

# Scoping study of the Coastal Fisheries in Tanzania



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**April 2021**

Value Chain Analysis for Development (VCA4D) is a tool funded by the European Commission / DEVCO and is implemented in partnership with Agrinatura.

Agrinatura (<http://agrinatura-eu.eu>) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development.

The information and knowledge produced through the value chain studies are intended to support the Delegations of the European Union and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions

VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: <https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d->

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## 1 Introduction

The EU Delegation (EUD) to Tanzania has identified coastal fisheries as an area for support in the next Multiannual Indicative Programme (MIP), particularly in the context of the blue economy approach. As an initial step, the Delegation asked for support from VCA4D to undertake an initial scoping in view of a full VCA4D study.

The objectives of the scoping are to:

Define with the EU Delegation to Tanzania the needed indicators on sustainability of fisheries (if possible, in line with those calculated within VCA4D) to complete the Intervention Matrix of the MIP and provide a first calculation/baseline. Indicators shall be in line also with the ones selected in the national fisheries strategy and with EU indicators on fisheries and food and nutrition security.

1. Map the availability and identify the gaps of data (in particular related to the sustainability and biodiversity issues of the fisheries activities)
2. Provide an overview and mapping of the coastal/marine fisheries VC and making thought-through proposals on which fisheries the EU could focus to best contribute to objectives of the BEST initiative and to a sustainable Blue Economy, looking in particular at the VCs where the private sector and women play (or can play) a role.

The expected deliverables are:

1. An overview of the fisheries and mariculture value chains in Tanzania, including Zanzibar
2. A commented and justified pre-selection of coastal fisheries VCs that could be included in the scope of a full VCA4D study – that will be evaluated on the basis of their contribution to Blue Economy objectives (highlighting in particular the risks/benefits on the environment and of the fishers' livelihoods – both in economic and social terms) and the role to be played by the private sector and women.
3. An identification of indicators to be included by the EUD in the Intervention Matrix of the MIP. The calculations will be mainly based on available statistics or secondary data and shall be reconfirmed by the VCA4D team during their more in-depth analysis.

Due to the current circumstances, work has been desk-based. Existing literature has been sourced and reviewed and this has been complemented by interviews at a distance. While not ideal, the process has been made easier by the relative abundance of recent and accurate data. The discussions, held with policy makers, scientists, private sector and civil society were extremely useful in helping to draw a picture of the current situation in the coastal economy.

Indeed, the volume of recent studies that have been made available present a challenge. While the author has been requested to provide an overview, the available information makes this difficult to do within the page limit. There is also the risk of plagiarising – there are only so many ways you can describe a fishery or a value chain. The author makes no pretence that some sections have been lifted from previous reports. These are referenced at the end of the report.

The report presents an overview of the coastal fishery and its positioning in the National context. The coastal fishery has been segmented and the five major value chains, together comprising of over three quarters of the fishery are considered in more detail. Finally, recommendations are made for further study.

Other issues, not directly relevant to this report are presented in annexes.

## 2 The Tanzanian Coastal Fishery

### 2.1 Production – Capture Fishery

While this study focusses solely on the marine coastal fishery, it is worth putting it in context. Fishing and aquaculture cover both inland and marine fisheries.

The Government of Tanzania estimated total available fish harvest (inland and coastal) at over 3 million tons<sup>1</sup> (excluding the EEZ). This is summarized in Table 1, below.

**Table 1:** Fisheries resource

Sn	Name	Surface Area (Km2)	Tanzania Share of Area (Km2)	Tanzania Share %	Fish Stock (Tons)
1	Lake Victoria	68,800	35,088	51	2,681,165
2	Lake Tanganyika	32,900	13,489	41	295,000
3	Lake Nyasa	30,800	5,760.20	20	168,000
4	Minor inland water areas	5,000	5,000	100	30,000
5	Territorial Sea	64,000	64,000	100	100,000
6	Exclusive Economic Zone (EEZ)	223,000	223,000	100	Not available
	<b>Total</b>				<b>3,274,165</b>

It is noted that the document that this table was taken from (see footnote 1, below) titles this table 'Tanzania Fisheries Potential'. The suggestion is that total potential production at maximum sustainable yield is in the order of 3.2 million tons. This table shows that coastal fisheries are exploited to approximately 85% of their capacity – possibly close to its limit. As an observation, looking at the fishery as a whole, total current production is in the order of 400,000 tons per year. It is optimistic to assume that there is potential to sustainably increase production by a factor of eight. Production is shown graphically in the pie chart below:

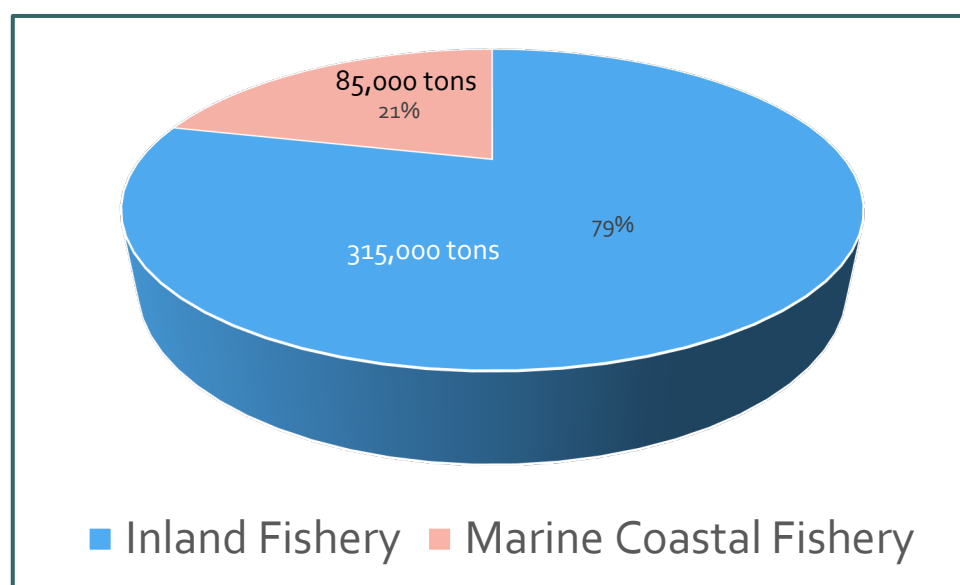


FIGURE 1: TOTAL FISH CAPTURE PRODUCTION IN THE REPUBLIC OF TANZANIA

<sup>1</sup> Government report: 'Blue Economy in Context of the Fisheries Sector in Tanzania, February 2021

Of these 400,000 tons, 315,000 is extracted from the fresh water, inland systems and 85,000 from marine fisheries. Of the 85,000 tons, approximately 4,000 tons is octopus and other invertebrates. (Source FAO Fishstat). Tanzania is a net exporter. It is assumed that the bulk of this is dagaa for regional export (19,300 t import, 67,000 tons export). Per capital fish consumption is 7kg per person per year.

Tanzania has a coastline of 1,424 km and numerous islands, the main ones being Pemba, Zanzibar and Mafia<sup>2</sup>. For the purposes of this report, this is separated in to five mainland regions and the Zanzibar Archipelago. This is shown in Figure 2, below.

