcredit system. Representatives of the other associations reported that their microcredit systems had collapsed following theft. The success of such associations seems to be strongly related to the strong leadership of a single member rather than the internal structures or the participation of the members of the association. Indeed, the few examples that have successfully established micro-credit systems are led by individual members, who have assumed the management of the association since its creation. The president of a traders' association explained: *"I have wanted to leave [this position] for many years, give it to someone else, but people say that if I leave the association will collapse"*.

The presidents of two traders' associations with active microcredit systems were inquired about its functioning during interviews. Both microcredit systems have an interest rate of 40% and the profit obtained is used to increase the amount given to the traders in the next loan. In one of the associations yearly loans are given to members and all the loans are paid at a certain date, after which there is a meeting to decide the financial strategy for the next year. The capital is loaned without signature of a contract, which led to strong confrontations between the president and some members when the whole amount was not returned. The other association gives the loans to groups of traders, in which the members of each group receive increasingly higher amounts of credit after every credit round. Members that receive a loan must offer a property as a guarantee and sign a contract at the notary in which the conditions of the credit are set. When the trader is married, it is also required for the husband to sign: *"I used to give credit directly to the palaiê, but then the husband created conflict, and would threaten me and the trader. That is why I do not give credit to married women if the husband does not sign. If the trader is single, then it is fine: she signs and offers a property of hers [as a guarantee]"*.

During interviews, representatives of several associations reported receiving external funding for the purchase of shared goods, such as driers or motorbikes. Several members expressed that the shared ownership of these goods acts as a source of conflict and reported that most of these materials are not repaired once damaged. They further expressed their opinion that, when possible, it was better if smaller versions of these goods were privately owned by individuals rather than shared.

¹³ Nuno, A. & Matos, L. "Associativismo para a co-gestão de recursos costeiros e marinhos na ilha do Príncipe?" Working document, project Omali Vida Nón (2017) 14 p. (available [here](#))

4.7.7.2. Chiquila

Chiquila is a system used both in São Tomé and Príncipe. At the *chiquila*, an informal group of traders (sometimes fishers too) pool their savings together, each of them providing the same amount of money to the common fund. There is then a lottery within the *chiquila* group and a member will be given the whole amount, to be returned after an agreed time, with no interest paid. Different types of *chiquila* exist, especially in São Tomé (from *chiquila* of 500 DBS each, to be returned in a month; to *chiquila* of 20 DBS, to be returned in a day). A trader in Príncipe explained: “*chiquila* is what keeps us moving”.

5. CONCLUSIONS

The exportation of dried fish from Príncipe to São Tomé offers opportunities to: **1)** producers in Príncipe, as it provides access to a larger and higher-end market; and **2)** vendors in São Tomé, as it allows them to meet the demand for dried fish and provides access to potentially high-end products. Nevertheless, the restrictions caused by the current production and distribution systems impose trade arrangements that generate a large risk for both producers and vendors.

Two main sources of risk have been identified. On the one hand, dried fish exportation is only profitable in large quantities, due the associated production and transport costs. Hence a considerable financial investment (especially for the traders) is required upfront, which might be lost if the exported goods are damaged, stolen or unpaid for. On the other hand, the *fiado* system, prevalent in most steps of the value chain, is one of the main sources of loss and risk. This is because the product is handed to the next person in the value chain, to be paid at a later date (upon completion of sale or payment of salary) without any guarantees. In some cases, the fish must pass through several trader nodes before payment happens. Besides, the number of vendors or retailers selling the fish multiplies at every trader node, dividing the debt amongst several traders and increasing the risk to the trader receiving the product from Príncipe as well as the producer (see Figure 12). Nevertheless, since dried fish vendors normally lack cashflow to pay the cargo upfront, the *fiado* system is the only feasible option.

