European Commission

VCA4D
VALUE CHAIN ANALYSIS FOR DEVELOPMENT

N°43b
MARCH 2023

Coastal fisheries value chain analysis in Zanzibar

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural, aquaculture and fisheries development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders, businesses, society, and environment.
The European Commission has developed a standardised methodological framework for analysis (https://europa.eu/capacity4dev/valuechain-analysis-for-development-vca4d-/documents/methodological-brief-eng). It aims to understand to what extent the value chain allows for inclusive economic growth and whether it is both socially and environmentally sustainable.

The value chain context

The semi-autonomous state of Zanzibar (ZNZ), part of the United Republic of Tanzania, is comprised of two main islands: Pemba and Unguja. ZNZ launched its Vision 2020-2050 on Blue Economy based on key sectors and prioritization of its economy. Among them, the artisanal, small-scale fisheries sector is recognized as a key component of the ZNZ Blue Economy, as it represents an important source of income and nutrition, employment, and livelihoods in ZNZ. The sector makes a relatively great contribution in terms of the ZNZ Gross Domestic Product (GDP), following tourism and agriculture. Marine fish provides over 90% of the animal protein requirements, the per capita fish consumption being about 22 kg/year. Adequate measures need to be in place to ensure sustainable and inclusive management of natural bioresources and to anticipate the effects of climate change on coastal communities. This is particularly true in ZNZ, where about 85% of the fish landing sites belong to one of the six Marine Conservation Areas (MCA), which overall cover about 2,288 km^2.

The European Union intervention

The EU is engaged in supporting interventions to contribute to Tanzania's National Development Plan objectives of creating job opportunities and fostering inclusive and sustainable economic growth. This is in line with the Sustainable Blue Economy Framework, the African Blue Economy Strategy, and the European Green Deal, in which the fisheries sector is recognized as an essential component. The EU Multiannual Indicative Programme (MIP) 2021/2027 identifies three priority areas: Green Deals, Governance, and Human Capital and Employment. The Blue Economy for Sustainable Transformation (BEST) program will support, among others, the development of sustainable fisheries and aquaculture VCs to contribute to food security, nutrition and livelihoods; the sustainable management of coastal ecosystems and the productive use of the marine and coastal ecosystems and targeted inland waters.

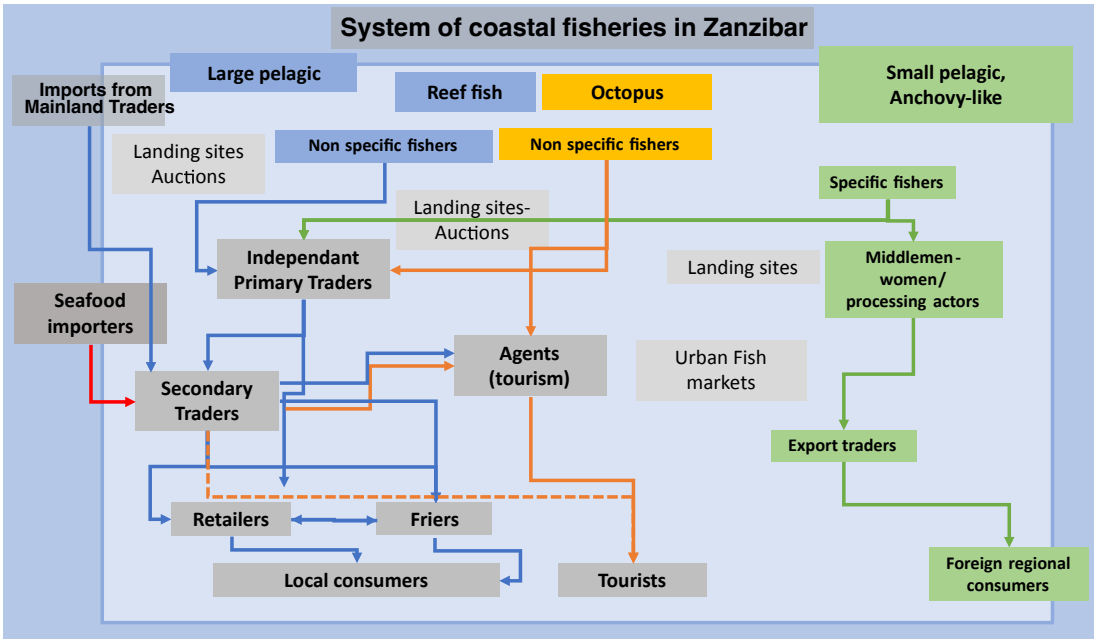


Figure 1: Flowchart of the coastal fisheries value chain in Zanzibar (2019)

