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Incorporating poverty and gender considerations in Marine Spatial Planning: Case study of the Tanga region in Tanzania

Technical Report

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PREFACE AND ACKNOWLEDGEMENTS

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1 Introduction

Marine Spatial Planning (MSP) is a strategic process for spatial planning of the use of the sea designed to bring about sustainable development of the "blue economy" through ecosystem-based management[1] and sustainable ocean governance (Douvere, 2008; Ehler & Douvere, 2009; Agardy, 2010, Schaefer & Barale 2011). A recurring critique of MSP is that it tends to be sector focused and fails to take all the complex social issues around space into account, such as the value of certain areas for marginalised groups (Flannery, Healy & Luna, 2018). MSP decisions are often accused of being centrally driven, favouring stakeholders that are resource strong and influential (International Monetary Fund, 2007; Jones, Lieberknecht & Qiu, 2016; Flannery *et al.*, 2018; Tafon, 2019; Saunders *et al.*, 2020). MSP can thus have negative impacts on vulnerable social groups that largely depend on marine resources for their food security and livelihoods.

The Swedish Agency for Marine and Water Management (SwAM) is supporting the implementation of MSP in the Western Indian Ocean (WIO) region and aims to have a regional approach in its MSP work. SwAM has recognised the potential risk that MSP fails to address the needs of society as a whole. With support from SwAM, Turpie *et al.* (2022) have developed a framework for incorporating poverty and gender perspectives in MSP. This involves incorporation of a Social Sustainability Framework into the overall approach, and the use of metrics and indices of relative poverty/prosperity and gender equality that are based on Sida's multidimensional poverty framework.

If following international guidelines for MSP, such as IOC-UNESCO's step-by-step approach, it can be a lengthy process (Ehler & Douvere, 2009). The approach involves a preparatory phase in which baseline data are collected, followed by an analytical phase in which alternative planning scenarios are evaluated. The next phases involve the development of spatial and management plans, the monitoring and evaluation of their impacts and adaptation of the plans as necessary. This report provides a pilot case of baseline data collection to better understand local communities' dependence on marine resources and other livelihood activities, with emphasis on understanding the role of marine spatial zonation and resource management on poverty and gender equality, and developing replicable methods to quantify these.

This case study is one of three studies undertaken in selected coastal areas of Kenya, Tanzania, and Madagascar. A total of 564 households were surveyed by a group of trained enumerators in the coastal stretch north of Tanga town, Tanzania, during December 2021. This information was supplemented by seven focus group discussions and key informant interviews. The methodology for this study and the overall analysis of poverty and gender metrics is provided in an accompanying report by Turpie *et al.* (2022). This supplementary report provides the detailed results of the baseline survey undertaken in Tanga, Tanzania.

[1] This entails adherence to the Malawi Principles. http://www.fao.org/3/y4773e/y4773e0e.htm

2 Study site description

In Tanzania, the study area was the Mkinga District within Tanga Region, which is located in the northeast of Tanzania. Mkinga District borders the Kenyan study area (Mulwa *et al.*, 2022) in the north, and has a coastline of about 50 km on the Indian Ocean. The coastline of Tanga has approximately 100 distinct coral reefs which are located 1-10km from the shore (Mcclanahan, Muthiga & Abunge, 2015). This coastline also has extensive mangrove forests and diverse fish species.

Households in the region fish, farm, engage in tourism activities, mine (cement and limestone), grow and process sisal[2] commercially or have small-scale businesses (Kihara *et al.*, 2021). The most common livelihood activities in the region are fishing and farming. The majority of households (63.7%) indicate that they have worked on agricultural (farming / raising livestock) or fishing activities in the last 12 months (Table 1). Households in the Tanga region on average work more on agricultural and fishing activities compared to the average Tanzanian household and compared to households further to the south of the Tanzanian coastline in Lindi. Households in the area of Pwani, just to the south of Tanga, on average engage just as much as Tanga households in agricultural and fishing livelihood activities (Table 1).

Table 1. Overview of household characteristics in the Tanga region and the neighbouring regions of Pwani and Lindi (data source: National Panel Survey published by Tanzania's National Bureau of Statistics in 2018; standard deviation in brackets)

	Tanga	Pwani	Lindi	Tanzania average
Household head age	45.3 (0.02)	47.4 (0.032)	48.3 (0.035)	43.9 (0.005)
Household head female	26.2%	24.3%	28.8%	28.8%
Household size	4.6 (0.003)	4.2 (0.004)	3.9 (0.004)	4.7 (0.001)
Number of habitable rooms	2.6 (0.002)	2.4 (0.002)	2.4 (0.002)	2.7 (0.000)
Number of children (age 5 to 17)	1.3 (0.002)	1.2 (0.002)	1.3 (0.003)	1.5 (0.000)
Work on household agricultural activities[1]	63.7%	46.3%	62.9%	55.1%

[1] in the last 12 months; including farming, raising livestock, fishing.

The capital of the Tanga region is the port city of Tanga which is expected to grow due to the East African Crude Oil Pipeline project, signed in the beginning of 2021. The oil pipeline will be built between Uganda's oil depots in the Albertine region and Tanga city (Chongoliani village) (Kyeyune, 2021). Shipping activities are recognized as an important sector for the economy with efforts underway to expand Tanga port to allow larger ships to dock in the harbour. However, over the years shipping activities have declined, even before the COVID-19 pandemic, mainly driven by the extra charges at the port due to double handling fees. Key informants on the local economy and shipping industry reported that COVID-19 reduced the amount of imported and exported goods even further which resulted in many shipping lines closing. The region currently imports more than they export which is largely attributed to an increase in port charges, long procurement processes, delays in inspection, corruption, delays in transhipment and poor port equipment.

[2] Sisal is a plant which is commonly used to make products such as rope or matting.

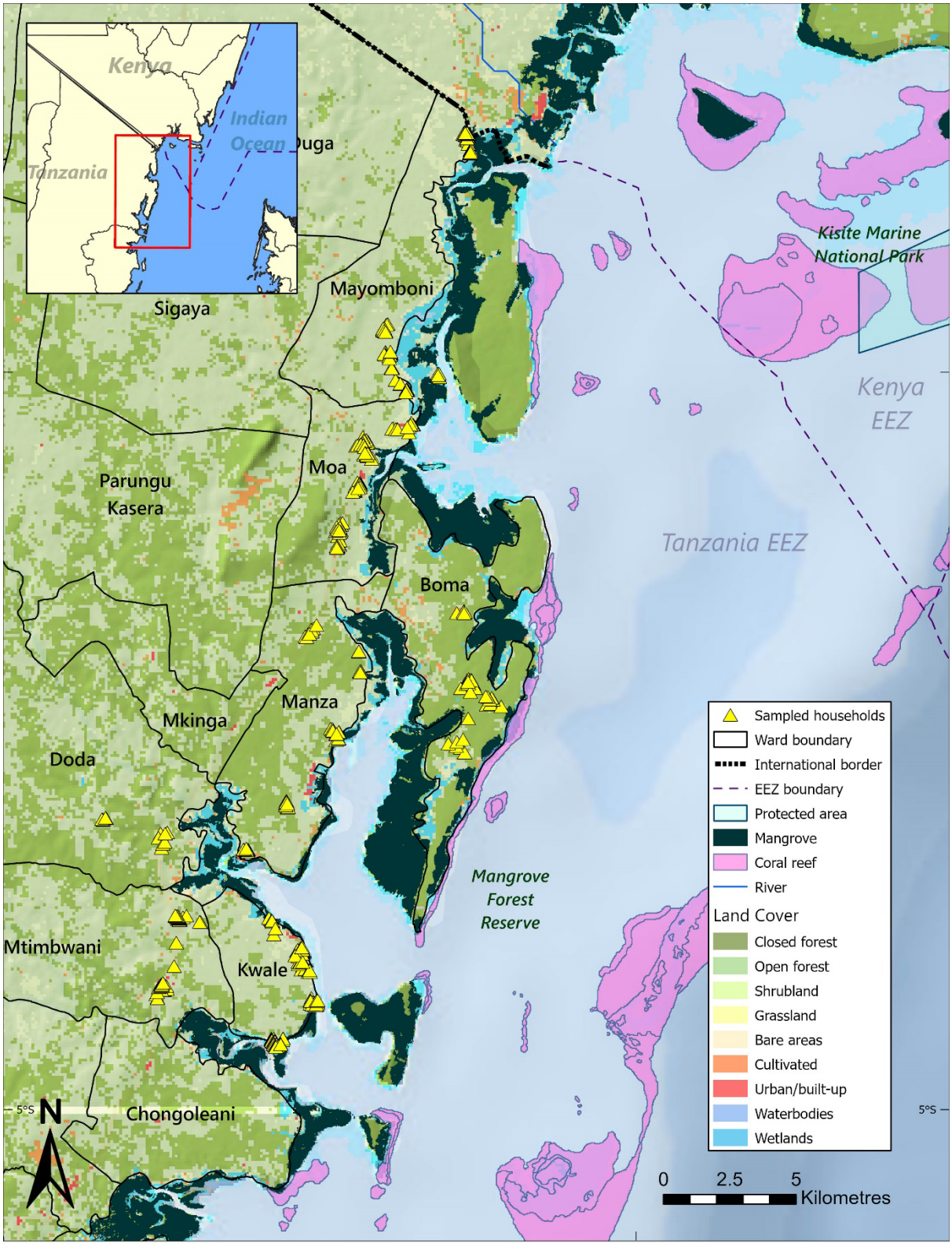

Figure 1. The Tanga region in the north-east of Tanzania shows the seven coastal wards of Mayomboni, Moa, Boma, Manza, Doda, Mtimbwani, and Kwale. The land cover, location of mangrove forests, coral reefs and marine protected areas are shown, as well as the location of households sampled in this study. Note that the Mangrove Forest Reserve comprises all the mangroves shown on the map.

The region has been experiencing severe degradation of its coastal and marine resources (Samoilys & Kanyange, 2008). An increase in fishing activities and the use of seine nets and dynamite for fishing has destroyed large amounts of coral reef. As degradation became more apparent, efforts were made to improve the coastal conservation and management in the region to ensure a more sustainable growth of the region (Samoilys & Kanyange, 2008). The Tanga Coastal Zone Conservation and Development Program (TCZCDP) was established in 1994 and focused on better management of fish stocks in collaboration with local communities. Communities were encouraged to collaboratively monitor and reduce the use of illicit fishing gear. Compliance with gear restrictions is seen as large success factor (Mcclanahan *et al.*, 2015).

3 Data collection

The study targeted households living within 10 km of the coast to capture those communities that could potentially be affected by changes in access to marine resources. Data were collected through focus group discussions, key informant interviews and household surveys. The data collection was carried out by staff and students of the University of Dar es Salaam. There were four supervisors and eight enumerators who were trained by the supervisors over two days. The supervisors were responsible for quality control and for holding the focus group discussions and key informant interviews.

3.1 Focus group discussions and key informant interviews

Thematic focus group discussions (FGDs) and key informant interviews (KIIs) were conducted in selected villages to collect information on different aspects of people's livelihoods and their poverty and gender dimensions. Focus group discussions were held on fishery-related livelihoods (including fishers, aquaculture producers, fish processors and traders), forestry (particularly mangrove) related livelihoods, and with women on their opportunities and roles in the community and at home. Key informant interviews were held on farming, tourism and marine conservation, industrial fishing, and the local economy. This allowed the research team to collect information of a general nature to avoid unnecessarily lengthy household questionnaires, such as resource descriptions, rules of access, equipment, seasonality, returns to effort, changes in availability, prices and inputs, and who is involved. Discussions took up to an hour and were semi-structured, following a discussion guideline which was developed in advance. Participants were reminded to speak on behalf of the entire community.

3.2 Household surveys

A total of 564 households were interviewed face-to-face in seven wards along the most northern stretch of coast in Tanzania. A representative sample of households was selected from a total of 21 coastal villages in the wards of Boma, Doda, Kwale, Manza, Mayomboni, Moa and Mtimbwani. Wards were grouped according to the coastal stretch which they access (Table 2).

Table 2. Number of households interviewed in the three study sites

	Frequency	Percent
Mayomboni-Moa	217	38.5
Doda-Manza-Boma	161	28.6
Mtimbwani-Kwale	186	33.0
Total	564	100.0

Household sampling effort per village was guided by information on village populations from census data. At the village level, households were randomly selected with the help of village headmen and given unique serial identifiers. Global Positioning System (GPS) coordinates were collected for each of the households surveyed. Enumerators interviewed one or more household members (male or female) who were the household's main decision-maker (and above the age of eighteen). In-person interviews were conducted in people's homes. Each interview took about an hour to complete.

The household surveys were programmed in Kobo Toolbox software[3] and executed face-to-face using smartphones or tablets (this could be done while offline). Using data collection software rather than paper questionnaires allowed for a faster interview process and reduced the likelihood of errors, overall resulting in more accurate data. The questionnaires were in English and were undertaken in the local vernacular by

[3] Kobo Toolbox is a free open-source software which was developed by the Harvard Humanitarian Initiative for data collection in challenging environments.

the enumerators. Completed questionnaires were checked by the supervisors before final submission to the online platform. The questionnaire design, programming and operation was tested through role play exercises during the enumerator training, in a pre-testing of the survey in the field. After the pre-test, final adjustments were made to the household survey and updated on the enumerator's devices.

3.3 Household questionnaire design

The household questionnaire was divided into several sections: Sections A and B covered the demographics and socio-economic background, and the residence and neighbourhood characteristics, and included questions on sources of energy and water, household assets and distances to services and markets. Section C covered employment and income for each member of the household, including economic sector of formal or informal employment. Here, broad information on dependence on household production activities, pensions, and welfare was also collected.

