



# THE FISHERIES SECTOR IN YEMEN

## STATUS AND OPPORTUNITIES

YEMEN ECONOMIC STABILIZATION AND SUCCESS (YESS) PROGRAM  
MIDDLE EAST ECONOMIC GROWTH BEST PRACTICES PROJECT (MEG)

Draft Report  
November 2019

Prepared for the United States Agency for International Development, USAID Order AID-OAA–  
M-17-00007

USAID ME Bureau Office of Economic Growth Middle East Economic Growth Best Practices  
Project (MEG)

The Pragma Corporation  
Principal Contact: Paul Davis  
116 East Broad Street  
Falls Church, Virginia 22046

DISCLAIMER: This report was produced for review by the United States Agency for International Development. It was prepared by the Middle East Economic Growth Best Practices Program (MEG) Project implemented by The Pragma Corporation. The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



# CONTENTS

ACRONYMS	I
EXECUTIVE SUMMARY	I
1. PURPOSE OF THE REPORT	3
2. BACKGROUND	3
3. MFW AND THE 5 FISHERIES PROJECTS	4
4. SMALL SCALE FISHERIES	6
4.1. DEFINITION	6
4.2. CATCH	7
4.3. AUCTION	8
4.4. TYPES OF FISH CAUGHT	8
5. FISHERIES INFRASTRUCTURE	9
5.1. LANDING SITES	10
5.2. PORTS	11
5.2.1 SEAPORTS	11
5.2.2 AIRPORTS	11
5.2.3 BORDER ENTRY GATES-LAND PORTS	12
5.3. FISHING VESSELS	12
5.4. INSULATED TRUCKS	14
5.5. INSULATED CONTAINERS	15
5.6. ICE PLANTS – FISHING GEAR	15
6. MAJOR STAKEHOLDERS IN THE FISHERIES SECTORS	16
6.1. MINISTRY OF FISH WEALTH (MFW)	16
6.2. FISHERIES REGIONAL AUTHORITIES	16
6.3. LABORATORIES	17
6.4. COOPERATIVES AND ASSOCIATIONS	17
6.5. FISHERMEN-COOPERATIVES	19
6.6. COASTAL WOMEN	20
6.7. PRIVATE SECTOR	20
7. ASSESSMENT OF THE FISHERIES MANAGEMENT SYSTEM	22
7.1. COMPLIANCE AND ENFORCEMENT MECHANISMS	22
7.2. ILLEGAL, UNREGULATED, & UNREPORTED FISHING; AND COAST GUARDS	22
7.3. QUALITY STANDARDS	23
8. INDUSTRIAL FISHERIES	23
8.1. FISH PROCESSING	23
8.2. FISH PRODUCT ADDED VALUE	23
8.3. AQUACULTURE AND FISH FARMING	24
8.4. EXPORT	25
9. MAJOR CHALLENGES OF THE FISHERIES SECTOR	27

10. SWOT ANALYSIS OF THE FISHERIES SECTOR	30
10.1. STRENGTHS	30
10.2. WEAKNESSES	31
10.3. OPPORTUNITIES	31
10.4. THREATS	32
11. CONCLUSION	32
12. REFERENCES	33
ANNEX A: TYPES OF FISH IN THE GULF OF ADEN AND GULF OF ARABIA	35
ANNEX B: FACILITIES IN THE LANDING SITES	36
ANNEX C: LOCATION OF LANDING SITES	43

## ACRONYMS

ARC	Aquaculture Research Center
CA	Competent Authority
CFC	Coastal Fisheries Corporation
DESA	Department of Economic and Social Affairs
DG SANCO	Directorate-General of Health and Consumer Affairs (of EC)
EC	European Commission
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Analysis
EPC	Environmental Protection Council
EU	European Union
FGA	Fisheries General Authority
FAO	Food and Agricultural Organization
FRA	Fisheries Research Authority
FCU	Fishermen's Cooperative Union
FIS	Fisheries Information System
FMP	Fisheries Management Plan
FQC	Fish Quality Control
FRMCP	Fisheries Resources Management and Conservation Project
FVO	Food and Veterinary Office (of DG SANCO)
GDP	Gross Domestic Product
GHP	Good Hygienic Practices
GMO	Genetically Modified Organism
GOY	Government of Yemen
HACCP	Hazard Analysis and Critical Control Points

HP	Horsepower
IFAD	International Fund For Agricultural Development
IOTC	Indian Ocean Tuna Commission
IUU	Illegal Unregulated, and Unreported
Km	Kilometer
LGL	Local Government Law
M	Meter
MAA	Maritime Affairs Authority
MCS	Monitoring, Control, and Surveillance
MFW	Ministry of Fish Wealth
MSRRC	Marine Science And Resources Research Center
MSBRA	Marine Science And Biological Research Authority
MSY	Maximum Sustainable Yield
Mt	Metric Ton
NCFM	National Corporation for Fish Marketing
NCSFM	National Corporation for Service and Fish Marketing
NFP	National Fisheries Policy
NFS	National Fisheries Strategy
NM	Nautical Miles
NSP	National Strategy Plan
NSWD	National Strategy for Women Development
PERGSA	Reg. Org. for the Conservation of the Environment of the Red Sea and Gulf of Aden
QC	Quality Control
R&D	Research & Development
SMEPS	Small and Medium Enterprises Promotion Service
SPS	Sanitary and Phyto-Sanitary



SWOT	Strengths, Weaknesses, Opportunities and Threats
TA	Technical Assistance
TAC	Total Allowable Catch
TL	Total Length
UNCLOS	United Nations Law of the Sea
UNDP	United Nations Development Program
YAR	Yemen Arab Republic
YCGA	Yemeni Coast Guard Authority
YSFEA	Yemen Seafood Exporters Association
TOR	Terms of Reference
VMS	Vessel Monitoring System



## EXECUTIVE SUMMARY

This report presents a rapid assessment of Yemeni fisheries in the southern coasts, extending from west of Aden to the Omani border in the east. It was conducted in Summer/Fall 2019 by a team of fisheries experts to describe the current status of the fisheries sector and its impact on the economy, trade, and the livelihoods of coastal communities. The analysis is a first of its kind to offer a critical review of vital factor associated with the sector. It is based on qualitative and quantitative findings regarding issues such as impacts from the 2015 war, existing infrastructure, fish stocks, relevant regulations/governance issues, internal/external markets, handling/processing, transportation issues, and more. The report addresses the major challenges and problems facing the fisheries sector, and it represents the first phase of our empirical effort to present evidence-based findings, opportunities, and recommendations on the fisheries sector in Yemen.