Functional analysis

Production and sub-chains

The small-scale, marine coastal fisheries production in ZNZ relies on three main fish categories: **small pelagic** (anchovies and anchovy-like species), **finfish** (i.e., large pelagic, tuna and tuna-like species, and reef fishes) and **octopus**. Large pelagic and reef fisheries are grouped into the category of finfish because fishers may opt for one type of fishing depending on the season and catch rates. ZNZ artisanal fisheries are performed by sail/paddle-propelled wooden vessels. The number of fiberglass boats and outboard engines is increasing. The used fishing gears are various (Figure 2).

Sub-chains	Fishing gears and boats	Main target markets	Production volumes (t)	Production value (Million Tanzanian Shilling: MTZS)	Number of Full Time Equivalent (FTE) fishers
Small Pelagic	Purse seiners, Ringnetters motorized	Domestic (fresh, fried) and export to regional Africa as dried anchovy ("dagga")	36,200	84,128 MTZS (€32 million)	2,613
Finfish	Ringnetters, trappers, gillnetters, handliners or longliners, motorized or sail,	Domestic and tourism (fresh, frozen, whole or cut)	31,980	267,269 MTZS (€102 million)	31,283
Octopus	Foot and dive fishers, trappers, spears, handliners or longliners, motorized boats	Tourism (fresh, frozen)	1,439	21,142 MTZS (€8 million)	1,029
Total			**69,619**	**372,539 MTZS (€143 million)**	**34,925**

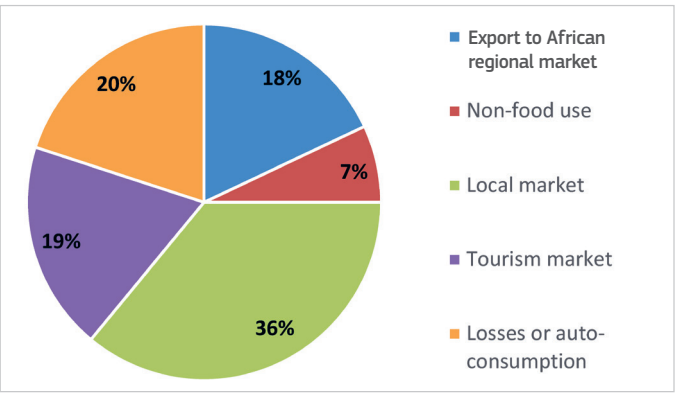
Figure 2: Characteristics of the fisheries sub-chains in Zanzibar

Processing and market channels

Landed seafood is usually sold as fresh at the landing sites, urban markets or directly to restaurants or hotels for the tourism market and a share is processed according to the seafood type: 1) small pelagic are mostly dried and sold in the local and regional market. Some are fried and sold in urban markets. 2) Finfish is mainly sold fresh/chilled or frozen by means of domestic chest freezers. They can also be fried. 3) Octopus is sold fresh/chilled or frozen, mainly targeting the tourism market.

Prices are set through auctions in 54% of the 235 landing sites. The rest of the harvested fish is directly sold from the boats to buyers-traders and/or processors (for small pelagic). The fish is transported by cycles, trucks, and cars to Zanzibar city and its surroundings, for secondary trading with retailers. The development of the tourist market has led to the emergence of a specific category of actor as agent/buyers, independent and/or commissioned by the hotels.

The most important artisanal processing activity is handled by middlemen and women who sell dried small pelagic to export traders for the regional African market. Market share by destination is represented in Figure 3.



Technical aspects

There is wide room for improvement to reduce fuel consumption during fishing and artisanal processing activities (fossil fuel and firewood) given the low energy efficiency of the engines and the equipment used for processing (braziers). Limited Cold-Chain System (CCS) and market infrastructures such as landing, auction sites, and seafood storage facilities contribute to high post-harvest losses, especially nutritional and quality losses.

