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Artisanal fishers arrive to shore in Zanzibar to land and sell their catch. Photo: M. Cornthwaite / TRAFFIC

A Rapid Assessment of the Trade Dynamics and Consumption of Key Protected Marine Species in the Zanzibar Archipelago

Focusing on the Pemba Channel Conservation Area (PECCA)

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Contents

SELECT ACRONYMS

CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DFD	Department of Fisheries Development
DF	Department of Forest
FAO	Food and Agriculture Organization
IUCN	International Union for Conservation of Nature
KMKM	Kikosi Maalum cha Kuzuia Magendo Zanzibar
MCA	Marine Conservation Area
MCU	Marine Conservation Unit
PECCA	Pemba Channel Conservation Area
RTI	Research Triangle Institute
SFC	Shehia Fisheries Committee
WHO	Western Indian Ocean
ZAFIRI	Zanzibar Fisheries Research Institute
ZARI	Zanzibar Agriculture Research Institute
ZALIRI	Zanzibar Livestock Research Institute

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EXECUTIVE SUMMARY

TRAFFIC was contracted by Research Triangle Institute (RTI) through the USAID Tuhifadhi Maliasili project to undertake a rapid assessment of the consumption and trade of marine protected fauna in the Zanzibar Archipelago, focusing on the Pemba Channel Conservation Area (PECCA). The objectives of the assessment were to identify the marine species and their products traded within the Archipelago, map the trade routes and source areas of the products, understand the relevant legal frameworks and efforts by law enforcement, and assess the involvement of local communities, especially the small-scale fisheries associations and traders, in the use and conservation of marine species.

The research team used a mix of methods to undertake the assessment. This included desk-based research, remote and in-person stakeholder consultations which also included socioeconomic surveys carried out by four trained enumerators between June and September 2022, and collection of field data at market and fish landing sites. A total of 186 respondents were reached, representing fishermen, government officials, especially law enforcement personnel involved in fisheries resource management, patrols and research, and traders.

Through the information collected from the literature and consultation with experts, as well as review of listings under the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the IUCN Red List of Threatened Species and national legislation, four groups of marine protected species were prioritised for the assessment. These included Chelonids (sea turtles), Elasmobranchs (sharks, rays, and skates), Holothurians (sea cucumbers), and Syngnathids (seahorses and pipefishes).

The assessment found that among the coastal communities in the Archipelago there is a high reliance on marine resources for food, medicine, and trade. This reliance may be contributing to an unsustainable harvest of marine protected species which in turn, is potentially impacting on the overall health of the Archipelago's marine ecosystems. In the case of trade, consumer demand from local tourist markets as well as international markets were found to be contributing drivers to the harvest. Among the prioritised groups, sea cucumbers (in the dried state) were found to be the most commonly exported marine product, while the meat of sharks, rays and skates dominated local markets. Shark fins were also exported to the Middle East and East Asia.

The study found that limited capacity among local law enforcement agencies and legislative limitations are contributing to significant challenges in countering illegal and unsustainable fishing practices, and the smuggling of marine products.

Overall, enhancing institutional capacities, strengthening monitoring and surveillance systems, human resources, and infrastructure, and increasing awareness of actors along the fishery value chain are essential in ensuring the trade and consumption of fisheries resources is legal and sustainable. Involvement of the judiciary and prosecutors in awareness activities will also be essential to strengthen treatment of fisheries crimes.

An outside view of Malindi landing site where hundreds of fishers land their overnight catch every day. Photo: M. Cornthwaite / TRAFFIC

1. INTRODUCTION TO FISHERIES, WILDLIFE TRADE AND REGULATIONS IN THE ZANZIBAR ARCHIPELAGO

1.1 FISHERIES

For generations, people of the Zanzibar Archipelago have relied on the sea for food and transport. It is estimated that the entire value chain of the fisheries sector supports about 20% of Zanzibar's population (Feidi, 2005) and generates approximately USD50 million from tourism and local consumption (Anon, 2020). Nearly 98% of Zanzibar's international trade by volume is from marine services, contributing to 29% of Zanzibar's Gross Domestic Product (GDP) and providing employment to approximately one-third of the population (ZIPA, 2014).

Artisanal fisheries remain one of the main economic pillars for the local communities of the Archipelago which covers Unguja (known also as Zanzibar) and Pemba Islands. It contributes to at least 95% of the marine catch and is the principal income-generating activity for many coastal households (Marine Fisheries Frame Survey report, 2016).

Fish is the principal source of animal protein among the local population. The total fish production is around 34,000 tonnes per year, with an annual per capita consumption of roughly 22 kg per person

(Tanguy, 2018). Fish provides livelihood and food security to about 190,204 people (approximately 35% of the total population) living along Pemba's coasts (of whom 45% are classified as poor and over 80% are fishers) (Tanguy, 2018).

In addition to generating income for communities through fishing activities, the abundant coral reefs and diverse species of marine life, including dolphins and sea turtles, help to attract over 500,000 foreign tourists who visit the Archipelago annually (Temple et al., 2017)—a growing primary market for various services provided by Zanzibar's rich and diverse marine ecosystems. For over a decade, the Archipelago's economy has been dominated by the tourism sector, and its strategic location provides it with unique advantages in harnessing marine-based economies. The most recent statistics shows tourism accounting for 80% of annual foreign exchange earnings (OCGS, 2023).

National population growth and demand for seafood has increased harvesting pressure and catch sizes have deteriorated (Colbert-Sangree, 2012). Fishing within the territorial waters (12 nautical miles) is mainly preserved for local consumption (Faum, Ministry of Blue Economy pers comm. to Q. Kagembe, February 2023); however, as tourist hotels and restaurants increase, coupled with impacts on marine life from liquid waste and coral harvesting for construction material (World Bank, 2019), increasingly little is being left for the local communities. Fishers have ventured into using prohibited fishing methods and tools to meet this increased demand.

Using traditional fishing methods, the artisanal fishery sector in the Archipelago uses canoes, dhows, and small boats powered by either sails or outboard motors. Various pelagic and demersal fish species, such as parrotfish, mullet, emperors, groupers, and snappers, are caught using traps, nets, and lines (Schaeffer et al., 2004). Small pelagic fish such as sardines, mackerel, and anchovies are caught with purse seine nets and scoop nets, while large pelagic fish such as kingfish, sailfish, marlin, shark, and ray are caught using lines, drift, and bottom set gillnets (De la Torre-Castro, 2006).

1.2. ILLEGAL FISHING PRACTICES

One of the biggest challenges affecting marine ecosystems of the Archipelago is illegal fishing, involving fishing without permits and in prohibited areas, as well as the use of unlawful methods such as illegal nets, traps, spear guns, chemicals such as cyanide, and dynamite (Wright et al., 2023). These activities not only impact fish stocks, but also threaten other marine life around the islands. For example, the use of dynamite and dragging of seine nets have led to the destruction of the coral of Misali Island and nearby areas, leading to the decline in at least 30% of the coral reefs (O. Faum, Ministry of Blue Economy pers comm. to Q. Kagembe, February 2022). Due to government enforcement efforts, dynamite or blast fishing, which was prevalent along Tanzania's coastline, dropped substantially between 2016 and 2018 (Braulik et al., 2020). However, according to Omar Faum, in the past five years, a resumption in blast fishing appears to be occurring (O. Faum, Ministry of Blue Economy pers. Comm. to Q. Kagembe, February, 2022).

According to the Zanzibar Fisheries Act, 2010, illegal fishing can result in three to six years imprisonment and a fine of up to TZS11,273,580 (USD4500 at 2023 rates). Despite government efforts to reduce illegal and unsustainable fishing practices by increasing law enforcement efforts, raising awareness among fisher communities, and improving the management and monitoring capacity/capabilities, such as the use of mobile phones in providing information on illegal fishing attempts, a lack of cooperation by the fishing communities has meant these illegal activities have persisted (DFD, 2018).

A fisher stands by illegal nettings, baskets, and fish traps. Photo: M. Cornthwaite / TRAFFIC

1.3 TRADE AND CONSUMPTION OF WILDLIFE PRODUCTS

Illegal trade in wildlife products in the Zanzibar Archipelago goes back to at least the 1600s when Unguja was recognised as the centre of the ivory trade, contributing an estimated 75% of the entire supply of ivory globally until the mid-20th century (Nelson, 2020). In addition to being a transit for ivory, it facilitated the illegal trade in other wildlife products, such as rhino horn, ambergris (from Sperm whales), big cat skins (Martin and Martin, 1978), reptiles (especially tortoise shell (Muir, 2005)), sea cucumbers (Nelson, 2020), and timber. The illegal trade is believed to have recently increased when mainland Tanzania implemented a ban on live animal exports in 2016 (Outhwaite *et al*., 2021) with traders responding by expanding their operations to the Archipelago.

Overall, demand for marine species by consumer countries in Asia, Europe, and the Middle East are key drivers for illegal and unsustainable fishing and trade of the Archipelago's marine protected species (Jiao *et al*., 2021). The usage depends on the marine species involved; for example, seahorses are often traded as dried (wild) specimens for traditional Chinese medicine (TCM) and curio trade with a much smaller trade in live (wild and captive bred) seahorses for aquariums display (Boehm *et al*., 2023). Other species groups, such as sharks, are seen as a delicacy in countries like China, and consumption has historically been linked with status and wealth (Yvonne *et al.,* 2018*).*

1.4 REGULATORY TOOLS

The Implementation of CITES Regulations, 2019: In the Zanzibar Archipelago, these regulations are enforced by the CITES desk, situated at the Department of Forest (DF) since 2019. Under the Constitution of the United Republic of Tanzania of 1977 as amended from time to time, natural resources are non-union matters, requiring individual legislative frameworks that guide the management of these resources, including wild animals and marine resources between the two sides of the union. Despite the establishment of the Zanzibar CITES desk through the Government Notice (GN) Number 6751 of 12th April 2019 and gazettement of Scientific Authority (ZAFIRI) in 2023, it was not officially recognised by the CITES Secretariat in Geneva as it has not been designated by Tanzania as a designated Management or Scientific Authority[1]. As a result, it plays a supporting role

[1] National authorities | CITES

in CITES implementation only and does not have any permitting authority, with permitting processes being handled by the CITES offices on Tanzania's mainland.

The Fisheries Act, 2010: The parliamentary Act was introduced in 2010 to repeal the Fisheries Act, 1988 and enact better provisions related to the management and development of fisheries in the internal and territorial waters of Zanzibar and matters connected in addition to that and supplementary to it. However, this Act does not provide for a national action plan for sustainable fishing practices of endangered or threatened species or which have national and/or international protection concerns, thus ensuring the conservation of the species.

The Fisheries Regulation, 1993: Despite repealing the Fisheries Act of 1988, which informs the establishment of the Fisheries Regulation, 1993, these regulations are still implemented and enforced. However, these regulations do not contain clear provisions on catch and trade of endangered species.

The Deep-Sea Fisheries Management and Development Regulations, 2021: These regulations were introduced in 2021, and include provisions for (i) sustainable fisheries management and conservation (by stating the general principles to be met, such as the principle of ecosystem integrity, the principle of international and regional cooperation in the management of fishery resources), (ii) conservation and management measures to be met by any fishing vessel and (iii) measures for the conservation of some species of sharks, whales, marine turtles, and incidental bycatch of seabirds.

The regulations explicitly address the conservation of protected and threatened marine species. However, they are only enforced beyond the territorial waters of Zanzibar. They guide the actions of the Deep-Sea Fishing Authority (DSFA), which both mainland Tanzania and the Revolutionary Government of Zanzibar manage. The territorial waters, however, remain vulnerable to unsustainable utilisation due to insufficient legislative requirements.

The Blue Economy Policy 2021: The policy aims to promote economic growth, social inclusion, and improvement of the people's livelihoods of Zanzibar while preserving and ensuring the sustainability of the ocean's biodiversity and coastal areas. It attracts investment opportunities for fisheries, tourism, and recreational services, together with other sea-based activities such as offshore renewable energy, aquaculture, and seabed extractive activities.

1.5 MANAGEMENT FRAMEWORK

The Pemba Channel Conservation Area (PECCA) declaration is provided for under section 7(1) of the Fisheries Act No. 8 of 1988. As of the 23rd of September 2005, the marine waters of the Pemba Channel became part of PECCA. The Marine Protected Area (MPA) proclamation was part of an initiative to counter the rising degradation threats and promote sustainable use of marine resources in Pemba.