The assessment is based on a mixed-method approach. The researchers conducted an extensive literature review of material on the Yemeni fisheries sector, including reports and findings from prior USAID program experiences. They conducted field visits, with focus group discussions (FGDs) and key informant interviews (KIs) with targeted stakeholders in the fisheries communities in southern Yemen and the broader fisheries sector. Statistical data and analytical information were gathered from reports of the UN Food and Agriculture Organization (FAO), World Bank (WB), multiple donor organizations, and other relevant sources. The descriptive analysis was further informed by a review of the five major fisheries projects implemented in Yemen between 1990 and 2015.

The results of this study are intended to inform strategic thinking on how to design future development programs to rehabilitate the fisheries sector in Yemen, in order to maximize its potential, improve coastal population livelihood, reduce poverty, and create employment. The findings of this study will be used to make recommendations for developing effective interventions to successfully address key constraints that impair the fisheries sector and limit its impact on the livelihood of the coastal populations of Yemen.

Section 1 of this report presents a brief description of its purpose, which is to provide a comprehensive description of the fisheries sector, including the current status, key challenges, and potential opportunities to improve it. Section 2 provides the background of the study and situates the fisheries sector as the second most important sector of the Yemeni economy. It describes that most fishing in Yemen is artisanal, provides a major source of employment and earnings for hundreds of thousands of coastal families, and is the greatest contributor to the country's GDP after oil and gas. The section underscores how fishing remains a vital sector for achieving food security, alleviating poverty, and increasing economic growth – and must be considered in any post war restructuring project(s) for the Yemeni economy. Section 3 summarizes the five main fisheries projects undertaken prior to the 2015 war. It shows how the Government of Yemen adopted development-oriented policies over three decades, with the aim of increasing fish production and investment in the sector. It also points out the important role of international donors, who supported the fisheries projects that helped the sector upgrade its boats, landing sites, ice plants, cold transport, quality inspection labs; train the fisheries authorities workforce; install a fish data collection/analysis system (FIS); and conduct a fish stock assessment. The section assesses the current status of the infrastructure, most of which has been destroyed, damaged, or affected by the war and is currently in various states of dysfunction.

Sections 4 to 8 provide a detailed description of the fisheries infrastructure, value chain, and major stakeholders. They describe the negative effects of the 2015 civil war (still raging at time of this report), which are evident throughout the survey, including damaged and destroyed infrastructure (e.g., fishing boats, landing sites), power failures, shut down of most processors and many ice plants, loss of foreign markets, fleeing foreign investments, abandoned aquaculture projects, closed airports, and seaports operating with diminished capacity. The sections look at the role of women in the fishing sector, which increases as men are drawn into fighting or guard duties; for example, with ratios of females to male workers rising from 20% to 50% in some fish factories.

Section 9 provides a detailed description of the major challenges facing the fisheries sector and discusses 15 major challenges affecting the rapid expansion of the sector. These include damaged infrastructure, dysfunctional transportation and logistics facilities, poor governance, weak compliance and enforcement of fishing regulations, over-exploitation of fish stocks, and increased corruption at all levels. The sections also discuss the absence of reliable data on fish stocks, quality and quantity of fish catches, the fisheries workforce, active cooperatives, and more. They reflect on the role of coastal women in fish harvesting, processing, and trading along with persistent gender inequalities that compromise women's ability to more fully contribute to the sector's development or take advantage of interventions that could increase their empowerment. The sections look at the institutional capacity gaps left by the diminished roles of fisheries cooperatives and associations, and their inability to offer the tangible supports that help sustain and develop the sector.

Section 10 highlights the findings from the analysis of the sector's strengths, weaknesses, opportunities and threats (SWOT), and section 11 concludes the report.

## **I. PURPOSE OF THE REPORT**

This report presents an assessment of Yemen's fisheries sector along the southern coast of the country, and its effect on the livelihoods of coastal communities and broader economic development issues. The report is a first of its kind, using analyses from both qualitative and quantitative findings to offer a critical review of the current status of the sector. It assesses a wide range of factors governing the sector, such as impacts from the 2015 war on fisheries' infrastructure, numbers of people and businesses associated with the industry, issues affecting fish stocks, regulations and governance issues, quality and standards, internal and external markets, handling and processing, transportation issues, and the roles of women, cooperatives, and other stakeholders. The assessment discusses SWOT analysis results associated with the sector's status and development, including areas for future technical assistance or support. Preliminary recommendations are presented in this report, which will be further explored in a second phase of this YESS activity.

The study covers six southern maritime governorates extending from west of Aden to the border with Oman, including Lahej, Aden, Abyan, Shabwah, Hadramaut, and Al Mahara. It goes back in time to review the investments, infrastructure development projects, and scale of the fisheries sector in Yemen prior to the 2015 conflict. That information is contrasted with current figures and inputs revealing the state of affairs following the devastating impacts of war, how the sector continues to operate, and the multiple opportunities for support to rebuild or strengthen its contributions to development, greater resilience, and sustainable livelihoods.

The assessment used a mixed-method approach. The researchers conducted an extensive literature review of material on the Yemeni fisheries sector, including reports and findings from prior USAID program experiences. They undertook field visits, with focus group discussions (FGDs) and key informant interviews (KIIs) with targeted stakeholders, such as fishermen, coastal women, leaders of fishing cooperatives, senior officials from the fisheries authorities, fish controllers, traders, processors, fish canneries owners, and exporters. The descriptive analysis was further informed by a review of the five major fisheries projects implemented in Yemen between 1990 and 2015. Additional statistical data and analytical information were gathered from reports of the UN Food and Agriculture Organization (FAO), World Bank (WB), multiple donor organizations, and other relevant research articles.

## **2. BACKGROUND**

Prior to the outbreak of war in 2015 (still raging at time of writing this report), Yemen's fishing industry was the most productive sector in Yemen's economy. It ranked second only to oil and gas in terms of Yemeni exports and contributed 15 percent of Yemen's GDP. Today, the sector still provides a main source of food security, earnings, and employment for Yemenis living along the southern coast, including in 50 localities along the Gulf of Aden and the Arabian Sea. There are 70,000 small-scale fishermen in the region, and the industry is often the sole source of income for coastal communities. The fisheries industry is also a major source of foreign exchange earnings and fiscal revenues for the Government of Yemen (GOY).

Past FAO and UNDP reports on the status of the Yemen fisheries sector indicate that it contributes to sustainable national economic growth. However, *the studies also find that the sector continues to experience heavy losses in the quantity and quality of production and sales as a result of poor practices regarding capture*

methods, on-board/on-shore handling, and preservation. These result in losses of both market value and nutritional opportunity.