Governance and policies

Coastal fisheries are managed by the Ministry of Blue Economy and Fisheries of the Revolutionary Government of ZNZ, and the district officers. Off-shore fisheries (within the Exclusive Economic Zone of Tanzania) are co-managed by the ZNZ Ministry of Blue Economy and Fisheries, and the Ministry of Livestock and Fisheries in Mainland Tanzania (MLT) through the Deep-Sea Fishing Authority. Regional and district agencies are involved in planning and implementing government policies, as well as in working with communities, interacting with the Village Fishermen Committees (VFCs) with the "Sheha", the administrative unit that encompasses several villages. ZNZ has a wide and complex legislative and policy framework to manage fisheries at various levels. The most important and recent policies are the Fisheries Policy (2014 and 2016), and ZNZ Blue Economy Vision launched in 2020. Linkages and coordination between and among the diverse entities relevant to various aspects of coastal fisheries governance are weak. There is limited institutional capacity to meet the challenge of implementing effective fisheries co-management regimes, taking account of the complexities involved.

Figure 3: Distribution of seafood by destination market (% of total production in ZNZ based on Live Weight Equivalent-LWE)

What is the contribution of the value chain to economic growth?

Financial viability for the actors

Profitability varies greatly between actors and sub-chains. The financial viability for fishers, expressed by the Net Operating Profit for an individual fisher, varies between 97,000-662,000 TZS (€37-255)/month, depending on the gears and targeted species, the costs incurred, the fish landing price and the catch volume. **Crew members of purse seiners, targeting small pelagic are potentially the most vulnerable.** In addition to price level, the profitability of fishers using motorized fiberglass boats and purse seiners is sensitive to the catch rates. The main trading and processing costs are related to transport, electricity, firewood, ice, handling, and processing labours. Monthly incomes of the traders and processors are between 235,000-1,250,00 TZS (€90-480) and 165,600-765,000 TZS (€65-294), respectively, depending on the sub-chains and the sub-categories of actors. Returns on turnover (ROT) range from 2 to 30% for traders and processors, with **more critical concerns for financial viability for small-scale processors and traders in the finfish sub-chain.**

Impacts on the national economy

The **Total Value Added (VA) (Direct VA + Indirect VA)** for marine coastal fisheries in ZNZ is estimated at **262,058 MTZS (€110 million)**. The Driving effect ratio (Indirect VA/Direct VA) is 20% meaning that for each unit of direct VA, there exists 0.2 unit of indirect VA created. The rate of integration indicates a high portion of the value of the VC production that remains within the national economy (70%). The VC contributes to the economy with direct VA of around 220,000 MTZS (€85 million). The total contribution of the overall fisheries VC to the **ZNZ GDP is 6.32%** and to the **agriculture GDP is 30%.**

The **public fund balance** (tax income minus subsidies) is positive; no subsidies were identified. Income tax is estimated at 4,566 MTZS (€1.7 million).

Total imports of goods and services by the VC actors are 43,000 MTZS (€17 million). With total exports of 54,000 MTZS (€20.5 million), the VC balance of trade is **positive because of the ZNZ dried small pelagics exports to the foreign regional market, which is a significant strength of this sub-chain.**

Viability in the international economy

The **Nominal Protection Coefficient (NPC)** is around **1**, indicating that all the VC actors generate equivalent incomes that they would have on international markets. **The Domestic Resource Ratio (DRC) is 1.12**, indicating that the coastal fisheries VCs would not be competitive in the global economy, i.e., the value of domestic factors which are consumed is higher than the value added they produce.

Comparison of sub-chains

The **contribution of the finfish sub-chain to the national economy is very significant, creating 71% of the Total VA** followed by the small pelagic and octopus sub-chains (25%, and 4% of the Total VA, respectively) (Figure 4). However, the small pelagic sub-chain displays a strong profile with a high Export Rate (63%), a good Rate of integration into the economy (77%), and a DRC <1 (0.4).

The coastal fisheries value chain is a very significant component of the Zanzibar economy, a major contributor to livelihoods for local coastal communities, and the Zanzibar GDP. Critical concerns for financial viability and income findings are seen in some categories of actors, mainly crew members, small-scale processors and traders, the ones not benefiting from the new opportunities provided by the tourism market. The small pelagic sub-chain for an export market is also important for the Zanzibar economy, a significant value added contribution, providing jobs and making the trade balance positive for the overall coastal fisheries in Zanzibar.