Section D then covered livelihood activities in more detail, fishing (boat-based and shore-based), other ocean related livelihood activities (mining for sand and coral, salt production, mariculture, and tourism), agriculture (crop production, poultry, and livestock), mangrove and other forest-related activities (timber, charcoal, and firewood), plant related activities (wild foods and medicines), and hunting. For each of these, respondents were asked to describe their participation, production, sales, and gender roles. For livelihood activities, households were first asked to estimate production or income in the last month and were then asked to provide an estimate for the past 12 months. Questions about marine activities included some details on location and status of resources as applicable.

Section E covered security and voice. This included levels of agreement on several statements about community and household harmony, questions on membership of organisations and questions on the extent of involvement of women in decision making.

Section F went into more detail on the status of marine resources and their use and management in the respondent's local area. These sought to understand household perceptions on the health of marine ecosystems and resource stocks, what they thought about existing regulations and their enforcement, and what they thought about different commercial activities in the area.

Section G comprised a choice experiment which is described and analysed in a separate report (Turpie *et al.*, 2022), while section H comprised questions on the impact of the pandemic on household income and activities. Finally, at the end of the interview, enumerators recorded the GPS location, their own details, details of who was present at the interview, whether the female(s) present seemed able to express themselves freely, the overall quality of the interview in terms of likely reliability of the information given, and whether the choice question was properly understood.

4 Household demographics and living conditions

Most household heads were male (65.6%) with an average age of 46.4 years, and commonly had either primary or no level of completed education (Table 3). Most household heads were married. The average household size was around six people and households had on average lived in the area for 33.3 years. Households generally did not own many assets: from a list of 16 assets, the average number owned was only about 3.5 (Table 3).

Table 3. Household demographics summary statistics by wards. For figures summarised as means, the standard deviation is given in parenthesis.

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Sample size	217	161	186	564
Male household head	56.7%	78.9%	64.5%	65.6%
Average age	45.6 (14.4)	46.3 (15.5)	47.3 (14.6)	46.4 (14.8)
Married incl. polygamous marriage	71.0%	82.6%	72.6%	74.8%
Level of education:				
None	22.6%	22.4%	19.9%	21.6%
Primary	53.9%	58.4%	54.3%	55.3%
Secondary	9.2%	6.8%	8.1%	8.2%
Higher education	0.5%	1.9%	2.2%	1.4%
Some but not completed	13.8%	10.6%	15.6%	13.5%
Household size	6.4 (3.0)	6.1 (2.6)	5.8 (2.8)	6.1 (2.8)
Number of children (age 0-12)	2.2 (1.7)	1.8 (1.4)	1.7 (1.5)	1.9 (1.5)
Number of youths (age 13-17)	0.9 (1.0)	1.2 (1.2)	1.1 (1.1)	1.1 (1.1)
Number of years in the village	30.5 (19.2)	35.3 (19.0)	34.9 (19.0)	33.3 (19.2)
Average number of assets	3.4 (1.6)	3.7 (1.6)	3.6 (1.7)	3.5 (1.6)

The most owned assets were houses, farmland, phones, and mobile phones (Table 4). Farmland ownership was most common in Doda, Manza, and Boma. Dhow and canoe ownership was most prevalent further to the south of the study area.

Table 4. Percentage distribution of households by assets owned, across wards and across the entire sample

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
House	85%	92%	86%	87%
Farmland	56%	66%	56%	59%
Phone	54%	45%	56%	52%
Mobile phone	34%	46%	42%	40%
Radio	31%	32%	34%	32%
Bicycle	31%	37%	28%	32%
Motorbike	17%	16%	17%	16%
TV	17%	10%	15%	14%
Dhow*	2%	10%	6%	6%
Canoe	2%	8%	6%	5%
Fridge	4%	2%	6%	4%
Motorboat	4%	0%	4%	3%
Car	1%	1%	1%	1%
Truck	0%	1%	0%	0%

Note: tuktuk and minibus was removed from the list because no household had these.

* A dhow is a traditional sailing boat, which commonly has one mast in this region.

Across all wards, the main source of energy for cooking was firewood (86%) or charcoal (14%) (Figure 2). For lighting, most households used solar energy (52%) followed by energy from the public electricity grid (26%). In the southernmost wards, households more commonly used solar panels to light their homes.

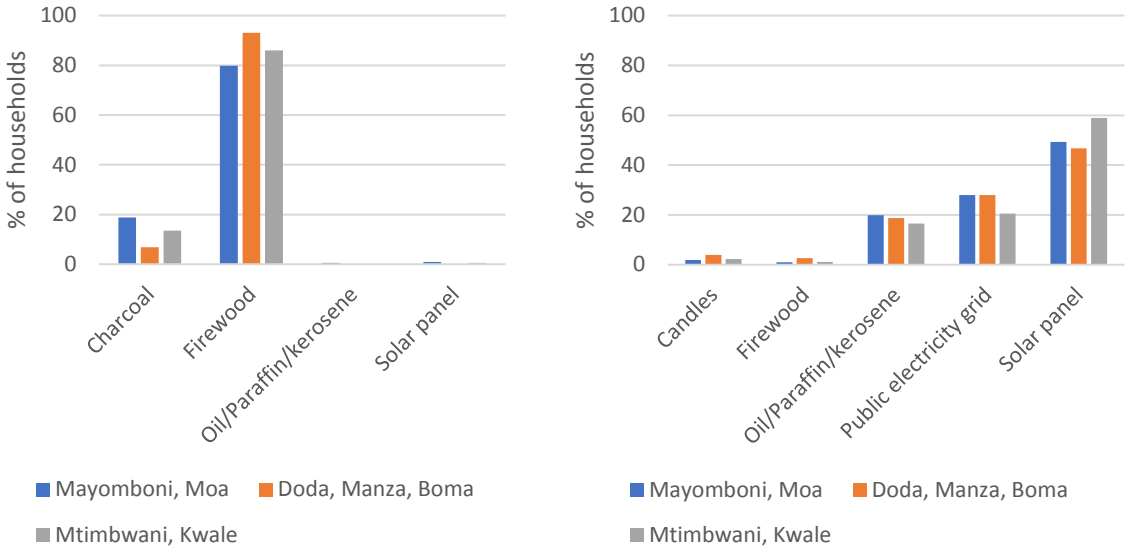

Figure 2. Percentage distribution of main sources of energy used for cooking (left) and lighting (right) across wards

Most households (75%) used a well or borehole for their daily water supply (Figure 3). However, households in the southernmost wards had more access to the public water system and therefore relied less on well or boreholes compared to the wards which are further north along the coast. Only a few households used rainwater tanks or river water.

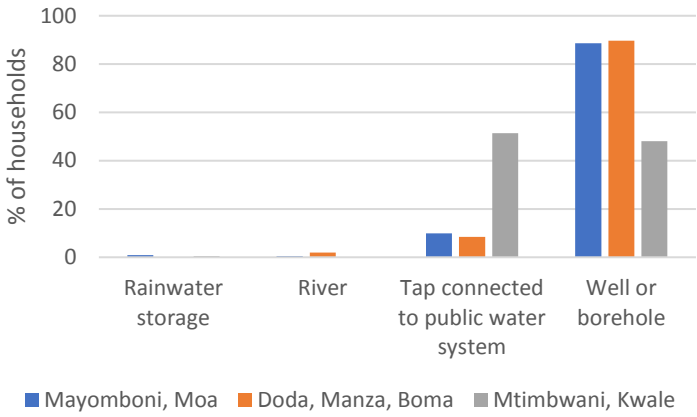

Figure 3. Percentage distribution of main sources of water across wards

Across all wards, households generally lived close to the nearest school and nearest clinic as the most chosen answer was “10 minutes or less” (Figure 4). However, in most wards it took households more than 30 minutes to get to the closest market (Figure 4).

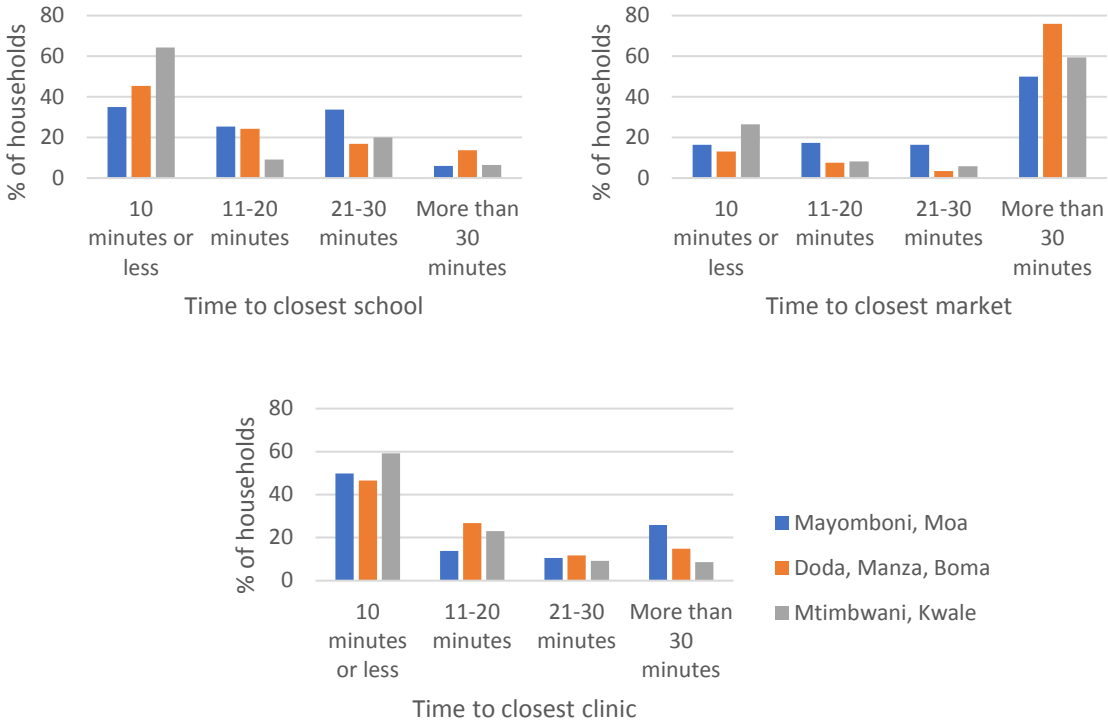

Figure 4. Percentage distribution of time that it takes households to get to the closest school, market, and clinic across wards

Overall, households rated the level of government services in their area as average (Table 5). Government services included the quality of public roads and recreational spaces, water, electricity and sewage, educational facilities, and public health services. Households in the southern part of the Tanga coast, closer to the city of Tanga, seemed to be slightly more satisfied with the level of received services. Only 15% of households in the most southern wards (Mayomboni-Moa) rated government services below average, compared to 45% in the wards further to the north (Doda-Manza-Boma) and 35% in the northernmost wards (Mayomboni-Moa).

Table 5. Level of satisfaction with government services on a scale of 1 to 7 (where 1 is very poor and 7 is excellent; 4 is average) across wards

	N	mean	sd	Median
Mayomboni-Moa	217	3.9	1.5	4
Doda-Manza-Boma	161	3.8	1.3	4
Mtimbwani-Kwale	186	4.3	1.1	4

Households were also asked to rate their agreement with statements about their community. Households across all three areas tended to agree that life in their community is harmonious and peaceful (Table 6). Households on average did not seem to have conflicts over access to resources. However, households in the Doda-Manza-Boma area tended to agree more that there were conflicts over resources. Overall, households tended to agree that local government officials were trustworthy.

Table 6. Mean score for the level of agreement with statements about the state of the community across wards (from 1 = strongly disagree to 7 = strongly agree)

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale
Community is harmonious	6.4	6.4	6.4
Life in this area is peaceful	6.3	6.4	6.4
There is conflict over access to resources in this area	3.1	4.2	3.6
Local government officials are trustworthy	5.8	5.7	5.9

5 Resources and Income

5.1 Employment and sectoral breakdown

Across all wards, households tended to earn an income from paid employment – on average 73% of households (Table 7). Across all wards, paid employment seemed to be somewhat spread evenly between men and women – on average 54.3% of employed household members were male.

Table 7. Percentage distribution of household members with employment and male household members with employment by ward

	% of hh with employment	Employed hh member is male (%)
Mayomboni-Moa	73.7	47.6
Doda-Manza-Boma	70.8	55.6
Mtimbwani-Kwale	73.7	54.3
Overall	72.9	51.9

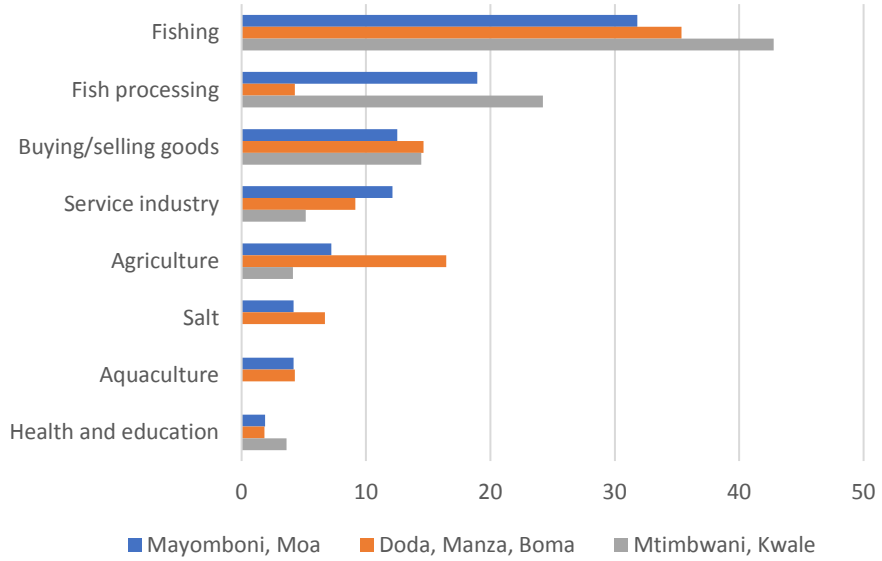

Figure 5. Sectoral contribution to employment across wards

The most common paid employment sectors were fishing, fish processing and buying/selling goods (Figure 5). The fishing and fish processing sectors were most important for employment in the southernmost wards. Buying / selling goods was equally important across all areas. Agriculture was most prevalent in the Doda-Manza-Boma area.