Yemen fishery resources suffer from a series of institutional and market-linkage constraints that severely inhibit competitiveness and the realization of robust income generation opportunities. In addition, the war has severely devastated the sector and its economic contribution. With the outbreak of the fighting in 2015, several landing sites were wiped out, hundreds of fishermen lost their boats, and infrastructure that had been built by several national fisheries projects was partially destroyed. Moreover, the governance and management of the sector have become paralyzed due to the inefficiency of the authorities.

### 3. MFW AND THE 5 FISHERIES PROJECTS

Prior to 2015, the GOY put forward five fisheries projects over the course of several decades to improve the infrastructure of the fisheries sector, increase its income, and raise its export (see Table I). The projects were mostly funded by the WB and co-financed by the European Union (EU), GOY, UN Development Program (UNDP), and other donors. They had a considerable impact on the infrastructure of the fisheries sector in coastal Yemen, resulting in the building of seaports, landing sites, routes between coastal villages, laboratories, and more. However, due to the 2015 War, most of the facilities built by the five fisheries projects were either damaged/destroyed, abandoned, or are now only partially operational.

The projects also supported the creation of the Ministry of Fish Wealth (MFW), and they redefined the management system of the sector between the MFW, the Ministry of Social Affairs, the Ministry of Agriculture, and the fisheries authorities. They empowered the fisheries cooperatives and enabled fishermen to purchase boats and fishing equipment using available financial schemes. However, with the 2015 conflict came corruption and poor management of the sector’s institutions. The result led to declines in the quantity and quality of fish and seafood products.

<b>Table I: Five Fisheries Projects</b>		
<b>Project</b>	<b>Project Date &amp; Budget</b>	<b>Major Interventions</b>
First Fisheries Project	1973-1975 370 YDR	Provided 100 traditional boats and construction of a small receiving station and cold store facilities at Mukalla.
Second Fisheries Project	1979-1980 932 YDR	Financed the construction of a fishery harbor in Nishtun, including a fish processing and storage complex, village facilities fishing vessels and outboard engines, and technical assistance.  Provided credit facilities to artisanal fishermen for the purchase of traditional fishing vessels. Import of marine engine. Construction of an artisanal fishing port in Hodeida and a fish processing facility in Khawbah.

**Table I: Five Fisheries Projects**

<b>Project</b>	<b>Project Date &amp; Budget</b>	<b>Major Interventions</b>
Third Fisheries Project	1980-1982  Budget 1274 YAR	<p>Established a Fisheries Manpower Development Center to provide training in marine engineering navigation and fish processing technology.</p> <p>Provided management training for government fisheries personnel.</p> <p>Provided fish receiving stations, engine maintenance, and net repair facilities in five fishing communities.</p>
Fourth Fisheries Project	<p>1992-1994 Budget: 39 Million YAR co-financed by IDA</p> <p>USD 13.2 M, an IFAD loan of USD 6.5M, an EU grant of USD 16.3 M, and GOY's USD 3.8 M</p>	<p>Expanded fish catches and improved processing. Improved the efficiency of the domestic and export marketing of fish. Improved the assessment and management of fish resources. Helped improve the position of women in fishing communities.</p> <p>Completed the construction of primary facilities for fish handling in seven villages and of a road between two fishing villages to improve access. Imported intermediate technology vessels, construction material for fishing boats, outboard engines and fishing gear, and a fleet of insulated and refrigerated trucks and plastic boxes for fish marketing.</p> <p>Provided technical assistance for the Coastal Fisheries Corporation, the National Corporation for Fish Marketing, cooperatives, and the Ministry of Fisheries. Strengthened the Marine Science and Resources Research Institute's fish stock assessment and resource management program and environmental research capability. Provided services for women in fishing communities.</p>
Fifth Fisheries Project	2010-2015  USD 35 M	<p>Strengthened the fisheries resources management of the Ministry of Fish Wealth (MFW) to enable it to undertake more effective fisheries research, resource management and fish landing regulation activities at the Governorate level.</p> <p>Improved fisheries infrastructure and fish quality. Provided support for improvement of facilities and handling procedures at existing fish landing sites to avoid deterioration in fish quality due to unsanitary conditions, delays in handling, shortages of ice, and auctioning of fish at these sites. Also provided support for on-board fish preservation and training to MFW staff in setting quality control guidelines and ensuring their implementation on board fishing vessels and at fish landing sites. Assisted the establishment of a quality control system consistent with international standards.</p>

<b>Table I: Five Fisheries Projects</b>		
<b>Project</b>	<b>Project Date &amp; Budget</b>	<b>Major Interventions</b>
		<p>Provided cooperative development and income generation for fishing communities by assisting fishing cooperatives (FCs) in strengthening their management skills, improving their ability to operate and maintain their physical assets, and building their operational capacity. Also funded income-generating activities at the local community level.</p> <p>Provided MFW with support for project implementation, as well as assistance in conducting technical and economic analysis of the need for future ports and landing sites along the Qusayer-Mukalla-Bir Ali corridor and the Red Sea Coast. Also supported necessary surveys, environmental assessments, and detailed designs of selected proposed investments.</p>

In addition to the five Fisheries Projects noted above, the Fish Investment Project was a YER 6.9 billion investment (equivalent to USD 30.9 million) implemented over a six-year period from 2011 to 2016 by the International Fund for Agricultural Development. Its aim was to improve the economic status of small fisher households to create sustainable economic opportunities for fishermen communities in the project areas. The project worked on reducing illegal and destructive fishing methods. It also strengthened fishermen’s organizations and their ability to deliver services for their members.

Since the war’s outbreak in 2015, Yemen has not signed or renewed any international aid or donor agreements for the fisheries sector. Technical support from donors such as the WB, EU, UNDP, FAO, or GCC, along the lines of the 4<sup>th</sup> and 5<sup>th</sup> Fisheries Projects, is needed to jumpstart a revival of the sector.