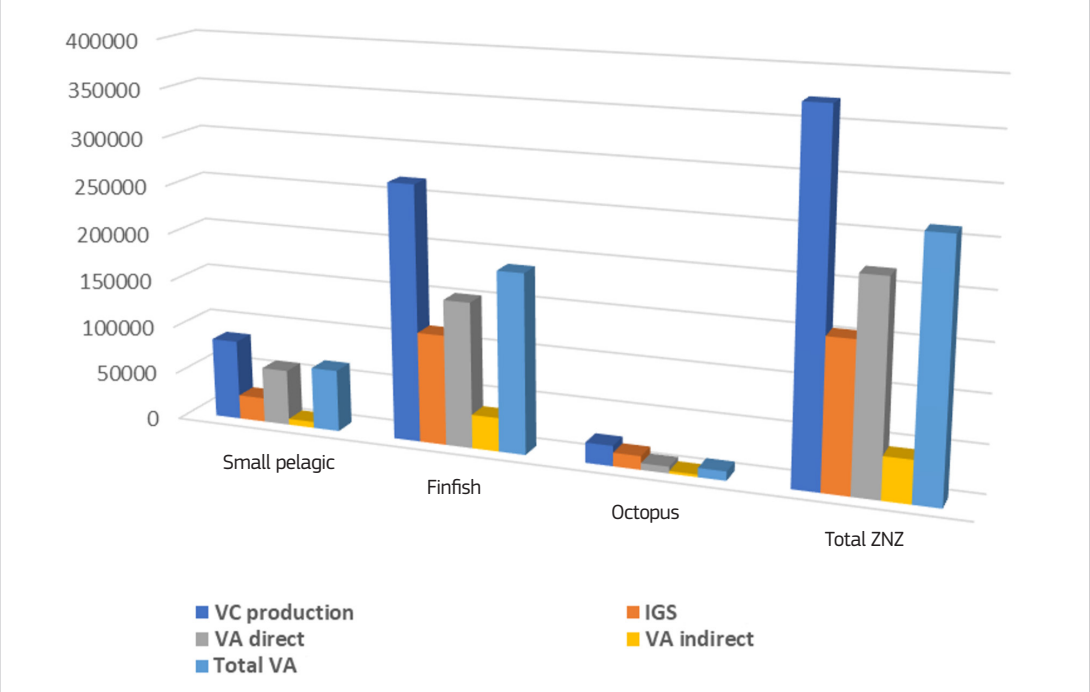


Figure 4: Comparing the sub-chains in the ZNZ coastal fisheries VC (production, IGS and total effects) in million Tanzanian shilling

Is this economic growth inclusive?

Distribution of income among the actors

Overall, **the estimated monthly incomes range from 0.5 to 4 times the reference minimum wage (300,000 TZS- €155/month) for all the categories of actors.** The share of the fisher's landing price in the final end-user price widely varies, from 9% (small pelagic in ZNZ) to 56% (finfish and octopus in ZNZ), indicating a potential higher inequality for small pelagic sub-chains with a **Gini's coefficient (0: perfect equality, 1:total inequality)** of 0.85 for small pelagic against 0.67 for finfish.

Fishers appear as a vulnerable group in most sub-chains although in some cases, their income can exceed three times or more the minimum wage.

In all sub-chains, except for octopus, women are traditionally involved in downstream activities as retailers and artisanal processors (frying, boiling, and drying). Women are getting more involved as primary traders and buyers at the auction places, emerging as entrepreneurs although their positioning is still relatively limited. **The women's overall participation in the VCs is around 15%.**

Job creation and employment

Most of the workers are **unqualified (>90%)**, independently of their skills. Traders and artisanal processors are **mostly self-employed**. There is little or no formal employment. Seasonal, temporary, partial jobs are seen in the seasonal fisheries (octopus, small pelagic) while in the finfish sub-chain, the activities are practiced the whole year long.