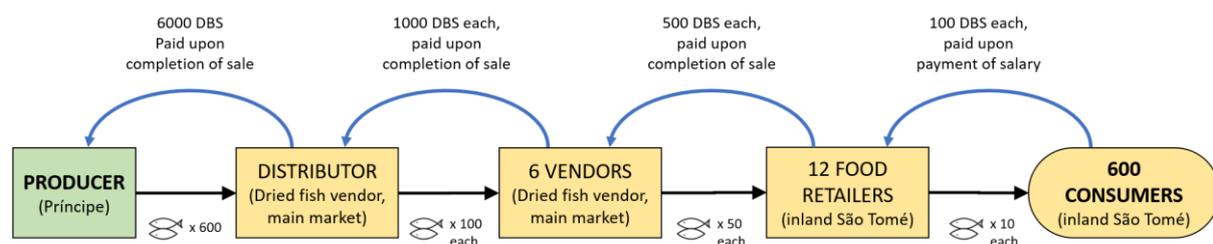


Figure 12: Theoretical example provided by a dried fish vendor in São Tomé, to illustrate how the debt of the fish is subsequently divided by several traders before the payment is completed. Yellow boxes indicate traders in São Tomé and green boxes producers in Príncipe.

Aside from the risks associated with the *fiado* system, the low prices paid for dried *peixe grosso* forces producers to stop the drying process prematurely to prevent the fish from losing too much weight. If the fish is not sold quickly, this can lead to losses on the vendor’s side as the fish will further dry in storage, progressively reducing in weight. Nevertheless, it is financially unfeasible for the traders to dry the fish further than 30%, as they purchase fresh fish at 60 DBS per kilo to sell it dried at 100 DBS per kilo. This initial evidence suggests that the *peixe grosso* prices might need to be reassessed at a national level, to promote sale prices that are more appropriate and viable for drying the fish to the recommended level. Nevertheless, the lack of empirical data on weight loss and product quality challenges a reassessment of the product prices.

Producer *palaiês* on Príncipe need to invest a large amount of money to gain access to this market and operate on very tighter profit margins. This, coupled with their lack of alternative income-generating activities, strongly restricts their access to the market of exported dried fish and makes them more vulnerable to losses and likely to abandon this activity.

6. RECOMMENDATIONS

In light of these results, three potential areas for intervention have been identified: **(1)** Collection of empirical data on different salt-drying methods (existing and potentially new), including weight loss, product quality and safety, and optimal drying times for different species. **(2)** Reassessment of product valuation to account for a potentially higher weight loss, and detailed market analysis for species sold as *peixe grosso*; **(3)** Creation of a facilitated exportation system for producer *palaiês* to sell flying fish and blue runner by unit price in their own communities to an organised group of traders; **(4)** Creation of a source of credit for the *palaiês* coupled with the exportation system, allowing producers to fund the purchase of the materials.

6.1. DATA COLLECTION ON PRODUCTION AND MARKET FOR DRIED *PEIXE GROSSO*

This study would tackle the areas of intervention (1) and (2) and collecting empirical evidence on the production of dried fish is necessary to assess appropriate prices for the species sold as *peixe grosso*. This data collection should explore the qualities of fish products dried using different techniques (current and alternative methods), disaggregating by different types and sizes of fish. Specifically, the properties to explore include: 1) weight loss after different drying times and maximum weight loss; 2) product durability and weight loss/rehydration in storage.

The information collected in this study should be used by relevant authorities to develop and promote a more appropriate table of prices, in order to ensure that all types of fish can be dried to safe levels, without damaging the profit margin of the traders. Finally, species sold as *peixe grosso* are generally more valuable products, so an assessment to expand the market for these species should be conducted.

6.2. FACILITATED EXPORTATIONS OF DRIED FISH

This system would tackle the areas of intervention (3) and (4) listed above. The feasibility of different exportation systems, as well as preferences of producers, vendors, and the fisheries department were explored in interviews with KI and FGD. The system described in Table 4 - 10 was considered optimal by all participants in the study due to its potential of diminishing risks and losses for both producers and vendors.

Table 4: Description of the recommended scheme for facilitated exports: product selection, objectives, and target group.