PECCA has been administered and managed by the Department of Marine Conservation within the Ministry of Blue Economy. However daily surveillance of the Marine Conservation Area (MCA) is conducted by the Marine Conservation Unit (MCU) which is under the Department of Fisheries Development (DFD).

On Pemba as a whole, 72 Shehia Fisheries Committees (SFCs), village-based bodies responsible for local decision-making for fishery management, operate at various levels of effectiveness to achieve local management and monitoring, control, and surveillance (MCS) of fishing activity. Within PECCA itself, there are around 33 SFCs. The DFD and SFCs also draw on enforcement support from the anti-

smuggling unit known as Kikosi Maalum cha Kuzuia Magendo (KMKM) and Tanzania Police, when necessary, given their power of arrest and use of firearms; however, no formal inter-institutional agreements exist among the three agencies (Marine Fisheries Frame Survey report, 2016).

The DFD regulations instruct SFCs to manage fishery activities in PECCA. In addition, the committees possess the authority to generate by-laws, with the approval of DFD, to control the fishing activity within their area of responsibility. These areas are usually in nearshore or tidal zones and are of a range of sizes depending on the Shehia involved. According to the Marine Fisheries Framework Survey (2016) they were established to ensure that fishermen are using legal fishing gear, to resolve minor conflicts that arise in fishing areas, and to ensure that fishermen only catch large and permitted marine species.

2. STUDY METHODS

2.1 OBJECTIVES

This rapid assessment aims to increase understanding of marine trade dynamics in PECCA, thereby contributing to the government's policy frameworks concerning biodiversity conservation, natural resource management, sustainable tourism and reducing wildlife crime.

Specifically, the study objectives are:

1. Identify protected marine species in trade within or sourced from PECCA including identifying and mapping the fishery supply chain for illegal marine products, including source areas, transit, destination, and overall trade routes.
2. Assess the coverage of the area's legal framework and law enforcement activities involving a review of the legal and institutional framework to determine ways of strengthening institutional capacity and legal and regulatory tools and identifying loopholes in enforcing laws and gaps along the fishery value chain.
3. Assess the understanding and involvement of the fishery communities in the use and conservation of marine resources in PECCA.

The collected information may be used to improve policies and management strategies to fight illegal fishing and trafficking of protected marine fauna, and for long-term capacity building among government and private stakeholders.

2.2 STUDY AREA

The Zanzibar Archipelago is made up of Unguja and Pemba islands. Situated slightly north of Dar es Salaam, about 40 km off the Tanzanian coast, the Archipelago has a total area of about 2,643 km2, with Unguja covering 1,658 km2, and Pemba about 985 km2.

2.2.1 GENERAL STUDY AREA

Pemba, known as the 'Green Island', lies just 50 km off the Tanzania coast. Unlike its neighbour Unguja, which lies 35 km off the coast of mainland Tanzania, Pemba is thought to have been isolated from the continent by a deep channel for several million years and is classified as a true oceanic island (Archer and Turner, 1993). The Marine Protected Area (MPA) was established in 2005 and covers an area of 825.8 km2 in a 3.22 km wide band stretching across the western coast of Pemba Island from north to south parallel to the Pemba Channel.

The area of PECCA which lies between Unguja and the coast of mainland Tanzania, was established in 2006. The Marine Conservation Area (MCA) covers the entire west coast of Pemba and is home to some of the most diverse coral reefs of East Africa. In addition to the high level of biodiversity, several species listed by IUCN as endangered or critically endangered were or are still found in the area, such as the five species of sea turtles, mainly Green *Chelonia mydas*, Hawksbill *Eretmochelys imbricata*, and Loggerhead *Caretta caretta*, and occasionally, the Leatherback *Dermochelys coriacea* and Olive *Ridley Lepidochelys* olivacea which formerly nested near Tanga (Muir, 2005), Indian Ocean Humpback dolphin *Sousa plumbea*, Humphead Wrasse *Cheilinus undulatus*, Humphead Parrotfish *Bolbometopon muricatum*, and Blacktip Reef Sharks *Carcharhinus melanopterus* (PECCA Assessment and Marine Compliance Report 2019). There were around 18,047 fishers in Pemba in 2021, of which 63% (11,328) operated within PECCA. The channel is one of the largest protected areas in the region.

2.2.2 SPECIFIC STUDY AREA

As agreed during the consultation visits with directors of relevant departments in Unguja together with insights gathered from the literature review, the study focused on Mkoani, Chake Chake and Wete, three districts in Pemba that form part of PECCA. However, because of the nature of trade, the assessment also involved other areas connected to Pemba, namely the coastal cities of Tanga and Dar es Salaam on Tanzania's mainland, and Unguja. Information collected in these areas was used mainly to supplement the data collected from sampling points in Pemba.

2.3 SPECIES GROUPS

An illegally-harvested live wild Sea cucumber *Holothuria scabra*. Photo: M. Cornthwaite / TRAFFIC

Based on the information collected during consultation with expert stakeholders, including with Fisheries Officers and CITES focal points, and review of relevant literature, including CITES listings (CITES, 2023), the IUCN Red List of Threatened Species (IUCN 2023), and national legislation, the following four species groups were prioritised for the assessment: Chelonids (sea turtles); Elasmobranchs (sharks, rays); Holothurians (sea cucumbers); and Syngnathids (seahorses and pipefishes). Animals found during the assessment were grouped by these taxonomic classifications.

However, the contribution of the four groups to the overall commercial catch in Zanzibar is minor. With the exception of sea turtles, fishing of the three groups (sharks and rays, sea horses and sea cucumbers) is not regulated by formal legislation. However, the government of Zanzibar has placed restrictive controls on the fishing of these marine products, including banning shark finning and wild collection of sea cucumbers, thereby significantly reducing commercial fishing of these products.

Despite the minimal contribution of the four groups to the total commercial fish catch, understanding the dynamics of harvest and consumption was important because of the role they play in preserving marine environments, including maintaining food chains and ensuring species diversity, while others are considered indicators of ecosystem health.

The research focused on understanding fishery dynamics of these four groups relative to each other by comparing aspects each species group's trade and market dynamics, regulatory frameworks and fishers' experience of the harvest and consumption.

2.4 SCOPING STUDY (STAKEHOLDER CONSULTATION)

Before the field surveys commenced, TRAFFIC staff travelled to the Tanga region, Unguja, and Pemba between 13-18 March 2022 to meet with government and private stakeholders relevant to the assessment. The objectives of this travel were to introduce the project and establish partnerships with government and non-government stakeholders in the study area, undertake a stakeholder analysis and mapping, and understand the logistics and infrastructure in the hotspots where physical surveys were to be conducted.

2.5 DATA COLLECTION AND ANALYSIS

2.5.1 LITERATURE REVIEW

The assessment included desk-based research reviewing legislative documents, policy and strategy papers, management and action plans and essays, peer-reviewed articles, and books to gather evidence of the population trends and local consumption patterns of marine protected species in the Zanzibar Archipelago and the coastal towns of northern Tanzania.

The analysis focused on a general trade and consumption assessment for all fisheries activities (small-scale and deep-sea) conducted in PECCA and its surroundings (Pemba, Unguja, and Tanga) using existing published literature and available secondary data from open public databases. In this analysis, all products described as protected species included those listed in the CITES Appendices, The IUCN Red List of Threatened Species, or protected under national regulations. The research involved analysing and filtering articles using Google Scholar and downloading trade data from UN-Comtrade.

All USD currency exchange rates were obtained in 2023 using Oanda.com.

2.5.2 PRIMARY DATA COLLECTION

The assessment involved a quantitative study design complimented with qualitative approaches to obtaining knowledge, opinions, and experiences on study subjects. A team of four trained enumerators was divided into two groups distributed throughout the study area. The first team was stationed in Tanga, and the second team in Unguja and Pemba. Both teams participated in data collection for one month and then transferred the data into Microsoft Excel for further analysis.

Interviews with fishers and traders

A life-long artisanal fisher speaks to TRAFFIC staff of evolving trade dynamics and supply challenges. Photo: M. Cornthwaite / TRAFFIC

The research teams used semi-structured questionnaires to gather information from fishers, intermediaries, and traders. This method was used because of the diverse knowledge and experience among fisher and trader groups in the archipelago, while allowing flexibility and modification of questions upon unanticipated insights.

Face-to-face semi-structured questionnaires were administered to 120 fishers and 50 traders. Each questionnaire was completed in-person with fishermen at selected landing sites. Landing sites were visited early in the morning when the majority of fishers return to the shores. However, interviews were conducted between 11:00 and 16:00 hours. At this time, most of the fishers are either resting or preparing fishing gear before returning to the sea. An average of 45 minutes was used for each session. Based on their experience, respondents were asked to compare four protected marine groups (sharks and rays; seahorses, sea cucumbers and sea turtles) using aspects of the trade and market dynamics, harvest and local consumption, and regulatory frameworks. Illustration cards and identification guides were used to ensure proper species identification.

The questionnaires used during the study included sections on population socio-demographic characteristics, patterns and trends of trade, patterns and trends of consumption, trade routes, attitudes and perceptions, law enforcement, and legal frameworks. Data collection took place over one month, from the 14th of August to the 14th of September 2022. Prior informed consent was obtained from each participant after reading a statement about the purpose of the research, the content of the survey, any risks or benefits, and the time commitment. Participants were assured that their participation was voluntary and could be withdrawn at any point.

Interviews with law enforcement and other non-government stakeholders

Law enforcement officials were interviewed to gather insights into the challenges and successes of managing and enforcing artisanal fisheries regulations and the effectiveness of these policies, identify any gaps in implementation, and explore potential areas for improvement. Interviews

focused on trade trends, illicit trade, fishery regulatory framework and its implementation, challenges and mitigation measures.

A total of 12 key informant interviews were carried out, comprising a fisheries officer from each of the three districts in Pemba (Chake Chake, Wete, and Mkoani) and two districts in Tanga region (Pangani and Tanga), coastal security including police and KMKM (anti-smuggling unit). Researchers also conducted interviews with the two CITES focal points based in Unguja stationed at the Department of Forest (DF) and Zanzibar Fisheries Research Institute (ZAFIRI) which represent the CITES managing Authority and Scientific Authorities respectively.

Two in-depth interviews were also conducted with representatives from the Wildlife Conservation Society (WCS), and a Civil Society Organisation operating in the study site (MWAMBAO Coastal Community Network).

Participants were selected based on their knowledge, roles in the fisheries value chain, and willingness and ability to provide helpful information. An interview guide was also used to prompt discussion and direct the interview.

Market observations

Aside from interviews with traders, enumerators also surveyed marine products displayed for sale at a fish market, where interviews with traders were conducted. This was done with the help of market leaders, who identified traders dealing with any of the four targeted species groups. No structured methodology was used to capture market survey data; however, if a product fell within the four groups, the research team would approach the trader and have an in-depth interview with them about the displayed product including knowledge on prices and market demand, and conservation status. Researchers would also take a photo of the particular product.

2.5.3. DATA ANALYSIS

For the qualitative data, a content analysis was undertaken for the informant interviews, whereby the recorded opinions were coded, interpreted, and cross-referenced with the results from the quantitative analysis. Data collected from questionnaires was cleaned and transferred into Microsoft Excel for further analysis.