According to a key informant from the local fish processing industry, most fishing businesses are not legally registered. Industrial fishing mainly focuses on octopus and catfish. The key informant suggested that the fishing industry mainly buys fish from Moa, Boma, Kwale (particularly Monga Vyeru) and the city of Tanga. Industrial fishing is obliged to stay out of closed areas, but there are no closed seasons. June and July are commonly considered to be a "low" season, due to adverse weather conditions, during which most fishers do not fish unless they have specific types of gear for catching octopus and kingfish. February to May reportedly is the best fishing season for fishers using hooks and lines, mainly catching kingfish, shellfish, and sword fish. August to December is a good season for fishing whitebait (small or juvenile fish). The best time for octopus is between June and July. According to a key informant from the fishing industry, fishing

restrictions are enforced for different types of species such as octopus. Fishermen are not allowed to harvest octopus of less than 500 g. Fishermen reportedly break these rules which has led to significant reductions in octopus stocks. Octopus stocks were estimated at 239 tons in 2016, 235 tons in 2017, 226 tons in 2018, 67 tons in 2019, 14 tons in 2020, and 22 tons in 2021 (key informant, general manager in the local fishing industry). The key informant attributed this significant decline to illegal fishing activities and catching under-sized octopus. The price of fish has increased significantly over the years, which was believed to be attributed to decreases in fish stocks. In the focus group discussions, fishers voiced their concern about the state of the fish stocks and their belief that if no measures are taken to control octopus fishing, the resources would be completely depleted. They suggested introducing closed seasons to allow the octopus stocks to recover from overfishing.

Focus groups and key informants also reported that in the fishing and fish processing sector, women are mainly involved in grading, cutting, processing, and cleaning activities while men are responsible for collecting fish stocks, transporting, icing, packing and loading. Activities that are performed by both women and men were sorting and grading of fish (most commonly by size). The differences in tasks are often due to the degree of strength needed.

Table 8. Percentage distribution of households identifying a certain marine sector as a key source of formal employment across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Marine fisheries	64.5	70.2	82.8	72.2
Don't know	11.1	13.7	5.4	9.9
Desalination	18.4	5.0	0.0	8.5

Households were also asked which marine sectors were a key source of formal employment. Their perception was that marine fisheries were by far the most important source of formal employment (Table 8). The second most common answer was “Don’t know” followed by “Desalination”, which was most likely a confusion with salt production. Many households in the Mayomboni-Moa area engage in salt making but desalination is not a common industrial activity. Most households thought that their community was fairly represented in the blue sector formal jobs (Figure 6).

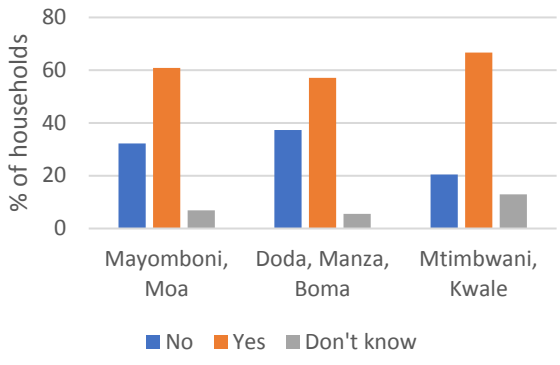

Figure 6. Percentage of households that agree / disagree that they are represented in the blue economy

During the household survey, households were asked to rate the differences in opportunities in the marine sector perceived by gender (men, women, youth) on a seven-point Likert scale, where 1 = strongly disagree and 7 = strongly agree. Household responses indicated that marine economy jobs were mostly available for the youth and men but not for women (Table 9). Households in the Doda-Manza-Boma area tended to rate

the level of opportunities for household members lower than households that live further north or south along the coast.

Table 9. Mean score for the level of opportunities in the marine sector for men, women, and youth across bays (from 1 = strongly disagree to 7 = strongly agree)

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale
Men	5.6	4.9	5.6
Women	4.4	3.1	3.6
Youth	5.5	4.6	5.2

5.2 Participation in different livelihood activities

The most common livelihood activities in the Mkinga district along the Tanzanian coast were growing crops, followed by farming poultry, collecting firewood, fishing offshore, and trading fish (Table 10). Offshore fishing and fish trade was most common in the southernmost wards (Mtimbwani-Kwale). Growing crops and farming poultry was most common in the Doda-Manza-Boma area.

Table 10. Percentage of households engaging in various livelihood activities across wards, and across the study area sample as a whole.

% hh	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Crops	41.5	62.9	50.5	50.5
Poultry	47.0	51.3	52.2	49.9
Firewood	23.0	65.6	41.9	41.4
Offshore fishing	28.7	33.5	45.7	35.3
Fish trading	32.3	21.1	46.2	33.7
Petty trade	24.4	20.5	20.0	21.9
Livestock	20.3	29.8	14.0	20.9
Inshore fishing	11.1	32.3	22.0	20.7
Mariculture	18.0	16.8	8.7	14.6
Salt making	12.0	18.6	3.2	11.0
Wild plant raw materials	1.8	11.8	6.5	6.2
Wild plant foods	0.9	8.7	4.3	4.3
Mining	0.0	3.1	0.5	1.1
Timber & poles	1.4	0.6	0.5	0.9
Charcoal	1.4	0.6	0.5	0.9
Tourism	0.0	0.6	1.1	0.5
Hunting	0.0	0.0	0.5	0.2

5.3 Fishing and fish trading

Fishing is a common livelihood activity in Tanzania and makes significant contributions to household income and food security (Jiddawi & Öhman, 2002). Given communities' high reliance on natural resources, sustainability needs to be mainstreamed into resource management and poverty reduction strategies (Tobey & Torell, 2006). Most fishing along the Tanzanian coast is done on a small scale using traditional boats such as dhows or canoes. Artisanal fishing accounts for 95% of the catches (Jiddawi & Öhman, 2002) and there has not been any industrialisation of the sector (Sekadende *et al.*, 2020). Local communities use coral reefs, mangrove forests, seagrass and estuaries for their fishing practices with reef fish being the most targeted fish (Jiddawi & Öhman, 2002). Fishing also supports a large number of people that are

processing and selling fish. However, fish stocks have been declining drastically along the Tanzanian coast; long-term records of fish landings showed a decline of 50% (1984-2016) (Silas *et al.*, 2020).

Offshore fishing

Offshore fishing was defined as boat-based fishing (by motorised boat, dhow or canoe) out at sea around offshore islands, offshore reefs or the deep sea. Offshore fishing was most prevalent in the southernmost part of the study area, in the Mtimbwani-Kwale area, where 45.7% of households had at least one household member going out to sea (Table 11). Very few households had any female household members going offshore fishing. These findings are in line with de la Torre-Castro *et al.* (2017) who find that no women had access to the open sea in their study of marine resource use and gender in Zanzibar.

Table 11. Percentage of households that have at least 1 household (hh) member / 1 man / 1 woman fishing offshore by wards

	At least 1 hh member	At least 1 man	At least 1 woman
Mayomboni-Moa	28.7	28.7	0.9
Doda-Manza-Boma	33.5	33.5	1.2
Mtimbwani-Kwale	45.7	45.2	1.1
Overall	35.3	35.6	1.1

Most offshore fishing took place just off the coast from where the households lived (Table 12). While many households tended to fish to the north or south of their villages, there did not appear to be any overall trend or convergence on any particular area.

Table 12. Percentage of households fishing north, south or around their homes across wards

	Further to the north of here	Further to the south of here	Offshore from around here
Mayomboni-Moa	12.7	20.6	66.7
Doda-Manza-Boma	7.8	11.8	80.4
Mtimbwani-Kwale	16.0	16.0	68.0
Overall	12.7	16.4	70.9

Offshore fishing was mostly done in the open sea with motorised boats in the Mayomboni-Moa area (Figure 7 and Figure 8). Households in the Doda-Manza-Boma area also mostly fished in the open sea but predominantly used canoes or dhows. Dhows are commonly used to catch fish further offshore while canoes are commonly used for inshore activities (Jiddawi & Öhman, 2002). Fishermen likely used outrigger canoes which are more suitable for offshore fishing. Further to the south, in the Mtimbwani-Kwale area, households used a mix of canoes, dhows and motorised boats for their offshore fishing activities. Across all wards, most households (65-69%) did not own the boats they used for fishing. Shared ownership of boats was much more prevalent amongst households in the Mayomboni-Moa area (Figure 9). Focus groups reported that households share their equipment through renting, especially motorised boats which cost between 20,000 to 40,000 TSh a day to rent. Previous studies found that coral reef fish are most commonly caught fish due to their easy access using traditional fishing methods (Jiddawi & Öhman, 2002).

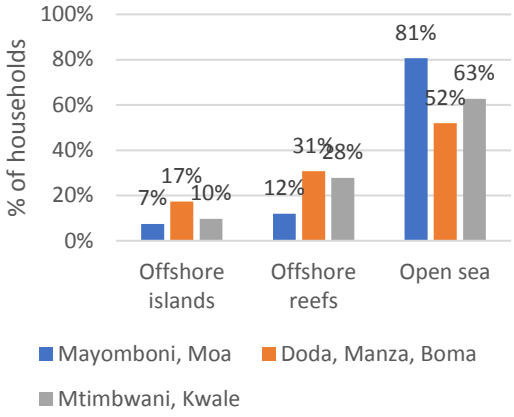

Figure 7. Most used fishing grounds

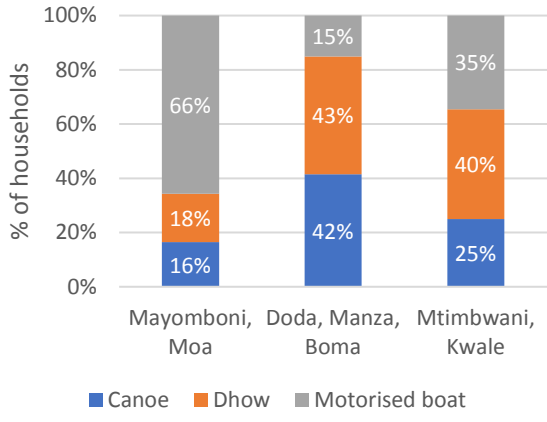

Figure 8. Most commonly used boat type

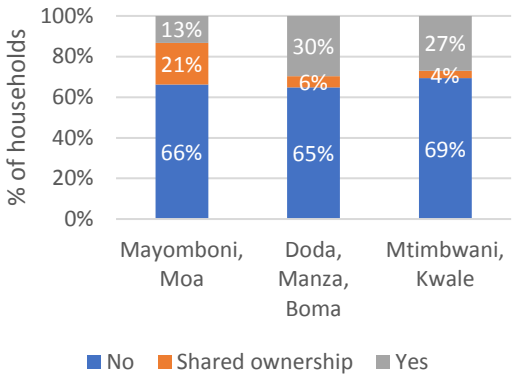

Figure 9. Boat ownership

The most important offshore fish species were small pelagics, large pelagics and demersal fish (Table 13). Pelagics is a term for fish which live in open oceanic waters (= pelagic zone), while demersal fish live close to or on the ocean floor. Small pelagics include prey fish such as anchovies, sardines, herrings, and mackerels. Large pelagics include predatory fish such as tuna, king mackerel, and sharks. In the south of the study area (Mtimbwani-Kwale), households focused on prawn fishing, which was not as prevalent in the areas further north.

64% of households that engaged in offshore fishing activities indicated that they catch small pelagics. This is in line with previous studies (Jiddawi & Öhman, 2002; Sekadende *et al.*, 2020) which found that small pelagic fish are the most important fish species for Tanzanian fisheries. In fact, the number of fishing vessels catching small pelagics increased by around 37% between 2007 and 2013 (Van der Knaap, 2014). Small pelagics are more affordable and accessible than the other fish species (Sekadende *et al.*, 2020). Across all wards, close to 100% of the catches were sold. Large pelagics and demersal fish used to be the preferred fish species due to their higher value (Mwaipopo & Mahongo, 2020). However, fishers had to switch to small pelagics due to major declines in these stocks. Now there is evidence that the small pelagic fish stocks are also in decline, with catches of these having decreased over the last 5 years (Mwaipopo & Mahongo, 2020). This suggests that there is serious overfishing of offshore stocks in the study area, and that fishing livelihoods will not be sustained for much longer.

Table 13. Frequency with which respondents identified different types of fish as their most important offshore catch (in percent), across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Small pelagics	61.2	72.2	61.2	64.1
Large pelagics	13.4	18.5	14.1	15.1
Demersal fish	17.9	5.6	11.8	12.1
Other	6.0	3.7	3.5	4.4
Prawns	0.0	0.0	5.9	2.4
Sharks and rays	0.0	0.0	2.4	1.0
Lobster	1.5	0.0	1.2	1.0
Total	100.0	100.0	100.0	100.0

According to focus groups, fishers obtain annual fishing rights/permits from the district office at 20,000 TSh (USD 9)[4] and have to pay a small fee, 5% of the fish value which commonly ranges from 3000 to 5000 Tsh, to the beach management unit at the landing site. Five percent of sales are also paid to the district council.