## **4. SMALL SCALE FISHERIES**

### **4.1. DEFINITION**

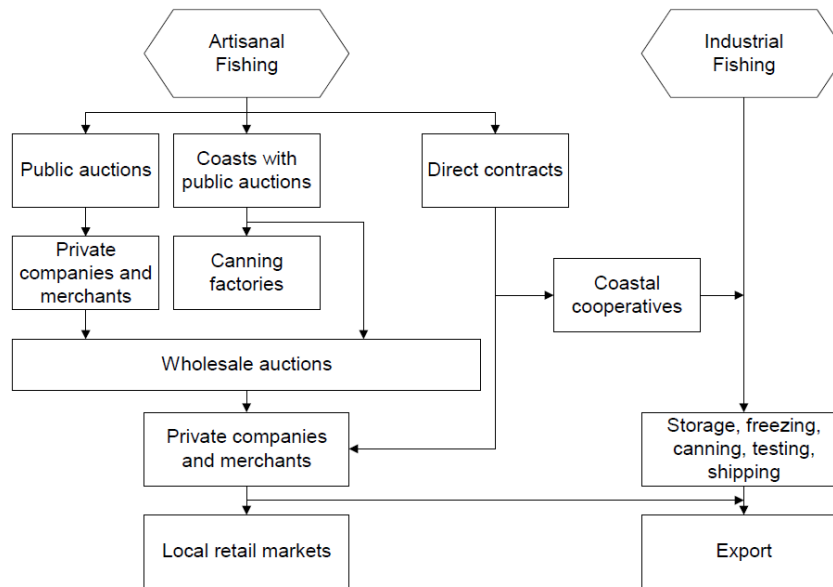
The fishing sector in Yemen relies on small-scale fisheries, also referred to as ‘traditional’ or ‘artisanal’ fisheries. It is a labor-intensive production system, based on the harvest of fish products by small units of artisanal fishermen (generally belonging to a same household or a same village) with or without the use of external hired workers. According to 2018 figures, there are 70,000 fishermen and 15,000 boats.

Small-scale fisheries are characterized by low levels of income and investment, small amounts of capital and energy, and a strong dependency on the services provided by a number of external people (e.g., cooperatives, auctioneers, traders, transporters, retailers, carpenters, mechanics). They use small open-decked wooden or fiberglass fishing vessels (<20 meters long), typically with an outboard (less often inboard) engine. The fishermen use nets or long lines with baited hooks, as well as crab and lobster cages. Fishing trips are short and close to shore, averaging a distance of about 8 nautical miles and not exceeding



ten days. More typically, outings last a half-day or overnight. The duration depends strongly on seasonality, varying by climate conditions (monsoon) and the migratory patterns of some fish stocks. Levels of production are relatively modest, as the fishermen generally use simple or unsophisticated technology and equipment. For example, there is no processing equipment on board, except for salting, drying and, more rarely, putting fish on ice. (FAO 2004).

Figure 1: Artisanal Fisheries Value Chain in Yemen



Source: Fish production and preparation cycle in Yemen: Reference: Trade and Environment dimensions of the Fisheries sector in the Arab countries: the case of Yemen and Oman (2007).

Figure 1 above illustrates the complex value chain of the artisanal fisheries, which represents the main input for fish production and preparation in Yemen

## 4.2. CATCH

The last stock assessment of sustainable Yemeni fish in both the Red Sea and Arabian Sea fisheries, conducted in 2007, was put at 400,000 tons/annum, with Pelagic fish representing 60-70% of the catch. No updated stock assessment has been conducted since. MFW statistics put fish production at 250,000 tons/annum and exports at 90,000 tons/annum from all processors. Fewer than 20 of them have export licenses to the EU, and just two have FDA approval for export to USA markets.

The research team was able to collect catch statistics from Yemeni Seafood in the Gulf of Aden (including Aden, Abien, and Lahaj). Results are presented in Table 2 below.

<b>Table 2. Catch Quantities for Yemeni Seafood, 2015-2019</b>			
<b>Year</b>	<b>Quantity in Kgs</b>	<b>Approximated value per Kg in YAR</b>	<b>Value in YAR</b>
2015	4,111,000	N/A	N/A
2016	4,813,200	500	2,406,600,000
2017	5,214,300	1000	5,214,300,000
2018	17,981,400	1250	22,476,750,000
2019 January-June	12,890,546	1500	19,335,800,000

### **4.3. AUCTION**

Landed fish are weighed, registered, and then auctioned and sold to the highest bidder. The buyer usually has an insulated truck with ice to hold the purchased fish and transport it to either a retail destination (e.g., fish shop, fish restaurant, hotel) or to a processor or exporter with whom the buyer has a contract to supply certain types of fish.

The fishing law stipulates in Article 17 that a remittance of 3% of the value of the fish sold/auctioned at landing sites must go to the state. However, our survey team found that fishermen have not paid this percentage since 2012. Article 18 of the law provides for a service charge of 5% of the sales value of seafoods sold at the landing site to be allocated as follows:

- 1% for the owner of the landing site (MFW or fishermen’s cooperative)
- 2% for the auctioneer
- 2% for the cooperative in which the fisherman is a member

### **4.4. TYPES OF FISH CAUGHT**

The south Yemeni seafood catch is diversified. Table 3 below presents the most commercially viable fish and seafood. A more detailed colored chart and list of Latin/Arabic names can be found in Annex A.

<b>Table 3. Most Commercially Viable Fish/Seafood in Southern Yemen</b>			
<b>Small Pelagic Fish</b>	<b>Large Pelagic Fish</b>	<b>Bottom Fish</b>	<b>Crustaceans</b>
Sardines-Anchovy	Yellow Fin Tuna	Emperor	Rock Lobster
Chub Mackerel	Frigate Tuna	Snapper	Deep Sea Lobster
Indian Mackerel	Long Tail Tuna	Sweet Lip	Coastal Shrimp
Horse Mackerel	Stripped Tuna	Sea Breems – Thread Breems	Deep Sea Shrimp
Mullet	Skipjack Tuna	Lizard Fish	Red Shrimp
Needle Fish	King Fish	Sea Catfish	4.4.5 Cephalopods
	Queen Fish	Grouper	Cuttlefish
	Marlin	Sting Ray	Squid
	Barracuda	Shark	Octopus
	Trevally		Sea Cucumber

**Box 1: Yemeni Yellow Fin Tuna Fish: A Popular Fish Product**

There is a big and stable stock of pelagic fish in Yemeni waters. The fish migrate from the Indian Ocean to the Sea of Yemen, attracted by food, warm water temperatures, and suitable salinity.

Tuna fishing carries a long tradition in Yemen, and the Yemeni fishermen are famous for it. Today, many use fiberglass boats with outboard motors, though others continue to rely on old-fashioned boats and methods. Tuna fishing in Yemen is not industrialized, and does not have negative effects on the pelagic fish stock. The fish is consumed locally. Some is canned in Mukalla fish canning factories. In the past, fresh tuna was exported to the international market. But since the onset of the conflict, the lack of air cargo facilities has made the export of fresh fish impossible, and the only tuna exports are as a frozen product. More broadly, the destruction of fishing infrastructure, coupled with increasing costs for inputs such as fuel and ice, have led to significant declines in quality, due to poor fish handling.