2.5.4 VALIDATION OF RESULTS

A validation meeting took place in Unguja on the 14th of February 2023, bringing together 27 representatives from relevant government agencies such as the Ministry of Blue Economy and Fisheries-Pemba Office, Department of Fisheries Development, Department of Marine Conservation, Department of Forest and Non-renewable Resources, Zanzibar Fisheries Research Institute, Zanzibar's CITES desk, partner organisations and relevant private stakeholders of the fishery supply chain (see Annex 7.2). In addition to validating the assessment results, the event also offered an opportunity for the participants to:

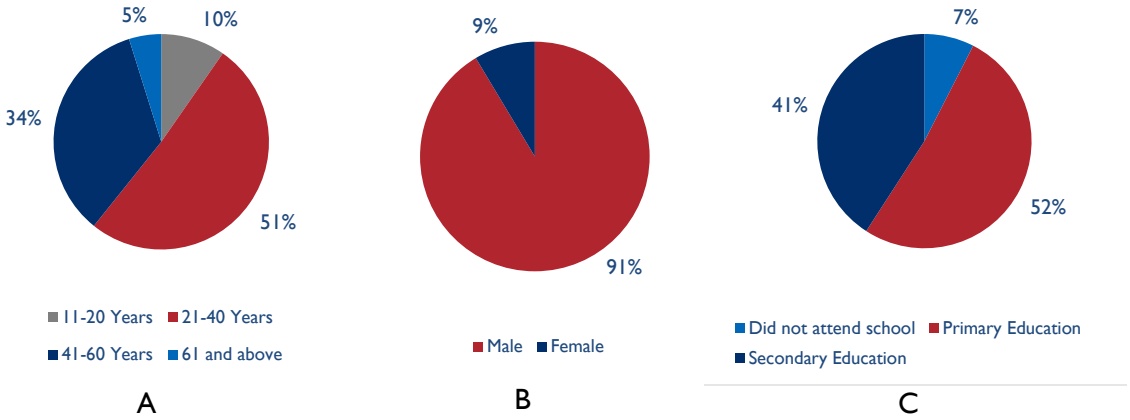
1. Understand the risks and impacts to the country and fishery industry caused by illegal and/or unsustainable harvest and trade of marine protected species;
2. Assess current efforts, critical gaps, and opportunities in the fishery value chain management systems; and,
3. Identify practical solutions and supporting mechanisms to tackle illegal and unsustainable harvesting of marine protected fauna effectively.

3. RESULTS

3.1. DEMOGRAPHICS

Of the 300 individuals approached for an interview, over half (n=186) were willing to be interviewed. Fifty-one per cent (51%) of these interviewees were aged between 21 - 40 years, followed by individuals aged between 41 - 60 years (34%). Individuals aged between 11 - 20 and 61 and above, comprised the smallest interviewee groups, at 10% and 5%, respectively (Fig. 1 a). The majority of interviewees were males (91%) compared with females (9%) (Fig 1 b). None of the respondents had tertiary education, with the majority attaining either secondary education (52%) or primary education (41%); very few respondents had never gone to school (7%) (Fig. 1 c).

Figure 1. Respondent profile, a: Age group b: Gender c: Level of education

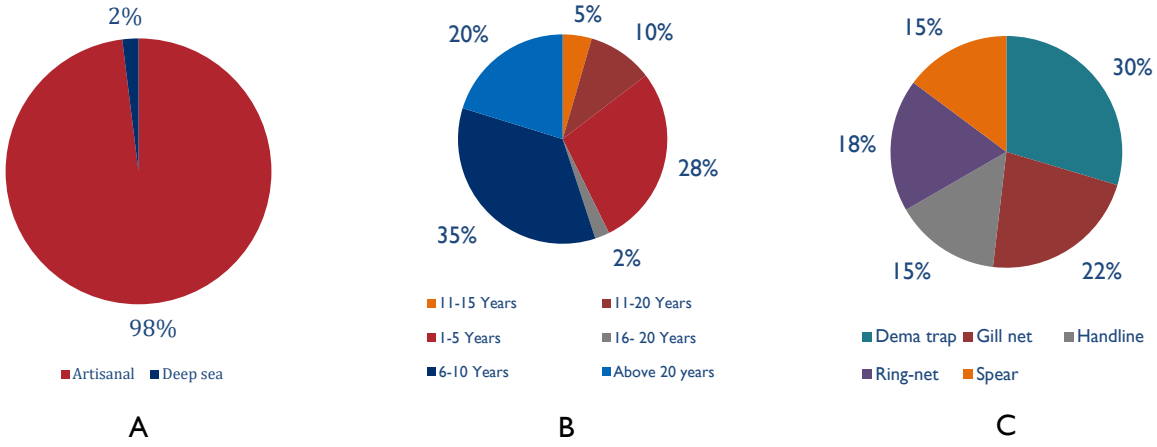


3.2. OVERVIEW OF FISHERY ACTIVITIES IN THE STUDY SITE PEMBA

The results showed that the most significant part of the fishery supply chain in Pemba is composed of artisanal fishers (98%) (Fig 2 a) with only 2% involved with deep-sea fishing. Results from interviews with fishers highlighted that, most of them use vessels ranging in length between 3m to 8m, exploiting waters greater than a depth of 20m. Most fishers were also reported using traditional fishing practices and local fishing gear. The majority (30%) operated dema traps, followed by gill nets (22%) and ring nets (18%), while 15% used handlines and 15% used spears (Fig 2 b). Although these were the commonly used fishing gear, interviews with law enforcement revealed that, a small number of fishers use dragnets. The researchers concluded that, fishers were reluctant to mention this gear because they are prohibited from use.

It should be noted that the research team had challenges meeting with deep sea fishers because they do not have specific landing sites and are not registered as fishers in a particular landing site or Shehia. Unlike artisanal fishing, which mainly involves fishing for species such as sea cucumbers, pipefishes, seahorses, and sea turtles, the deep-sea fishers target larger species such as sharks, especially for their fins.

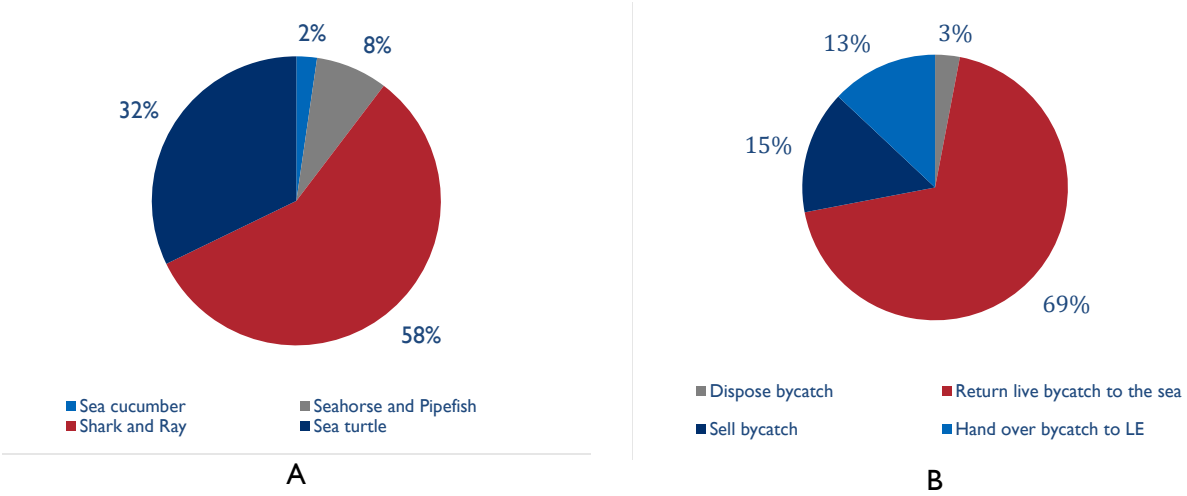
Figure 2. a: Fisher category b: Duration of fishing c: Gear used for fishing.



For incidental fished products (i.e. bycatch), fishers reported that the majority of protected species comprised sharks and rays (58%), followed by sea turtles (32%), seahorses and pipefishes (8%), and lastly, sea cucumbers (2%) (Fig. 3 a).

When fishers were asked what they do with protected species in bycatch, 69% of respondents reported that they are returned to the sea, 15% said they sell the bycatch upon returning to the landing sites, 13% stated that they hand the products over to law enforcement officers, and the remaining 3% reported that depending on the species, it was consumed (Fig 3 b). Fishers mentioned that bycatch involving sharks, rays and sea turtles fetch high prices and as such were sold. Cetaceans caught as bycatch are often returned to the ocean.

Figure 3 a: Composition of reported protected marine species commonly fished b: Composition of reported ways of handling bycatch involving marine protected species.



3.3. PATTERNS OF HARVEST AND CONSUMPTION

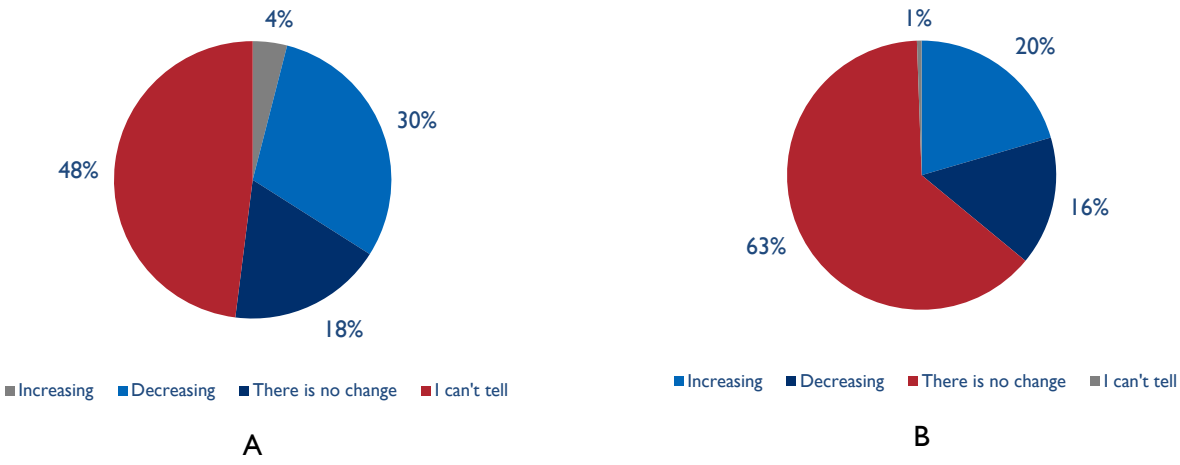
Due to limited information on landing data, the perception of fishers was used to assess the change in fish harvests, for example, rating the shift in catch over the past ten years. Almost half of those interviewed (48%) responded that they could not tell whether there was any change, whereas 30% acknowledged that there had been a decline in the catch size, 18% observed no difference, and 4% reported that catches had increased (Fig 4 a).

With respect to protected marine species, such as sharks and rays, 63% of the fishers reported that populations were decreasing, 20% could not rate the change, 16% reported that populations were constant, while 1% reported that populations were increasing (Fig 4 b).

Below are the reasons provided by respondents for declining catches:

- Overfishing;
- Use of illegal fishing methods;
- Climate change;
- Increase in number of fishing vessels; and
- Increase in the number of fishermen.

Figure 4 a. Composition of fisher's responses with respect to the question "How do you compare the quantity of your current catch over the last ten years?" b: Composition of fisher's responses with respect to the question "How do you compare the quantity of your current catch over the last five years?".

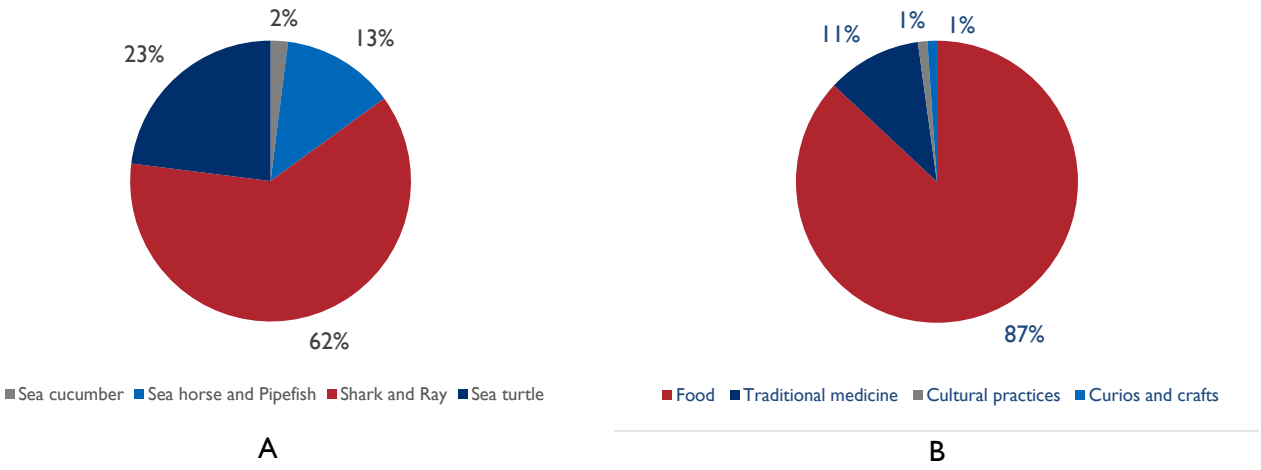


Interviews revealed that a significant percentage of the overall (all species) total catch is locally consumed in Pemba, while the larger species of fish, such as tuna and snapper, as well as molluscs (i.e. octopus and squid) and crustaceans (i.e. lobster, crab, and prawn), are often transported to Unguja, Dar es Salaam and Mombasa for sale to the hotels. However, responses of 120 fishers and 40 traders, revealed that the minimal volume of the four protected species groups fished is often exported to regional and international markets, and very little is consumed locally.