Table 14. Prices for main fish species caught (source: focus group discussions with local fishermen)

Main species targeted or caught	January 2022 Price (TSh)
Octopus Octopus *vulgaris*	2500 to 6000/kg
Whitebait (collective term for immature fish fry)	5800 to 6500/kg
Blackspot Emperor *Lethrinus semicinctus*	5000/kg
Trevally/ Pompano/ Jackfish (family *Carangidae*)	5000/kg
Kingfish (family *Carangidae*)	6000 to 7000/kg
Yellowfin Tuna ("Johadiri") *Thunnus albacares*	5000/kg
Grouper (finfish family ***E**pinephelinae***)**	4000/kg
Lobster	120,000/kg
Valamugil buchanan	*3000/kg*
Skip Jack tuna *Katsuwonus pelamis*	3000/fish
Viroho (type of small sized fish)	18,000 - 30,000/10-litre bucket

On a good fishing day, according to focus groups, fishers catch around 10 kg of fish with an average price of TSh 2000 to 4000 per kg (

According to focus groups, fishers obtain annual fishing rights/permits from the district office at 20,000 TSh (USD 9) and have to pay a small fee, 5% of the fish value which commonly ranges from 3000 to 5000 Tsh, to the beach management unit at the landing site. Five percent of sales are also paid to the district council.

Table 14). During off season, fishers catch up to 2 kg which they either sell or use for home consumption. If they sell their catch during off season, they earn approximately TSh 4000 to 6000 per kg. Fishermen reported that the price of fish has been increasing due to decreasing fish stocks, increasing demand for fish, and the seasonality of some fish species.

Households reported that the fish stock reduced significantly and attributed some of this fish stock decrease to the increasing number of fishermen with no alternative jobs after finishing school especially for the youths. Fish stocks in the Doda-Manza-Boma area seemed to have been declining particularly strongly compared to the fish stocks in the other wards: more than 60% of households across these wards indicated that they perceive fish stocks to be "severely reduced" (Figure 10). Focus group discussions highlighted that local communities think that at the current rate of extraction and the population growth, fish stocks will be depleted if no measures are implemented to ensure resource use sustainability. These findings are in line

[4] USD 1= around 2 300 TSh as of 22nd March 2022

with previous studies, such as Silas *et al.* (2020), which find that between 1984 and 2016 catch per fishing boat dropped by 50%. Most of this decline (57%) was attributed to overfishing by the interviewed fishers in their study. According to Silas *et al.* (2020), 70% of fishermen along the Tanzanian coast changed from inshore fishing to offshore fishing in the last decade due to the large decline in inshore fish stocks.

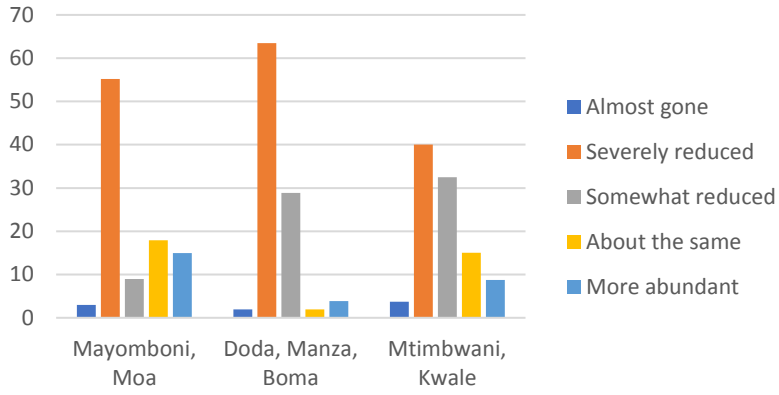

Figure 10. Percentage distribution of households' rating of abundance of offshore fish stock by ward

According to a key informant, restrictions are in place to prevent illegal fishing or illegal gear, such as the use of bombs, spear, dynamite, poison, nets with less than 1.5 inch. There are no closed seasons but closed areas where fishing is prohibited (marine reserve areas). Fishermen are also prohibited from catching certain species such as stingrays, dolphins, large mammal dugongs, and fish that are very small size.

The fishing restrictions are well enforced, involving house to house patrols and identifying illegal fishermen in the community who could be fined up to TSh two million (around USD 860), according to a key informant. Compliance with restrictions is enforced by both local communities and government especially with regards to the use of dynamite. However, bordering areas, such as Kenya in the north and Zanzibar to the east have different fishing restrictions which reportedly negatively affect fishermen from this region. According to discussions with local fishermen, enforcement of restrictions has dropped in recent years (since 2018) and as a result illegal fishing started to increase again. Local communities would like to see an increase in patrolling efforts to decrease illegal fishing from neighbouring districts.

Inshore fishing

Inshore fishing referred to any fishing activities that were done at the shore or in tidal areas, often in seagrass or mangrove areas. Inshore fishing was most common in the Doda-Manza-Boma area where 32.3% of households reported that at least one household member went fishing inshore (Table 15). Overall, very few women went fishing inshore (Table 15). Inshore fishing was much less common than offshore fishing: in the northernmost area, 28.7% of men went offshore fishing but only 10.6% went inshore fishing; in the southernmost area, 45.2% of men went offshore fishing but only 21.5% went inshore fishing. However, in the Doda-Manza-Boma area, both inshore and offshore fishing were equally as prevalent (Table 11; Table 15). Similar studies along the coast of Zanzibar find that women do not engage in fishing activities with gear or vessels but collect invertebrates in shallow areas and seagrass beds (de la Torre-Castro *et al.*, 2017).

Table 15. Percentage of households that have at least 1 man / 1 woman fishing inshore by ward

	At least 1 hh member	At least 1 man	At least 1 woman
Mayomboni-Moa	11.1	10.6	0.5
Doda-Manza-Boma	32.3	30.4	2.5
Mtimbwani-Kwale	22.0	21.5	2.2
Overall	20.7	19.9	1.6

The most important fish species caught inshore by men were finfish, tasi, octopus and prawns (Table 16). Men who caught fish species inshore in the northern areas focused on finfish (Table 16). Households in the Mtimbwani-Kwale area specialised in prawn fishing. Inshore fishermen in the Mayomboni-Moa area also target sardines (Table 16).

Women who fished inshore in Mayomboni-Moa only caught octopus. Octopus are commonly caught with sticks or spears during low time (Jiddawi & Öhman, 2002). In Doda-Manza-Boma, they mainly collected seaweed or seagrass (75%) while in Mtimbwani-Kwale, they caught a mix of finfish, mudfish, octopus, sharks and rays and tuna. Most inshore fishermen and women sell their catches (about 81% for men and 88% for women) across all wards. Future surveys should also ask about collection of shells, as previous studies have highlighted the importance of ornamental shells for cash income (Jiddawi & Öhman, 2002).

Table 16. Percentage distribution with which respondents identified different types of fish as their most important inshore catch, by ward

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Finfish	39.1	38.8	17.5	31.3
Tasi	17.4	20.4	10.0	16.1
Octopus	4.4	10.2	15.0	10.7
Prawns	0.0	4.1	25.0	10.7
Tuna	4.4	10.2	5.0	7.1
Sardine	17.4	2.1	5.0	6.3
Squid	4.4	6.1	5.0	5.4
Cuttlefish	4.4	2.1	5.0	3.6
Sharks and rays	4.4	2.1	2.5	2.7
Lobster	0.0	0.0	5.0	1.8
Crabs	0.0	2.1	0.0	0.9
Scaleless fish	0.0	0.0	2.5	0.9
Shellfish	0.0	0.0	2.5	0.9
Turtles	0.0	2.1	0.0	0.9
Yellowish brown kingfish	4.4	0.0	0.0	0.9
Total	100.0	100.0	100.0	100.0

In the Doda-Manza-Boma area, men mainly fish at reefs while most of the inshore fishing in the areas further to the north and south was done in rivers or estuaries (Figure 11). Mangrove creeks were a more common inshore fishing ground in the areas further south.

Women in Doda-Manza-Boma only fish off the beach, while they only fish on reefs in Mayomboni-Moa (Figure 11). Women who fish inshore in the Mtimbwani-Kwale area do so in sand or mudflat area, mangrove creeks, or on reefs.

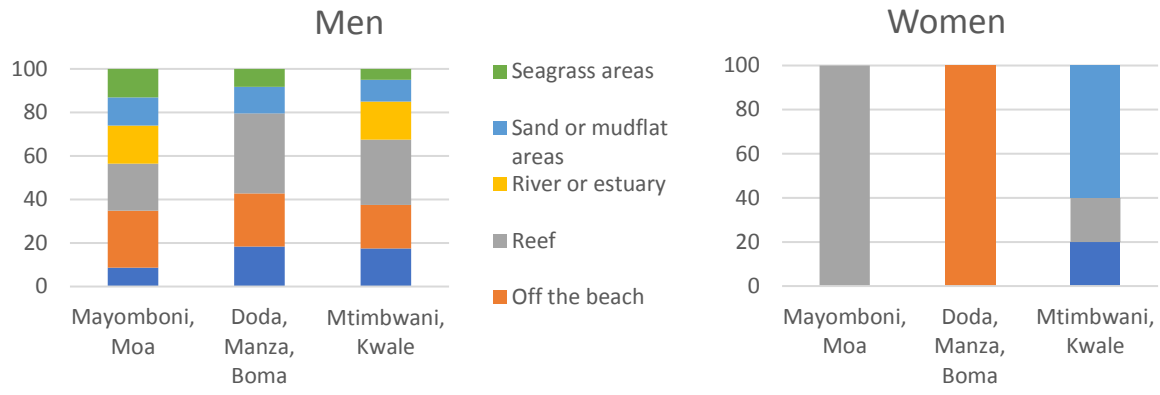

Figure 11. Percentage distribution with which men and women named different types of fishing areas as their primary inshore fishing areas.

Both men and women who fished inshore perceive the fish stocks to be severely reduced (Figure 12). Very few households indicated that they did not see a change in the availability of inshore fish.

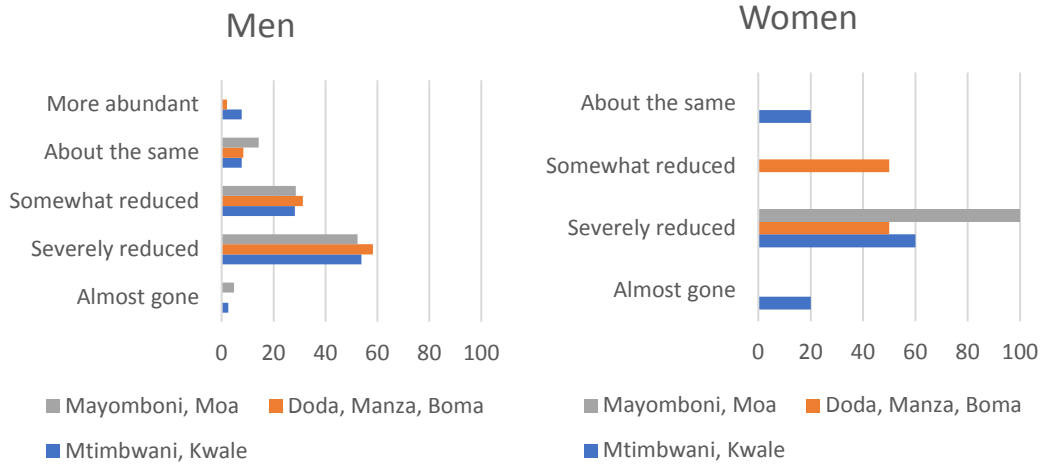

Figure 12. Percentage distribution of inshore fish stock abundance rated by men and women across wards

Fish trading

Most fish trading in the area was done in the Mtimbwani-Kwale area (Table 17). Most of this work was done by women. Fish trading is also a common livelihood activity for women in the Mayomboni-Moa area (Table 17). This finding aligns with previous studies, such as Jiddawi and Öhman (2002), highlighting the important role of women in processing and trading fish.

Table 17. Percentage of households engaging in fish trading and percentage of the work done by female household members across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Percentage of hh trading fish	32.3	21.1	46.2	33.7
Percentage of work done by women	76.6	67.2	73.4	73.5

5.4 Tourism

The study area does not comprise any marine parks or protected areas and is not a common tourism destination. Unsurprisingly, there were only three households in the survey sample which indicated that they provide tourism services – in Boma and Kwale. However, tourism could be developed in this area and provide income earning opportunities for local communities. A park official from the Tanga Coelacanth Marine Park was interviewed as part of this study to get more insights into the tourism industry in the greater Tanga region. The Tanga Coelacanth Marine Park comprises a 100km stretch of coast from the north of Tanga City to the north of Pangani River estuary. Tourism is an important income for marine reserve areas, closed areas where no fishing activities are permitted. Areas classified as marine parks (as opposed to marine reserves) allow local communities to extract resources and conduct tourist activities. According to a key informant from the Tanga Coelacanth Marine Park, the tourism industry is not male dominated, and a park official commonly earns between 1,000,000 TSh and 3,000,000 TSh. Tour guides reportedly make up to 50,000 TSh per day during peak season and up to 15,000 TSh during off peak season. December to January and the Easter holidays are regarded as peak tourism periods. The pandemic reportedly significantly affected tourism activities in Tanzania: the Tanga Coelacanth Marine Park had to let go of volunteers, a number of employees had to be laid off, and park's revenues dropped significantly which affected office operations.

5.5 Salt making

Salt making is mainly done in the Doda-Manza-Boma area by both men and women (Table 18). Salt making is also prevalent in the Mayomboni-Moa area where the work is done mainly by women (Table 18).

Table 18. Percentage of households engaging in salt making and estimated percentage of work done by female household members across wards and the entire sample

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Percentage of hh making salt	12.0	18.6	3.2	11.0
Percentage of work done by women	76.1	43.7	33.7	56.3

5.6 Mariculture

The Tanga Coastal Zone Conservation and Development Programme (TCZCDP), which was launched in 1995, has encouraged the development of mariculture and has focused on empowering women through mariculture activities (Samoilys & Kanyange, 2008). Mariculture is most prevalent in the Mayomboni-Moa area with most of the work being done by female household members (Table 19). The household survey showed that almost all the mariculture in the area is seaweed farming. Other studies, such as de la Torre-Castro *et al.* (2017), also find that the majority (67%) of seaweed mariculture in Tanzania is done by female household members. The dominance of seaweed farming is rooted in the initial development of the Smallholder Empowerment and Economic Growth through Agribusiness and Association Development (SEEGAD) project which was funded by USAID and encouraged seaweed farming (Samoilys & Kanyange, 2008). Only households in Doda indicated that they farm fish. The median plot size for mariculture was 1 acre.