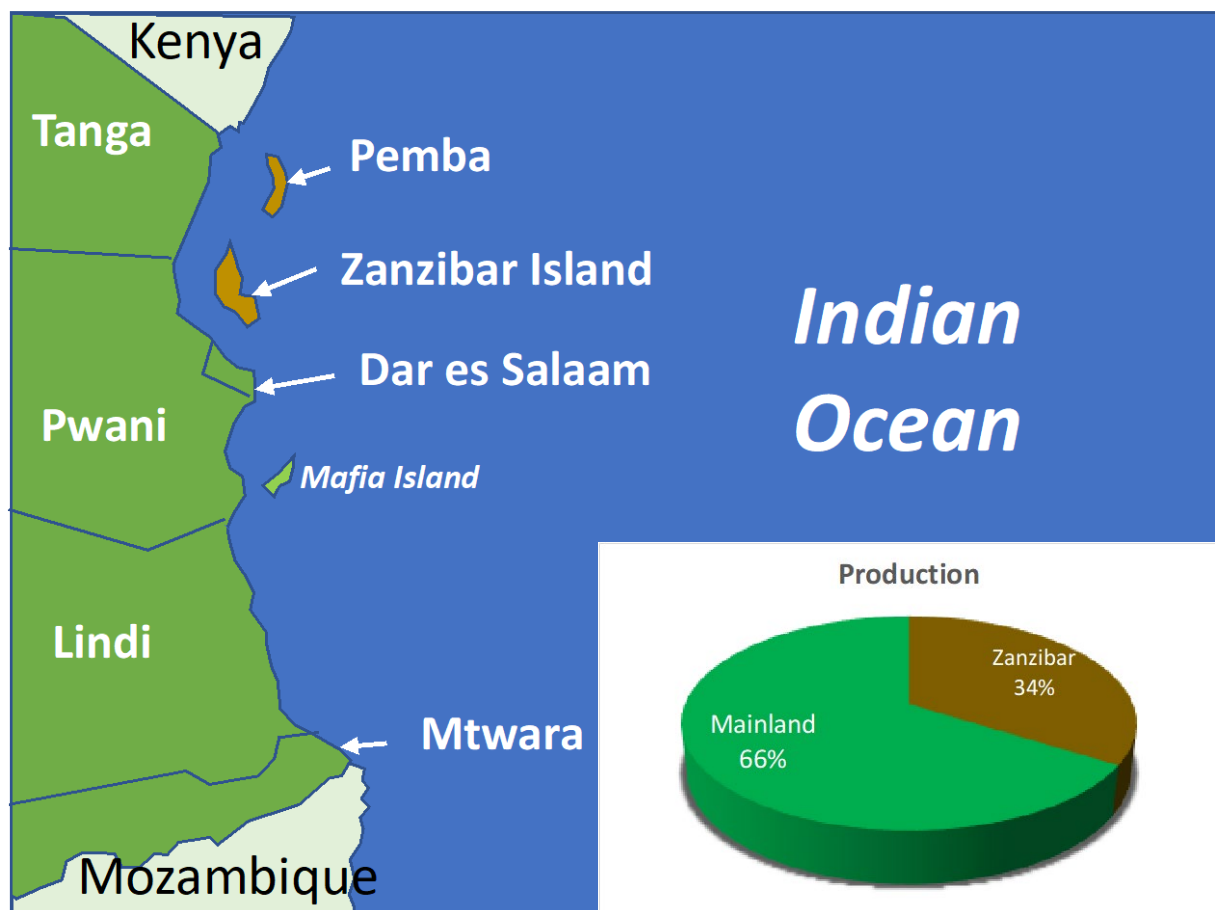


FIGURE 2: TANZANIA'S MARINE COASTAL ZONE

Annual average marine fish production, 2008 – 2017 is approximately 85,000 tons, of which some 34% comes from Zanzibar<sup>3</sup>. Thus, relatively to land area, Zanzibar is significantly more active in coastal fisheries than the mainland.

Fishing activities are licensed, although access is open and the cost of licenses for Tanzanian operators is understood to be symbolic rather than substantive.

Fishing activities are almost exclusively 'artisanal'. That is to say, fishing is carried out by micro, small and medium sized operators. However, this is not to say that operations are not commercial in nature. It would be a mistake to equate 'artisanal' to 'smallholder' or 'subsistence farmer'.

<sup>2</sup> Frame Survey, Mainland Tanzania

<sup>3</sup> Value chain analysis for the fisheries sector in the United Republic of Tanzania, World Bank, 2019

Fishing effort is regularly enumerated and well understood<sup>2,3</sup>. The number of people engaged in fishing, their location and, broadly speaking, the type of fishing they engage in are all recorded through regular frame surveys.

Headline data is shown in Table 2, below.

**Table 2:** Key indicators from the Marine Coastal Fishery

Item	Unit	Tanzania <sup>4</sup> (Mainland)	Zanzibar <sup>5</sup>	Total
Gross production	Tons per year	55,000	30,000	85,000
Number of fishers, <i>of which</i>	People	53,000	49,000	102,000
<i>Boat owners</i>		11,500	34,000	79,000
<i>Crews</i>		33,000		
<i>Foot fishers</i>		1,500	15,000	16,500
<i>Migrant fishers</i>		7,000	n/a	7,000
<i>Male</i>		52,450	41,000	93,450
<i>Female</i>		550	8,000	8,550
Vessels, <i>of which</i>	Number	9,250	8,500	17,750
<i>Length &lt;5M</i>		6,500	3,300	9,800
<i>Length = 5-10M</i>		1,950	4,600	6,550
<i>Length &gt;10M</i>		800	600	1,400

Coastal fishing vessels are broadly segmented as follows:

- Large 'modern' style vessels, generally motorised and over 10 meters in length, usually used for fishing small and large pelagic species
- Large 'traditional' style vessels, also called Dhows, both motorised and sail driven
- Medium sized motorised vessels, generally between 5 and 10 meters in length. These can be fibreglass vessels or the more traditional 'Mashua'
- Medium sized sail driven traditional vessels (canoes and dug-outs)
- Smaller sail and paddle driven canoes and dugouts.



FIGURE 3: TRADITIONAL DHOW

<sup>4</sup> Frame Survey, Mainland Tanzania

<sup>5</sup> Frame survey, Zanzibar



Scope of operations is generally limited by size of vessel – the smaller vessels generally fish closer to shore. Smaller vessels of less than 5 meters length will be limited to within 500m to 1 km of shore. Larger vessels will venture further, often on multi-day trips.

Fish are generally landed at designated 'Landing Sites'. These are formally designated areas with various levels of amenities. The larger landing areas will have marketing and processing infrastructure as well social facilities such as nurseries.

The map in figure 4 shows the distribution of fish landing sites (shown in brackets).

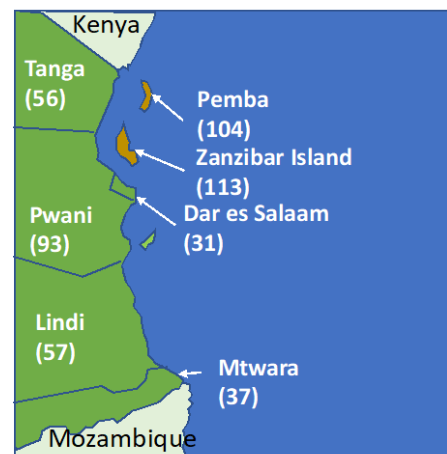


FIGURE 4: FISH LANDING SITS

## 2.2 Production - Mariculture

Mariculture, with the exception of seaweed, is not a significant player in terms of volume or economic contribution. The challenges that aquaculture faces are common to the challenges faced elsewhere in Africa:

- Access to seed: Where aquaculture works in Africa, there is access to affordable high-quality fingerlings and seed. In countries where aquaculture really works (Egypt, Ghana, Nigeria for example), hatcheries are generally run by the private sector.
- Feed: Good feed is critical to growth and profitability, particularly with fish and shrimp farming. Reports suggest that feed supply is currently erratic.
- Pilferage: This has been reported as a problem in the sea cucumber farming community. This is a common problem but can be overcome by community participation and engagement.

### 2.2.1 Seaweed

Two strains of red seaweed are grown in Tanzania: *Kappaphycus alvarezii* (cotonii) and *Eucheuma denticulatum* (spinosum). They are used to make carrageenan, an emulsifying agent found in food, pharmaceutical and beauty products – from chicken sausage to yogurt, beer, soap and toothpaste.

Seaweed farming is well established and has historically provided meaningful livelihoods for coastal populations. A key feature of seaweed farming is that women are major players. The 2018 frame survey for The Tanzanian mainland reported that over of a total of 1800 seaweed farmers, 1000 women (56%). Also, it was lucrative. At its peak, production in Zanzibar alone was at 15,000 tons which generated US\$8 million to the local economy.<sup>6</sup>

However, the sector has recently faced challenges that have led to sharp decline. The frame survey reported a 58% decrease in effort over a two-year period. It is understood that warming waters through climate change has led to disease and declining yields. This combined with unfavourable market prices has contributed to the decline.



FIGURE 5: SEAWEED FARM IN ZANZIBAR

The possibility of value-added processing is being explored. If successful, this should improve profitability.

### 2.2.2 Shrimp

It is understood that shrimp farming is emerging, with at least one operational operator (Alphakrust Ltd on Mafia Island). The trade-offs between environment and production need to be taken in to account if this sector is to be developed. Establishment of shrimp farms has a significant and detrimental impact on mangroves. It is noted that the Alphakrust operation has not been free of controversy.

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<sup>6</sup> For seaweed farmers in Zanzibar, a chance for real growth, Global Aquaculture Alliance, 2020

### 2.2.3 Milkfish

Milkfish culture has been piloted in Tanzania for a number of years. Starting in Zanzibar and Pemba, operations have now expanded to Mtwara and Lindi. As with many aquaculture ventures in Africa, the main challenge is access to quality seed.

### 2.2.4 Sea Cucumber (Bêche de Mer)

There is an emerging sea cucumber farming sector. Sea cucumber is a highly sought after and high price commodity in the Chinese market. Initial trials have proved successful. However, pilferage and access to quality seed remains a constraint to further expansion.



FIGURE 6: MILKFISH FARMING, MTWARA

### 2.2.5 Sponges

At least one NGO is working with communities to develop sponge farming businesses. Using techniques imported from Micronesia and the Far East, communities farm sponges for export. This is still in its infancy.

## 2.3 Post-harvest and Marketing

The coastal fishery is largely commercial in nature. That is to say, it is not subsistence-based, and while some fish is produced for the pot, indications are that the majority is produced for market.

The main markets are:

- Local domestic: Fish is sold within 10 to 20 km of where it is caught. This is almost exclusively the lower price end of the market. Processing is relatively rudimentary, and, in many cases, no preservation other than frying or smoke-drying is used.
- Local, high-end: This is a relatively small but lucrative market, servicing mainly wealthy tourists. It is worth noting that this sector generally grows, as a quality sensitive middle class emerges.
- National: This market services national population centres – cities such as Dar Es Salaam.
- Regional: Certain products (dried small pelagic fish for example) have a well-established regional export market.
- Export: Although niche, there is an established export market to Europe, particularly for octopus.

The market chain follows the usual pattern: fishers, middlemen/ wholesalers/ processors/ exporters/ retailers/ customers.