When respondents were asked which of the four protected species groups was the most commonly consumed locally, the majority of them (62%) stated sharks and rays as the most consumed group,

followed by sea turtles (23%), with the remaining 15% comprising sea cucumbers (2%) and seahorses and pipefishes (13%) (Fig 5 a). Responses from interviews with fishers revealed that, majority of these species are used for food (87%), with 11% as ingredients in traditional medicine (Fig 5 b).

Figure 5 a: Common marine protected fauna locally consumed in the study site (Pemba); b: Reported use types for marine protected species.



Sharks and Rays

A Stingray is landed and prepared for sale at a fish market in Zanzibar. Photo: M. Cornthwaite / TRAFFIC

Fishers were interviewed to investigate the nature of exploitation, temporal and known changes in populations of sharks and rays, and how the shark fin and meat trade influence current fishing practices. The most common shark commodity consumed locally is the flesh/meat. However, there were minimal differences in preference for different elasmobranch species and species were traded

equally regardless of their protection status. The researchers did not observe local consumption of fins. Given their commercially high value, and demand from East Asia, it was assumed that shark fins were for export.

Sea turtles

Less than one half of the fishers (45) and traders (13) interviewed were willing to respond to questions involving sea turtles. While discussions with fisheries officers indicated that the government has undertaken several initiatives to protect marine turtles, including raising awareness among the fishing communities in Pemba, fishers and law enforcement officials acknowledged that there has been an increasing demand for and capture of sea turtles for local consumption.

Information gathered through in-depth interviews with fisheries officials revealed that the hunting and capturing of sea turtles occurs either in the ocean or as they move to nesting sites on land. In some areas, such as Misali Island, fisheries officers reported that coastal inhabitants were observed collecting eggs from turtle nests. Targeting sea turtles was apparently not recorded in the past with fishermen stating that when sea turtles were caught, they were often returned to the ocean .

The interview results also indicated that a key driver in the capture of sea turtles for meat is the taste. Fishers interviewed reported that hunting may be conducted upon request from clients not in Pemba, including Unguja's tourist hotels.

Overall, the study found that the consumption and trade of turtle meat are clandestine in nature and conducted within closed networks.

Seahorses and pipefishes

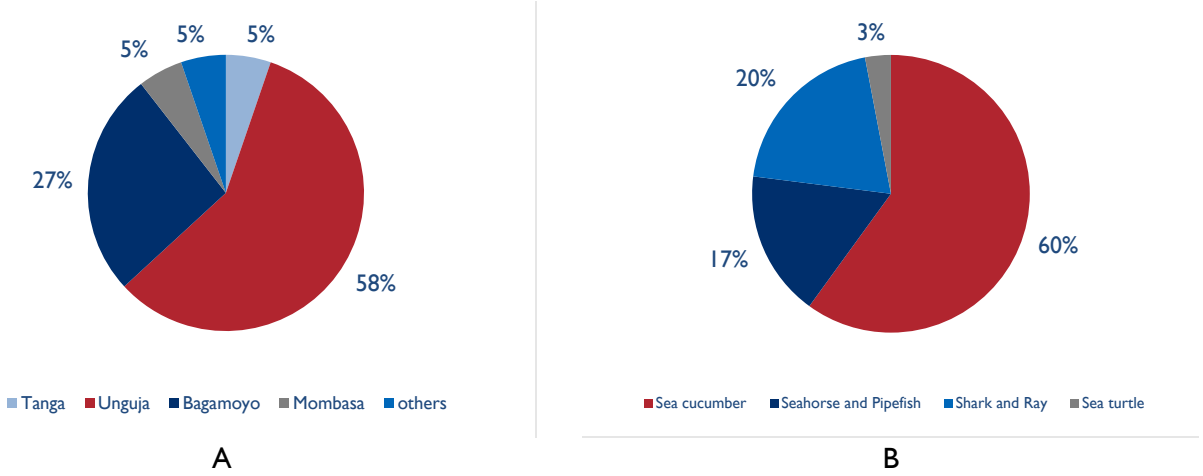
Of the 120 fishers only 30 fishers were willing to respond to questions involving seahorses and pipefishes. Most of these fishers (75%) acknowledged unprecedented demand and increased consumption among local communities. While there was limited consumption of these species in the past, the fishers highlighted that increased consumption has been due to a belief that they can cure impotence and asthma. Traders believe the presence of Asian communities near coastal towns and villages, and practice of traditional Chinese medicine (TCM) that utilises seahorses, has contributed to this belief.

3.4 PATTERNS OF TRADE

Traders were asked which were the most common export destinations. Respondents reported that marine products are being exported mainly to Unguja (58% of respondents), followed by Tanga (27%), with a lower percentage (5%) reporting Bagamoyo and Mombasa each (Fig 6 a). Most respondents also reported that sea cucumbers are the main marine protected species exported internationally (60% of respondents), followed by sharks and rays (20%), seahorses and pipefishes (17%), and sea turtles (3%) (Fig 6 b).

Information gathered through in-depth interviews with traders and fisheries officers revealed that, illegal trade exists, however depending on the protection status of the marine product involved, trade is often done behind closed doors, and products are not openly on display. Moreover, collected responses highlight that most fishers and traders are aware of the regulatory framework that prohibits the fishing and trade of certain marine species.

Figure 6: a: Reported market destinations (coastal towns in East Africa) for marine products. b. Commonly traded (exported) marine protected species; b: Protected marine products commonly exported internationally from Zanzibar Archipelago



Sea cucumbers

While this study focused on wild caught species, both farmed and wild-collected sea cucumbers are traded in the Zanzibar Archipelago. Overall, only 12% of the fishers had previously been involved with sea cucumber collection, being an activity undertaken mainly by women and children. Overall, fishers acknowledged that there has been an exponential decrease in the quantity of wild-collected sea cucumbers.

The initial literature review plus interviews conducted with fishers revealed that local collectors spend five to six hours daily collecting up to 2 kg of sea cucumbers. In most cases, catch is displayed at the landing sites, where agents (intermediaries) make their purchases for processing before being exported. Traders reported that on average, at the landing sites, the price of fresh products range between TZS60,000 (USD25) and TZS250,000 (USD104) per kg, depending on the species (See Table 1). CITES Appendix II listed sea cucumber species were said to fetch higher prices than non-listed species.

Through a survey of landing sites and fish markets, the study team learned that sea cucumbers are primarily exported in a dried state, with the majority destined for China. Other countries include Viet Nam and Malaysia. Sea cucumbers were also exported to Uganda. According to interviewees, the number of sea cucumber dealers in the study area has increased due to a ban on exports from Tanzania mainland and Kenya.

Table 1. Species observed on sale at the landing sites and fish markets during the data collection period (August 2022 – September 2022).

Species name	Common name	Commodity types/state	Reported price in TZS (per individual/piece/kg)	Reported market	Protection status in Zanzibar	CITES Appendix	IUCN category
Holothuria scabra	Sandfish	Both fresh and dried	TZS60,000 (USD25) – TZS100,000 (USD41.7) per kg	International	Trade is allowed for farmed products	NA	NA
Holothuria fuscogilva	White Teatfish	Both fresh and Dried	Up to TZS160,000 (USD67) – TZS250,000 (USD104) per kg	International	International trade is banned	II	NA
Holothuria nobilis	Black Teatfish	Both fresh and Dried	Up to TZS160,000 (US 67) - TZS250,000 (USD104) per kg	International	International trade is banned	II	NA
Actinopyga lecanora	Stonefish	Both fresh and Dried	TZS60,000 (USD25) – TZS100,000 (USD41.7) per kg	International	International trade is banned	NA	NA

CASE STUDY – ANALYSIS OF TRADE DATA FROM UN-COMTRADE

Using the UN-Comtrade database, a comparative analysis of imports and exports for sea cucumbers from Tanzania was conducted to potentially inform trade dynamics of the study site. The data included trade volumes and flows for the period 2012 – 2021.

UN-COMTRADE DATABASE

The Harmonized System (HS) is administered by the World Customs Organization (WCO) and used globally to standardise the representation of commodities in trade using HS codes. The codes are harmonised internationally using a six-digit configuration (HS-6 level). For this analysis, Zanzibar (Unguja and Pemba islands) was represented by the United Republic of Tanzania, as the former is not in the database. Only two protected marine products (sea cucumbers, sharks and rays) were reported in the database as exported or imported from Tanzania. However, the analysis concentrated on sea cucumbers with the following HS codes (see Table 2).

Table 2. HS commodity codes are used for filtering data in the UN-Comtrade database.

030812	Aquatic invertebrates: sea cucumbers (*Stichopus japonicus, Holothuroidea*, frozen
030819	Aquatic invertebrates: sea cucumbers *(Stichopus japonicus, Holothuroidea*, dried, salted or in brine, smoked, whether or not cooked before or during the smoking process
030811	Aquatic invertebrates: sea cucumbers *(Stichopus japonicus, Holothuroidea*, live, fresh, or chilled

UN Comtrade data were downloaded according to the criteria below:

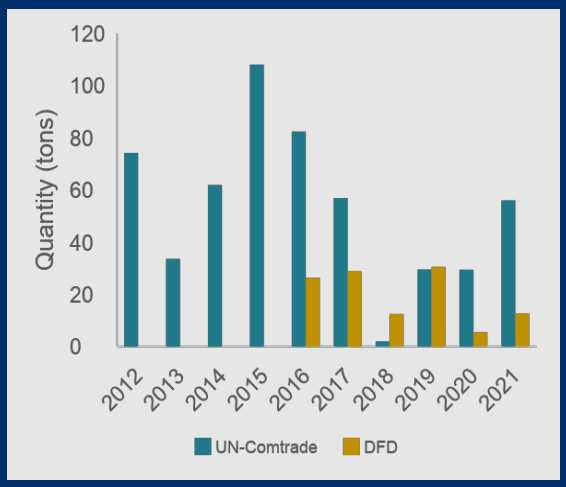
- Timeframe: year 2012 - 2021
- Reporter: Tanzania
- Trading partner: All
- Trade flow: Exports
- Frequency: Annual
- HS codes: As reported

Export data downloaded from Comtrade include both exports and re-exports. Records were analysed using the mass of commodities in trade in kilograms reported by countries which was reported for all commodities imported. Trade reported to partner 'world' were removed from analyses to remove duplicate values from all importers combined.

ANALYSIS OF RESULTS

The findings showed that Hong Kong Special Administrative Region (SAR) is the largest importer of sea cucumbers from mainland Tanzania, importing approximately 56 million kg over the past 10 years. Hong Kong SAR accounts for 83% of the world's total sea cucumber imports from mainland Tanzania (Figure 7 a), followed by Malaysia (11%), Rwanda (2%), and Sri Lanka (1%). Other sea cucumber importers included Canada, Macao SAR, Indonesia, Malawi, Malaysia, Myanmar, Rwanda, Singapore, South Africa, Sri Lanka, Turkey, Uganda, and the United Arab Emirates, together accounting for 1% of the total imports reported by Asia.

Representing the most significant quantities, Hong Kong SAR imported approximately 534,365 kg of dried sea cucumbers from Tanzania between 2012 and 2021 (Fig 7 b), with the highest amounts between 2012 and 2016. Comparing data from UN-Comtrade with export data from Tanzania's Department of Fisheries Development (DFD) revealed that the amount of sea cucumbers reported by import countries between 2012 and 2016 was three times the amount (130 tons) reported exported by DFD in that same year (Fig 7 a). Moreover, DFD mentioned only Malaysia, Viet Nam and China as having imported sea cucumbers from Zanzibar, while 14 countries and jurisdictions recorded such imports.