Table 19. Percentage of households engaging in mariculture and percentage of work done by female household members across wards and the entire sample

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Percentage of hh engaging in mariculture	18.0	16.8	8.7	14.6
Percentage of work done by women	81.5	58.4	96.9	76.9

5.7 Mining

There are very few households indicating that they generate income from mining: only households in Doda-Manza-Boma where all mining work is done by women and Mtimbwani-Kwale where mining work is done by men (Table 20).

Table 20. Percentage of households engaging in mining and estimated percentage of work done by female household members across wards and overall

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Percentage of hh engaging in mining	0.0	3.1	0.5	1.1
Percentage of work done by women	NA	100.0	1.0	40.4

5.8 Mangrove harvesting

Very few of the wood products are from mangroves (Table 21). According to a key informant interview, national law requires a permit for cutting of mangroves in Tanzania. This includes cutting mangroves to make space for industrial salt production. Local communities are not permitted to cut mangroves for any domestic use or for sale. Therefore, very few of the households interviewed declared collecting any wood products from mangroves.

Table 21. Percentage of timber, poles, charcoal, and firewood production from mangroves by wards (median is shown in brackets)

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Timber	0.0 (0.0)	NA	0.0 (0.0)	0.0 (0.0)
Poles	0.0 (0.0)	18.0 (18.0)	NA	9.0 (9.0)
Charcoal	16.7 (0.0)	0.0 (0.0)	0.0 (0.0)	10.0 (0.0)
Firewood	4.0 (1.0)	3.3 (1.0)	9.5 (1.0)	5.5 (1.0)

5.9 Agriculture (crops and livestock)

About half of the interviewed households grew crops or kept poultry; livestock farming was generally less prevalent (Table 22). Crop farming was most common in the Doda-Manza-Boma area, followed by the Mtimbwani-Kwale area further south. Poultry farming was approximately equally important across all wards. Livestock farming was also most prevalent in the Doda-Manza-Boma area.

Table 22. Percentage of households engaging in farming activities across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Crop farming	41.5	62.9	50.5	50.5
Poultry	47.0	51.3	52.2	49.9
Livestock farming	20.3	29.8	14.0	20.9

The most common crops across all wards were potatoes and cassava, followed by maize and fruit (Table 23). According to a key informant from the agricultural sector, the main food crops in the area are maize, cassava, paddy, pigeon pea, cowpea, common beans, millet, and sweet potatoes. Common cash crops are cashew nuts, sisal and spices (cardamom, clove, cinnamon). The cash crops have a structured market for farmers to sell their crops. The key informant suggested that farming households mainly use hand hoes, ploughs and tractors which are shared or rented among local people. The farming seasons are from March to May and September to November. The communities practice both crop rotation and monocropping according to the key informant. Most people in the communities own their farming land.

Table 23. Percentage of various types of crops grown across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Potatoes / cassava	58.9	62.0	78.7	66.6
Maize	40.0	31.0	22.3	31.0
Fruit	24.4	27.0	19.2	23.6
Beans / legumes	18.9	9.0	10.6	12.7
Vegetables	5.6	5.0	8.5	6.3
Rice	3.3	2.0	9.6	4.9

Households in Mayomboni-Moa had larger areas that they used for cultivating crops (their mean plot size was 4.8 acres compared to 3.4 acres in Doda-Manza-Boma and 2.9 acres in Mtimbwani-Kwale). Farming across all wards was mostly done for household consumption: 75% of households indicated that they kept most of their produce for their own use. The key informant from the agricultural sector reported that if farming products are sold, farmers need to pay a market fee and an agricultural license fee which is paid to the council and at the local markets.

Farming activities were done by both men and women but were more female-dominated in the Doda-Manza-Boma area (Table 24). Men and women are involved in different farming activities, with women mainly involved in production and processing while men conducted most of the marketing activities according to a key informant from the agricultural sector.

Table 24. Percentage of farming activities done by women across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Percentage of work done by women	48.8	58.2	53.2	53.5

During focus group discussions, households reported that in the past few years, crop yields have been decreasing due to changes in weather patterns. Most households fish, make charcoal, or engage in small business activities when the harvest is severely reduced. To deal with the changes in climate, focus group participants suggested planting trees, having designated areas to store water during the rainy season that

could be used for irrigation during the dry months, having specific areas for feeding livestock to avoid conflicts between farmers and livestock keepers, and promoting the cultivation of annual crops.

5.10 Upland resource harvesting

The most common upland resource livelihood activity was firewood collection. Firewood was collected across all wards but was most prevalent in the area of Doda-Manza-Boma (Table 25). Most of the firewood collection was done by female household members (Table 26) and used for the households' own consumption. Across all wards, very little to none of the firewood was collected from mangroves (Table 21). Wood collection in coastal forests in Tanzania was previously found to be female dominated (de la Torre-Castro *et al.*, 2017).

Across all wards, around 22% of households made products for sale with most of this work (around 86%) being done by female household members. Products were mostly sold to locals, not tourists. However, 22% of households in Mayomboni-Moa indicated that they sell most or all of their products to tourists.

Table 25. Percentage of households engaging in various upland resource harvesting activities across wards

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Firewood collection	23.0	65.6	41.9	41.4
Making products	24.4	20.5	20.0	21.9
Plant raw materials	1.8	11.8	6.5	6.2
Wild food	0.9	8.7	4.3	4.3
Timber making	1.4	0.6	0.5	0.9
Charcoal making	1.4	0.6	0.5	0.9
Hunting	0.0	0.0	0.5	0.2

More households in the Doda-Manza-Boma area indicated that they collected plant raw materials or wild food compared to households in the other wards with most of this work done by female household members (Table 25; Table 26). Timber and charcoal making was not a very prevalent livelihood activity (Table 25). Only one household in this study sample indicated that they hunted.

Table 26. Percentage of the work done by women for selected livelihood activities

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Firewood collection	76.2	86.0	85.0	83.5
Making products	82.6	87.1	89.2	85.8
Plant raw materials	93.8	80.4	38.0	67.4
Wild food	62.5	69.8	53.3	63.7

6 Overall income

Most households in the study area received income from formal or informal employment (between 71% to 74%). Median annual household income from formal or informal employment was between TSh 1.2 and 1.8 million (Table 27). Median employment income was highest in the Mtimbwani-Kwale area followed by the Mayomboni-Moa area and the Doda-Manza-Boma area.

Table 27. Annual household income from employment (in TSh '000s), by ward

Wards	% of households receiving income from employment	% of this income made by female hh member	N	Mean	sd	Median
Mayomboni-Moa	73.7	52.0	156	3 060	4 490	1 710
Doda-Manza-Boma	70.8	35.0	111	2 014	2 282	1 185
Mtimbwani-Kwale	73.7	39.3	137	2 392	2 248	1 800

Households were also asked to divide their monthly income up into the various sources that it came from (employment, fishing, farming, pension and welfare, and remittances; Figure 13). On a household level, across all wards, most households reported that most of their monthly income came from fishing (around 50-60%) followed by farming (around 18-21%) and employment (14-18%; Figure 13). The contribution of fishing to household's monthly income was highest in the southernmost and northernmost wards while farming was most important for livelihoods in the Doda-Manza-Boma area. These results are in line with previous findings that fisheries are an important livelihood and income activity (Jiddawi & Öhman, 2002). Another study (Mwaipopo & Mahongo, 2020) found that 90% of men were involved in fishing and fish-related activities, which potentially included fishing employment and self-employed fishing activities.

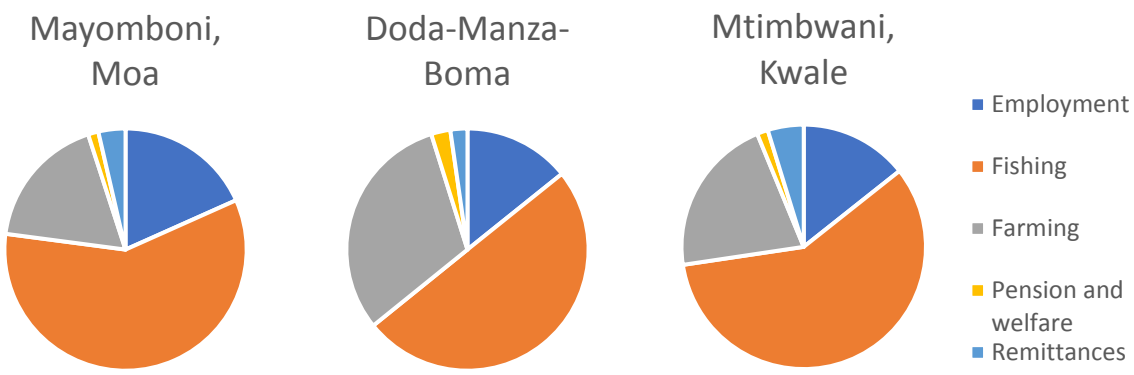

Figure 13. Household income sources across wards; indicated by respondents by dividing 20 beans to show how much the different sources contribute to their household's monetary income in a typical month

Income from livelihood activities included any income that households earned from fishing related activities (inshore / offshore fishing and fish trading), other ocean related activities (salt making, mariculture, tourism, mangrove harvesting activities, and mining), non-mangrove wood related activities (timber, charcoal, or firewood production), the collection of wild food or hunting, and farming activities (cultivating crops and raising livestock and poultry).

Table 28. Annual income from livelihood activities (fishing, farming, other marine activities, and upland activities, in TSh '000s) by wards

	N	mean	sd	median
Fishing				
Mayomboni-Moa	138	1 291	1 615	700
Doda-Manza-Boma	120	745	829	500
Mtimbwani-Kwale	155	1 225	1 303	900
Farming				
Mayomboni-Moa	151	149	387	0
Doda-Manza-Boma	129	146	221	50
Mtimbwani-Kwale	133	130	212	45
Other marine activities				
Mayomboni-Moa	61	503	557	360
Doda-Manza-Boma	55	724	938	450
Mtimbwani-Kwale	33	206	260	90
Upland activities				
Mayomboni-Moa	62	609	727	300
Doda-Manza-Boma	62	259	360	150
Mtimbwani-Kwale	56	460	564	300

Households in the northern part of Mkinga (Mayomboni-Moa) made the highest median annual household income from fishing and other marine activities (Table 28). Annual income from fishing included inshore fishing, offshore fishing, and fish trading. Households in the southernmost part (Mtimbwani and Kwale) generated the highest annual median household income from fishing and upland activities (Table 28). Southern wards made comparatively less income from marine activities other than fishing. The median household income from farming activities is low because most households did not sell their produce (Table 28). These calculations do not include subsistence production at market prices but only reflect households' cash-based income from livelihood activities.

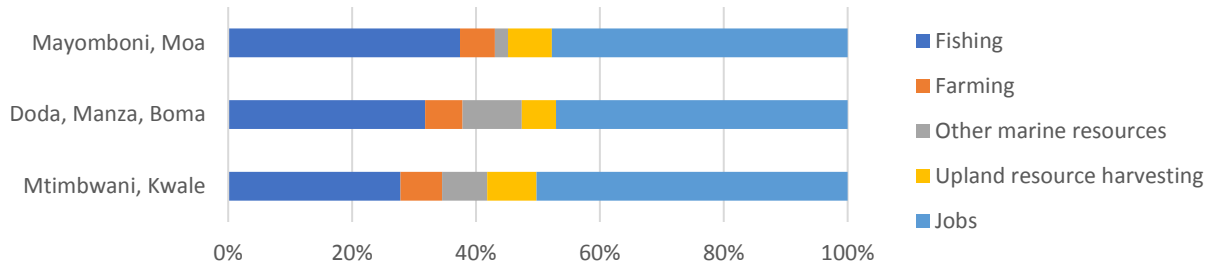

Figure 14. Percentage contribution of various income sources to household's total annual income, across wards

Households make approximately 50% of their annual income from employment and 30 to 40% from self-employed fishing (Figure 14). Farming, other marine resources, and upland harvesting activities play a less significant role in household's income (Figure 14). These results are different to the self-reported sources of income shown in Figure 13, where households indicated that around 50-60% of their monthly income is derived from fishing and only 14-18% from employment. This discrepancy might stem from households conflating fishing as employment and subsistence fishing activities. In fact, we find that out of the 198 households that indicated that they fish offshore 143 (72%) indicated that someone in their household has employment – more than 70% of the jobs were in the fishing sector. In the future, survey enumerators and supervisors need to ensure that households understand the difference between fishing for subsistence and fishing as employment.

Most of the fishing and farming income is made by male household members (Table 29). However, women are much more involved in the production of other marine resources and upland resource harvesting (Table 29).

Table 29. Percentage of household income from livelihood activities generated by women (average; median shown in brackets)

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Fishing	33%	18%	31%	28%
Farming	14%	22%	19%	18%
Other marine resources	70%	51%	68%	62%
Upland resource harvesting	89%	68%	82%	80%

Median annual household income from all livelihood activities combined in the southernmost wards was TSh 850,000 compared to TSh 750,000 in the northernmost wards (Table 30). Income from livelihood activities was lowest in the Doda-Manza-Boma area.

Table 30. Annual income from all livelihood activities across wards (in TSh '000s)

Wards	N	mean	sd	median
Mayomboni-Moa	203	1 326	1 586	750
Doda-Manza-Boma	156	1 052	1 135	720
Mtimbwani-Kwale	181	1 325	1 335	850

Median total annual household income (including income from all different sources) was highest in the southernmost wards (Mtimbwani-Kwale) (Table 31). On average, women earned between 34% to 46% of the annual household income (cash income) across all areas along the northern Tanzanian coast.