## **5. FISHERIES INFRASTRUCTURE**

As noted above, most of the fisheries infrastructure in the coastal governorates of Yemen was put in place thanks to the Five Fisheries Project. There was much activity between 1990 and 2000, when landing sites, ports, and fishing vessels were built or renovated. Investments also enabled the development of ice plants and factories for building fiberglass boats and containers in several governorates. Seaports were built to

facilitate fish/seafood exports, and the airports of Aden, Al Rayan, and Seyoun had cargo facilities to export fresh seafood products.

## 5.1. LANDING SITES

Landing sites are used by fishermen to deliver their catch, which is sold by auctioneers. The buyers represent the local market of fishmongers, restaurants, or processors. The current study covered main landing sites situated in the coastal area stretching from Bab Al Mandab in the southwest to Al Mahra Governorate on the borders of Oman in the east, passing through the Gulf of Aden, Beer Ali, Al Shehr, and Hadramout. The area comprises about 45,000 landing sites, many of which have auction yards, fuel tanks, stations for bunkering fishing vessels, refrigerators, docking areas for boats, ice factories, an electricity network, a water network, and slipways.

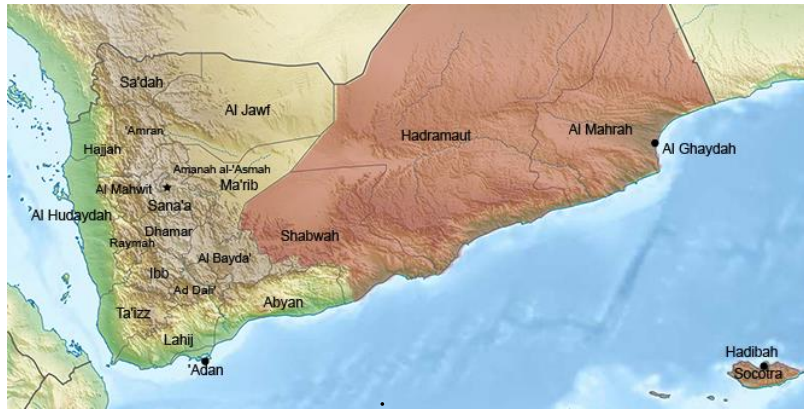


Figure 1: Map of Yemen illustrating the Gulf of Aden and Arabia Sea, the Southern coastal area

Most of the landing sites were financed by the 4th Fishery Project, jointly managed by the MFW and the fishing cooperatives. Today, the landing sites are funded through fishermen membership fees, calculated as 2% of the value of the caught/auctioned fish. Membership in the cooperative grants fishermen access to a wide range of services and facilities offered by the landing sites. These may include auctioning, marketing, various facilities, maintenance, healthcare, and access to credit.

The researchers found that most of the landing sites they visited had a roof, but were partially or totally open on the sides. They also noted that most of the sites lacked strict supervision and management, and that several types of infringements of rules or codes could be observed daily. Examples included failing to deny access to persons not involved in the fish supply chain, inadequate cleanliness and hygiene, and variability in the availability of adequate quantities of ice, water, or fuel. Further practices not in accordance with local and international regulations or codes of practice included such things as poor handling of fish at sea, on boats, or on landing sites.

For the purposes of this study, researchers visited the landing sites presented in Table 4. A complete list of landing sites and the description of their facilities is in Annex B.

<b>Table 4. Landing Sites Visited in the Assessment</b>	
<b>Governorate</b>	<b>Landing Site Visited</b>
Aden	Dockyard (destroyed in the War but rebuilt by Norwegian Aid, not fully operational yet), Seerah, Al-Moala, Al-Darbah, Fuqum, Ras Omran (Solar powered partially)
Abyan	The most damaged area from the war: Al-Matlaa, Al-Sheik Abdallah, Zingebbar (Al Souk Al-Markazy), Shugrah (4 cooperatives active there)
Lahag	Ras El-Arrah, Khor El-Omeirah
Shebwah	Beer Ali, Albaydah, Halah/EinBamabed, Aragh, Hoor el Sahel
Hadramout	AlShehr, Mukalla, AlReeda
AlMahra	Mehifif, Nashtoon, Khyout, Fedemi, Brob, Hasween, Hagoor, Seyhout, Etab, Rakhoot, Yahoot, Keshn

Landing sites and auction yards in remote areas do not have a full stock of necessary facilities such as ice plants, storage, and marketing services. Moreover, cooperatives in these areas typically are not active, and fishermen membership rates are very low. These areas lack basic infrastructure, for the most part. As a result, fishermen stop paying the taxes imposed by the local authorities. These practices lead to a vicious circle of significant losses for both the fishermen and the local fisheries authorities. Fishermen earn less for their catch, because the prices are dictated by the traders. The landing site loses control over the data collection system and loses the levies. Also, this process minimizes the funds available for fisheries management and reduces the economic potential of the fishery.

## **5.2. PORTS**

### **5.2.1 SEAPORTS**

Within the area under study, there are two seaports: Aden Seaport and Mukalla Seaport. Aden Seaport is reportedly functioning at 70% of its operational capacity. Mukalla Seaport is a small port with low draft, and only has one shipping company (MSC) with reefer containers coming to port once every two weeks. The reefer containers are reported to be inspected in Jeddah Seaport (KSA) as part of Blockade Regulations before they are given approval to head to Mukalla Seaport. The port is closed to shipping when the vessels of the Alliance call, 1-2 times weekly.

### **5.2.2 AIRPORTS**

In the southern part of Yemen, there are three functioning airports: Aden Airport, Al-Rayan Airport (near Mukalla), and Seyoun Airport (360 km NE of Mukalla). Aden Airport is operational but closes when there are conflictual events in Aden. The Yemeni authorities reported that Al-Rayan Airport will be operational starting from November 2019. Seyoun Airport is operating regularly. International Airlines no longer service Yemen, leaving a few Arab airlines and Yemenia (national flag carrier) to fly in and out of the country.

This situation has negatively affected the trade of fresh chilled fish from Yemen to Europe, which had been the highest moneymaker for Yemeni seafood exporters. Some fresh fish exporters use insulated trucks to transport their fresh or frozen products across border to Oman, and then fly it from Salalah Airport to export markets in UAE and elsewhere, with mixed results.