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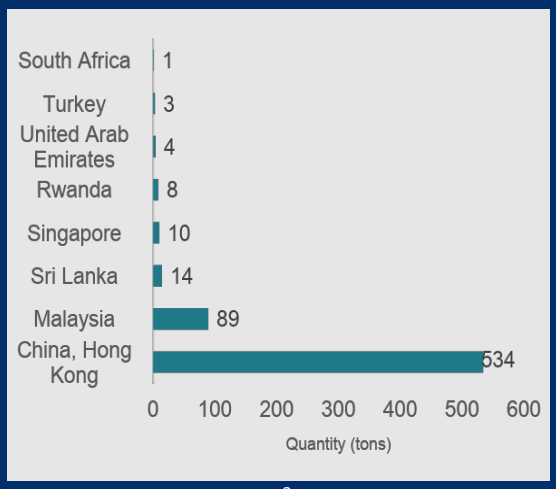


b[2]

Figure 7 a: Quantities (kg) of sea cucumbers per year as reported by import countries between 2012 and 2021. b: Quantities (kg) of sea cucumbers as reported by import countries between 2012 and 2021 showing the importing countries (Source: UN Comtrade, Department of Fisheries Development, 2021)

Sea turtles

Information gathered through market surveys, highlighted that sea turtles, the shell (carapace) was the most common product for sale and accounted for 87% (n= 15) of the total products found. Other turtle products observed in trade were meat, eggs and the body traded as a curio. Interviews with law enforcement officers highlighted that turtle meat, often for home consumption, is considered a delicacy being relatively rare and having a unique taste. Unlike other marine protected species, turtle meat was not openly on display for sale in the landing sites or fish markets. However, through the discussions with law enforcement officials the study team learned that clandestine arrangements could be made to trade meat among people with close relationships. Generally, the price of turtle meat was found to be relatively high compared with beef (average price is TZS8,000 (USD3.3) per 1 kg while the estimated price for turtle is TZS5,000 (USD2) per piece (See Table 3), which is often less than 300 g in weight). It was learned that the cost of meat and rate at which turtles were hunted increased during Muslim festivals.

Information collected from interviews with traders and law enforcement official showed that turtle shell was found to be commonly traded and often offered to foreign tourists visiting Pemba. No

[2] Data from UN-COMTRADE did not include import and export data from Viet Nam

international export or bulk selling of turtle shells was reported. Fishers also acknowledged that, accidental catch of turtles is relatively uncommon (once every three months), while fisheries officers confirming that most of the supply is obtained from targeted hunting. Fisheries officers also stated that the main customers for shells are curio shops. However, interview results showed that, street vendors also target tourists in hotels and restaurants in Unguja. Pricing depends on the season; for example, during the high tourist season, the local market prices for hawksbill turtle shells range between TZS20,000 (USD8.3) and TZS50,000 (USD20.8), with no fixed costs and dealers setting prices based on the availability of customers and size of the shell.

Table 3. Species observed on sale at the landing sites and fish markets during the data collection period (August 2022 – September 2022).

Species name	Common name	Commodity types/state	Reported price in TZS (per individual/piece/kg)	Reported market	Protection status in Zanzibar	CITES Appendix	IUCN category
Chelonia mydas	Green turtle	Meat	TZS15,000 (USD6.25) – TZS20,000 (USD8.3) per kg	Domestic market (household consumption)	National and International trade banned	I	CR
Eretmochelys imbricata	Hawksbill turtle	Shell	TZS50,000 (USD20.8) – TZS100,000 (USD41.7) per shell	Domestic market (tourist hotels and restaurants, curio shops)	National and International trade banned	I	CR

Sharks and rays

A Critically Endangered Bottlenose Wedgefish *Rhynchobatus australiae* is de-finned after sale. Photo: M. Cornthwaite / TRAFFIC

The study team learned of both domestic and international markets for local shark products. While the meat is mainly for domestic consumption, shark fins were primarily exported to markets in Asia and the Middle East. In comparison with the other studied groups (i.e. sea cucumbers, pipefishes and seahorses, and sea turtles) as presented in section 3.3, majority of respondents reported sharks

and rays as the most consumed group, although fishers stated that there is only a small-scale domestic market for shark products in Unguja as they are actually not preferred by the coastal communities in comparison to marine fish species. Fishers reported that to elude the high cost of shark fishing, fishers who target this species group prefer to be generalists, targeting more than one group of marine species. Unlike other fish types, interviews with traders highlighted that, the inexpensive methods of processing and preservation which involve salting and drying, allow shark products to reach markets far beyond the coastal towns. In local markets, the advertised price ranges between TZS1,000 (USD0.4) and TZS3,000 (USD1.25) per piece (approximately 200 g), whereas one kg could range between TZS15,000 (USD6.25) and TZS30,000 (USD12.5) (See Table 4) in the local markets. The research team found that the market price of shark products does not depend on the type of species but rather on the size of a piece and the time the product is in the market.

Through the discussions with fisheries officers and presentations made by representatives from DFD during a meeting to validate the results of this assessment, the team learnt that currently, the government of Zanzibar was not providing licenses for exporting shark fins sourced from its territorial waters . Despite this ban, fishers and fisheries officers acknowledged that the collection of fins is still conducted on different parts of the island. Through the market surveys, the research team also observed that shark fins are dried, consolidated, and sold to dealers (agents) who periodically visit fishing communities and landing sites. As this trade is banned on the island, information about the price, volumes, species, and destinations was not easily obtained.

Noting the above, the assessment did find that shark fins are often destined for international markets. Although the researchers were not able to get information on shark fin exports from DFD, analysis of data from UN-Comtrade indicated that shark and ray commodities from Tanzania are mainly destined for the Middle East (Yemen accounted for 50% of the total imports between 2012 and 2022).

Table 4. Species observed on sale at the landing sites and fish markets during the data collection period (August 2022 – September 2022).

Species name	Common name	Commodity types/state	Reported price in TZS (per individual/piece/kg)	Reported market	Protection status in Zanzibar	CITES Appendix	IUCN category
Galeocerdo cuvier	Tiger shark	Meat and fins	TZS25,000 (USD10.4) per individual (≈40cm)	Fins: International Meat: Domestic market	International trade is banned	NA	NT
Taeniura lemma	Blue-spotted Ribbon tail ray	Meat	TZS15,000 (USD6.25) – TZS20,000 (USD8.3) per individual (≈30cm)	Domestic market	International trade is banned	NA	NT
Acroteriobatus zanzibarensis	Zanzibar guitarfish	Meat and fins	TZS2,000 (USD0.83) – TZS5,000 (USD2.1) per piece	Fins: International Meat: Domestic market	International trade is banned	NA	NT
Carcharhinus longimanus	Oceanic whitetip shark	Meat and fins	TZS25,000 (USD10.4) – TZS30,000 (USD12.5) per individual (≈40cm)	Fins: International Meat: Domestic market	International trade is banned	II	VU

Seahorses and pipefishes

A small number of respondents were knowledgeable and willing to speak about the trade in seahorses and pipefishes. Six traders interviewed suggested that this trade was expanding rapidly and demand for products among coastal communities was increasing. A significant amount of information on sea turtle trade was obtained from interviews with law enforcement officials.

Interviews with traders (intermediaries) highlighted that dried seahorse and pipefish products are purchased from fishers between TZS500 (USD0.2) and TZS1,000 (USD0.4) per individual, while also acknowledging that the price has increased in recent years. For example, in the past, they could buy a 5-litre bucket full for TZS10,000 (USD4) to TZS20,000 (USD8) (containing more than 100 individuals). Traders highlighted that readily available Chinese buyers, such as those residing near landing sites or undertaking construction or other industrial activities, have contributed to the increase in prices. The traders explained that the selling price also largely depends on the customer. For example, seahorses are sold for higher prices to Chinese buyers, with 5-litre buckets selling for between TZS200,000 (USD83) and TZS300,000 (USD125) (see Table 5). Foreign clients often purchase large volumes, which may reach up to 500 seahorses per visit. For local customers, one seahorse can be sold for between TZS2000 (USD0.83) and TZS5000 (USD2), with the overall price not fixed, largely dependent on availability.

Although the study didn't trace the destination of the seahorses and pipefishes purchased by foreign clients, the larger volumes indicated that they were sent to foreign markets and, based on the nationalities of the most frequent buyers, likely to East Asia.

Table 5. Species that were observed on sale at the landing sites and fish markets during the data collection period (August 2022 – September 2022).

Species name	Common name	Commodity types/state	Reported price in TZS (per individual/piece/kg)	Reported market	Protection status in Zanzibar	CITES Appendix	IUCN category
Hippocampus	Seahorse	Dried products	TZS5,000 (USD2) per individual for Tanzanians up to TZS300,000 (USD125) per bucket	Local market and international market (mainly Asia)	National and International trade banned	II	NA
Syngnathinae	Pipefish	Dried products	TZS1,000 (USDO.4) – TZS5,000 (USD2) per Individual	Local and International market (foreign tourists)	National and International trade banned	II	NA

3.5. ANALYSIS OF ILLEGAL TRADE NETWORKS IN PEMBA

This section presents information gathered through literature reviews, in-depth interviews, market surveys and presentations made by fishery supply chain stakeholders during the meeting to validate the results of this study.

Overall, as presented in section 3.4, information gathered through in-depth interviews with traders and fisheries officers revealed that, illegal trade exists. The majority of fishers reported that illicit marine products are often consolidated at residential areas, landing sites, and fish markets before being exported outside Pemba. Apart from sea cucumbers, other products such as seahorses and pipefish were generally not displayed for sale, but instead, collection was often initiated upon requests by clients.

Based on interviews with law enforcement officials, the study team learned that the primary methods for trafficking protected marine products were small fibre boats fitted with motors, dhows, or larger boats travelling between Pemba and adjacent coastal towns (e.g. Unguja, Tanga, Bagamoyo, and Mombasa). From the ocean, smuggled marine products start an overland journey using trucks and buses to reach air or seaports for onward export to foreign markets.

The study observed that the exchange of products may also be conducted at sea to minimise attention from law enforcement. For example, fisheries officers highlighted that sea cucumbers from the Tanzania mainland are often offloaded onto Zanzibar vessels at sea. Consignments are then shipped to Unguja and sometimes mixed with farmed products before being exported to markets in Asia.

Information gathered from literature review and through interviews with law enforcement officials, showed that illegal routes that were used to smuggle contraband between Pemba and other East African coastal towns such as Bagamoyo, Tanga, and Mombasa during the late 18th and early 19th centuries are still being utilised for smuggling products in and out of Pemba.

The study team was informed that some routes also involve northwest Mozambique (NWM); this network operates from NWM using public transport (i.e. cargo trucks, passenger buses) to the Tanzanian coastal towns of Mtwara and Kilwa. In Kilwa, four landing sites (Mapimbi, Kilwa Divine, Somanga, and Mtoni) are used to launch boats with the goods to Zanzibar. The second route (northeastern network) starts from Tanga to Pemba up to Unguja Malindi port. The other route is from Tanga direct to Mkokotoni on Unguja.

Another reported commonly utilised network is the Pemba – Mombasa trade route. Fisheries officers reported that Pemba's marine products to Mombasa include crabs, prawns, lobsters, and anchovies. Most of these products are consumed in Mombasa and Nairobi, while part of the shipment makes its way to international markets outside the region. Other traded marine protected products included seashells (for example, giant clams and queen conch) and stony corals, where more significant amounts are exported to Asian markets through the port of Mombasa.

The study team learned that large volumes of smuggled marine products find their way to international supply chains through Unguja's international airport (Abeid Amani Karume International Airport) and seaport. It was explained that the more significant amounts of products collected in Pemba waters and Tanzania's territorial waters of Tanga and Bagamoyo are smuggled to international markets via the Abeid Aman Karume International Airport and the Port of Zanzibar. For example, smugglers from mainland Tanzania have been reported to channel dried sea cucumbers through Pemba and then to Unguja for international export via the seaport or airport. The findings show that products are mainly channelled through Unguja because of increased enforcement of CITES regulations on mainland Tanzania. The research team also learned that Abeid Amani Karume International Airport has been targeted by smugglers of smaller quantities of marine products, mainly dried shark fins, seahorses, sea cucumbers, and pipefish.

The study team also learned that informal ports and porous borders on the Pemba and Unguja coastlines have facilitated the smuggling of marine products on and off the islands. Moreover, the

team found that these informal ports are used as consolidation points or trade hotspots for many marine products and as “hideouts” for smugglers of marine products and other illicit goods such as drugs and counterfeits. Fisheries officers highlighted that while most of the trade occurs at landing sites and informal ports, with it also occurring at sea, effective law enforcement action is difficult.