As previously stated, all fish is landed through designated fish landing sites. Landed fish is sometimes sold by auction and sometimes by agreement.

Exact details vary between products and value chains. This is presented in greater details in subsequent sections.

## 2.4 Governance

The Ministry of Livestock and Fisheries has a legal mandate to manage and regulate the exploitation and utilization of the fisheries resources in a sustainable manner. This is guided by the National Fisheries Policy of 2015 whose overall objective is to “develop a robust, competitive and efficient fisheries sector that contributes to food security and nutrition, growth of the national economy and improvement of the wellbeing of fisheries stakeholders while conserving environment”. The policy is implemented through various legal instruments as follows:

- **The Fisheries Act No. 22 of 2003 and its Principal Regulations of 2009 and amendment of 2020:** The Act stipulates Fisheries Administration, Development of the industry, Aquaculture Development, Management and Control of the fishing industry. It also stipulates the legal use of various fishing gears at different types of water bodies and issues on fish quality management and standards, financial provisions, enforcement offences and penalties as well as general provisions.
- **Marine Parks and Reserves Act No. 29, 1994:** The Act promote sustainable management of critical marine resources and habitats through community participation. It guides establishment and management of marine protected areas. Currently, there are three (3) marine parks and fifteen (15) marine reserves. The Act also establishes Marine Parks and Reserves Unit which has overall mandate of managing the parks and reserves.
- **Tanzania Fisheries Research Institute Act No. 11 of 2016:** The Act established the Institute with purpose to promote, conduct, and co-ordinate fisheries research in Tanzania. This is to ensure that management decisions for fisheries resources are based on the best available scientific findings.
- **The Deep Sea Fisheries Management and Development Act No. 5 of 2020:** The Act established to oversee the all issues related to management and development of fisheries resources in the Exclusive Economic Zone Deep Sea.

There are also several other cross-cutting acts which have significant role in governing the fisheries sector including: The Water Resource Management Act of 2009; The Labor, Employment and Youth Act in 2004; Environment Management Act of 2004; Investment Act of 1997; and the Land Act of 1999. <sup>7</sup>

In practice, co-management approaches are used and are reportedly effective. Co-management is recognized by law and the ambition is that 100% of the coastal area be under co-management.

From interviews, it became apparent that community-based management organisations common, operational and effective. A notable success has been the management of the octopus fishery.

It is also noted that this is an activity that does benefit through external support, for example through the Irish Government. Also, NGOs are very active in this space. The EU has also been active in this space. Investment from the EU in partnership with WWF has been made in support of beach management units in recent years.

Management tools include (are limited to) assigning closed seasons and limiting gear types. There was no reports of access being limited. If you can afford a license, you can go fishing.

A full value chain study should examine these operations further to see how their success can be supported. It is worth noting that the link between community-based management and links to

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<sup>7</sup> Government of Tanzania Policy paper, 'Blue economy in the context of the Fisheries Sector in Tanzania Date? From the Ministry of Fisheries and Livestock?

national institutions are critical to success and it was reported that these links are in place in Tanzania.

### **3 Preliminary Value Chain Analysis**

The Marine Fisheries Frame Survey for Mainland Tanzania identified and enumerated 10 separate fisheries as follows: Large pelagics, Tuna, Medium Pelagics, Small Pelagics, Reef Fishery, Octopus, Prawns, Crabs and Others. The Frame Survey for Zanzibar identified four fisheries: large pelagic, small pelagic, reef fisheries and others. This does not include industrial fisheries in the EEZ.

The World Bank funded value chain study (2019) found that the first four of these and shrimp represented 75% of total production. More detailed information on these value chains are shown in Table 3. This is not disaggregated for Mainland and the islands but shows totals for the fishery. This study focusses on these five value chains.

Summary data is shown in table 3. Below.

**Table 3:** Key aspects of selected value chains<sup>8</sup>

Item	Large Pelagic & Tuna	Small Pelagic	Octopus	Reef Fish	Shrimp (capture only)
Production (tons)	14,000	18,000	2,400	29,000	1,300
% of marine catch	16%	21%	3%	33%	2%
Growth in production / year	+8% pa since 2008	-7% pa since 2008	+4% pa since 2008	+6% pa since 2008	+4% pa since 2008
Capture technology	Artisanal (industrial)	SME & semi-industrial	Subsistence & artisanal	Subsistence and artisanal	Artisanal and industrial
Fishing gear used	Gill net, long & hand line	Purse seine & lights to attract fish at night	Spear on foot on littoral or diving	Gill net, hand line, long line & traps	Gill net, beach seines & trawl (industrial only)
Fishing boats used	Traditional wooden 5-10m, sail and 5 – 60hp engine	Rigs: Lead boat & small fleet of support light boats	Boats only used to transport fishers to reefs	Wide range of traditional boats, sail, paddle & 5 – 60 P engines	Boats for transport and also 25m trawlers for commercial ventures.
Processing	Gutting and steaking	Boiling and drying	Gutting and freezing	Gutting and freezing	De-heading and freezing
Domestic market	Traditional and modern	Traditional	Modern, growing traditional	Traditional and modern	Mostly modern
Export	Minimal, but potential	Yes, regional	Yes, international	Potential, but prime species only	Yes, international
Fisher income, TZS per month	TZS 1,200,000 to TZS 2,300,000	TZS 566,000 to TZS 1,600,000	TZS 140,000 to TZS 950,000	TZS 700,000 to TZS 860,000	TZS 610,000 to TZS 620,000
Trader income TZS per month	TZS 1,500,000 to TZS 1,900,000	TZS 1,200,000 to TZS 1,900,000. Retailers TZS 300,000 to TZS 350,000	TZS 200,000 – TZS 800,000	TZS 540,000 to TZS 800,000	TZS 1,400,000 to TZS 2,650,000

Exchange rate used TZS = 2,250 per US\$1, meaning that TZS 1,000,000 = US\$ 444.00

<sup>8</sup> Value chain analysis for the fisheries sector in the United Republic of Tanzania, World Bank, 2019



### 3.1 Small Pelagic Fishery

Small pelagic saltwater fish marketed as Dagaa are an important part of the fishery and diet in Tanzania and beyond. With annual catches at approximately 18,000 tons, they represent nearly 20% of marine production. It is a well-established value chain with well-defined actors and well-established markets. Dagaa is a traditional, highly nutritious and relatively affordable. It is noted that in Tanzania, the vast majority of Dagaa is fresh water in origin. The fresh and salt water Dagaa serves similar markets. A simplified value chain is presented below.

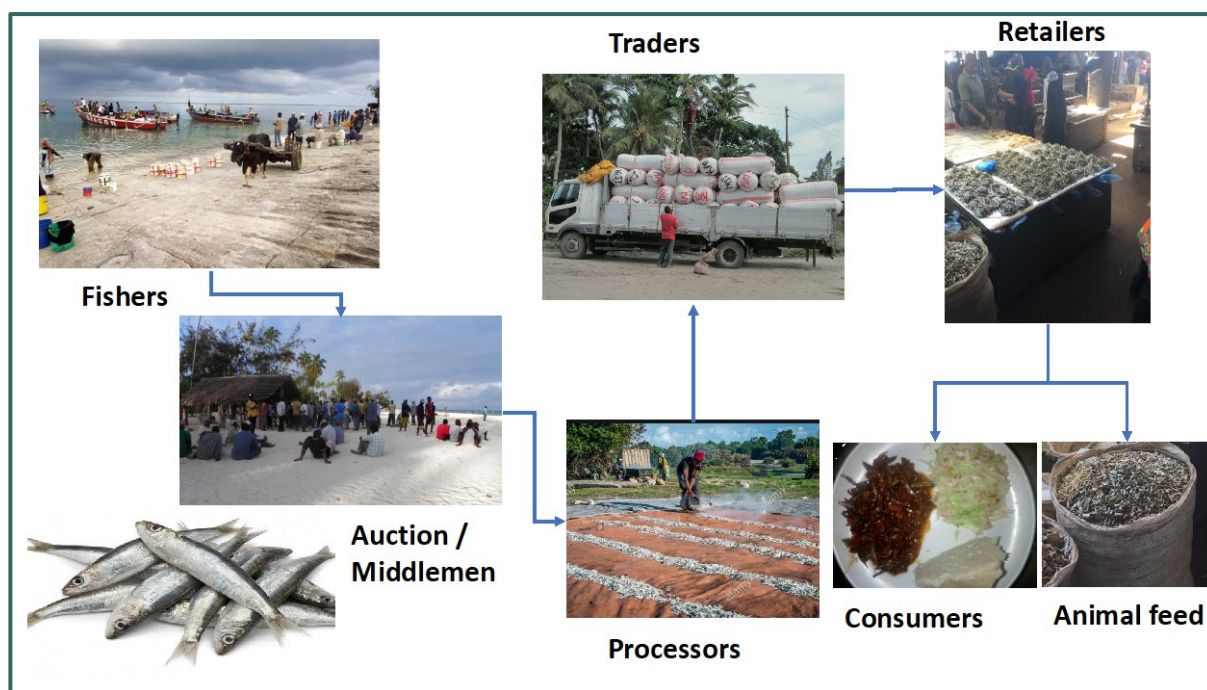


FIGURE 7: SIMPLIFIED DAGAA VALUE CHAIN

- Dagaa is fished by relatively large SME operators, driven by the need for larger boats operating heavy ring/purse nets.
- Middlemen or “wajanja wawili” buy the fish and also provide emergency funding to fishers who lack alternative recourse to cash. This will guarantee access to the catch at a discount.
- Dagaa is also sometimes sold through auction, however this is not that common as the marketing channels are built on well-established long-term relationships.
- The fish is processed by boiling in brine, sun-drying, storing and bagging. Product that is not fit for human consumption is used as animal feed.
- Fish is then sold by traders, through to retailers and finally to consumers. It is noted that a substantial part of the catch is exported regionally (DRC, Rwanda, Kenya).