Table 31. Total annual income by wards (in TSh '000s)

Wards	N	Mean	sd	Median	% earned by women
Mayomboni-Moa	217	3 497	5 217	1 840	46.4%
Doda-Manza-Boma	161	2 445	2 577	1 600	33.5%
Mtimbwani-Kwale	186	3 052	2 854	2 210	36.7%

Livelihood per capita income (median and mean) as well as total income per capita (median and mean) was also highest in the southernmost area (Mtimbwani-Kwale), followed by the northernmost area (Table 32). Median and mean per capita incomes in the Doda-Manza-Boma were considerably lower in comparison.

Table 32. Annual total per capita income and per capita income from various sources by ward (in TSh '000s)

	N	mean	sd	median
Livelihood				
Mayomboni-Moa	203	231	276	144
Doda-Manza-Boma	156	186	198	121
Mtimbwani-Kwale	181	278	311	178
Total				
Mayomboni-Moa	217	609	894	336
Doda-Manza-Boma	161	469	522	310
Mtimbwani-Kwale	186	629	641	411

7 Gender roles and equality

7.1 Employment and livelihood activities of women

Women in the area engaged in different types of economic activities to men. Across all wards, the number of jobs were approximately evenly spread between men and women. Most employment was in the fishing or fish processing industry. Women did not commonly engage in inshore or offshore fishing activities – overall only around 2% of households indicated that they had a female household member going fishing from the shore. Men worked as fishers while women and children were involved in transport, cleaning, and processing of fish. Women were involved in all fishing processing and trading activities that required less manpower. Women commonly were food vendors and owned shops – most of the fish trading work in the area was done by female household members (73.5%). Other studies, such as Mwaipopo and Mahongo (2020), find that women are mostly engaging in petty trade, fish processing and selling cooked food.

Female household members were also more responsible for maricultural work, which was predominantly seaweed farming in the area. Mariculture was most prevalent in the Mayomboni-Moa area where 82% of work is done by women. Salt making was mostly done in Doda-Manza-Boma and Mayomboni-Moa. In Doda-Manza-Boma, salt making was a shared livelihood activity between men and women while the majority of the salt making work was done by female household members in Mayomboni-Moa.

Women were also involved in farming of paddy and cassava, collecting and selling firewood, or making straw mats. Focus group discussions highlighted that some activities, including baking and selling food, are traditionally female activities. Farming activities were done by both men and women but were more female-dominated in the Doda-Manza-Boma area. Firewood collection was also a female dominated livelihood activity – on average 84% of firewood collection was done by women. Women also made more products for sale across all wards (86% of production).

During focus group discussions it was pointed out that some women and female youth were prevented from conducting activities such as transporting fish and selling food by their husbands. In some households, women were asked to not engage in any income earning activities but to stay at home and take care of the kids while the husband provided for the family. De la Torre-Castro *et al.* (2017) also find a gendered labour division in which women are responsible to taking care of the kids and the household and mean engage in fishing activities.

7.2 Decision-making power in households

Women seemed to have a strong say in household decision-making. Most households indicated that women mostly or always had a say in how the household earns an income, how the household spends its money, where the household lives, the children's schooling and whether to have children or not (

Table 33). Very few households indicated that women did not have a say in household decisions. These results are in contrast to previous findings in the literature (for example see Torell *et al.* (2017)) which find that women commonly lack a voice in household decision-making.

Very few households answered that women are seldomly or not at all involved in household decisions: 5.1% of households indicated that women were seldom or not at all involved in income earning decisions, 4% in household expenditure decisions, 5.3% in decisions on where the household lives, 2.7% with regard to children's schooling, 3.2% in decisions on having children, 3.8% regarding their own occupations and activities.

Table 33. Mean score for the level of agreement with statements about women's decision-making power across wards (from 1 = strongly disagree to 7 = strongly agree)

Level of agreement with the following statements (1 = strongly disagree to 7 = strongly agree, (4 = neutral)):	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale
Women's involvement in decisions on:			
...how household earns an income	5.8	5.5	5.6
…on household expenditure	5.8	5.6	5.8
…on where household lives	5.9	5.6	5.7
…on children's schooling	6.2	6.0	6.1
…on having children	6.1	5.7	6.0
…on their own occupations and activities	6.1	6.1	6.0

The survey results were supported by the focus group discussions with women. During the open discussions, women suggested that they are involved in their household's decision making which included how they earn an income by agreeing as a couple on the best livelihood activities for both and cooperating. They described that in most cases, women in the community work collaboratively with their husbands, also in polygamous marriages.

7.3 Perceptions of household harmony

Households tended to agree that their lives were harmonious (Table 34). There did not seem to be any differences between the coastal areas. Only 1.1% of the surveyed households felt that their family did not function well (any level of disagreement with the statements of household harmony); only 1.2% of households felt negatively about their family's day to day interactions; 1.1% of households disagreed that their family members accommodate each other.

Table 34. Mean score for the level of agreement with statements about household harmony across wards (from 1 = strongly disagree to 7 = strongly agree)

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale
My family functions well for all members	6.4	6.4	6.5
My family's day-to-day interactions are peaceful	6.4	6.4	6.5
Family members accommodate each other	6.4	6.3	6.4

8 Household membership in community organisations

The most common membership organisations for men were political organisations and religious groups, including churches and mosques (Table 35). Very few male household members were members of farming or fishing co-operatives, despite their dependence on these activities for their livelihoods (Table 35).

Table 35. Percentage of male household members being part of an organisation across wards

Membership organisation type:	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Political organisation	12.9	24.2	22.0	19.2
Religious group	10.1	25.5	21.0	18.1
Business association or co-operative	7.8	7.5	4.8	6.7
Farming association or co-operative	2.8	4.4	2.7	3.2
Fishing association or co-operative	1.4	3.1	3.8	2.7
Neighbourhood security group	2.8	0.0	1.6	1.6
Environmental or conservation association	0.5	2.5	1.6	1.4
Educational, developmental or social welfare association	0.5	1.9	1.1	1.1

Similarly, women were also mostly part of political organisations. However, women were more likely to be part of a business association or cooperative (Table 36). As women are more involved in trading fish and in conducting petty trade, it follows that they would organise themselves more in business associations than men. Given their very low levels of inshore and offshore fishing activities, women commonly were not part of fishing associations or cooperatives.

Table 36. Percentage of female household members being part of an organisation across wards

Membership organisation type:	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale	Overall
Political organisation	13.4	19.3	21.0	17.6
Business association or co-operative	20.3	13.7	15.6	16.8
Religious group	7.8	19.3	10.8	12.1
Educational, developmental or social welfare association	3.7	6.2	3.8	4.4
Farming association or co-operative	2.8	5.6	2.2	3.4
Neighbourhood security group	0.9	0.0	2.7	1.2
Environmental or conservation association	0.9	0.0	2.2	1.1
Fishing association or co-operative	0.9	0.6	0.5	0.7

9 Household perceptions and preferences regarding marine ecosystem management

9.1 Household's perception on feeling heard on marine issues

There did not seem to be a big difference in terms of whether households felt that they are able to voice their concerns about coastal and marine management and that their concerns were heard across the coastal wards in the Mkinga district (Table 37).

Table 37. Mean score for the level of agreement with statements about coastal and marine management across wards (from 1 = strongly disagree to 7 = strongly agree)

	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale
Households are able to voice concerns about coastal and marine management.	5.3	5.3	5.2
Concerns about marine / coastal management are heard.	5.2	5.1	5.0

9.2 Household's perception on enforcement on rules

Most households supported marine wildlife conservation and agreed that there was a good balance between marine protection and the use of marine resources in the area (Table 38). On average, people felt that their marine life was healthy – which stands in contrast to their concern over diminishing inshore and offshore fish stock (see Figure 10 and Figure 12). Households did not seem to think that there were too many restrictions on fishing, such as closed areas, closed seasons, or permits. However, households in the Doda-Manza-Boma area tended to be more in agreement that there were too many fishing restrictions. Households in this area and the coastal areas further to the south also tended to disagree more that small-scale fishing is threatening the marine life. These are the areas where a substantial number of household members engage in inshore and offshore fishing.

Table 38. Mean score for the level of agreement with statements about marine resources across wards (from 1 = strongly disagree to 7 = strongly agree)

1 = strongly disagree to 7 = strongly agree, (4 = neutral)	Mayomboni-Moa	Doda-Manza-Boma	Mtimbwani-Kwale
The marine life is healthy	4.9	4.5	4.9
Fishing regulations are well enforced	5.0	5.1	5.4
Small-scale fishing is threatening the marine life here	4.1	3.7	3.7
Too many fishing restrictions	3.9	4.3	4.1
There is a good balance between protection and use	5.0	4.7	5.1
Industrial expansion will pose a risk to our marine life	3.8	4.4	4.3
Must ensure that inshore fishing areas are not impacted	4.6	5.2	5.5
Our household supports marine wildlife conservation	4.2	4.4	4.9
Ecotourism is an important source of income here	2.5	2.9	3.3
If government gets more taxes, it will deliver better services	5.4	5.4	5.7

Households tended to agree that the government would be able to deliver better services in the area if they got more taxes from large corporations. However, they would want to ensure that inshore fishing areas are not impacted by any future economic development – particularly in the coastal areas further south where households were more reliant on fishing.

While the stock of marine resources in the area has been decreasing over the last decades, competition over the increasingly scarce resources has been increasing (Tobey & Torell, 2006). Around 40% of households agreed to some degree that there were conflicts over access to resources in their area. More households in the Doda-Manza-Boma area indicated that they had some level of conflict (50%) compared to 33% in the northernmost and 40% in the southernmost area. Ecotourism did not provide an important income source to households.

9.3 Household preferences for future coastal developments

As demonstrated in the previous chapter, livelihoods were strongly dependent on fishing activities and employment, which also revolved around jobs in the fishing and fish processing sector. Commonly men were responsible for catching fish and women took part in preparing and selling fish. There were almost no women going fishing offshore or inshore. However, most of the fish trading was done by female members of the household. Mariculture was also a female dominated livelihood activity. Salt was made by both men and women. Mining and tourism were less important for local livelihoods.

If fish stocks were severely reduced, households in the district would take up alternative jobs in farming and running their own businesses according to focus group discussions. To ensure resource availability in the future, local communities were open to having alternative jobs that would reduce the focus on fishing activities, reduce illegal fishing and have closed seasons or areas to allow fish stocks to recover. Previous programmes, such as the TCZCDP, show that fishers are generally willing to move into livelihood activities other than fishing to reduce the pressure on fish stocks (Samoilys & Kanyange, 2008). Along the Tanzanian coast, fishermen would be willing to abandon fishing if fish stocks were to decline by 50% (Silas *et al.*, 2020).

Households were asked if they would vote for a situation where job opportunities were increased, if it had a negative impact on small scale or inshore fishing. The majority of households were open to reductions in small scale fishing opportunities if it meant better job opportunities in other sectors (

Figure 15). However, households seemed more opposed to changes that would come at the expense of inshore fishing, particularly in the southern part of the district (

Figure 15).

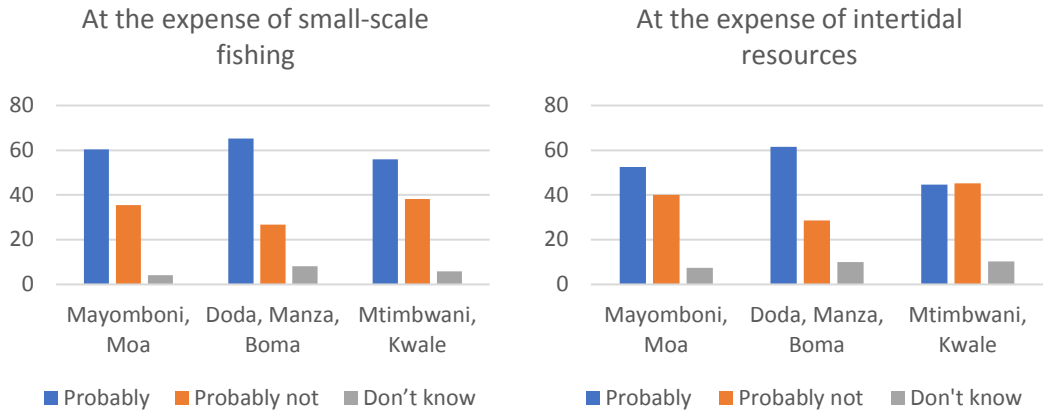

Figure 15. Percentage distribution of households' interest in employment opportunities at the expense of small-scale fishing and intertidal resources across wards

Households were asked which types of development would provide their household with the best income opportunities. Across all wards, households would like to see more economic developments in marine fisheries and fish processing (Table 39). Households in the northernmost wards were also interested in increasing desalination, transport, and tourism in their area. Households further to the south were equally

as interested in infrastructure and coastal tourism developments. Households in the southern wards, particularly, chose port development for their areas. The interest in infrastructure and port development might be due to the ongoing expansion of Tanga port. According to a key informant from the tourism industry in the area, the government is also planning to improve transport infrastructure to islands, which will improve tourist activities in the area.

Table 39. Preferences for different types of developments across wards

Mayomboni-Moa		Doda-Manza-Boma		Mtimbwani-Kwale	
Development 1st choice					
Marine fisheries	46.1	Marine fisheries	68.3	Marine fisheries	64.0
Desalination	13.4	Fish processing	11.2	Fish processing	16.1
Fish processing	12.9	Ports	5.60	Ports / Transport	3.76
Development 2nd choice					
Fish processing	30.0	Fish processing	25.5	Fish processing	46.2
Marine fisheries	18.9	Coastal tourism	14.3	Marine fisheries	12.9
Transport / Tourism	11.1	Transport	13.7	Coastal tourism	8.10

10 Conclusions and discussion

Earning income from employment was common and shared equally between men and women across the coastal wards in the Tanga region. Most employment opportunities were within the fishing and fish processing sector. Offshore fishing was more common than fishing from the shore and fishers mainly caught small pelagic fish – on average about 64% of catches were small pelagics. Fishing, both offshore and inshore, was a very male dominated activity – only few households had female household members going out to sea. Inshore fishing was less common among households and also a very male dominated activity, except for Manza where some women collected seaweed.