3.6. AWARENESS GAPS

This study also investigated the knowledge, perceptions, and attitudes of fishers and traders towards conserving marine protected fauna in the study area. Overall, 63% of fishers reported that fishing in PECCA does not present threats to marine protected species and their habitats. While 98% of fishers agreed that marine protected areas could provide critical environmental services necessary for the well-being of coastal communities, 65% held negative attitudes toward establishing marine protected areas (MPAs), including PECCA.

Almost half (46%) of the fishers interviewed had some knowledge on the trade and fishing restrictions of the study’s target species; however, the level of this knowledge varied per species group. For example, sea turtles were rated the highest (53%) in terms of fisher/traders’ knowledge of regulatory status (fishing and trade), followed by sea cucumbers (42%), seahorses and pipefishes (21%) and sharks and rays (2%).

The majority of fishermen (63%) reported that they do not fish certain marine species because of law enforcement restrictions; in comparison, 37% stated that they refrained because of conservation concerns, including population size being small (18%), the species being endangered (13%) or listed by CITES (5%). It was noted that the decrease in fish stocks from the MPA has resulted in a lower level of compliance among fisher groups, as evidenced by the wide use of illegal fishing methods and gear. Based on discussions with fishers and traders, the study team concluded that PECCA appeared to have been established without adequate consultation and participation of the local communities.

3.7. ENFORCEMENT OF LAWS

3.7.1. PENALTIES FOR FISHERIES CRIMES

This section presents information gathered through literature review, in-depth interviews, and presentations made by fishery supply chain stakeholders during the meeting to validate the results of this study.

In the Zanzibar Archipelago, illegal fishing activities are covered in the Fisheries Act of 2010, which includes illegal fishing methods, including gear, fishing without a license, and obstructing authorised personnel from carrying out their duties. Average offenders for these offences are liable for a fine of not less than TZS100,000 (USD42) and not more than TZS10,000,000 (USD4,167) or imprisonment for a term of not less than three months and not more than six years. There are no separate provisions for offences and penalties that deal with CITES-listed species or endangered species. There are also no specific penalties for landing, selling, buying, receiving, or possessing protected species. Generally, all species, regardless of their protection status, are penalised equally under this Act.

Overall, based on the discussions with fisheries officer and other law enforcement officials, it was observed that there is weak prosecution of fishery-related crimes. For example, it was discovered that it was common for offenders not to be penalised because of close social ties among community members, with decisions made to maintain harmony rather than disrupt relationships. This was

expressed as one of the significant challenges facing fisheries officers who enforce laws on behalf of the DFD. The study team also found that penalties given to offenders do not match the seriousness of the crime committed and that first-time offenders often receive a warning. Action might only be taken for those with repeated offences.

3.7.2. MONITORING, SURVEILLANCE, AND CONTROL

The study found that the governance of Zanzibar Archipelago's fishery supply chain is challenged by a limited capacity to conduct proper surveillance and implement enforcement controls. Fisheries officers stated they lack the infrastructure for conducting good surveillance, including communication tools, patrol vessels and fuel, and human resources. There are also very few fisheries officers in Pemba, making it impossible to monitor the entire MCA. The results confirm that Pemba authorities are challenged by their limited capacity to conduct adequate monitoring and surveillance. Around 50% of the law enforcement officers highlighted insufficient ability to perform these essential enforcement efforts effectively, with only three officials in Pemba covering a patrol area of around 800 km2, including 31 landing sites. The study also found that out of the 31 landing sites, only 30% have beach recorders (O. Faum, Ministry of Blue Economy pers comm. to Q. Kagembe, November 2022). The remaining 70% is left unmonitored.

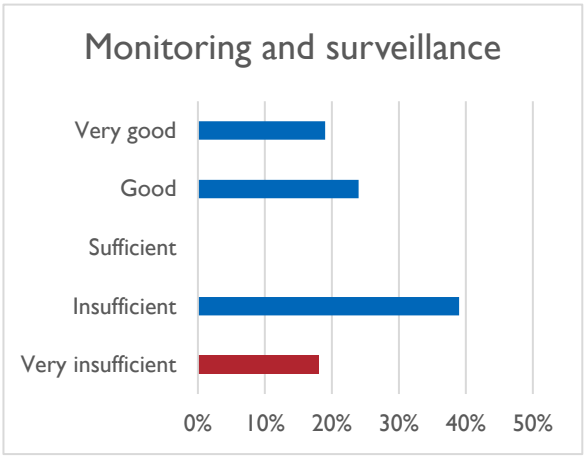
Forty-one per cent of the respondents mentioned that there needs to be more coordination and collaboration among law enforcement agencies. The leaders of SFCs also expressed that they need to be adequately involved in the decision-making process and receive little incentive despite being used to monitor and manage fisheries operations.

The study team also learned that there needs to be more communication systems installed in Pemba, such as radio systems, currently absent, to enable communication among law enforcement personnel. Responses from fisheries officers highlighted that while they use mobile communications, in most cases, they must rely on fishers to report suspicious activities.

Management of PECCA has also been challenged by limited knowledge of CITES and IWT in general. For example, it was observed that fisheries officers, customs, and scanner operators have little capacity to identify marine commodities, including sea cucumbers and shark fins.

The study also highlighted challenges in assessing fish stocks over time. It was observed that DFD depends on data collected by beach recorders who monitor the number of landings daily. However, the number of beach recorders could be increased as they are present in only 9 of 31 landing sites in Pemba, limiting the quality and quantity of data collected. Figure 8 below highlights the challenges faced by law enforcement in the study site as reported by fisheries officers during the data collection period.

Figure 8. Reported challenges facing fisheries law enforcement in Zanzibar Archipelago. Responses collected during interviews with fisheries officers and other law enforcement officials during the data collection period. (August – September 2022)



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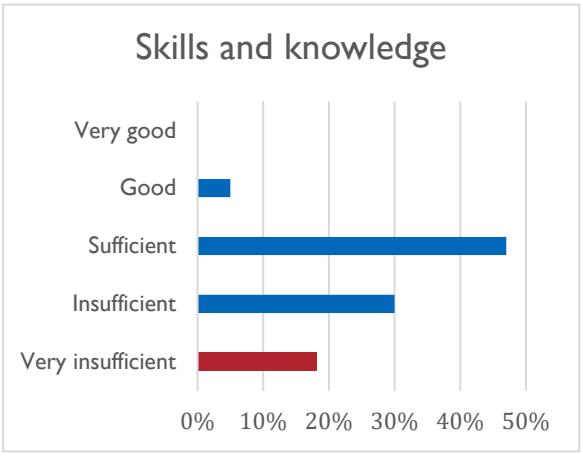

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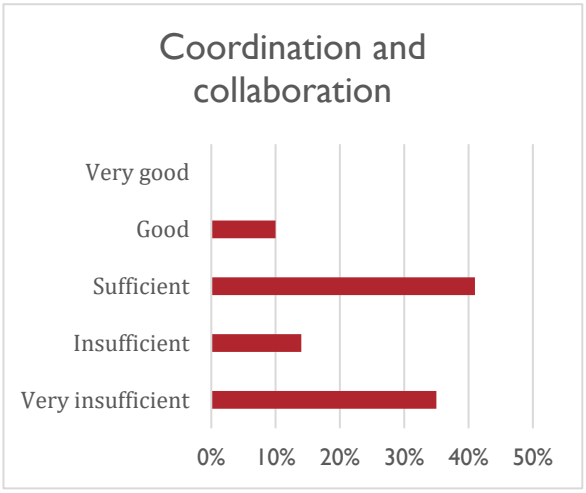

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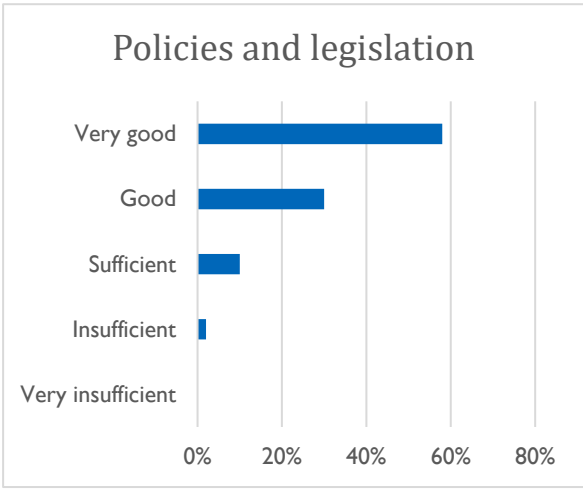

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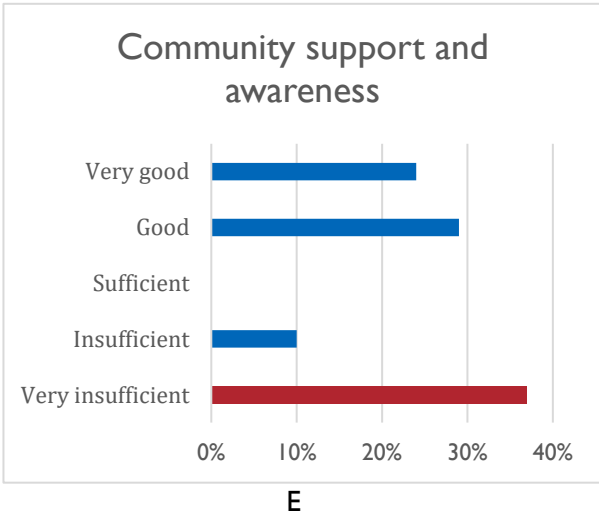

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3.7.3. IMPLEMENTATION OF CITES REGULATIONS IN ZANZIBAR ARCHIPELAGO

The study team observed that the CITES desk in Zanzibar hasn't started issuing permits as it has not been officially recognised by the CITES Secretariat and Zanzibar still needs to put necessary procedures and tools in place. Consequently, all permits are issued by the CITES office in mainland Tanzania.

Furthermore, funds for supporting travel of CITES officials from the mainland to Unguja are provided by applicants, creating opportunities for corruption and inefficiencies in inspection (as the relevant costs are borne by exporters).

In addition, the CITES desk has limited capacity to make stock assessments and support non-detriment findings to inform export quota allocations.

Finally, the capacity to implement CITES regulations in Unguja is limited, with only two officers having received in-depth training on CITES. The situation in Pemba is even more challenging with no CITES desk present or monitoring of trade in marine protected species.

4. DISCUSSION AND CONCLUSIONS

4.1. FISHERY ACTIVITIES IN PEMBA

Overall, the study found that most fishers in Pemba are artisanal and often rely on traditional fishing methods. Such methods, however, coupled with non-discriminant local fishing gear, are thought to be catching vulnerable species, impacting on the area's sensitive marine fauna (Moore et al., 2010; Gössling et al., 2016). Furthermore, artisanal fishers in Pemba have been associated with illegal fishing practices such as the use of small-sized nets and cyanide poisoning having significant detrimental impacts on the health of marine habitats. In addition, spear guns in highly diversified islets have reduced the population of coral communities by 10% in five years (O. Faum, Ministry of Blue Economy pers comm. to Q. Kagembe, February 2023).

Despite the ban on the trade (including exportation) of shark fins, it persists in the study site including off the coast of mainland Tanzania. For example, in 2018, the High Court of Tanzania sentenced three persons to twenty years imprisonment or to pay a fine of TZS1,000,000 (USD417) for unlawful possession of shark fins in Tanzania's Exclusive Economic Zone (EEZ). Managing illegal fishing in the EEZ has faced many challenges as the zone is a union matter and so under both the Revolutionary Government of Zanzibar and the Tanzania mainland through the Deep-Sea Fishing Authority (DSFA). The site requires joint patrols that cover extensive areas and proper arrangements for vessel registration. As a result of enforcement challenges, local agents have used this opportunity to falsely represent foreign fishing vessels.

4.2. FISHING OF PROTECTED MARINE FAUNA

Although almost half of the interviewed fishermen clearly understand restrictions regarding catching marine protected fauna, some still believe this is legal. This misunderstanding among fishers might

have been contributed by the lack of laws governing either the catch or bycatch of some marine protected fauna such as sharks and rays, but also limited enforcement of laws for marine mammals and sea turtles, which has resulted in improper handling of bycatch—unintended capture. At the same time, fishing has recently become a significant focus for scientific study and conservation concerns. As a result, international agreements have adopted several arrangements, such as the Convention on the Conservation of Migratory Species (CMS). Bycatch is recognised by the CMS as a critical threat to aquatic species (Berggren et al., 2011). However, in the case of the Zanzibar Archipelago, these international legal frameworks are poorly implemented.