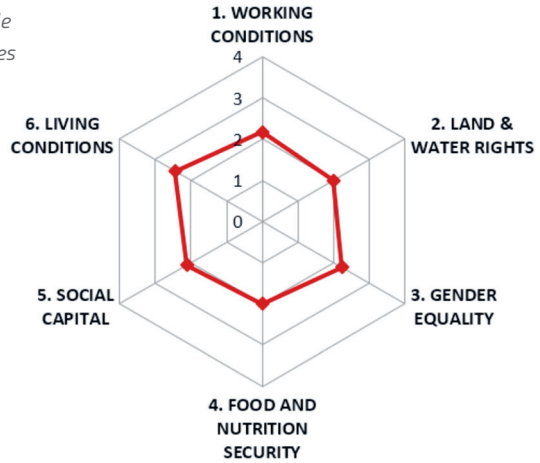
Although quite dynamic in terms of job creations and income, the coastal fisheries value chain in Zanzibar shows sign of inequality in income distribution among the actors and depending on the sub-chains. A high proportion of the value chain actors is vulnerable because they are highly dependent on fisheries and have limited capacity to adapt to socio-economic and biophysical stresses.

Is the value chain socially sustainable?

The following table and graph provide an indication of the main social consequences and context of the VC activities in six key domains.

Working Conditions	• Workers in coastal fisheries VCs are in informal sector where enforcement of rights, job safety and organization of workers is challenging. • People (including women and youth) are attracted by the VCs activities in spite of challenges but returns vary widely.
Land and Water Rights	• Previous fisheries policy criticized for being insufficiently aligned with SSF Guidelines. A National Program of Action (NPoA) to implement SSF Guidelines has been drafted. • Fishers "property rights" affected by protected areas and coastal developments, particularly tourism, with limited benefits to local people. • Land policy/ law implementation: no recent private large-scale acquisitions in coastal fisheries VCs. Level of prior disclosure for coastal development investments not clear suggesting need for more transparency, accountability, public participation; rules not always followed and compensation not always appropriate.
Gender Equality	• Increasing involvement by women in coastal fisheries postharvest activities (exception of octopus), but relatively low in production. • Some women economically empowered through fisheries VCs. Other women, and men, are vulnerable. • Division of labour is unequal; women increasingly expected to earn and do household work. • Women's participation shaped not just by gender, but also by assets, education, etc.
Food and Nutrition Security (FNS)	• In ZNZ fish is frequently consumed (4.6 times/week); only 7% of households caught own fish; 87% purchased and the rest is traded or received as gift, aid, etc. • In fishing communities, fisheries make a direct and indirect (income) contribution to FNS. • Food production reported as decreasing in communities. FNS increasingly depends on households' ability to buy food. • Risks of dependency on income from fisheries VCs are high for fisher and also non-fisher households if stocks are not sustained.
Social Capital	• Coastal fisheries actors belong to a range of formal and informal organisations and are embedded in a complex web of social relations. • Goals, performance and inclusivity of organizations in fisheries VCs vary. Many fishers did not feel well represented. • Village Fishermen Committee (VFC) mainly comprise fishers and men; performance variable. • Formal support service capacity to fishers is generally weak.
Living Conditions	• Improved health facilities attributed to the government, although household spending on health is high. • Increasing and high proportion of houses considered "modern" (i.e. iron sheet roofs); fisheries income contributed. • Rural primary school net enrolment rate 78% in ZNZ; access to education has improved and now equal for both girls and boys.

Figure 5: Social profile of the coastal fisheries VC in Zanzibar



People are attracted, in spite of challenging working conditions, to these informal value chains. There are concerns regarding land, coastal resource property and small-scale fishers' rights. Women are increasingly participating in postharvest activities, but further improvements can be made. Fishing communities are increasingly dependent on purchased food, increasing their vulnerability to changes in fish stocks and food prices. In terms of social capital, many fishers reported limited representation and weak support. Education, housing and health facilities are improving for many; fisheries income is particularly contributing to housing. However, there are other social concerns e.g. increasing incidence of non-communicable diseases.

Is the value chain environmentally sustainable?

The environmental impacts of ZNZ coastal fisheries VC have been measured through the Life Cycle Assessment (LCA) methodology, considering three areas of protection: **Human Health, Resource Depletion**, and **Ecosystem Quality**. LCA results also show the VC's impact on **Climate Change**. Besides, the risks for **biodiversity** are presented.
From the environmental point of view, the most important phases defining the performance of the sector are the fishing and the processing phases. The phase associated with the transport refers mainly to exported seafood.