FACILITATED EXPORTATIONS OF DRIED FISH (Part I)

Product selection
<p>Recommended: <u>Flying fish</u> and <u>blue runner</u>, as these species are the cheapest and most landed, and are sold (or can be sold) by unit. A table of prices must be developed for the blue runner, as the price of an individual fish is dependent on the size.</p> <p>Avoid: <u>Peixe grosso</u>, sold by kilogram. The product is probably undervalued, which promotes unsanitary salt-drying techniques (see Section 5). In addition, the current demand for this type of fish is low. <u>A detailed market analysis is needed for this type of fish, coupled with empirical data collection on the salt-drying process.</u></p>
Objectives and target group
<p>The proposed facilitated export system consists on an informal group of traders, led by a <i>palaiê</i> in Príncipe and a <i>palaiê</i> in São Tomé, buying fish in large quantities in Príncipe and reselling it to dried fish vendors in São Tomé. From now on this informal group of traders and dried fish vendors will be provisionally referred to as “The Exporters”. The proposed exportation scheme is described below, and Table 7 contains a cost-benefit analysis of the proposed system.</p>
<p>OBJECTIVES</p> <ul style="list-style-type: none"> • Minimise the risk for the producers, as the fish is bought directly in the community. • Reduce the transportation costs by transporting larger amounts of fish 1) from the community to the harbour in Príncipe and 2) from the harbour to the market in São Tomé. • Minimise the risks to the dried fish vendors at Bobo Forro, as the fish will be wholesaled to them at the amounts they request. • Establish a system for product traceability, allowing the Exporters to trace the product back to its producer.
<p>TARGET GROUP</p> <p>The initial scheme for <u>the proposed exportations aims to work exclusively with producer <i>palaiês</i></u> at the fishing communities, as they have a smaller profit margin, and are a more vulnerable than the fishers. The selection criteria are described on page 38.</p> <p>On the other hand, it must be noted that <u>the proposed exportation system aims to work with dried fish vendors in Bobo Forro as exclusive buyers</u> of the product sold by the Exporters. The reasons for this are:</p> <ul style="list-style-type: none"> • Vendors at Bobo Forro are currently the main buyers and vendors of dried fish from Príncipe. • Most food vendors and retailers source their products at the Bobo Forro market. By wholesaling directly to these vendors, the Exporters would be creating an unfair competition. • Bobo Forro’s vendors are suffering a major decrease in sales due to the COVID-19 financial crisis and the move to the new market outside of the city centre. • The city council and Fisheries Department’s vision of the Bobo Forro market is to have a major distribution centre, where the sanitary conditions of the food stands and products can be monitored and maintained.

Table 5: Description of the recommended scheme for facilitated exports: Description of the facilitated exports scheme.

FACILITATED EXPORTATIONS OF DRIED FISH (Part II)

Description of the facilitated exports scheme
<p>STEP 1: Purchase of fish from producer <i>palaiês</i> at the communities (Príncipe)</p> <ul style="list-style-type: none"> • Fish will be purchased by the Exporters from specific <i>palaiês</i> or groups of <i>palaiês</i> in their respective communities. • The Exporters will pay for the fish upfront, upon reception of the cargo, thus minimizing risk of capital loss associated with the <i>fiado</i> system for producers. • The fish will be collected by The Exporters at the producing communities. The fish will be counted, verified, and packed at the communities by The Exporters. A receipt and a standardised product traceability document will be issued by the producers upon every purchase. • The amount and type of fish to be purchased from each trader will be agreed with the Exporters beforehand. • The amount of fish to be purchased from a single community will depend on the maximum capacity of the transporting vehicle, in order to maximise the cost-efficiency of the trip.
<p>STEP 2: Transport to the city and to the harbour (Príncipe)</p> <ul style="list-style-type: none"> • The fish will be collected from the community by the Exporters one or two days before shipping. • The fish will be brought to the city and stored until the cargo vessel's departure. On the day of departure, the fish will be transported to the harbour and loaded into the boat.
<p>STEP 3: Collection from the harbour and transport to Bobo Forro (São Tomé)</p> <ul style="list-style-type: none"> • The fish will be collected from the harbour and transported to Bobo Forro's storage room by the Exporters in São Tomé. • A member of The Exporters in São Tomé will verify and count the fish at Bobo Forro to ensure that the product has kept integrity during the transport. • The fish will be stored at a locked room at Bobo Forro's market, leased by The Exporters.
<p>STEP 4: Sale to the traders at Bobo Forro (São Tomé)</p> <ul style="list-style-type: none"> • The storage room at Bobo Forro will serve as a selling point of Príncipe's fish. A member of The Exporters will sell the fish at Bobo Forro daily from 6 AM to 7 AM. • The fish will be wholesaled to dried fish vendors at Bobo Forro, at the amounts requested by the vendors. The sales will be recorded in an accounting book. A receipt with the batch code could be issued by the Exporters for product traceability. • Two options for payment are proposed: 1) Payment upfront (safer in terms of avoiding debts); 2) At a certain day of the week (safer in terms of avoiding the accumulation of cash).
<p>STEP 5: Deposit of the money on the Exporters' bank account and start again</p> <ul style="list-style-type: none"> • The Exporters' vendor will periodically deposit the money from the sales on the Exporters' account, sending the record of the sales to the Exporters team in Príncipe. • The periodicity of the deposit will be determined based of the following criteria: 1) not too long, to avoid the accumulation of an excessive amount of cash; 2) not too short, as depositing money in the bank can be time-consuming. • The money from the sales will be used to start a new exportation cycle.