4.3. PATTERNS OF LOCAL CONSUMPTION

Marine products are auctioned for local consumption at an artisanal community market. Photo: M. Cornthwaite / TRAFFIC

In the Zanzibar Archipelago, artisanal fishing practices contribute to a supply of at least 98% of the marine catch. It is the main socio-economic activity in most coastal villages and contributes to 95% of animal protein among the local population (Georgia 2019).

However, the overdependence on marine habitats by local communities in Pemba has inadvertently increased threats to the populations and habitats of marine protected species (Colbert-Sangree 2012). For example, a study by Andimile (2019) highlighted that the populations of species such as octopus, sea turtles, dugong, tuna, shark, and sea cucumber have declined due to increased human pressure.

Sharks and rays

The study observed that among the four studied groups, the most consumed protected marine fauna are the sharks and rays (62%) for limited local consumption and export to supply international markets, specifically the fins. However only a tiny volume of these products is used for food and generating income for coastal fishers in Pemba. The research team observed that most shark and ray species are fished regardless of their protective status. Both protected and non-protected species are consumed, concurring with public comments by WCS (2018) that unsustainable harvesting of sharks and rays where over half of the studied ray species and over a third of the shark species being caught by Zanzibar fishers were classified as threatened by The IUCN Red List.

Seahorses and pipefishes

Based on discussions with fishers and traders, it was learned that while there isn't a tradition of coastal communities in PECCA consuming seahorses or pipefish, respondents admitted that there has been a developing trend in using the species mainly for traditional medicine. This has been associated with the influx of Chinese communities in the coastal cities of Tanzania and the Zanzibar Archipelago. In China, seahorses are an ingredient in TCM, being used to treat erectile dysfunction (Chen, Wang, & Huang, 2015), respiratory illnesses and other ailments. The study team noted that the belief in the efficacy of seahorses as a medicinal ingredient is rapidly spreading among coastal inhabitants.

The general acceptance of traditional medicine among coastal communities and the collection and use of marine species in conventional treatments has increased pressure on marine resources (Almeida, 2002) as unsustainable exploitation rates of wild-sourced ingredients increase (Kang and Phipps, 2003). Unsustainable exploitation combined with habitat destruction resulted in the entire genus Hippocampus being listed under Appendix II of CITES whereas several species have been listed as Vulnerable or Data Deficient under IUCN Red List of Threatened Species (IUCN www.iucnredlist.org).

Currently, there are no initiatives by law enforcement within the study area to address this problem as knowledge of the volumes, types of species, trade patterns, and market drivers are limited. However, in view of the increased use of seahorses and pipefish for medicinal purposes there is a need for increased law enforcement coupled with creating awareness programmes on the species for fishermen, traders, and communities.

Sea turtles

As was evidenced during the assessment, fishers, traders, and fisheries officers acknowledged increased turtle meat consumption among coastal communities within the study area.

Turtle meat is considered a delicacy and sometimes an alternative protein source among the fisher communities. Interviewed fishers and fisheries officers reported that turtles were often accidentally caught during fishing activities in the past, but now are being targeted for meat and eggs. This seemingly new trend pattern poses an alarming threat to these critically endangered species.

While the assessment found that marine conservation programmes in the study site have been directed at habitat protection, illegal fishing practices, and raising awareness, initiatives at strengthening law enforcement or raising awareness among communities to address illegal harvesting of turtles for consumption and trade have been limited.

4.4. PATTERNS OF TRADE

Sea cucumbers

The study found that sea cucumbers collected in the territorial waters of the Zanzibar Archipelago are the most exported marine-protected products, with the majority intended for Asian markets. However, this conflicts with local regulations which only allow trade and export of farmed Sandfish *Holothuria scabra*, a trade that has increased exponentially over the past decade. The study team identified the following reasons to account for the increase.

1. The decline in returns from seaweed farming. Climate change causing warmer waters has presented a threat to seaweed production, which, together with the decrease in global prices, has affected the incomes of over 25,000 Zanzibarians employed in these industries. In efforts to recover from wavering seaweed markets, most of these fishers have ventured into sea cucumber farming.
2. Ban of sea cucumber trade from mainland Tanzania. Export of all wild-collected species of sea cucumbers is not allowed in mainland Tanzania. Therefore, most of the traders have turned to the market in the Zanzibar Archipelago. Recently, Tanzania have started providing permits for farming, and a few places in Tanzania (Mtwara region) have started farming sea cucumbers. However, most of these products are transported to Zanzibar for export to international markets.
3. Contribution of Zanzibar's Blue Economy policy. The Blue Economy is regarded by Zanzibar's Development Vision of 2050 as a high-priority area for the next 30 years. It aims to provide an effective and sustainable means of improving livelihoods and strengthening the economy while preserving the health of marine and coastal ecosystems. As a result, small-scale mariculture activities such as sea cucumber farming, which are still in their infancy, have been diversified and enhanced. Sea cucumber farming has also been seen as an alternative to wild collection to reduce pressure on their wild populations. However, to some extent, this has also created opportunities for illegal dealers to collect and export products by mixing them with farmed products. This is evident from the study as sea cucumber species collected from the wild and those not allowed to be farmed have been observed openly for sale at landing sites and fish markets in Pemba and Unguja.
4. Volume of sea cucumbers illegally sourced from mainland Tanzania entering supply chains and using Zanzibar's seaports and airports as exit points. While the exact volumes are still unknown, the current number of seizure incidents reported by the DFD indicates that large amounts are smuggled. The lack of a well-established traceability system for sea cucumber trade and limited knowledge of species identification has challenged law enforcement in controlling imports and exports. While larger volumes of sea cucumbers are transported via the seaport, in Zanzibar, smaller amounts, often illegally sourced, are exported via Zanzibar's international airport, where customs officials and most relevant airport personnel have limited knowledge of species identification, and scanner operators have limited capacity in identifying scanned images accurately.

Seahorses and pipefishes

Zanzibar has banned the harvest and export of seahorses and pipefishes. Therefore, current trade patterns involve illegal trade, both local and international markets, especially China, where it is used as an ingredient in TCM. China accounts for the most significant consumption of seahorses; for example, in 2005, its value exceeded USD20 million (Foster & Vincent, 2005). The study team found that in the case of the Zanzibar Archipelago, a more significant part of the trade is driven by resident

Asian communities, mainly Chinese living or working in or close to coastal towns. The relationship involves direct harvesting by local fishers supplying resident Asian buyers (Giles, et al., 2006). The presence of these communities near landing sites has increased collection effort, trade, and price of seahorse products.

It was observed that seahorse products are also sold at lower prices in the local markets despite fetching higher prices in the Asian markets. The study team attributed this to a need for more price knowledge among fishers, allowing clients to purchase larger volumes of products at once. For example, the trade has grown exponentially in Pemba and Tanga after hearing high demand from the Chinese, who periodically visit landing sites and fish markets. This has increased prices and, inadvertently, increased the harvesting of these vulnerable organisms. A report by Louw and Bűrgener (2020) indicated that most dried seahorse exports from Africa (97%) were reportedly destined for import by Asian countries. In the case of Zanzibar Archipelago, the study team was led to believe that most seahorses are destined for Asia, especially China and Viet Nam.

Sharks and rays

The study highlighted sharks and rays as the most locally traded and consumed among the four prioritised groups. However, the volume traded locally is very small compared to other fish groups because sharks and rays are not favoured products and, hence, not highly marketable in the local markets. The study team also observed that the local market price was independent of the species rather than the size and time since harvest, implying that both vulnerable and non-vulnerable sharks and rays are valued equally. However, some vulnerable species, such as guitarfish and dogfish, are priced lower due to their smaller size.

For artisanal fisheries, the primary reason for fishing elasmobranch was mainly for local market consumption. However, fins were collected and consolidated over time for international export. The research could not show the volumes of fins exported over the last ten years because of inconsistent data from the DFD. It was also observed that the DFD does not issue a permit for international export of sharks and rays (including fins). However, analysis of data from UN-COMTRADE showed that there has been an export of shark and ray products sourced from Tanzania (including the Zanzibar Archipelago) over the last ten years. This data shows a discrepancy in data reported by Tanzania and importing countries.

According to Cripps et al, (2015) shark fin is one of the most expensive fish products in the world. Perhaps as a result, the business continues to exist in mainland Tanzania and the Zanzibar Archipelago despite the risks. It was also observed that large amounts of shark products are mainly harvested by foreign vessels in the EEZ. However, there is little knowledge of the types and volumes of species harvested due to limited surveillance and patrol information about the number of foreign vessels operating in the EEZ.

Sea turtles

The five species of marine turtles, specifically, Green turtle, Hawksbill turtle, Loggerhead turtle, Leatherback turtle, and Olive Ridley turtle, which occur in the West Indian Ocean (WIO) have been reported in the waters of PECCA. These species are listed under Appendix I of CITES, categorised as endangered or critically endangered under IUCN (IUCN 1996), and are officially protected by the Tanzania and Zanzibar Fisheries Acts of 2009 and 2010. Despite several initiatives to protect sea turtles through awareness campaigns and nest surveillance, their products such as shells continue to be on sale in local markets, and their meat sought after despite having higher prices compared with other protein sources.

During the study, researchers found that in nesting season at least three turtles are killed weekly for meat at Mnemba island, the only nesting site for sea turtles in the islands. Beach recorders reported that turtles did not visit the site for two years consecutively sometime between 2015 and 2020 due to turtle hunting and destruction of nesting sites (O. Faum, Ministry of Blue Economy pers comm. to Q. Kagembe, November 2022). In 2020, 16 people were fined between USD500 and USD1,500 each for poaching turtles. More work on understanding the patterns, drivers, and dynamics of sea turtle poaching and trade is needed to develop effective risk mitigation measures.

4.5. ANALYSIS OF ILLEGAL TRADE NETWORKS

Unguja is a transit hub for wildlife trafficking both regionally and internationally. The island has a centuries-old history as a trade centre, including trade in slaves, ivory, and myriad of wildlife products (see our earlier description). The old trade routes that connected Pemba with other coastal towns such as Mombasa, Bagamoyo, Tanga, Malindi, and Kilwa are still exploited by marine smugglers due to limited surveillance and law enforcement capacity (e.g. fisheries officers, patrol vessels and radio communications).

Marine smugglers in Unguja also take advantage of the over 200 informal ports distributed over the island. These ports enable consolidation of marine products, from illegally sourced sea cucumbers to shark fins. They are also used as points of exchange for other wildlife products and illicit goods from adjacent coastal towns, including Pemba. Considering the limited capacity of law enforcement, the volume of illicit trade without being noticed is likely significant. Both the international airport and seaport have been documented as potential export and transit hubs for wildlife trafficking (UNODC, 2013) due to their strategic locations, which provides wildlife smugglers with easy access to international trade routes and markets, likewise creating opportunities for the exit of marine products. Between 2017 and 2022, at least three incidents involving marine products, including sea cucumbers, seahorses, stony corals, queen coaches, and sea turtle shells destined for the EU, involved the Unguja's Abeid Aman Karume International Airport. A report by Environmental Investigative Agency in 2014 also highlighted that due to an increase in law enforcement in mainland Tanzania and Kenya, illegal wildlife dealers have shifted their operations to Unguja suggesting little interference from law enforcement.

4.6. KNOWLEDGE AND AWARENESS GAPS

The results show that traders and fishers have limited knowledge of the conservation threats to some of the endangered, threatened, and protected species in PECCA and believe that ongoing fishing in the area does not pose threats to species populations. At the same time, fishers highlighted that any declines in fish stocks and catch could possibly be attributed to illegal fishing gear and methods such as poison, prohibited nets, and spear guns. As a result, increasing local understanding of the impacts of illegal and unsustainable fishing practices and their threats on livelihoods might influence individuals to more willingly accept conservation policies, adopt personal behaviours to preserve marine ecosystems and promote community engagement.