The coastal fisheries value chain in Zanzibar could be improved in terms of environmental efficiency. The main sources of environmental costs are the fuel combustion for fishing operations (especially for high-Fuel Use Intensity sub-chains, i.e., finfish longliners and ring-netters) and the combustion of firewood for processing (boiling and frying). The higher Fuel Use Intensity could be linked to the use of outdated engines. Similarly, the environmental burdens associated with the processing activities could be linked to the overall inefficiency of the equipment used (braziers). The regular reporting of landed fish products and a well-functioning data flow system are crucial for the evaluation of the effects of value chain activities on biodiversity.

Impact on areas of protection

Among the areas of protection, **Human Health** is the most impacted by the VC activities. The fishing activities of motorized vessels (Figure 6) are those contributing the most to potential damage to Human Health. The same applies to the frying process using firewood and vegetable cooking oil and the two-phase drying process (boiling using firewood and sun-drying) (Figure 7). The combustion of fuel and firewood release CO2, other greenhouse gasses (GHGs), and particulate matter damaging human health. Production of vegetable oil has also some negative outcomes due to land transformation and use of fossil fuels for planting, harvesting and processing.

Abiotic **Resource Depletion** associated with the VC mainly derives from the direct use of fuel during fishing operations and indirectly from the use of cooking oil, whose manufacturing requires fuels for planting, harvesting, and processing. Both processes involve fossil resource extraction.

The use of fuel for engine operations and cooking oil for frying can also affect the state of ecotoxicity and eutrophication of terrestrial and aquatic ecosystems, thus contributing to the degradation of **Ecosystem Quality**. The frying process has the highest potential impact on this due to the manufacturing process of vegetable cooking oil which leads to chemical pollution of soil and water, land transformation, and habitat loss. In addition, the boiling phase prior the sun-drying processing also shows relevant damage because of the use of firewood. However, a specific investigation regarding the use of firewood is recommended, as the firewood used during processing could be either actively cut in the forests or harvested from the ground.

The **Climate Change** impact category is the most affected by the fishing activities using fossil fuels. Those with the highest Fuel Use Intensity (FUI-amount of fuel per ton of landed seafood), the processing activities of the boiling and drying, and frying process contribute most because of the GHG and particular matter-related emissions of firewood combustion.

Biodiversity

Despite the weak reporting of landed products and the absence of up-to-date stock assessment, most of the fish stocks of ZNZ artisanal fisheries are classified as fully or overexploited. This information is corroborated by the perception of many fishers. This may be caused by the combination of: increased numbers of fishermen resulting in decreased Catch per Unit Effort; use of destructive fishing systems or practices, climate change that causes species to migrate.

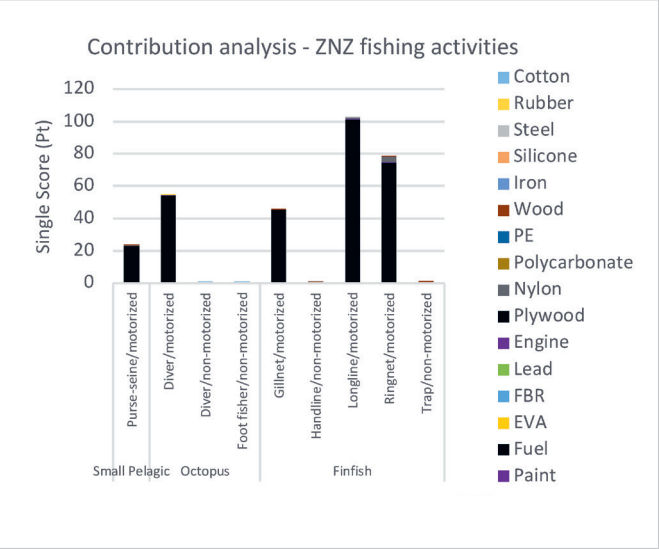


Figure 6: Contribution of fishing activities by sub-chain to the overall potential damage (for 1 t of landed seafood)