### 5.2.3 BORDER ENTRY GATES-LAND PORTS

After the closing of Midi, the Saudi border gate on Red Sea, the current active border to Saudi Arabia from South Yemen is Al Wadeeah. This is where most Yemeni seafood exported from Hadramout enters Saudi Arabia. Another land route used by seafood exporters is through Shahn, a land entry gate to Oman from Al Mahra.

## 5.3. FISHING VESSELS

Yemeni artisanal coastal fishing vessels are typically made of wood and fiberglass. They measure less than 12 meters long with inboard or outboard petrol engines (shown in photos below). The smaller boats, called Hoori, usually have two to three fishermen on board and are used for single day trips within 40 km of the shore. Bigger boats, called Sambuuq, may have up to 25 fishermen using nets and longlines, and generally have an insulated hold for ice. Larger boats are used for longer trips, ranging from few days to three weeks. The researchers were told that some Yemeni seafood processors and exporters (e.g., Burum and Tamimi) own bigger fishing boats that fish mostly in international waters off the coast of Somalia.

In Mukalla, there are four fiberglass factories producing fishing boats and insulated truck bodies and boxes. There is only one operational company for making or repairing fiberglass boats (Balaxar), located in the Sabr area, north of Aden.

Yemeni law prohibits the use of motherships, though they would be a way to improve the quality of fish catches. Motherships provide ice holds, cleaning services, and refueling without going ashore. They also offer safety for smaller boats, as they can latch on to the mothership in the event of bad weather.

There are two types of fishing vessels used in the artisanal fishery of Yemen: The Hooris, the Sanbuugs. Almost all boats are made from fiberglass. Some older wooden boats are still in use, but they are becoming rare.

### A. The Hooris

Hooris are canoe-like boats (6-20 meters long). They are usually made of fiberglass, with a 75 Hp outboard petrol engine. The small Hooris are single-day fishing boats. Their fishing areas are close to shore, within a range of about 20 nautical miles. Their hold capacity is 15-25 tons. They cannot operate when the sea is



too rough. Larger Hooris can make trips lasting up to one week and can carry more iced fish. Fiberglass Hooris are more common nowadays, as they are relatively affordable. But larger Hooris are still made of wood.

#### B. The Sanbuuqs

The sanbuuq is a large wooden boat, with a 150-250 Hp inboard engine. There are different types of sanbuuqs, ranging in capacity from 25 to 70 tons. They can have a crew of 10-25, and the duration of their trip can reach 10 days at sea. Due to expensive fuel, fishermen tend to make longer trips at sea to harvest more catch and have a better return on their investments.



In the southern governorates, there are several private sector factories specialized in boat construction. These private suppliers build fiberglass boats, ice containers, and water containers. They work following confirmed orders from fishermen. Some boat builders in Al Mahra reported that they face challenges in supplying imported raw material, which can delay their delivery time. They also reported a lack of qualified local workforce specialized in boat construction, including fiberglass and resin preparation, building plugs and molds, manipulating fiberglass, mixing fiberglass, working with resin and gel coat, and dealing with manufacturing defaults and repairs.

The field team found six operational factories that are specialized in the fabrication and molding of fiberglass fishing boats (Table 5).

<b>Factory Name</b>	<b>Location</b>
Hadramout Fiberglass	Hadramout, AlShehr
AlReeda Fiberglass	Hadramout, AlReeda
Al Meshkas fiberglass	Hadramout, Keseyr
Alsafa factory	Hadramout, AlReeda
AlGheedah-Mehéfif	Al Mahra
Aden Gulf Fiberglass	Aden



In addition, there are several workshops specialized in the maintenance and repair of boats, but they are micro enterprises that are unable to equip their workshops with new equipment to repair and maintain new four-stroke engines. The research team undertook field visits to several boat engine maintenance and repair workshops in several villages in Hadramout governorate. Three focus group discussions (FGDs) were organized with technicians, engineers, and workshop owners in collaboration with the fisheries associations to highlight their needs. Most FGDs reported an urgent need to upgrade the workshops' personnel with know-how to repair and maintain four-stroke boat engines, use electronic tools, disassemble and assemble cranes, and diagnose engine's electronic malfunctions. The attendees in the FGDs reported that newly built vessels are equipped with modern Japanese or Korean engines (Yamaha, Honda, and Daewoo) and that most workshop technicians and engineers lack the technical know-how to repair and maintain them. Spokesmen from the fisheries associations reported that the inability to regularly diagnose, maintain, and repair vessel engines can cause engine failure, resulting in vessel drifting or inefficient use of fuel due to overconsumption. Moreover, when boat engines are unreliable, it limits fishing operations to areas close to the coast, which leads to overexploitation of inshore resources.

**Box 2: Al Mahra Fiberglass Factory: A Sole Provider of Fiberglass Boats**



Al Mahra Fiberglass Factory is the only fiberglass products provider in the governorate of Al Mahra. The factory supplies boats, containers, and water reservoirs to local fishermen. Fiberglass is imported to Yemen, which is a source of raw material needed to build boats and other fiberglass-made products. However, the factory faces shortages of raw material whenever the routes between the factory and the fiberglass supplier are blocked. The factory produces up to 25 boats monthly. It specializes in 5-meter boats, which are only used by Al Mahra fishermen. The factory also offers maintenance and repair of fiberglass products.

#### **5.4. INSULATED TRUCKS**

The same factories that make fiberglass fishing boats also produce fiberglass boxes for insulated trucks. The boxes usually are strapped on the truck's chassis. Few refrigerated trucks and semitrailers are available, but there are about 600 3-ton trucks fitted with insulated boxes to transport fish in ice.



## 5.5. INSULATED CONTAINERS

As with the insulated truck boxes, the same fiberglass boat factories also produce insulated containers for holding ice and fish. Fishermen using Hoori boats do not like to equip their small vessels with insulated containers, because it limits the amount of catch they can store, slows down the vessel, and increases fuel consumption. As small Hoori boats only go out for one day, the fishermen dispense with ice or insulated containers. They simply keep the catch on the deck during the whole trip and then unload it at the landing site once they dock.

## 5.6. ICE PLANTS – FISHING GEAR

Ice is imperative for cooling fish and seafood to maintain quality and safety until it is processed or consumed. The researchers found that there were several private sector ice making plants producing blocks of sheet ice near or on fish landing sites on the Yemeni coast. The cleanliness quality of the ice was not up to world standards, but it was clear that the more fishermen used ice, the better the quality and quantity of exports became. Block ice is crushed and bagged in 25-45 kg bags for sale to fishermen at prices ranging from 1200-1500 YAR (2-3 USD) per bag, depending on the transport distance from the ice plant to the landing site, fishing port, or wharf.