The Revolutionary Government of Zanzibar and non-governmental organisations such as WCS, MWAMBAO, and Sea Sense have conducted several programmes to enhance the conservation of MCAs, including raising conservation awareness among fisher communities. However, the assessment has shown that the level of understanding remains limited for certain threatened and protected groups. For example, there was less knowledge among fishery supply chain players of the conservation aspects of sharks and rays. In addition, endangered species of guitarfish (e.g. the Zanzibar guitarfish *Acroteriobatus zanzibarensis*) were also on sale, with fishers admitting that they

were unaware of their protection status and whether fishing and trade could threaten their populations. This group of fish (i.e. Rhinobatidae) is one of the most threatened marine megafaunas globally.

The study also highlighted little involvement of local fisheries knowledge in managing fisheries activities in Pemba. Despite the establishment of SFCs in co-managing these with fisheries officers, their traditional first-hand knowledge of marine ecology was not taken into consideration such as when MPAs were being established, including PECCA. As fisheries management sometimes misses important data due to the associated costs and inaccessibility of areas to biologists (Garcia-Quijano, 2015), using fishers' knowledge of different aspects of the ecosystem, such as their knowledge of migratory patterns and habitats, can contribute to developing proper management measures. A study by Drew (2005) highlighted numerous potential benefits if scientists and fishers collaborate, and traditional ecological knowledge can be used as supplementary information in the management of small-scale fisheries. Several studies have also highlighted the use and involvement of coastal communities during decision-making to improve their conservation knowledge and acceptance of marine conservation initiatives.

4.7. ENFORCEMENT OF LAWS

4.7.1. PENALTIES FOR FISHERIES CRIMES

Based on the Zanzibar Fisheries Act 2010, fisheries crime offences were given a maximum length of 10 years imprisonment or a maximum fine of USD4,500 for dealing in illegal fishing activities and obstructing officers from executing their duties. This assessment has highlighted that the current regulations have no provisions which provide exceptions for dealing with endangered, threatened, and protected species. Currently, all offences are categorised equally, with similar penalties, despite differences in severity of the crime. Smugglers and illegal fishers in Zanzibar have taken advantage of gaps in legislation, weak law enforcement, and lenient penalties to perpetuate and expand the illicit trade (UNODC, 2016). Researchers also found that offenders often are either released upon arrest or cases are acquitted or dismissed. This was attributed to a lack of cooperation from leaders of the SFCs, corruption, and limited knowledge of conservation among prosecutors and magistrates (O. Faum, Ministry of Blue Economy pers comm. to Q. Kagembe, November 2022). Generally, the criminal justice system in Zanzibar still faces many challenges, and fishery-related criminals are not subject to strong punishments undermining the protection of vulnerable marine species and habitats.

4.7.2. MONITORING, SURVEILLANCE, AND CONTROL

The study found that government surveillance strategies have been largely directed at illegal fishing practices, such as using illegal fishing vessels and gear with fewer initiatives and resources directed at tackling illicit trade at the markets, restaurants, and border points, including seaports and airports. As a result, there is less awareness and data on these aspects of the fishery value chain which could inform useful interventions.

Fifty per cent of fisheries officers mentioned weak law enforcement capacity as the main challenge facing the fight against smuggling of marine products. Other challenges include regulatory and policy gaps, informal ports and porous borders, and limited knowledge, collaboration, and coordination among responsible agencies.

4.7.3. IMPLEMENTATION OF CITES REGULATIONS

There are no officially designated CITES authorities on Unguja partly because regulations to implement CITES have only been recently established. Therefore, some tasks, such as issuing permits, are still being handled in collaboration with officials on mainland Tanzania. This has created loopholes for illegal exports of CITES-listed species. In addition, the unofficial CITES desk on Unguja has limited capacity to conduct non-detriment findings (NDFs) and therefore, rely on rough estimates to establish quotas for marine species trade, rather than scientific evidence as required by the Convention. While in accordance with CITES, "export permits for specimens of species included in Appendices I and II shall be granted only when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of the species" (CITES, 2023), the study observed that no properly established export quotas for Appendix II species have been developed. As a result, products have been exported without sufficient information on the availability of stocks thereby impacting the sustainability of harvested species and the fishery sector.

Another major challenge facing implementing CITES regulation is the limited capacity to conduct fishery stock assessments. The study observed that due to limited resources for training to conduct fish surveys in Pemba, information regarding fish stocks, including the numbers of fish caught, catching effort, and other biological information about the captured fish, are obtained and analysed from records by beach recorders at the landing sites. Therefore, organisms mainly collected from gleaning activities and bycatch, such as sea cucumbers and seahorses, are often not recorded as fish landings, limiting information about their stock and volume changes over time. Moreover, the study has observed both CITES and non-CITES-listed products being exported without proper scientific evidence questioning the sustainability of trade. Some Appendix II listed species exported from Zanzibar include the White teatfish (*Holothurian nobilis*).

The limited number of CITES experts in Zanzibar has made areas such as Pemba, which has no stationed officers with expertise or sufficient knowledge on CITES, vulnerable to illegal exports of CITES-listed species. Currently, there are only two CITES experts stationed on Unguja. Therefore, implementing CITES in Pemba remains challenging due to existing trade relationships with neighbouring countries, for example, Kenya through Mombasa, where CITES-listed products are traded without proper inspection. In addition, the current fishery law enforcement officers in Pemba have limited knowledge on IWT, including species identification, smuggling techniques, and knowledge of international legal frameworks, further impacting their capacity to interdict smuggling attempts and handling export and import of CITES-listed species.

5. RECOMMENDATIONS

This rapid assessment reveals a comprehensive and multifaced issue requiring immediate attention and broad mitigation measures. The findings highlight the urgent need for a strengthened institutional framework that enhances monitoring and surveillance to address illegal harvesting, trade, and consumption of protected marine species.

The evidence highlights the potential detrimental impact of fishing, trade, and consumption of marine protected species, jeopardising the recovery ability of fish stocks and reducing the population of vulnerable species such as sharks and rays.

The assessment underscores the ineffectiveness of the current regulatory framework and a fishery management system that is implemented in close collaboration with fishery communities.

Based on the findings and consultations with fishery stakeholders in the Zanzibar Archipelago, the following recommendations are proposed.

5.1. RESEARCH

Assessment of the trade of farmed sea cucumber products in Zanzibar Archipelago

Since there is limited information to inform the current sea cucumber aquaculture initiative, it is recommended that a baseline study be undertaken to understand the scope and scale of the industry, specifically, trade dynamics, its contribution to the livelihoods of local communities, and how it can inform future fishery management plans and risk mitigation measures.

Behaviour change to improve sustainability of fish harvest and consumption

As the assessment results showed, there is a significant gap in consumers' knowledge about the need for conservation of marine species and sustainable harvest practices. It was also found that fishery value chain players such as traders, transporters, and export companies have not been the target of awareness initiatives. Therefore, it is recommended that government and other non-government entities work with the private sector to conduct a range of activities to raise awareness among all fishery value chain stakeholders.

In-depth analysis of local and international trade of shark and ray products

While household consumption may be minimal compared to other fish species, this coupled with the international trade in shark fins could threaten vulnerable species such as the endangered Oceanic white-tip shark and species of guitarfish. To address these potential conservation threats, the study recommends an assessment of the local consumption of shark products and sharing findings with local organisations working on the trade and consumption in sharks and rays.

To have a holistic understanding of the international trade. The study recommends a comprehensive assessment of the international trade of shark products to identify key trends in regional and global markets, including, products in trade, market size, growth rates, and major players. The study will also evaluate changes in trade volumes over time, identify emerging markets, and trade routes.

Seahorse trade and traditional medicines

Despite the ban on trade of seahorses in mainland Tanzania and Unguja, the trade has increased, driven by both local and international markets. Law enforcement needs to be more informed about this trade. It is, therefore, recommended that a comprehensive study be undertaken to understand the drivers and dynamics of the seahorse and pipefish trade in the Archipelago.

Trade of CITES-listed Appendix II species.

The findings underscore the need to undertake an assessment of all CITES Appendix II listed marine species, to generate a baseline for future quota allocation for Appendix II species. The assessment will investigate the volume, price, origin of species, consumer countries and the capacity of the LE agencies to enforce CITES at each node of the supply chain.

5.2. CAPACITY

Capacity building and training are needed for customs and other law enforcement personnel (e.g. fisheries compliance officers, port officials, and border police). Systematic training on CITES, species identification (e.g. using TRAFFIC's 3-D shark ID tool), and anti-corruption should be delivered to staff at the seaports of Pemba (Wete) and Unguja, as well as AAKIA.

Furthermore, the CITES desk officers and relevant personnel should receive knowledge on undertaking of NDFs, including stock assessment for CITES-listed and non-listed species.

5.3. LEGISLATION

The Fisheries Act 2010 does not reflect CITES requirements because the Act was enacted before Zanzibar domesticated CITES regulation. However, section 34 of the Act provides for the Minister to develop rules prohibiting or regulating the sale of any fish, aquatic flora, and or any fish product or product of marine flora. Currently, the Ministry of Fisheries and the Blue Economy has not developed such regulations. Therefore, it is recommended that the Ministry initiate a process to establish these regulations to enable full implementation of the domesticated CITES Regulations of 2019.

Strengthening penalties for fishery-related crimes. The Ministry of Blue Economy is encouraged to revise the fisheries regulation to include penalties for illegal capture, sale, and trade of endangered species. The Ministry is also encouraged to resolve the current legal practice which allows first-time offenders to be discharged upon arrest. Fisheries and the Blue Economy have not developed such regulations. Therefore, it is recommended that the Ministry initiate a process to establish these regulations to enable full implementation of the domesticated CITES Regulations of 2019 to include capture, sale, and trade of endangered species.

5.4. STRENGTHENING COMMUNITY-BASED MANAGEMENT

The DFD and DMC should promote collaborative management and local community involvement through working with SFCs. These departments should encourage NGOs and CSOs working in the

area to support community-led marine management efforts, including strengthening institutional capacity of local government authorities and fishery communities in planning, and implementation of community-based conservation initiatives, and creating integrated alternative livelihood systems.

5.5. SURVEILLANCE AND INTERDICTION

It was observed that limited surveillance and monitoring capacities have facilitated illegal fishing practices and trade of protected marine fauna in the Archipelago. The following is recommended to enhance surveillance capacity:

Tools

- DFD should ensure a reliable radio communication network to ensure a constant exchange of information on smuggling attempts and illegal fishing.
- The DFD and MCU should provide each fisheries office and ranger unit in Pemba with patrol vessels to maximise the frequency and duration of operations.
- Law enforcement units in AAIKA and Pemba airport should be equipped with sniffer dog programmes (i.e. K9 units with dogs trained to detect marine products).

Training

- DFD should provide training to all enforcement units at all points of the supply chain, including beach recorders, fisheries officers, rangers, SFC members, customs, and port staff on fisheries regulatory frameworks, including fisheries, CITES, and other relevant regulations, to keep them up-to-date and raise their awareness on marine conservation.
- Airport and seaport staff (e.g. customs, cargo handlers, security, CITES, wildlife, and fisheries) at Pemba and AAKIA should be trained in species identification, smuggling techniques, concealment methods, analysis of scanned images, and risk profiling.

Omar Hakim Foum – Marine Conservation Manager discusses future training, tools, and capacity needs. Photo: M. Cornthwaite / TRAFFIC

5.6. COLLABORATION AND COORDINATION

The assessment showed that there is lack of coordination among regulatory bodies resulting in limited cooperation and exchange of information, potentially resulting in vague institutional responsibilities, creating gaps in jurisdictions that smugglers and illegal fishers can easily exploit. To address this, it is recommended that relevant enforcement agencies such as DFD, MCS, police, KMKM staff, and district authorities focus on strengthening their collaboration together with SFCs and enhancing their capacity to manage fisheries activities by providing more structured support and developing inter-agency agreements to foster collaboration.

5.7. CORRUPTION

The alleged inability of the CITES desk in Zanzibar to fully implement CITES regulations has created substantial bureaucracy in obtaining permits, creating opportunities for corruption. Moreover, unclear policies regulating the utilisation of marine protected species such as sharks, rays, and sea cucumbers have also created loopholes for corrupt activities. To address this, it is recommended that the DFD, DMC, and the CITES desk should undertake the following approaches:

- strengthen on-the-ground anti-corruption capacity by fostering national interagency cooperation and increasing international cooperation;
- improve oversight of fishery agents; and,
- support monitoring, control and surveillance centres and task forces.

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