If one were to design a product to support development and achievement of the MDCs, it would be hard to beat small pelagic fish. They are readily caught in large volumes almost exclusively by local artisanal fishers. They are traditionally processed without using expensive capital equipment. The value chain is relatively labour intensive and involve both women and youths. The end product is a dried product and not only transportable without a cold chain, but also lighter than its wet-fish alternative. The end product is of relatively low monetary value and affordable to the end consumer. Finally, and perhaps most importantly, small pelagic fish is a super-food.

There are challenges, though. The resource is vulnerable to external shocks, such as climate change. It is also susceptible to overfishing, particularly economic overfishing. Increased effort (more people fishing) means that the revenues are shared between more people, thus decreasing the wealth generated per unit effort. To put it crudely, as effort grows, the wealth generated at the capture stage is increasingly captured by input suppliers.

There is much in the literature about the problem with post-harvest losses and the need to include ice and / or refrigeration in the value chain. It is no doubt true that better post-harvest handling would improve quality. It is doubtful that it would improve price. **Before recommending investment in costly processes, it is really important to understand the links between and impact on market acceptability, price, yield and spoilage.**

**Table 4:** Small Pelagic Fishery – Headline facts.

Item	
Total annual production	18,000 tons
Geographical coverage	Throughout, but focus on Zanzibar
Product	Mostly dried products. Also animal feed
Target Markets	Traditional national and regional
Indicative price to fisher	US\$ 0.50 per kg
Retail price	US\$2.50 (dried product) pe kg
Main strengths	Creates employment where it is needed; Low input processing methodology; Superfood
Main weaknesses	Post-harvest handling leading to loss in productivity; possible unsustainable processing methods;
Main opportunities	None – Opportunities already being exploited
Main threats	Resource depletion through overfishing; erosion of wealth & value through overcrowding (too many fishers)

### 3.2 Large Pelagic Fishery

The large pelagic fishery comprises of tuna species, king mackerel, bill fishes and other large free-swimming species. In Tanzania, these are generally high value species which are sought after, particularly by the tourist sector. Interviews suggest that fishing is generally undertaken in larger vessels. This is borne out by various frame surveys. Interviews suggested that the large pelagic sector was the more 'profitable' sector for fishers.

Processing is rudimentary, largely limited to gutting, icing and possibly freezing.

The basic value chain is as follows:

- Fishers deliver the fish they catch to shore and mostly sell at the beach landing site via auctions or direct to traders. Fish is reportedly sold per piece, rather than by weight.
- Middlemen will buy the fish at a pre-agreed price, often recognising the fact that they will have funded fishing operations. It is noted that this is an important and critical service in the absence of a more formal credit system.



FIGURE 8: LARGE TUNA CAUGHT BY SMALL SCALE FISHERS



- Some product is reportedly sold at auction. While this does provide transparency, an auction does not provide the ancillary financial and social services of a middleman.
- Primary traders/distributors will then trade fresh tuna, sometimes on ice.
- The fish is then processed by gutting and freezing, primarily undertaken to preserve the fish for domestic sale
- Secondary traders - effectively wholesalers will then sell on to retailers, food services and tourist hotels.

Currently, the market is almost exclusively domestic, although there have been some reports of exports. The export market for this type of product is generally high end, fresh/frozen. This requires high standard, certified processing facilities and processes.

In normal circumstances, the consultant would have visited the field and observed the value chain in action. However, this was not possible. The next section, therefore, is based on first-hand experience of fishing, processing and marketing large pelagic tropical fish.

In considering the large pelagic value chain, there are a number of factors to be borne in mind.

- When one reads the literature, the phrase 'large pelagics' is added to with 'tuna and tuna like species. Tuna are very varied and occupy very different market niches. At the one end is skipjack, generally the target of industrial fisheries. This is used for canned fish and can be best described as a commodity. At the other end is Atlantic Bluefin – the well-reported million dollar fish. The tuna found in the Tanzanian coastal fishery lies between these two extremes. Table 5, below shows the main species of large pelagic fish caught in the Tanzanian fishery, the indicative catch composition and the end use.<sup>9</sup>

**Table 5:** Large Pelagic Coastal Fishery Catch Composition

Species		Catch comp.	Comments
Indo-pacific Sailfish	<i>Istiophorus platypterus</i>	37%	Premium food-fish. Niche market for smoked product. Highly prized sports fish
Yellowfin Tuna	<i>Thunus Albacares</i>	22%	Very wide range of uses from canning to fresh. Also potential for 'traditional' value added product.
Common dolphinfish	<i>Coryphaena hippurus</i>	11%	Top quality food fish, highly prized,
Skipjack Tuna	<i>Katsuwonus pelamis</i>	8%	Standard commodity, generally used for canning. Some niche high value products (Maldives Fish, Katsuobushi for example)
Other species		20%	
<b>Total</b>		<b>100%</b>	

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<sup>9</sup> Indicators of stock status for large-pelagic fish based on length composition from driftnet fisheries in Zanzibar. Tobias K. Mildenberger (WIO Journal of Marine Science 2018)

- Currently, large pelagic species are caught using a variety of fishing techniques, including drift nets, hand lines and long lines. There is potential to improve catch rates (and by implication, profitability) by using fish aggregating devices (FAD). This is not a new technique and it is likely that this has been explored in the past. It would be useful to know if FADs are in use and if not, why not?
- Tuna and large pelagic species are fragile. If post-harvest handling is not of high quality, then it deteriorates rapidly. Unless it is fresh, flash frozen or well iced, it simply doesn't taste nice. The implication is that access to any of the markets indicated above will require some significant investment.

None the less, potential for value addition in the large pelagic sector is significant. Examples of success can be seen in the Maldives (fresh yellowfin exports, katsuobushi, Maldives Fish) and Mauritius (smoked marlin). It is also worth noting the Large Pelagic fishery in Reunion, where fish are caught off FADs by small scale fishers and then sent by air to Paris.

**Table 6:** Large Pelagic Fishery – Headline facts.

Item	
Total annual production	16,000 tons
Geographical coverage	Throughout
Product	Fresh, iced and frozen
Target Markets	All income sectors, depending on quality o processing
Indicative price to fisher	US\$ 2.00
Retail price	US\$ 4.00
Main strengths	Established fishery generating wealth along the value chain
Main weaknesses	Cold chain
Main opportunities	Export markets, value addition
Main threats	Resource management

### 3.3 Octopus

Octopus has been traditionally fished along the Tanzanian coast. In recent years this fishery has grown in importance and value, capitalising upon a high value specialist export niche - that for octopus in Southern Europe.

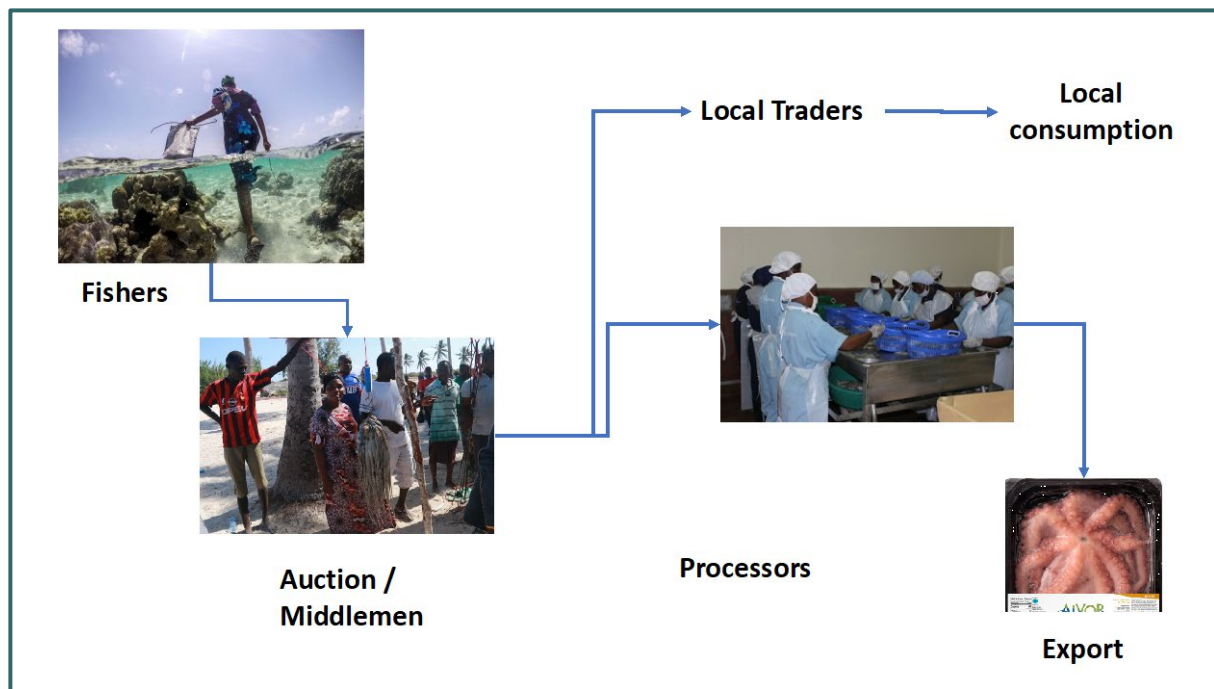


FIGURE 9: THE OCTOPUS VALUE CHAIN

The simplified value chain is as follows:

- Octopus are speared by artisanal fishers walking the shoreline at low tide (reef foraging) or diving for them. Catches are small, but the possibility of also catching lobster (mostly by divers) provides scope for additional revenue. Most sell to collectors or traders who aggregate the small quantities from each fisher. Octopus are sold by kg, unusual in an industry where sale by piece is the norm.
- Collectors: are a specific and usual feature of this value chain - quantities are small and handling the product well - ie kept on ice - from the outset is paramount. This is the collector's role, alongside aggregating catches into viable quantities. In some cases, they also freeze the product. They supply traders or to processors directly, and are frequently equipped by their customers with ice and other facilities. Some collectors are tied to their processor customers but there are also independents
- Primary traders & agents source octopus variously from collectors or fishers, including foreign producers (Mozambique). They finance fishers, sometimes through the collectors, to allow them to buy ice, hire boats etc. This is in turn rewarded through tied sales at discounted prices to the traders. Some have their own boats and most freeze the product in their own freezer chests. They know their territory well and this allows them to build volume and ensure quality
- Processors - prime markets - source from collectors, traders, agents and occasionally fishers. Their role is to freeze and pack the product for export or sale to upmarket foodservice in-country. But above all it is quality management (eg through HACCP) that is their critical function, plus some additional treatments, eg tenderising.
- Processors - domestic middle income market - octopus can be sundried in the communities where caught, but the key processing option is fried for sale eg as bite sized snacks. In this case this is undertaken close to the markets, ie in urban centres - the octopus frying operation close to the main Dar es Salaam fish market is a case in point

- Final sale: (i) Prime frozen octopus is exported to Portugal and other Mediterranean markets, (ii) Prime fresh or frozen octopus is sold to up-market foodservice or retail in main cities and coastal tourist resorts and (iii) sale as an urban snack food in mid-level restaurants and food stalls

The following is noted:

- This value chain seems to be very pro-development, pro-equity and pro-gender. At production level, the barriers to entry are low. Access is open and no expensive capital equipment is needed. The market chain is in place and the primary producer sells all that is caught.
- The main challenge facing this value chain is without a doubt resource management. The very accessibility and value of the resource that makes this an attractive livelihood option for the poor also represents an existential threat. It is noted that there are a number of initiatives (some run by NGOs) that specifically target resource management of octopus. It is noted that 'closed seasons' for example, have proved to be an effective tool.
- The various recent value chain studies suggest that there is stability and even modest growth in the octopus sector. This is at odds with results from interviews, where phrases such as 'revive the fishery' were used.

**Table 7:** Octopus Fishery – Headline facts.

Item	
Total annual production	2,400 tons
Geographical coverage	Throughout
Product	Frozen for export, chilled and frozen for high end local consumption
Target Markets	Southern Europe for export, local urban
Indicative price to fisher	US\$ 1.90
Retail price	US\$ 4.50 FOB (Export to Europe)
Main strengths	Export based, strong market demand, low entry cost, gender & youth friendly.
Main weaknesses	Open access, needs costly postharvest processing
Main opportunities	Export markets, value addition
Main threats	Resource management

### 3.4 Reef fish

This is the second largest value chain in the coastal fishery. It comprises of largely demersal fish caught from a depth of 200 m upwards. In practical terms this means that most of the fishing activity takes place relatively close to shore. This value chain can best be described as diverse – diversity of species, ranging from large snappers and groupers to smaller types of reef fish; diversity of fishers, ranging from those who fish on foot, diving and those who use larger motorised vessels; diversity of gear; the fish is caught, using a very wide range of gear – gill nets, hand lines, long lines, traps and spears to name a few. Equally, the market it serves is also diverse – low income urban, through to high-end tourism. The basic value chain is shown in Figure 10 and discussed below.

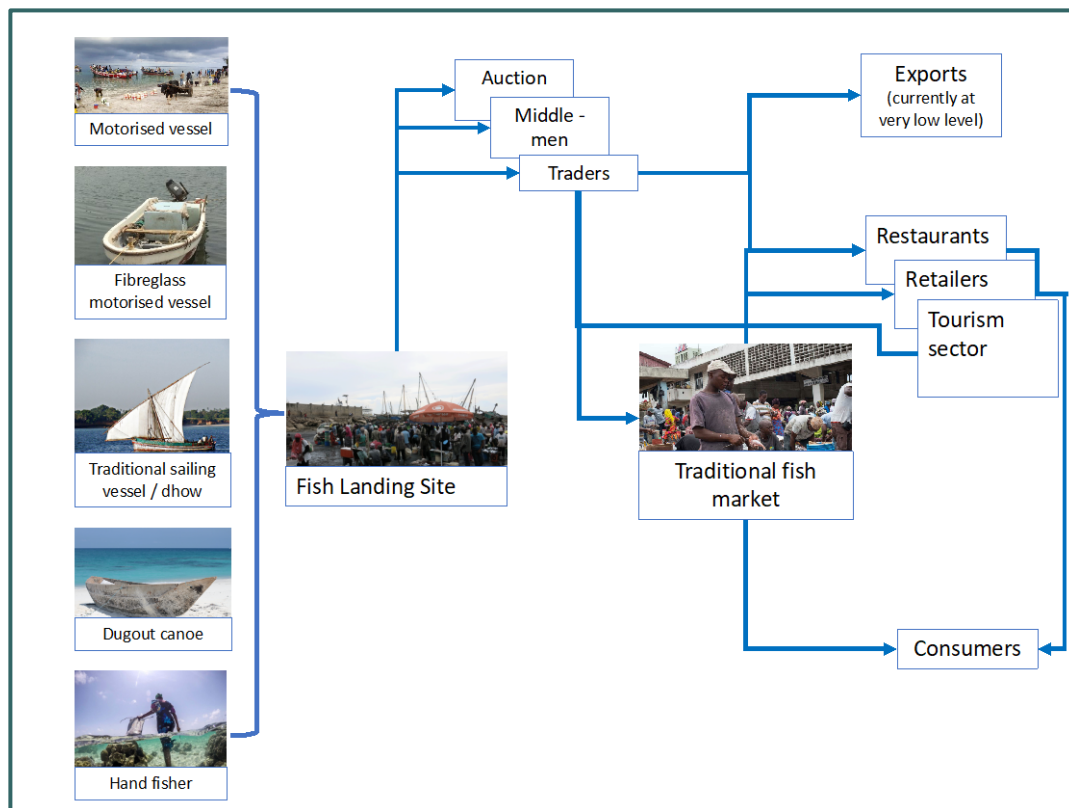


FIGURE 10: REEF FISH VALUE CHAIN

- Fishers land and sell their catch at the beach landing site via auctions or direct to traders, usually selling by piece rather than unit weight (per kg).
- As with other value chains, middlemen will prefinance fishers in return for guaranteed access to their catch at discounted prices. Fish is also sold through auction.
- Primary traders/processors will buy direct or via auctions and gut, fillet, sun-dry or freeze reef fish as the situation or market conditions dictate
- Secondary traders/distributors: buy, distribute, store and sell as follows:
  - Fresh fish to retailers, local restaurants, wholesalers & and if quality standards can be met, hotels and resorts
  - Processed fish: retailers, local restaurants, and if quality standards can be met, exports
- Final sale is made to fresh fish retailers (many of whom are located at local fish markets) for low income consumers, restaurants, tourist hotels,

There is, reportedly, a very small amount of export. Reef fish will be exported fresh or frozen and will need to meet demonstrably high quality standards.

Although there is some national and regional export trade, nearly all produce is sold close to where it is caught at the major coastal conurbations.

The following is noted:

- There is considerable variation within this value chain. For example, reef fish species such as snappers and groupers might be targeted by slightly more sophisticated fishers, using small modern motorised vessels and ice. At the other end of the scale, fishers using small dugout canoes are very limited in the fish they can access and, by inference, the income they can generate. This underlines the importance of differentiating between the subsistence fisher who sells the surplus and the professional who fishes for a living.

- It is not clear from the literature how much, if any of the catch is processed using traditional methods. It would be useful to know.
- As with most capture-based fishery (octopus being the exception), fishing is predominantly a male activity. Women are involved in processing and trading and their involvement increased along the value chain.
- As with other coastal fisheries, resource management is a critical issue. This is particularly so where fishing activities will generally be concentrated around conurbations and geographic reach of most of the fishers is limited.
- There is scope for increasing the value of the fishery. Various reports comment on post-harvest losses and varying levels of cold chain management. Improved cold chain management would immediately increase the revenue received by actors along the value chain, thus decreasing post-harvest losses. Cost/benefit, though would need to be carefully assessed.
- There may also be scope for exploring regional export opportunities. Sudan, for example, has developed a very lucrative export market in Saudi Arabia. This is a growing segment. Fish is exported out of the Red Sea Province, mainly by air to Jeddah in Saudi Arabia but also by air and road to other parts of Sudan, especially Khartoum. Although there is quality inspection, it does not seem to be overly rigorous. It is noted that existing facilities would not be compliant with EC requirements. It is lucrative and the preferred species (grouper, snapper and parrotfish) are readily available in Tanzania.