<b>Table 6. Ice Production Plants</b>	
<b>Ice Plant</b>	<b>Production Ton/Month</b>
<b>Aden</b>	
Mooamer ice plant	670 t/m
<b>Lahj</b>	
Aden ice	400 t/m
Al-Safy ice	250 t/m
<b>Shabwa</b>	
Beer Ali factory	250 t/m
Hadramout factory	250 t/m
Al-Naeem plant	250 t/m
Al-Atal plant	150 t/m
Galaa plant	150 t/m
Al-Abbad plant	200 t/m (crushed flakes/ice)
Garoul plant	200 t/m

MFW estimates that daily production of ice now is at 250-300 tons/day (down from 1000 tons/day pre-war capacity). It encourages investments in new ice plants, cold stores, freezers, and refrigerated trucks (investment law 22/2002).

All fishing gear required by fishermen (e.g., fishing lines, nets, floaters, and hooks) are imported. The survey team found one net-making machine in Fukum west of Aden, but it is no longer operational. The team also located four metal/wire mesh manufacturers for lobster cages ('Sakhawy' in Arabic), based on raw materials imported from UAE and Oman.

## **6. MAJOR STAKEHOLDERS IN THE FISHERIES SECTORS**

### **6.1. MINISTRY OF FISH WEALTH (MFW)**

The MFW is in charge of the management of fish resources. The structure of the MFW has changed and some of its functions have been decentralized. In August 2007, MFW was divided into semi-independent fishing authorities, separated from the ministry in Sanaa and the deputy ministry in Hodeida by Presidential decree. There are four Fisheries General Authorities:

1. The General Authority of Fisheries, based in Aden
2. The General Authority for Arabian Sea fisheries, based in Al Mahra
3. The General Authority of Fisheries, based in Mukalla
4. The General Authority for Red Seas Fisheries, based in Hodeida.

Each authority acts independently within its own geographical domain, and there is no communication between the different authorities. Following the assessment conducted by the WB on the structure of MFW, a WB/EU financed Fisheries Resource Management and Conservation Project was implemented in 2010. Through this project, the MFW, the fisheries authorities, and the Marine Science and Resources Research Center (MSRRC) went through a major reconstruction plan. The MFW remains the Government's principal advisor on fisheries and fisheries management, with responsibility for monitoring the sector, planning strategic development, and formulating fisheries policy, legislation and regulations. MFW is also responsible for international fisheries policy, export promotion, licensing of foreign vessels, and overseeing the Fisheries General Authorities (FGA) and the Fisheries Research Authority (FRA).

### **6.2. FISHERIES REGIONAL AUTHORITIES**

There are four FGA offices, located in Aden, Mukalla, Al Mahra, and Hodeida. These offices are helped by fishermen cooperatives and the Coast Guard, each of which has its jurisdiction in enforcing fishing laws and regulations.

In 2017, the governors of Hadramout and Al Mahra issued an updated fishing regulation to be enforced within Hadramout, Shebwa, Sokotra, and Al Mahra without interference from the central government. The new regulation was developed with the cooperation of the Arabian Sea Fisheries Authority and fishermen cooperatives. It includes resolutions that are very detailed and cover boat length, engine capacity, defined non-fishing seasons, water depth, type of fishing gear allowed, and net mesh size. It also covers protection

of marine mammals and sea turtles, environmental protection, control of pollution and emissions, and it confines artisanal fishing to within three miles of the coast.

The Fisheries Regional Authorities are responsible for the implementation of MFW fisheries policies. They are in charge of monitoring, controlling, and enforcing regulations. They administer local fisheries licenses, collect levies from fishermen, gather landing sites data, control fish quality, and provide training and capacity building workshops.

### **6.3. LABORATORIES**

Before the 2015 War there were four labs in Yemen performing required tests for safety and quality controls of fish exports, located in Aden, Sanaa, Hodeidah, and Mukalla. The survey team was able to visit and interview laboratory personnel in four functioning labs in Aden, Mukalla, and Al Mahra. It was able to confirm that they are operational to an extent and still perform required tests for samples of exported fish. A certificate of analysis for microbial, chemical, and heavy metals for exported fish is imperative for acceptance in export markets. According to the team's visits, the three laboratories provide the following tests:

Aden Lab AlTawahy: Operated by Fisheries Authority, it performs sensory, microbiology tests. It performs heavy metal tests for lead and cadmium, but there is no histamine test. Test fees for export of a container of cuttle fish are 12,000 YAR, for a container of fish are 9,000 YAR, and the fees for an export health certificate are 200,000 YAR. These fees are in addition to export services fees charged by MFW (Fisheries Authority).

Mukalla Lab: Operated by the Ministry of Health, it performs sensory, microbiology, chemical, heavy metals, water, and ice tests and swabs in processors plants. Due to lack of required equipment, histamine tests are done at a private laboratory in Mukalla. Also, copper, zinc, and antimony tests are not done in the Mukalla laboratory. Some tests are conducted in Hadramout University at the Faculty of Science labs.

Al Mahra Lab: It performs sensory, microbiological, and chemical tests, along with histamine tests. Prices of tests in both Mukalla and Al Mahra labs range between 15,000 and 12,000 YAR/test except histamine, which costs about 35,000 YAR (USD 60) per test.

The Fisheries Research Authority also is still operational, although reports say that they lack the research equipment and qualified workforce to carry out their research projects. The Research Authority is responsible for research in support of fisheries management and development, aquaculture development, and marine environment management. This includes providing information on fish biology, population dynamics and stock assessment, scientific advice for fisheries management planning, and research support for private aquaculture development. However, since 2010, no stock assessment analysis has been conducted on Yemeni coasts and marines.

### **6.4. COOPERATIVES AND ASSOCIATIONS**

There are 70 active cooperatives in the six governorates covered by this study. Table 7 presents their distribution.

<b>Table 7. Cooperatives</b>	
<b>Governorate</b>	<b>Number of Active Cooperatives</b>
Lahj	5
Aden	11
Abyen	12
Hadramout	20
Shabwa	12
AlMahra	10

Active cooperatives are registered and fall under the supervision of MFW. Their role is to support the development of small-scale fisheries, and they defend local fishermen businesses by counterbalancing tribal powers in the local communities. Prior to the onset of the war, cooperatives were a key driving force in the fisheries sector. They offered substantial services to fishermen and fishing communities, such as healthcare, education, social welfare, water supply, and electricity. Some also processed and exported fish products to the EU. However, the impacts of the war have depleted the financial support for the fisheries cooperatives, which comes from both fisherman’s membership fees and the cooperatives’ commercial activities. The cooperatives are facing a downward spiral; many fishermen are refusing to pay their membership fees as the cooperatives are reducing their support activities due to budgetary constraints. Indeed, the researchers found that most cooperatives were either just breaking even or suffering losses.