Table 6: Description of the recommended scheme for facilitated exports: Description of the Exporter Group.

FACILITATED EXPORTATIONS OF DRIED FISH (Part III)

The Exporters
<p>Recommended: <u>Informal group</u>: Group of traders and drivers led by two coordinator <i>palaiês</i>. The retribution per fish/trip/export of the members of the Exporter group is agreed beforehand. The coordinator <i>palaiês</i> will be selected by the project according to specific criteria (see below). <u>The legal aspects for the establishment of this group should be consulted.</u></p> <p>Avoid: <u>Formal associations</u>: Their members report numerous internal problems, especially in the management of the association's money or payment of fees. The examples of successful associations are led by individual associates, who have assumed the management of the association since its creation. By working with individual traders, the Exporters will replicate the model used in the associations that have showed better performance.</p>
<p>The proposed exporter informal group will be comprised by 1) Príncipe's coordinator (<i>palaiê</i> with experience in producing dried fish); and 2) São Tomé's coordinator (<i>palaiê</i> at Bobo Forro with experience in selling dried fish). In addition, it is recommended that The Exporters establish agreements with specific <u>service providers</u>, in order to secure better deals for the transport of fish. These service providers include: 3) Driver / transport owner in Príncipe island; 4) Monangamba (dockworker) in Príncipe; 5) Monangamba (dockworker) in São Tomé; 6) Driver / transport owner in São Tomé.</p>
<p>COORDINATOR PALAIÊ (PRÍNCIPE)</p> <p>Functions: Coordinates the purchase and transport of fish from individual traders or groups of traders in the communities to the city centre/harbour. Counts, verifies, packs, and labels the fish. Manages the Exporters' bank account, auditing to <i>Fundação Príncipe's</i> project or financial officer. Manages the Exporters' accountancy and pays producer <i>palaiês</i> and service providers.</p> <p>Recruitment criteria: The following selection criteria are proposed, to be expanded and discussed by project partners: 1) <i>Palaiê</i> as main occupation, currently involved in fresh fish trade and knowledgeable of good practices for drying fish; 2) Capable of keeping written record of purchases, payments and sales.</p>
<p>COORDINATOR PALAIÊ (SÃO TOMÉ)</p> <p>Functions: Coordinates the collection of the fish at the harbour and its transport to the storage room at Bobo Forro. Opens the storage room daily from 6 AM to 7 AM to wholesale fish to vendors at Bobo Forro at request. Manages the Exporters' accountancy and deposits the money at the Exporters' bank account.</p> <p>Recruitment criteria: The following selection criteria are proposed, to be expanded and discussed by project partners: 1) Dried fish vendor at Bobo Forro market as main occupation; 2) Capable of keeping written record of purchases, payments, and sales.</p>
<p>SERVICE PROVIDERS: TRANSPORT TO AND FROM THE HARBOUR</p> <p>It is recommended to establish agreements with specific owners / drivers of vehicles (cars, trucks, pickup vans, etc) in both Príncipe and São Tomé. To maximise the cost-efficiency of the transport, the maximum allowable weight of the vehicle must be known beforehand. The amount of fish at each community should be ordered accordingly, so as to minimise the number of trips.</p> <p>Avoid: <u>Project partners</u> (<i>Fundação Príncipe</i>, MARAPA, Oikos) <u>should not provide the transport for the fish.</u> For the Exporters to become independent, it is important to create a system that is financially sustainable on its own. Therefore, the transport costs must be included in the financial plan.</p>