Previous studies in Tanzania showed similar allocations of different fishing tasks to women and men. For example, in Zanzibar, deep sea fishing is carried out entirely by men, while women tend to only utilise shallow areas and coastal forests for the collection of invertebrates and firewood, as well as seaweed farming (de la Torre-Castro *et al.*, 2017). Similarly, in the rest of Tanzania, men are linked to higher value offshore capture fisheries, while women are linked to lower value shore-based gleaning (Fröcklin *et al.*, 2013).

Median household income from fishing related activities was much higher in the Mtimbwani-Kwale area in the south of the region than further to the north, in the Mayomboni-Moa area or in the Doda-Manza-Boma area. The Mtimbwani-Kwale region was also where most of the fish trading happened – 46% of households in this area traded fish and most of this work was done by female household members. Previous studies have demonstrated that women commonly play crucial roles in processing and trading of marine resources (Schwerdtner Máñez & Pauwelussen, 2016). For example, Hagedoorn et al. (2021) found that women are more active in small businesses than men. Similarly, this study found that women were commonly food vendors and shop-owners.

Mariculture, most common in the Mayomboni-Moa region, was mainly done by women. Salt making, most common in the Doda-Manza-Boma region, was done predominantly by men (66%). Other marine related livelihood activities, such as mining or tourism were not common in the study area. Farming activities, including crop and poultry farming, were most prevalent in the Doda-Manza-Boma region; livestock farming was not as common. Most households, and predominantly female household members, collected firewood for their own use.

Approximately half of household's monthly income was generated from jobs, followed by self-employed fishing. Fishing contributed the largest percentage to monthly household income in the northern most region (Mayomboni-Moa). Along the coastlines, households were worried about reducing fish stocks and reported that they would be willing to take up alternative jobs if they reduced the pressure on fish stocks. However, household's responses suggested that new employment opportunities in the blue economy would most likely benefit the youth or men rather than women. Households were particularly interested in economic developments in marine fisheries and fish processing.

Given that new economic developments would most likely benefit men rather than women, changing marine zonation for blue economy development would most likely not have any direct positive effects on women's livelihoods. However, a key informant pointed out that jobs in the tourism industry are also available for women who would provide services, such as tour guiding, cooking, and cleaning. According to focus group discussions, local communities are already worried about the extent of marine reserve areas affecting access to fishing areas. Increasing marine protected areas and restricting access to marine resources could increase conflicts in the area. Particularly households in the Doda-Manza-Boma area felt that there were conflicts and too many fishing restrictions in their area.

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12 Appendix: Household Questionnaire

A: INTRODUCTION AND INFORMED CONSENT

Greetings. My name is XXXX. We are doing a survey on behalf of the government to inform the future management of marine and coastal resources in this area through a process called Marine Spatial Planning. We would like to ask you about how your household derives its income and the way in which you benefit from coastal activities, and we would like your opinion on how future developments might affect your household. We need about 45 minutes of your time. Our questions relate to the whole household, so we need to talk to at least one senior decision maker in the household, but it will be even better if we could jointly interview both a man and a woman of the household. Your answers are confidential. and our report will not identify individuals. Would your household consent to being interviewed?

☐ Yes ☐ No

B: DEMOGRAPHIC AND SOCIO-ECONOMIC BACKGROUND

1. Please could you give the following details about the household head:
    a. What gender is the household head?: ☐ Male ☐ Female ☐ Other ☐ Don't know / Prefer not to say
    b. What age is the household head? _____
    c. Marital status:
        ☐ Never married ☐ Married ☐ Previously married ☐ Polygamous marriage
        ☐ Other ☐ Don't know
    d. Level of education completed:
        ☐ None ☐ Some schooling but no level completed ☐ Primary ☐ Secondary
        ☐ Higher education ☐ Don't know
2. How many members are there in this household in the following age groups?
    Adults (age 60 +) ____ Adults (age 18-59) ____ Youth (age 13-17) _____
    Children (0-12) _____
3. How long have you been resident in this village / area (in years) _____
4. [if < 4 years] Where did you move here from?
    ☐ Another village in this ward
    ☐ Another ward
    ☐ Another country

C: RESIDENCE AND NEIGHBOURHOOD CHARACTERISTICS

5. What are the main house's walls made of?

   ☐ Mud ☐ Thatch/leaf/reed/palm/ bamboo ☐ Cement blocks ☐ Mud bricks – local/homemade ☐ Commercial bricks ☐ Other ☐ Don't know

6. What is the roof made of? ☐ Thatch/leaf/reed/palm/ bamboo ☐ Corrugated iron ☐ Mud ☐ Cement/concrete ☐ Other ☐ Don't know

7. What is the household's main source of energy for cooking? ☐ Firewood ☐ Charcoal ☐ Solar panel ☐ Public electricity grid ☐ Oil/Paraffin/kerosene ☐ Candles ☐ Other ☐ Don't know

8. What is the household's main source of energy for lighting? ☐ Firewood ☐ Charcoal ☐ Solar panel ☐ Public electricity grid ☐ Oil/Paraffin/kerosene ☐ Candles ☐ Other ☐ Don't know

9. What is the household's main source of water? ☐ River ☐ Well or borehole ☐ Tap connected to public water system ☐ Rainwater storage ☐ Other ☐ Don't know

10. Does this household own any of the following? ☐ Bicycle ☐ Motorbike ☐ Car ☐ Phone ☐ Radio ☐ TV ☐ Fridge ☐ Mobile phone ☐ Canoe or rowing boat ☐ Dhow (sailing boat) ☐ Motorboat ☐ Tuktuk ☐ Minibus ☐ Truck ☐ House ☐ Farmland ☐ Don't know

11. About how long would it take to get from your home to the nearest school if you walked? ☐ 10 minutes or less ☐ 11-20 minutes ☐ 21-30 minutes ☐ More than 30 minutes ☐ Don't know

12. About how long would it take to get from your home to the nearest market if you walked? ☐ 10 minutes or less ☐ 11-20 minutes ☐ 21-30 minutes ☐ More than 30 minutes ☐ Don't know

13. About how long would it take to get from your home to the nearest clinic by motorized transport? ☐ 10 minutes or less ☐ 11-20 minutes ☐ 21-30 minutes ☐ More than 30 minutes ☐ Don't know

D. EMPLOYMENT AND INCOME

14. Has anyone in this household earned income from formal or casual employment here in this area in the last 3 years? ☐ Yes ☐ No ☐ Don't know

15. Please give details for each of these household members:
    a. Gender: ☐ Male ☐ Female ☐ Other
    b. Type of occupation: ☐ Self-employed/ informal trade ☐ Formally registered business ☐ Employed in community ☐ Employed outside of community
    c. Economic sector related to main occupation: ☐ None ☐ Farming livestock ☐ Farming crops ☐ Aquaculture ☐ Fishing ☐ Fish processing ☐ Forest extraction ☐ Oil / gas ☐ Salt ☐ Mineral extraction ☐ Construction ☐ Manufacturing ☐ Transport ☐ Tourism ☐ Buying/selling goods ☐ Service industry ☐ Health and education ☐ Other

16. When was their last month of paid employment (year and month)?
    a. Year: ☐ 2021 ☐ 2020 ☐ 2019 ☐ 2018 ☐ before 2018

b. Month: ☐ January ☐ February ☐ March ☐ April ☐ May ☐ June ☐ July ☐ August ☐ September ☐ October ☐ November ☐ December

17. What is or was their monthly income (before tax)? (Don't know 999)
18. Please divide these 20 beans to show how much the following contribute to your household's monetary income in a typical month (Don't know 999)
    - Employment
    - Own fishing or other livelihood activities involving coastal and marine resources or coastal tourists
    - Own farming or livelihood activities involving upland resources
    - Pensions and welfare
    - Remittances

E: LIVELIHOOD ACTIVITIES AND INCOME

Fishing by boat

19. I am going to ask separately about fishing by boat and fishing on the shore. Let's start with boat-based fishing. How many men in this household have regularly gone fishing out to sea (by motorised boat, dhow or canoe) in the last 12 months? (Don't know 999)
20. And how many women? (Don't know 999)
21. Where off the coast did most of this fishing take place?
    - ☐ Offshore from around here
    - ☐ Further to the north of here
    - ☐ Further to the south of here
    - ☐ Don't know
22. Where do you/they do most of this fishing? ☐ Offshore islands ☐ Offshore reefs ☐ Open sea ☐ Don't know
23. What type of boat is used for this?
    - ☐ Dhow
    - ☐ Motorised boat
    - ☐ Canoe
    - ☐ Other
    - ☐ Don't know
24. Does this household own the boat?
    - ☐ Yes
    - ☐ No
    - ☐ Shared ownership
    - ☐ Don't know
25. What are the main types of species caught (up to 3)?
    - ☐ Demersal fish
    - ☐ Small pelagics
    - ☐ Large pelagics

- ☐ Turtles
- ☐ Dolphins or whales
- ☐ Prawns
- ☐ Lobster
- ☐ Sharks and rays
- ☐ Other
- ☐ Don't know

26. Was this fishing mainly for household consumption or for sale?
    - ☐ Household consumption
    - ☐ Sale
    - ☐ Don't know
27. Approximately what percentage of the catch was sold? (Don't know 999)
28. Approximately how much income (in TSh) was earned from offshore fishing in the last month? (Don't know 999)
29. Approximately how much income (in TSh) was earned from offshore fishing in the last 12 months? (Don't know 999)
30. How do you rate the abundance of these fishery stocks relative to their historical levels?
    o Almost gone ☐ Severely reduced ☐ Somewhat reduced ☐ About the same ☐ More abundant ☐ Don't know

Men inshore fishing

31. How many men in the household have regularly gone fishing from the shore (in tidal or shallow areas) in the last 12 months? (Don't know 999) If number > 0:

a. What were the 3 main types of species caught or collected at the shore, in order of importance?
    - ☐ Finfish
    - ☐ Prawns
    - ☐ Lobster
    - ☐ Sharks and rays
    - ☐ Crabs
    - ☐ Octopus
    - ☐ Squid
    - ☐ Turtles
    - ☐ Sea Cucumber
    - ☐ Shellfish
    - ☐ Seaweed or sea grass
    - ☐ Oyster
    - ☐ Tuna
    - ☐ Mud fish
    - ☐ Eel
    - ☐ Cuttlefish
    - ☐ King fish

- ☐ Sardine
- ☐ Scaleless fish
- ☐ Unican fish
- ☐ Yellowish brown kingfish
- ☐ Giant rock cod
- ☐ Other
- ☐ Don't know

b. Where do you do most of this fishing? ☐ River or estuary ☐ Reef ☐ Mangrove creeks ☐ Seagrass areas ☐ Sand or mudflat areas ☐ Off the beach ☐ Don't know

c. How do you rate the abundance of these fishery stocks relative to their historical levels? Almost gone ☐ Severely reduced ☐ Somewhat reduced ☐ About the same ☐ More abundant ☐ Don't know

d. Approximately what percentage of these catches were sold? (Don't know 999)

e. Approximately how much income (in TSh) did this earn in the last month? (Don't know 999)

f. Approximately how much income (in TSh) did this earn in the last 12 months? (Don't know 999)

Women inshore fishing

32. How many women in the household have regularly gone fishing at the shore in the last 12 months? (Don't know 999)
    a. What were the 3 main types of species caught or collected at the shore, in order of importance?
        - ☐ Finfish
        - ☐ Prawns
        - ☐ Lobster
        - ☐ Sharks and rays
        - ☐ Crabs
        - ☐ Octopus
        - ☐ Squid
        - ☐ Turtles
        - ☐ Sea Cucumber
        - ☐ Shellfish
        - ☐ Seaweed or sea grass
        - ☐ Oyster
        - ☐ Tuna
        - ☐ Mud fish
        - ☐ Eel
        - ☐ Cuttlefish
        - ☐ King fish
        - ☐ Sardine
        - ☐ Scaleless fish

- ☐ Unican fish
- ☐ Yellow brown kingfish
- ☐ Giant rock cod
- ☐ Tasi
- ☐ Other
- ☐ Don't know

b. Where do you do most of this fishing? ☐ River or estuary ☐ Reef ☐ Mangrove creeks ☐ Seagrass areas ☐ Sand or mudflat areas ☐ Off the beach ☐ Don't know

c. How do you rate the abundance of these fishery stocks relative to their historical levels? Almost gone ☐ Severely reduced ☐ Somewhat reduced ☐ About the same ☐ More abundant ☐ Don't know

d. Approximately what percentage of these catches were sold? (Don't know 999)

e. Approximately how much income (in Tsh) did this earn in the last month? (Don't know 999)

f. Approximately how much income (in TSh) did this earn in the last 12 months? (Don't know 999)

Fish processing and trading

33. Have any members of the household been regularly involved in buying fish or other sealife from fishers to process and sell, or just to sell? ☐ Yes ☐ No ☐ Don't know

    a. How much of this work was by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know

    b. Approximately how much income (in TSh) did this earn in the last month? (Don't know 999)

    c. Approximately how much income (in TSh) did this earn in the last 12 months? (Don't know 999)

Salt

34. Has anyone in this household been regularly involved in salt making in the past 12 months? ☐ Yes ☐ No ☐ Don't know

    a. How much of this work was by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know

    b. How much income (in TSh) did your household earn from this in the last month? (Don't know 999)

    c. And approximately how much income (in TSh) was earned in the last year? (Don't know 999)