FIGURE 11: SUDANESE FISH READY FOR EXPORT TO SAUDI ARABIA

**Table 8:** Reef Fishery – Headline facts.

Item	
Total annual production	29,000 tons
Geographical coverage	Throughout
Product	Fresh and rudimentary processing (cooking). Some icing and freezing.
Target Markets	Domestic, generally close to point of capture
Indicative price to fisher	US\$ \$2.50
Retail price	US\$3.50 FOB (Export to Europe)
Main strengths	Low entry cost at bottom end. Well established value chain that everyone understands. Major contributor to livelihoods and nutrition
Main weaknesses	Open access, post-harvest losses, for many it is an existence, not a living.
Main opportunities	Export markets, value addition
Main threats	Resource management



### 3.5 Shrimp

Globally, shrimp is one of the most widely traded seafood products. The major change in this sector, globally, is the emergence of shrimp farming at scale. This has resulted in a lowering of prices generally and pressure on the capture fishery. The industrial trawl fishery in Tanzania was banned in 2007 and only recently resumed (2017). Meanwhile a significant artisanal fishery has emerged.

- Shrimp are caught by a variety of method, shown in the table below.

**Table 9:** Artisanal vessels engaged in Shrimp fishing

Vessle/Area	Length	Power	Fishing gear	Crew	Season	Catch
Dugout canoe, Rufiji Delta, Pangani	3-4 M	Sail	Gillnet, 800 – 1000m 2" mesh, no ice	2 fishers	April to August	30-100kg per week, by catch includes sardines & crabs
On foot / dugout canoe Rufiji Delta	3-4 M	Paddle	Beach seine, 0.5-1" mesh, no ice	2 fishers	April – August	20-50kg/week, bycatch includes crabs
Outrigger canoe, Bagamoyo, Kilwa, estuaries and lagoons	5 m	Sail	Gill net, 1000 – 1500 m, 1.5" mesh, insulated ice box	1 – 2 fishers	April – October	Up to 15 kg per day. By catch includes reef fish and sardines

It is noted that shrimp have a closed season. For example, recent legislation has closed the Bagamoyo fishery for September to January. It is also noted that although industrial trawling is now allowed, there has not been significant uptake of the available licences.

- As with the octopus value chain, collectors are involved - and for the same reason - a scattered fishery supplying small quantities of a high value product that needs special care (ice especially). They operate at the landing sites or from boats when fishers are dispersed (eg in the Rufiji Delta). Collectors and agents can either be tied to a trader/processor or be independent. They facilitate the value chain's operation through (i) funding upstream actors (boats & nets for fishers) and (ii) maintaining the quality essential for the downstream actors through use of ice in insulated ice boxes (e.g. old fridges). Collector's reward for funding fishers follows the national convention of repayment through guaranteed supply, received at a discounted price.

Secondary traders may be involved. They will link primary traders / collectors to premium domestic markets: hotels, restaurants and retail for high income consumers, transporting shrimp to markets these traders well understand. They use ice.

- Processors who service the export market source from collectors or agents and produce high



FIGURE 12: SHRIMP AND REEF FISH FOR SALE, KIVUKONI FISH MARKET, DAR ES SALAAM

quality & food-safe frozen and fresh shrimp (mostly frozen) using HACCP systems etc. Produce and export blast frozen and IQF shrimp which meets EU and other market's requirements. Processors - low income local market small scale processing close to landing sites where shrimp is fried, colouring added or dried, and sold to retailers in local or inland towns

Final markets include:

- Export markets, high quality, frozen product
- Premium markets, hotels, restaurants and upmarket retail
- Mid to low markets, often sold fresh on ice through urban fish markets and stalls
- Low market segments, sold cured (fried or dried) in towns or village markets in the rural hinterlands.

**Table 10:** Shrimp Fishery – Headline facts.

Item	
Total annual production	1,300 tons
Geographical coverage	Deltas, estuaries and reef lagoons
Product	Quick frozen (export and high end), iced, fresh and semi-cured
Target Markets	Export and domestic high end (mainly)
Indicative price to fisher	US\$ \$2.50
Retail price	US\$6.00
Main strengths	High unit value, relatively low entry cost
Main weaknesses	Open access, post-harvest losses, seasonality
Main opportunities	Export markets,
Main threats	Resource management

## 4 Recommendation of value chain for further study

The terms of reference requested that 'A commented and justified pre-selection of coastal fisheries VC that could be included in the scope of a full VCA4D study' be prepared.

This preselection needed to take into account the contribution of that value chain to the blue economy, to livelihoods and to gender and social equity. The assumption is that one of the five main value chains has enough differentiation to warrant special attention.

The implication also is that one of the five main value chains is a cost-effective target for EC support – more cost effective than others. Thus, in selecting the value chain for further study, a subjective analysis has been undertaken, using the framing questions from the VCA4D Value Chain Methodology<sup>10</sup>. These are:

FQ1: What is the contribution of the VC to economic Growth?

FQ2: Is this economic growth inclusive?

FQ3: Is the VC socially sustainable?

FQ4: Is the VC environmentally sustainable?

The analysis has taken a view on both the current situation and the potential. This is summarised in the table below:

<sup>10</sup> VCA4D Methodological Brief for Agri-Based value Chain Analysis: Frames and Tools 2021; Also see Annex 1



**Table 10:** Analysis of Coastal Fisheries Value Chains against VCA4D Framing Questions.

Value chain	FQ1 – Economic	FQ2 – Inclusive	FQ3 – Social	FQ4 – Environmental
<b>Small pelagic</b>	Gross value is approximately 20% of the selected value chains.	Highly inclusive. Gender friendly in processing and marketing	Highly nutritious traditional product, serving domestic market.	Resource less susceptible than others to overfishing, but some risk. Some risk of negative environmental impact through processing method.
<b>Large pelagic</b>	Gross value 20-30% of selected value chain. Considerable potential for increasing value through developing new markets <sup>11</sup>	Moderately inclusive.	High social impact on livelihoods of coastal communities.	Resource less susceptible than others to overfishing, but some risk.
<b>Reef fish</b>	Gross value of over 40% of selected value chains. Potential to increase through exports	Very inclusive, but possibly not activity of choice at lower end of scale.	High social impact on livelihoods of coastal communities. Major contributor to nutrition in coastal communities in particular.	Highly susceptible to over-fishing
<b>Octopus</b>	Niche – less than 10% of gross value – but major export earner	Very inclusive through low entry cost in production and access to females and youth	High easily accessible means of earning income for rural communities	Highly susceptible to over-fishing
<b>Shrimp</b>	Niche – less than 10% of gross value – but high value product. Probably not much potential for value addition, but some for post-harvest loss reduction.	Moderately inclusive as barriers to entry are relatively low.	Moderate. Not a staple food, but an important source of employment in some areas.	Susceptible to over-fishing. High environment risk associated with farming.

In terms of size and value, the small pelagic, large pelagic and reef fish sectors stand out as clear candidates for further examination.

The value chains that rely on pelagic fish are least vulnerable to over-fishing. However, they are not immune from over-exploitation. Octopus and reef fish, on the other hand are fragile. It is worth noting that current co-management initiatives focus on these two fisheries.

The octopus fishery is certainly inclusive. It is gender friendly and the cost of entry is low. It services a lucrative export market, and the market linkages are strong. However, it is very susceptible to over-exploitation.

<sup>11</sup> Authors opinion

The shrimp fishery is high value and has the potential to grow, particularly if farming takes off. However, expansion has its costs, not least environmentally. Also, activities at the moment are relatively limited.

If one looks at potential for growth, it is unlikely that there is much potential to grow production. Government projections suggest that current production could grow by as much as 80% (60,000 tons to 100,000 tons – See table 1.). However, interviews and literature consistently suggested that resources were under pressure. Here are a number of NGOs that are actively involved in working with communities to manage the fisheries and reports suggest that they are having an impact. The reality is that it is more likely that the challenge is to maintain a sustainable level of production, rather than to target growth.

It cannot be overstressed how important it is to manage the resource, and to do so in a way that involves communities and provides everyone with a clear and common understanding of the value of the resource. For example, investment from the EU in partnership with WWF has been made in support of beach management units. This lies at the heart of the blue economy approach and it is also a cornerstone of the Government of Tanzania's to management<sup>12</sup>. It is noted that this is common across all five value chains.

However, volume and value are not the same. There is clearly potential to increase value per unit volume harvested, be it through decreasing postharvest losses or through identifying and exploiting more lucrative markets. It may be useful at this point to define 'postharvest losses'. It is a term that is often misunderstood.