Table 7: Description of the recommended scheme for facilitated exports: Preliminary cost-benefit analysis of the exportation of two bags of fish.

FACILITATED EXPORTATIONS OF DRIED FISH (Part IV)
Preliminary cost-benefit analysis

Cost-benefit analysis for the producer <i>palaiês</i>							
Item		Individual price (DBS)			Amount per export	Price per export (DBS)	
		Min.	Max.	Unit		Min.	Max.
FLYING FISH EXPORTS							
COST	Fresh flying fish	-5	-7.1	Fish	1200	-6000	-8520
COST	Salt	250		Package	2	-250	
COST	Eviscerating fish	-100	-200	Batch	1	-100	-200
RETURN	Dried flying fish	8.3		Fish	1200	9960	
PROFIT OF A FLYING FISH EXPORT						3610	990
BLUE RUNNER EXPORTS							
COST	Fresh blue runner (approx. 0.4 kg per fish)	-45	-60	Kg	200	-9000	-12000
COST	Salt	250		Bag	2	-250	
RETURN	Dried blue runner ¹⁴	67.5		Kg	200	13500	
PROFIT OF A BLUE RUNNER EXPORT						3250	1250

Cost-benefit analysis for the Exporters					
Item		Individual price (DBS)	Unit	Amount per export	Price per export (DBS)
Cargo bag		-100	Bag	2	-200
Transport to the harbour ¹⁵		-300	Trip	1	-300
Customs		-100	Bag	2	-200
Boat transport		-100	Bag	2	-200
<i>Monangamba</i> Príncipe		-50	Bag	2	-100
<i>Monangamba</i> São Tomé		-50	Bag	2	-100
Transport to Bobo Forro market		-200	Trip	1	-200
Príncipe's coordinator retribution		-125	Bag	2	-250
São Tomé's coordinator retribution		-125	Bag	2	-250
TRANSPORT COSTS					-1800
FLYING FISH EXPORT					
COST	Dried flying fish	-8.3	Fish	1200	-9960
COST	Transport				-1800
RETURN	Dried flying fish	-10	Fish	1200	12000
PROFIT PER 2 BAGS OF FLYING FISH					240
BLUE RUNNER EXPORT					
COST	Dried blue runner (0.4-kg per fish)	-67.5	Kilo	200	-13500
COST	Transport				-1800
RETURN	Dried blue runner ¹⁶	77.5	Kilo	200	15500
PROFIT PER 2 BAGS OF BLUE RUNNER					200

¹⁴ To be sold at 135 DBS per 5 fish, assuming an average weight of 0.4 kg per individual fresh fish.

¹⁵ The following costs have been calculated assuming a maximum allowable weight of 200 kg, and a cost of 300 DBS per individual trip

¹⁶ To be sold at 155 DBS per 5 fish, assuming an average weight of 0.4 kg per individual fresh fish.