Mariculture

35. Does this household undertake any mariculture (farming fish, prawns or seaweed) as a business? ☐ Yes ☐ No ☐ Don't know

36. What type of mariculture?

    - ☐ Fish
    - ☐ Prawns
    - ☐ Seaweed

☐ Don't know

a. What size area do you have for mariculture (acres)? (Don't know 999)
b. How much of the mariculture work is done by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
c. How much income (in TSh) did your household earn from this in the last month? (Don't know 999)
d. And approximately how much income (in TSh) was earned in the last year? (Don't know 999)

Tourism

37. Has anyone in this household have regularly provided guiding or other services to tourists in the last 3 years? ☐ Yes ☐ No ☐ Don't know
    a. How much income (in TSh) was earned from this in the last month? (Don't know 999)
    b. And in the last 12 months (in TSh)? (Don't know 999)
    c. How much of this was earned by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    d. How much would have been earned in a year before the pandemic? (Don't know 999)

Timber and poles

38. Has anyone in this household regularly cut timber or poles from mangroves or other forests in the last year? ☐ Yes ☐ No ☐ Don't know
    a. Approximately how many logs were cut for timber in the last two months? (Don't know 999)
    b. Approximately how many of these were from mangroves (in percent)?
    c. How much income (in TSh) was earned from timber in the last two months? (Don't know 999)
    d. And approximately how much in the last year (in TSh)? (Don't know 999)
    e. Approximately how many scores of poles were harvested in the last two months? (Don't know 999)
    f. Approximately how many of these were from mangroves (in percent)?
    g. How much income (in TSh) was earned from poles in the last two months? (Don't know 999)
    h. And approximately how much in the last year (in TSh)? (Don't know 999)

Charcoal

39. Has anyone in this household regularly made charcoal from mangroves or other forests in the last year? ☐ Yes ☐ No ☐ Don't know
    a. Approximately how many bags of charcoal were produced in the last two months? (Don't know 999)
    b. Approximately how many of these were from mangroves (percent)?
    c. How much income (in TSh) was earned from selling charcoal in the last two months? (Don't know 999)
    d. And approximately how much in the last year (in TSh)? (Don't know 999)

Firewood

40. Does this household regularly collect firewood? ☐ Yes ☐ No ☐ Don't know
    a. How much of the firewood collecting is done by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    b. How many headloads were collected in the last month? (Don't know 999)
    c. How much of the firewood collected comes from mangroves? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    d. What percentage of firewood collected is sold? (Don't know 999)
    e. How much was earned from this in the last month (in TSh)?
    f. Approximately how much was earned from this in the last year (in TSh)?

Wild food and medicines

41. Has anyone in the household regularly collected wild vegetables, fruits or medicines in the past year? ☐ Yes ☐ No ☐ Don't know
    a. How much of this work was done by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    b. What proportion of the food collected was sold? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    c. How much was earned from this in the last month (in TSh)? (Don't know 999)
    d. Approximately how much was earned from this in the last year (in TSh)? (Don't know 999)

Hunting

42. Has anyone in the household regularly hunted for bush meat or wild honey in the past year? ☐ Yes ☐ No ☐ Don't know
    a. Which of these do they hunt for the most? (top 3)
        ☐ Mangrove honey
        ☐ Forest honey
        ☐ Forest animals and birds
        ☐ Coastal and mangrove birds
        ☐ Don't know
    b. What proportion of this was sold? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    c. How much was earned from this in the last month (in TSh)? (Don't know 999)
    d. Approximately how much was earned from this in the last year (in TSh)? (Don't know 999)

Plant raw materials

43. Has anyone in the household harvested reeds, sedges, grasses or palm leaves in the last year? ☐ Yes ☐ No ☐ Don't know
    a. How much of this work was done by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know

b. What proportion of the amount collected was sold? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
c. How much was earned from this in the last month (in TSh)? (Don't know 999)
d. Approximately how much was earned in the last year (in TSh)? (Don't know 999)

Mining

44. Has anyone in the household regularly mined for sand or minerals in the last year? ☐ Yes ☐ No ☐ Don't know
    a. How much of this work was done by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    b. What proportion of the amount collected was sold? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    c. How much was earned from this in the last month (in TSh)? (Don't know 999)
    d. Approximately how much was earned in the last year (in TSh)? (Don't know 999)

Making products for sale

45. Has anyone in the household regularly prepared food, drinks or handicrafts for sale in the past 12 months? ☐ Yes ☐ No ☐ Don't know
    a. Approximately how much was earned from this in the last month? (Don't know 999)
    b. Approximately how much was earned in the last year? (Don't know 999)
    c. How much of this income was generated by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    d. Approximately what proportion of this income was from sales to tourists? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know

Crops

46. Does this household engage in growing crops, fruits, nuts or coconuts? ☐ Yes ☐ No ☐ Don't know
    a. How many banana plants do you have? (Don't know 999)
    b. How many coconut palms? (Don't know 999)
    c. How many fruit and nut trees? (Don't know 999)
    d. What area of land do you cultivate (acres)? (Don't know 999)
    e. What are the main crops grown?
        ☐ Rice
        ☐ Maize
        ☐ Potatoes or cassava
        ☐ Fruit
        ☐ Beans or other legumes
        ☐ Vegetables
        ☐ Other
        ☐ Don't know
    f. Approximately what proportion of this work was done by female members of the household? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know
    g. What proportion of your production was sold? ☐ Most or all ☐ More than half ☐ Less than half ☐ Little or none ☐ Don't know

h. How much income was generated in the last year (in TSh)? (Don't know 999)

Livestock

47. Do you keep poultry? ☐ Yes ☐ No ☐ Don't know
48. Does this household have any other livestock? ☐ Yes ☐ No ☐ Don't know
    a. (If yes) How many pigs do you have?
    b. How many goats or sheep do you have?
    c. How many cattle do you have?
    d. How many horses or donkeys do you have?
49. How much income was generated from poultry and livestock in the last month (in TSh)? (Don't know 999)
50. And in the last year (in TSh)? (Don't know 999)

F: SECURITY AND VOICE

51. Please rate the following on a scale from 1 = strongly disagree to 7 = strongly agree:
    - My family functions well for all members.
    - My family's day to day interactions are peaceful.
    - Family members accommodate each other.
52. Please rate the following on a scale from 1 = strongly disagree to 7 = strongly agree
    - Our community is harmonious.
    - Life in this area is very peaceful.
    - There is conflict over access to resources in this area.
    - Local government officials are trustworthy.
    - Households are able to voice their concerns about the use and management of our coastal and marine areas through organisational structures.
    - I feel that our concerns about marine and coastal management are heard.
53. Are any men in the household part of any community organisations? Please select:
    ☐ Church, mosque or other local religious group
    ☐ Fishing association or co-operative
    ☐ Farming association or co-operative
    ☐ Business association or cooperative
    ☐ Political organisation
    ☐ Neighbourhood security group
    ☐ Environmental or conservation association
    ☐ Educational, developmental or social welfare association
    ☐ Don't know
54. Are any women in the household part of any community organisations? Please select:
    ☐ Church, mosque or other local religious group
    ☐ Fishing association or co-operative
    ☐ Farming association or co-operative
    ☐ Business association or cooperative
    ☐ Political organisation
    ☐ Neighbourhood security group
    ☐ Environmental or conservation association
    ☐ Educational, developmental or social welfare association
    ☐ Don't know

55. To what extent are women involved in decision-making in the house, on: (Seldom or not at all, Sometimes, Often, Mostly or always)?
    - How the household earns an income
    - How the household spends its money
    - Where the household lives
    - Children's schooling
    - Having children
    - Women's occupations and activities

G: HOUSEHOLD PERSPECTIVES ON LOCAL CONDITIONS AND DEVELOPMENT

56. Please say how much you agree with the following, based on a scale from 1 = strongly disagree to 7 = strongly agree:
    - The coastal and marine life around here is healthy, diverse and productive.
    - It is important to ensure that inshore fishing areas are not impacted by other developments.
    - There are too many restrictions on fishing in this area, like closed areas, closed seasons or permits.
    - Fishing regulations in this area are well enforced.
    - Anyone should be able to fish or harvest resources in this area.
    - Ecotourism is an important source of income in this area.
    - Small-scale fishing is threatening the marine life in the area.
    - An increase in industrial activities along this cost will increase the risk to our marine life.
    - Our household supports marine wildlife conservation.
    - There is a good balance between protection and use of marine resources in this area.
    - If the government gets more taxes from big business, it will deliver better services in our area.
57. How do you rate the overall level of government services in your local area, including the quality of public roads and recreational spaces? ☐ Very poor ☐ Poor ☐ Below average ☐ Average ☐ Good ☐ Very good ☐ Excellent ☐ Don't know
58. Which of these marine sectors is a key source of formal employment in your community?
    ☐ Coastal tourism ☐ Oil and gas ☐ Fish processing ☐ Shipbuilding ☐ Marine fisheries ☐ Ports ☐ Aquaculture ☐ Transport ☐ Marine Renewables ☐ Desalination ☐ Coastal protection ☐ Marine biotechnology ☐ Don't know
59. How would you rate the general availability of marine sector formal jobs for men, women and youth in your community? (on a scale of 1 (not available) to 7 (abundant))
    ☐ For men
    ☐ For women
    ☐ For youth
60. Which types of marine sector development in this area would provide <u>this household</u> with the best opportunities for income? (top 3)
    o Coastal tourism ☐ Oil and gas ☐ Fish processing ☐ Shipbuilding ☐ Marine fisheries ☐ Ports ☐ Aquaculture ☐ Transport ☐ Marine Renewables ☐ Desalination ☐ Coastal protection ☐ Marine biotechnology
61. Would you say that your community is fairly represented in blue sector formal jobs in this area? ☐ Yes ☐ No ☐ Don't know

62. Would you vote for a situation where job opportunities are increased if it meant loss of access to small scale fishing? ☐ Probably ☐ Probably not ☐ Don't know
63. And if it only meant loss of access to the marine resources that are collected from the shore at low tide? ☐ Probably ☐ Probably not ☐ Don't know

H: CHOICE EXPERIMENT

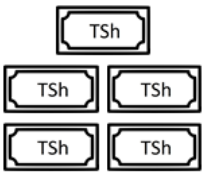
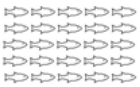
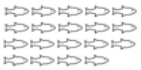
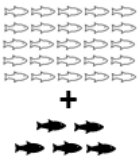
Now I would like to ask you about how you feel about potential future development decisions regarding the use of the coastal and marine areas in this county. The government of Tanzania is embarking on the process of Marine Spatial Planning. One of the outcomes of this process will be decisions on the zonation of the coastal and ocean areas for different types of uses, and whether and how this might change from what we have today. Decisions will need to be made about what areas to set aside for protection and tourism, for different types of fishing or aquaculture, for ports and shipping, or for oil and gas exploitation, or other activities. The government will also need to decide how to find a balance between high value activities that generate jobs and taxes to pay for government services, and the status of natural resources from which households derive material and non-material benefits.

Depending on how different types of developments or activities are prioritized for this area, it might affect your household in the following ways. Firstly, **household income from formal or casual employment** could change. It might go up if the area undergoes development in different sectors, or it could even go down if some activities are moved away from this area. Secondly, it might affect the **amount of marine resources** that you would have access to **in inshore and inshore areas**. This could change as a result of changing the area available for fishing and/or the impacts from other sectors. Thirdly, it will also affect the level of **protection of coastal and marine ecosystems and wildlife,** and the capacity of these systems to generate benefits such as recreation or protection from storms, or helping to reduce climate change. This would be determined by how much area is set aside in reserves, as well as how ecosystems might be impacted by other types of developments.

In this exercise I am going to show you the potential outcomes of three possible marine spatial planning scenarios, and then I am going to ask you to choose which one you would vote for if you had the choice. We'll do this four times.

Before we start, I need to mention the COVID pandemic. We realise that the world has changed a lot during the COVID pandemic. We'd like you to consider the situation before the pandemic, as being the business as usual situation that we expect to return to in the near future. We are comparing everything against this baseline.

Choice Task 1:

Attribute	Business as usual	Option 1	Option 2
Household income from employment 	Same as 2019 	100,000 TSh more 	500,000 TSh more 
Boat-based fishing stocks that households have access to 	Same as 2019 	25% less 	20% more 
Onshore fishing stocks that households have access to 	Same as 2019 	Same as 2019 	50% less 
Level of coastal and marine ecosystems protection 	Same as 2019 	50% more 	20% more 

Please choose your preferred option:

- ☐ Business as usual
- ☐ Option 1
- ☐ Option 2

64. Do you believe that the potential increases in household income shown in this question could be achieved as a result of better coastal planning? ☐ Yes ☐ Not sure ☐ No

I: COVID IMPACT

65. To what extent was this household's income negatively affected by the COVID pandemic? ☐ Very little ☐ Moderately ☐ Greatly ☐ Don't know
66. Did your use of any of the following increase as a result? ☐ Boat based fishing ☐ Marine resources harvested at the shore ☐ Mangrove wood ☐ Sand, salt or other mining ☐ Bush and forest resources ☐ Don't know

That is the end of the interview. Thank you for your time.

Please complete the final part of the form after leaving the interview.

J: INTERVIEW DETAILS

Note: Date, start and end time will be automatically recorded by the programme
Take the GPS location at the house then fill in the details away from the house.

Enumerator:	Supervisor:
Ward:	Village:

Who was present (tick one or both)

- ☐ Adult male
- ☐ Adult female

Was the female able to express herself freely?

- ☐ No
- ☐ Somewhat
- ☐ Yes

Overall quality of the interview (reliability of information given)

- ☐ Poor
- ☐ OK
- ☐ Good

Understanding of the choice question

- ☐ Poor
- ☐ Good

Any other comments, observations or information to take note of? _____

END