- 'Physical losses' is the one that everyone understands. This is the volume of product that is produced, but which is not consumed, usually because it is unfit for human consumption.
- Economic / quality losses: This is the reduction in value that occurs as a result of the product not achieving optimal price for quality reasons. For example, a poorly handled fish will attract a lower price than it could realise, were it handled properly. A good example of this is seen in the tuna fishery targeting the highly lucrative Sashimi market. Unless the tuna meets the highest specifications, full price will not be achieved.
- Market losses: These occur when oversupply results in a glut in the market, resulting in lower prices.

Investment in infrastructure and capacity along the value chain will address the first two of these. Improving efficiency in the market system and diversification will address the last.

Postharvest losses have been reported as common problems in each of the five value chains that were examined. The causes are reportedly similar – poor practice, poor facilities and poor infrastructure.

There are opportunities for value addition and improving financial contribution of the sector. The obvious ones are developing the export markets for tuna and reef fish. This has been done successfully elsewhere. The two examples cited in this report are a) the Maldives, which developed an export market for fresh or flash frozen yellowfin tuna in the 1990s and early 2000s and b) Sudan which has developed a small but lucrative market for reef fish in Saudi Arabia.

All five value chains were inclusive to a degree. Certainly, production, being artisanal, provides employment at grass roots level. Octopus, shrimp and, to a certain extent reef fish are probably the most inclusive, as there is a low barrier to entry. Capital investment is small (in some cases a pair of goggles) and access is straightforward. It also gives employment opportunities to women. Also it is worth noting that the more sophisticated processing factories tend to employ women on

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<sup>12</sup> Blue economy in the context of the fisheries sector in Tanzania, Ministry of Livestock and Fisheries, 2021

the factory floor. Women tend to be employed because of their dexterity. In the case of tuna canning, this is almost exclusively so. However, there are not that many processing facilities operating on the Tanzanian coast. It will be a task of the VCA4D full analysis to identify areas of opportunity.

As stated in the above paragraph, all value chains have a significant social impact in so far as they provide much needed employment, often in places where there are no alternatives. Reef fish and small pelagic fish in particular also make a major contribution to nutrition. There is increasing interest in the role of pelagic small fish as a superfood in the African continent. It really ticks all the boxes. It is plentiful, cheap, easy to transport and easy to process. Moreover, it is hugely nutritious – more so than larger fish and farmed fish.

In terms of environmental impact and as stated previously, all value chains are susceptible to overfishing. It is critical that there is a clear understanding of the link between exploitation and sustainability. This is well understood by the Government of Tanzania and it actively manages and monitors resource exploitation. In this context, it is worth noting that the Blue Economy approach demands that the sector is looked at as a whole, so that the unintended consequences of expansion in one area on other areas are understood.

While there are differences between the value chains, there are also similarities. The fish is generally landed at the same markets; many of the actors are not exclusively actors in that single value chain. Most importantly, perhaps is the fact that the species share an ecosystem. They are interdependent. What happens to one will affect the other. Also a single intervention will impact on several value chains. This is shown in Tables 11, below.

**Table 11:** the Value Chains – Issues and challenges.

Value chain stage	Impact / implication on Value chain					Focal area
	Small pelagics	Large pelagics	Reef fish	Shrimp	Octopus	
Production	This is a critical area for all value chains. It is universally recognised that the resource is finite and, if not managed, will have a major detrimental impact on the value chain. Fragility needs to be understood across the ecosystem.					Resource Management & Governance
	Improved infrastructure will improve quality, decrease wastage and improve post-harvest losses. However, a clear understanding of the overall economics and careful planning / consultation is needed. There are many examples of unwise and unused investments in Africa.					Investment in infrastructure and new methodologies
	Broadly OK	Room for improvement; Better use of ice would improve product and give access to new markets. Understanding the dynamics of the value chain would give a better understanding of potential benefits.			Broadly OK	Improved quality
Processing	Broadly OK	Room for improvement.			Broadly OK	Improved / new methods
	Broadly OK	Would certainly benefit from ice.			Broadly OK	Investment in the cold chain
	Not needed	Possibly			Not needed	New methods
	At retail level?	Yes	Yes	Not needed	Not needed	Value addition
Marketing	Development and application of national food standards will have a positive impact on health and nutrition. This is also essential in order to access some export markets. There is a need to understand which markets are quality sensitive					Governance / Standards (ISO, HACCP etc)
	Well established market niche	Well established position in existing markets, but scope for value addition through identification of new markets.			Well established market niche	Finding new markets (Domestic/export)
All	There is a need to understand the institutional framework that defines the enabling environment across the value chains.					Governance and regulation
	Access to finance is a common problem across all productive sectors, not least in medium size and working capital finance. The fisheries sector brings its own challenges. It is important to understand how these are currently addressed.					Access to finance

	This has to do with creating worthwhile jobs – employment opportunities that allow participants to aspire, rather than simply exist. Capacity is an essential aspect of the enabling environment and the enabling environment is an essential aspect for growth.	Building capacity (methods & technologies)
	Growth is driven by entrepreneurial innovation. This is common to all value chains.	Building capacity (Entrepreneurial approaches)
		Community engagement

A choice would be to look at the reef fish value chain, based on its size, vulnerability and potential or both collapse and growth in value.

If one is to look at the reef fish value chain, it also makes sense to analyze the large pelagic value chain. After all, many actors are involved in both chains.

Small Pelagic value chain is more distinct and can be more easily separated. A discrete value chain study could be undertaken and it may have some value. The small pelagic VC is absolutely critical to livelihoods in Southern and Eastern Africa. There is a possibility that what is learned looking at marine coastal dagaa, could be applied to fresh water dagaa. However, it is understood that separate value chain study under the auspices of FISH4ACP is currently being undertaken.

The other value chains are niche. Although they do generate employment and export earning, they are not that significant in the great scheme of things. It would make little sense to invest in a full VCA4D study for such relatively minor value chains.

The challenge perhaps lies in how a single value chain can be selected in the context of the blue economy. The 'Blue Economy' has several definitions, but there is a common theme: *Economic activity planned in a holistic way that recognizes all activities (social and economic) and implemented in a way that is sustainable and equitable.*

Given this, **it is strongly recommended that the Coastal Fisheries value chain be looked at as a whole**, rather than one single value chain being selected and all the five VC shall be included in the scope of a VCA4D study and in the BEST initiative contribution from the EU.

## Annex 1: VCA4D framing questions, core questions and indicators/themes

Framing Question 1: What is the contribution of the VC to economic growth?	
CQ1.1	<p><b>How profitable and sustainable are the VC activities for the actors involved?</b></p> <p><b>Indicators:</b> Operating Accounts of every type of actor; Net Operating Profit; Return on turnover (operating profit/production); Current Benefit/Cost ratio (operating profit /total expenses); Estimates of Return on Investment (if relevant and available); <b>Benchmarks for farmers' net income</b> (minimum wage, livelihood needs, job opportunities...).</p>
CQ1.2	<p><b>What is the contribution of the VC to the GDP?</b></p> <p><b>Indicators:</b> Value of final VC production; Consolidated operating account of the whole VC and relevant sub-chains; <b>Total Value Added and components</b> (Wages, Taxes, Financial Charges, Operating Profits); <b>Total Value Added in percentage of the GDP</b>; <b>Rate of Integration into the Economy</b>; Driving effect ratio.</p>
CQ1.3	<p><b>What is the contribution of the VC to the agriculture sector GDP?</b></p> <p><b>Indicators:</b> VC agricultural actors' Value Added in percentage of the agriculture sector GDP.</p>
CQ1.4	<p><b>What is the contribution of the VC to the public finances?</b></p> <p><b>Indicators:</b> Taxes and subsidies; Operating profits of public enterprises; Other receipts and outlays of the government budget; <b>Public Funds Balance</b></p>
CQ1.5	<p><b>What is the contribution of the VC to the balance of trade?</b></p> <p><b>Indicators:</b> VC Exports; VC Total Imports; <b>Balance of trade of the VC</b>; Return on Foreign Currency outlays (FC net balance/FC outlays); Total Imports/VC Production).</p>
CQ1.6	<p><b>Is the VC viable in the international economy?</b></p> <p><b>Indicators:</b> <b>Nominal Protection Coefficient (NPC)</b>; Effective Protection Coefficient (EPC); <b>Domestic Resource Cost Ratio (DRC)</b>; Share of the export price (FOB) in the final consumer price in the importing country.</p>

Framing Question 2: Is this economic growth inclusive?	
CQ2.1	<p><b>How is income distributed across actors of the VC?</b></p> <p><b>Indicators:</b> Disaggregated Value Added; Total Farm Income; Total wages and salaries (at every stage, all activities – absolute and %); Value of social benefits; Comparison of sub-chain's income distribution; <b>Total income accruing to marginalized and vulnerable groups.</b></p>
CQ2.2	<p><b>What is the impact of the governance systems on income distribution?</b></p> <p><b>Indicators:</b> Income distribution among actors; Share of farm gate price in the final price (%); Income Gini Index.</p>