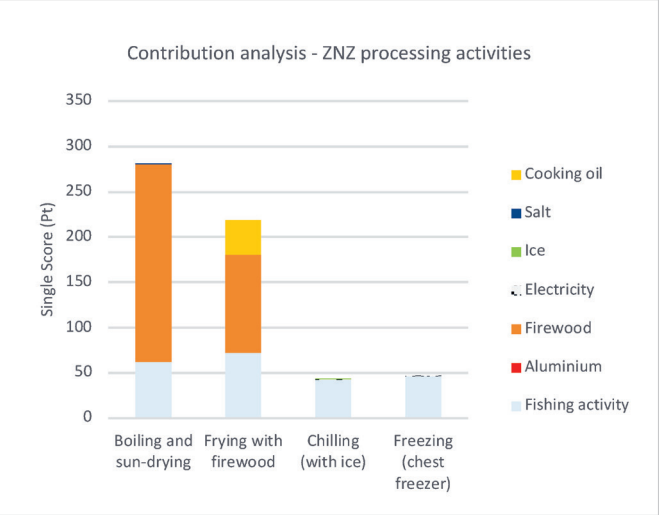


Figure 7: Impact of the processing activities in ZNZ on the overall environmental damage (for 1 t of processed seafood)

Main findings and recommendations

Main risks and findings

The coastal fisheries VC in Zanzibar **gives a very significant contribution to ZNZ economy, to livelihoods for fishing communities, to protein supply for the wider population as well as to the overall public finances.** The small pelagic sub-chain is growing in importance for the local economy, food security, and exports but a strong data collection system is needed to assess its sustainability and inclusiveness because a high degree of inequality exists among actors. The finfish sub-chain provides a major contribution to economic growth and food security but attention should be paid to the sustainable management of the resources. Concerning these sub-chains, there is a need to improve the co-management of stocks with Mainland Tanzania. Overall, the sustainability of ZNZ coastal fishery VC is highly linked to tourism development and the associated positive and negative impacts. Potential high threats to coastal fisheries are linked to the weak management of fish stocks and overexploitation risks, climate changes, ecosystem degradations, and degraded food safety and sanitary situations. A high proportion of VC actors and coastal communities are vulnerable because they are highly dependent on fisheries and have limited capacity to adapt to socio-economic and biophysical changes. In the context of the Blue Economy policy implementation, there is a challenge to achieve fair outcomes while managing the trade-offs between the coastal fisheries VC and the other sectors identified in ZNZ, such as marine conservation measures, tourism expansion, and oil/gas extraction activities.

Main recommendations

Data and information system

- Strengthen capacities (including technical and financial support) for data collection on actual catches and potential yields, improve the information flow and the collaboration among stakeholders.

Environmental issues

- Co-design ways of reducing the amount of fuel required per trip at sea, improving the efficiency of the kilns used for processing (as well as the choice of the fuel used for processing, i.e. LPG).
- Improve hygienic conditions and modernize infrastructure to reduce post-harvest losses.
- Decrease fishing efforts and create space for alternative income-generating activities, such as sustainable aquaculture.

Coastal fisheries in the context of Blue Economy

- Develop an integrated planning framework for all aspects of the Blue Economy and appropriate institutional arrangements.
- Develop actions in relation to the Blue Economy with all donors joined together in an organised group.
- Support responsible investments, e.g., through the application of principles of sustainable Blue Economy Finance.

Social issues

- Improve the alignment with the principles of the SSF guidelines.
- Give attention to understand the relationship between food and nutrition security and fisheries in coastal communities and nationally.
- Promote multi-stakeholder co-management initiatives, in ways that fairly distribute both costs and benefits.

Coastal fisheries issues in the context of Agroecology

- Explore how agroecology practices and principles can contribute to the economic, environmental and social sustainability of coastal fisheries systems

Anchovy drying in a landing and processing site in Zanzibar (Credit: R. le Gouvello)

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

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

The information and knowledge produced through the value chain studies are intended to support the Delegations of the European Union and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions. VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d-

This document is based on the report "Le Gouvello, R., Lamboll, R., Martini, A., Mgawe, Y., 2022. Value Chain Analysis of Coastal Fisheries in Tanzania. Report for the European Union, DG-INTPA. Value Chain Analysis for Development Project (VCA4D CTR 2017/392-416), 211 p + annexes. Only the original report binds the authors.