Table 8: Description of the recommended scheme for facilitated exports: Preliminary financial forecast

FACILITATED EXPORTATIONS OF DRIED FISH (Part V)

Preliminary financial forecast							
Type	Item	Individual price (DBS)	Unit	Amount per export	Total price (DBS)	CAPITAL	
						DBS	EUR
DEPOSIT	SEED CAPITAL (provided by the project) ¹⁷				99375	99375	3975
Initial investment							
COST	Locked shipping container chest ¹⁸	NA	NA	NA	NA	NA	NA
COST	Others	NA	NA	NA	NA	NA	NA
Trial export							
COST	Bag of dried fish (Abade) Flying fish + blue runner	-5855	Cargo bag (mix. fish)	1	-5855	93520	3740.8
COST	Bag of dried fish (H. Vel.) Flying fish + blue runner	-5855	Cargo bag (mix. fish)	1	-5855	87665	3505.6
COST	Transport, retribution for coordinator <i>palaiês</i>	-900	Cargo bag	2	-1800	85865	3434.6
RETURN	Sales of dried fish in São Tomé	6875	Cargo bag (mix. fish)	2	13750	99615	3984.6
Second export							
COST	Bag of dried fish (Burras) Flying fish + blue runner	-5855	Cargo bag (mix. fish)	2	-11710	87905	3516.2
COST	Bag of dried fish (Camp.) Flying fish + blue runner	-5855	Cargo bag (mix. fish)	1	-5855	82050	3282.0
COST	Bag of dried fish (Rib Iz.) Blue runner	-6750	Cargo bag (bl. run.)	1	-6750	75300	3012.0
COST	Transport, retribution for coordinator <i>palaiês</i>	-900	Cargo bag	4	-3600	71700	2868.0
RETURN	Sales of dried fish in São Tomé	6875	Cargo bag (mix. fish)	3	20625	92325	3693.0
RETURN	Sales of dried fish in São Tomé	7750	Cargo bag (bl. run.)	1	7750	100075	4003.0
Third export							
COST	Bag of dried fish (Abade) Flying fish + blue runner	-5855	Cargo bag (mix. fish)	1	-5855	94220	3768.8
COST	Bag of dried fish (H. Vel.) Flying fish + blue runner	-5855	Cargo bag (mix. fish)	1	-5855	88365	3534.6
COST	Bag of dried fish (Lapa + São Joaquim) Blue runner	-6750	Cargo bag (bl. run.)	1.5	-10125	78240	3129.6
COST	Bag of dried fish (Santo António) Blue runner	-6750	Cargo bag (bl. run.)	1.5	-10125	68115	2724.6
COST	Transport, retribution for coordinator <i>palaiês</i>	-900	Bag	5	-4500	63615	2544.6
RETURN	Sales of dried fish in São Tomé	6875	Cargo bag (mix. fish)	2	20625	77365	3094.6
RETURN	Sales of dried fish in São Tomé	7750	Cargo bag (bl. run.)	3	23250	100615	4024.6

¹⁷ Budget approved in August 2020, Blue Action Fund project.

¹⁸ The purchase of one or several locked shipping chests should be explored to minimise the risks of product loss due to saltwater spray or theft.

Table 9: Description of the recommended scheme for facilitated exports: producer *palaiês*, funding the production of fish, and product traceability.

FACILITATED EXPORTATIONS OF DRIED FISH (Part VI)