Framing Question 3: Is the VC socially sustainable?
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CQ3.1	<p><b>Are working conditions throughout the VC socially acceptable and sustainable? Do VC operations contribute to improving them?</b></p> <p><b>Main themes:</b> Respect of international norms; Respect of contracts; Risk of discrimination and forced labour; Job Safety; Attractiveness; Child labour and education...</p>
CQ3.2	<p><b>Are the land and water rights implemented throughout the VC socially acceptable and sustainable?</b></p> <p><b>Main themes:</b> Adherence to and application of VGGT; Equity and security of access to land/water resources; Transparency of procedures; Consultation; Arbitration procedures; Compensation procedures...</p>
CQ3.3	<p><b>Throughout the VC, do actors foster and put into practice gender equality?</b></p> <p><b>Main themes:</b> Inclusion/Exclusion of women/vulnerable groups in certain activities; Access to resources, goods and services (land, credit, extension services, inputs...); Participation in decision-making (on activities, organization, income...); Responsibility and empowerment in collective processes; Arduous working conditions...</p>
CQ3.4	<p><b>Do VC operations contribute to upgrading and securing the food and nutrition conditions?</b></p> <p><b>Main themes:</b> Contribution of the VC to the availability, accessibility and stability of food resources; Food diversification; Nutritional quality; Price instability...</p>
CQ3.5	<p><b>Is social capital enhanced by VC operations and equitably distributed throughout the VC?</b></p> <p><b>Main themes:</b> Strength and representativeness of producers' organizations; Information sharing; Level of trust among actors; Participation in decisions and community activities; taking traditional practices into account...</p>
CQ3.6	<p><b>Do the VC operations contribute to improving the living conditions of the households through acceptable facilities and services?</b></p> <p><b>Main themes:</b> Access to facilities and services: health, education, training, housing, water and sanitation; Quality of these infrastructures ...</p>



Framing Question 4: Is the VC environmentally sustainable?	
CQ4.1	<b>What is the potential impact of the VC on resource depletion?</b> <b>Indicators:</b> Resource uses (water, fuel...); Mineral extraction; Energy cost; <b>Increased extraction cost</b> ; Hotspots identification
CQ4.2	<b>What is the potential impact of the VC on ecosystem quality?</b> <b>Indicators:</b> Emissions of substance (CO <sub>2</sub> , NH <sub>3</sub> ...); Resource use; Potential deterioration of land quality; Damage to terrestrial, freshwater and marine species; <b>Potentially Disappeared Fraction of species (PDF)</b> ; Hotspots identification
CQ4.3	<b>What is the potential impact of the VC on human health?</b> <b>Indicators:</b> Emissions of harmful substance; Potential deterioration of safety (potable water, working conditions, etc.); Potential increase in diseases; <b>Disability Adjusted Loss of Life Years (DALY)</b> ; Hotspots identification
CQ4.4	<b>What is the potential impact of the VC on climate change?</b> <b>Indicators:</b> Emission of greenhouse gases (CO <sub>2</sub> , N <sub>2</sub> O, CH <sub>4</sub> , CFC...); <b>Carbon footprint (kg of CO<sub>2</sub>eq.)</b> ; Hotspots identification
CQ4.5	<b>Does the potential impact of the VC on biodiversity deserves specific studies?</b> <b>Indicators:</b> Potentially Disappeared Fraction of species; Carrying capacity; Compliance to area protection; <b>Existence of Key Biodiversity Areas</b> ; Connectivity of terrestrial protected areas; Endangered, Threatened or Protected species; Water stress; Crop diversification, rotations and intercropping; Crop varietal diversity; Livestock breeds diversity; Area affected by land degradation; Soil conservation; <b>Presence of targeted projects.</b>

Cross-cutting core question: which risks may affect the performance of the VC?	
Cross-cutting CQ	<b>Which risks may affect the performance of the VC?</b> <b>Indicators:</b> Risk factors; Probability; Severity of damages; Actors affected.

## **Annex 2: Other opportunities for the coastal economy – Recreational fishing**

This value chain is ignored in virtually all the literature. However, it exists and is at least as significant as the emerging mariculture sectors. Aligned with, but not the same as ecotourism, this involves taking tourists and visitors out day fishing. A casual search on the web ([https://fishingbooker.com/destinations/location/tz/kusini?booking\\_days=1&booking\\_persons=2](https://fishingbooker.com/destinations/location/tz/kusini?booking_days=1&booking_persons=2)) showed that there were nearly 50 organizations currently advertising fishing charters. These range from day trips to longer cruises and prices are relatively high. A day trip for one person is likely to cost more than an average artisanal fisherman will earn in a month.

Studies in other countries have shown that recreational fishing has many benefits, low environmental impact significant value-added and impact on the local economy being three of them. It is accepted that if one looks at the photo above, it is clear that non-Tanzanians seem to play the leading role in this activity. It is stressed that this is by no means the case in other countries where this sector has developed. Indeed, there is a marketing advantage to be had by selling local knowledge!

A recent example of successful development of recreational fishing as an economic activity in depressed areas is seen in Norway. A clear example of this is seen in the company, 'Din Tur' <https://www.dintur.no/Holiday-in-Norway/home/>.

## **Annex 3: Finance and the Fisheries Value Chain**

Access to finance is a challenge and is often cited as a constraint to development. This is particularly so in fisheries value chain, where conventional wisdom has it that lenders view fisheries as a risky proposition, where the main asset is liable to sinking and the raw material is either overexploited or subject to varying access rights.

The reality is that finance is available but difficult to access. The further reality is that any business that isn't immediately cash positive needs credit. The general perception is that with conventional lending, if you can access credit and afford it, you don't need it.

Studies have shown that access to credit, particularly for investment, is a real challenge for SME's.<sup>13</sup> Of course any enterprise that requires investment acquires it or goes under.

In an environment where bank loans are hard to access without collateral and/or expensive, credit provided by players further up the value chain (Trader credit) is very common. This is also the case in Tanzania, where middlemen will pre-finance operations in return for preferential access to the catch. This is often seen as a 'bad' thing, where fishers are tied into lower prices than they might otherwise get. However, this cannot be assumed, and more detailed comparative analysis should be undertaken. Certainly, a study in Sudan<sup>14</sup> found that commercial operations were underpinned by multi-generation relationships and where services were mutually beneficial and competitive. This is possibly because they were underpinned by the principles of Islamic financing. Indeed, Islamic finance may well be more 'SME Friendly', and is expanded on below:

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<sup>13</sup> Kleih et al, Financial services for small and medium-scale aquaculture and fisheries producers, , Marine Policy, 2012

<sup>14</sup> Linton and Abukasawi, Review of the Artisanal Fisheries Sector in the Red Sea Coast, Landell Mills limited report for the European Commission, 2017

### **Mudarabah**

Mudarabah is a partnership in profit sharing between two parties; the first party is the financier or the investment capital owner (Rab-Almal). The first party provides the investment capital and the other party, who operates the business (called 'Mudarib') provides entrepreneurship and effort to run the business. Rab-Almal has no right to interfere in the management process. The profit derived from the business is shared between the capital owner and the Mudarib according to a predetermined ratio specified in the contract. The loss is borne by the financier, where the financier may lose part or his entire capital and the mudarib loses his share of profit. The mudarib will bear the loss only in cases of neglect and transgression by breaching any of the contract terms and conditions.

### **Murabaha**

The Arabic origin of the word "Murabaha" is "RIBIH" which means profit and Murabaha means a sale transaction with profit. It is a transaction of sale of goods at cost, plus an agreed profit mark up. The seller should inform the purchaser of the price at which he purchased the good and stipulates an amount of profit in addition to this. The purchase price and the profit should be known to the purchaser.

### **Salam**

Salam is a sale/purchase transaction, where the price of the good is paid immediately at the agreement time and the good is delivered at an agreed future date. The price is referred to as Salam Capital/fund and the good as the Salam good. The Salam capital could be in cash or in kind.

It is noted that trader credit can also meet capital costs. The aquaculture sector in Egypt was largely built on trader credit. The author has also seen examples in the Maldives, where traders have invested in production facilities.

**Patient Capital** and **Impact Investment** are relatively recent mechanisms for addressing capital investment in less economically developed and risky environments. The Acumen Fund (<https://acumen.org/companies/?sector=agriculture>) for example was established in 2001 and is the market leader. It has invested extensively in agriculture, but, interestingly, virtually nothing in the fisheries value chain.

Agdevco (<https://www.agdevco.com>) is a leading impact investor, particularly in Africa. Funded largely by DFID it has an investment portfolio of US\$138 million with some \$21 million in Tanzania alone. Their portfolio is almost exclusively agricultural with a total absence of any fisheries related investments.

Finally, a note on Friends and Family. Investment by friends and family has driven African enterprise. Impacts of diaspora investments are well documented. Steps can be taken to create an enabling environment to promote this type of investment. For example, in the UK, the EIS and SEIS schemes (<https://www.gov.uk/guidance/venture-capital-schemes-apply-for-the-enterprise-investment-scheme>) actively promote and reward individual investments.

This leads nicely to **the enabling environment**. Access to a well-managed resource is key here. Investors are more willing to invest if the risk is low and guaranteed access to a well-managed resource not only mitigates risk but can also have an intrinsic value that can serve as collateral. A good example of this can be seen in New Zealand, which operates a Transferable quota system. It is noted however, that this approach is not universally adopted or indeed approved of. It is also noted that the enabling environment is not limited to resource management. It manifests itself along the value chain, be it adoption of minimum quality standards or health and safety. The

elements that make up the enabling environment fulfil many functions. One of those is to give comfort to investors that investees will have access to resources and markets.

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