Producer <i>palaiês</i>
<p>Target group: The Exporters should target <i>palaiês</i> currently engaging in the production and exportation of dried fish. Priority should be given to <i>palaiês</i> whose access to fish trade is more restricted, namely: 1) <i>palaiês</i> who practise fish trade as their only income-generating activity; 2) <i>palaiês</i> whose household does not own fishing materials (boat, engine, or net).</p>
<p>Recommendations: work with informal groups of <i>palaiês</i>, inside or outside the traders' associations. These groups could be of 5 <i>palaiês</i> in charge of producing a cargo bag worth of dried fish (~600 flying fish or 200 kg of blue runner), dividing the costs of purchasing materials and eliminating the need of paying a person to help eviscerate fish. As per the estimations in Table 7, each member of a 5-person group would obtain a profit of 358 – 450 DBS for a cargo bag of flying fish or blue runner (assuming a cost of 6.6 DBS or 55 DBS per fresh flying fish or kg of fresh blue runner). The benefits of working with small informal groups of <i>palaiês</i> would be:</p> <ul style="list-style-type: none"> • Each group could act as a production unit, facilitating traceability and monitoring of the production quality. • Informal groups with a flexible structure are more suitable to the dynamic nature of fish trade, allowing the members of each group to enter or exit the group as per their individual needs. • Producing in informal groups would allow better access to the traders through 1) a reduction of the initial investment (costs shared by the members of the group); and 2) shorter return, as the Exporters pay fish upfront.
Funding the production of fish
<p>Recommendations: Once the producer groups are established, the Exporters could fund the purchase of materials (fish and salt) by paying half of the cargo bag in advance, with the other half to be paid upon the collection of the product.</p>
Product traceability and production quality
<ul style="list-style-type: none"> • Guidelines for good practice must be produced. If necessary, training must be delivered to the producer groups. • Each <i>palaiê</i> participating in the production will be allocated an individual identification number. If they have a <i>palaiê</i> registration number (provided by the fisheries department), this number will be used. • Per batch of fish, information on the production process must be recorded, namely: identification number of the producers involved, landing (date and time), evisceration (times of start and finish), number of fish, fresh weight of the batch, weight after evisceration of the batch, amount of salt used, storage in brine (time and date of start and ending), number of hours of exposure to the sun, type of drier used (<i>quialo</i> or solar drier), weight of the dried batch. • The information on the drying process will be recorded in a form provided by the Exporters and will be handed to the Exporters upon delivery of the batch. This information will be attached to the cargo.
Auditing
<p>Given the strong investment by the project (seed capital), the accounts and accountancy books should be closely monitored and audited by project partners, and members of The Exporters should be provided with technical support by trained project officers for at least a year after the creation of the group.</p>

Table 10: Description of the recommended scheme for facilitated exports: Implementation phases.

FACILITATED EXPORTATIONS OF DRIED FISH (Part VII)

Implementation
<p>PHASE I: Establishment of the facilitated exports</p> <ul style="list-style-type: none"> • Recruitment of the coordinator <i>palaiês</i> on Príncipe and São Tomé. • Identification of suitable service providers for transport. • Identification of suitable space at Bobo Forro market and signing of lease agreement. • New cost-benefit analysis performed, after securing agreements with service providers and providers of storage space at Bobo Forro. • Explore the possibility of purchasing locked shipping containers to minimise product losses due to damage or theft. Note that using these containers might change the shipping costs, and their transport back to the island must be included in the cost-benefit analysis. • Development of a table of prices for different size classes of dried blue runner (according to sale prices at Bobo Forro and cost-benefit analysis). • Identification of producer <i>palaiês</i> at the communities and creation of informal production groups. • Creation of the Exporters' account and deposit of the seed capital. • Order and exportation of the first batch of fish.
<p>PHASE II: Scale-up</p> <p>Given the tight profit margin of the proposed system (see Table 7), it will be difficult to scale up to include more <i>palaiês</i> without additional funding. <u>If the system demonstrates feasible and sustainable</u>, the Exporters could start buying fish <i>fiado</i> (paid upon a certain date) from producer <i>palaiês</i> in Príncipe. The amount of fish bought using the <i>fiado</i> system and the date for paying the fish must be appropriate to the sales rate, estimated from the sales records.</p>
<p>PHASE III: Diversification</p> <ul style="list-style-type: none"> • Exportation of other fish products: Currently, the exportation of large fish sold by kilogram (<i>peixe grosso</i>) is a potential source of conflict and economic losses, due to low demand, low prices and incomplete salt-drying practices. I recommend avoiding <i>peixe grosso</i> exports unless this is coupled to: 1) a market development intervention, in which the market for this type of fish is developed; 2) an empirical study in which the weight loss and other quality parameters are analysed, and the product pricing is reassessed. • Importation of other food products: The importation of other food products to Príncipe can be explored. For example, the exportation of dried fish products could be coupled with the importation of other food products (such as horticulture products, which are regularly imported from São Tomé). This could allow for investment in more expensive, safer shipping containers, that could be used to transport food products from Príncipe to São Tomé and vice versa, potentially maximising the cost-efficiency of the boat transport.