The field team organized FGDs with leaders of cooperatives to assess their membership, organization, management, services provided, and their financial situation. The findings revealed that cooperatives suffer from inadequate administrative structures, lack of good governance and clear mission, and limited numbers of dedicated and qualified staff. They have poor financial statements and are unable to mobilize funds for investment. Further challenges include an inability to provide adequate services for members. Moreover, cooperatives have developed poor relationships with the MFW and the FRA. According to representatives from the cooperatives, MFW does not protect the interests of small fishermen. They say that the ministry is not enforcing fisheries laws and regulation, nor protecting the marine and coastal resources from over-exploitation. The cooperatives also report that the MFW considers that fishermen are hiding behind the cooperatives to avoid paying taxes or report accurate figures regarding daily catches. Several cooperatives have closed as a result of conflicts with the MFW.

### **Box 3: The Impact of 2015 War on the Role of Cooperatives**

A report written by the Small and Medium Enterprise Promotion Service (SMEPS) in 2009 on the Yemeni Fisheries Value Chain described the commercial business of the Al Shihr Cooperative this way: “We used to export processed fresh fish, such as fresh whole and fillet yellow fin tuna to France. We did the processing in our own processing facility, which has a 100ton cold storage capacity. We dealt through a commercial intermediary who provided us with foreign markets. We were the first association to get the European Export License...”

The Al Shihr Cooperative used to be one of the most active and profitable cooperatives in Hadramout. Members received good services, and the cooperative processed raw tuna and other fish products with high quality near the landing site, due to its strong infrastructure.

The research field team visited the Al Shihr Cooperative to get updates on its activities. They found that in 2016, the cooperative received a \$50,000 fund from the SMEPS Brave Project to improve its processing activities, but it could not commit to the project due to financial hardships. Shortly afterwards, the Al Shihr Cooperative went through difficult financial issues and had to sell all of its processing equipment.

## **6.5. FISHERMEN-COOPERATIVES**

Before the armed conflict began in 2015, there were 65,000 licensed fishermen in Yemen operating 17,000 artisanal boats. Table 8 shows the tally of boats and fishermen for each cooperative surveyed by the team in the Gulf of Aden region:

<b>Cooperatives</b>	<b>Number of fishermen</b>	<b>Number of boats</b>
Seera	843	278
Rimbaud Bay	345	115
Al Hiswah	333	111
Al dolphin	213	59
AL gassr	202	68
Al Khaissa	471	157
Shabab Al Khaissa	297	99
Foqum	759	253

<b>Table 8. Tally of Boats and Fishermen within Cooperatives</b>		
<b>Cooperatives</b>	<b>Number of fishermen</b>	<b>Number of boats</b>
Emran	828	276
Kawa	213	71
<b>TOTALS</b>	<b>4,504</b>	<b>1,487</b>

## 6.6. COASTAL WOMEN

Within the fisheries value chain, women play an active role in fish processing and small-scale fish drying and salting. They also take part in net making, sewing, mending, and fish selling in some markets. Their role and potential are underutilized, even though the war has diminished the numbers of men participating in the labor force due to military and guard duties. The survey team found that the percentage of women workers varied from 20-50% across the fish-processing workforce, ranging from receiving and preparation of seafoods to lab staff and administrative work.

In Gulf of Aden region, the survey team found some 80 women engaged in fishing in Khour Omeirah and Raas-Al-Aaerah. In the governorate of Lahj, too, there are women who own boats and are directly engaged in fishing. The researchers note that these ‘fisherwomen’ communities would benefit highly from training focused on fish handling, use of ice, improved hygiene, and using a GPS, along with skills building to fix engine or motor failures and to conduct troubleshooting to make them safer at sea.

## 6.7. PRIVATE SECTOR

Previously, some fishing and processing activities in Yemen were executed by state owned organizations, either solely or jointly with the private sector. Eventually the state’s role in fishing dwindled, and by 2005 it had shifted to a regulatory role exclusively, leaving all activities of fishing and processing to the private sector and foreign investors (mostly from Saudi Arabia). The Al Gwezy canning factor in Mukalla presents one exception, as it is still partially owned by the state.

Though many processors have shut down operations, notably in the Gulf of Aden region, the survey team tracked 24 factories in Southern Yemen still involved in the processing of fish and seafood by freezing, canning, and drying. Table 9 presents a list of those firms.

<b>Table 9. Fish and Seafood Processing Firms Still Operating in South Yemen</b>		
	<b>Company Name</b>	<b>Location</b>
1	Moamer Seafood Co.	Aden
2	Aden Central Stores Co. (Adenco Seafood)	Aden

<b>Table 9. Fish and Seafood Processing Firms Still Operating in South Yemen</b>		
	<b>Company Name</b>	<b>Location</b>
3	Burum Fish Co. (Ali Al-Habashi)	AlShehr
4	Hadramout Coastal Fish Co.	Hadramout
5	Apasra Fisheries Co.	Hadramout
6	ALWADY Fisheries and Cold Store	Hadramout
7	ALRAYAN SEAFOODS (Also ALRAYAN CANNERY)	Hadramout
8	AlAfaq Fish Co.	Mukalla
9	TAMIMY Fish Co.	AlShehr
10	AlMushkas Fisheries Co.	AlReeda
11	Gulf Seafoods (Bin Maraey)	Shuhair, Hadramout
12	SABAA (ALAMOUDI) Fish Canning Factory	Mukala
13	Mukala Canning Factory (ALGOWEZY)	Mukala
14	Khaleej Fisheries Co.	Hadramout
15	AL Omgry Fisheries Co	AlShehr-Qeseiar
16	Bawazeer Tuna Canning Plant	AlRayan
17	Aden Fish Farming Co. (Fish oil/Drying powder)	Mukalla

The research field team visited all of the private processors listed above to inquire about their activities and assess the impact of the 2015 conflict on their businesses. Most processors seem to be fully functioning with modern infrastructure and efficient processing systems. Some serve the local and regional markets and others have succeeded in maintaining local, regional, and international markets.

#### **Box 4: Burum Seafood Company: The leading Seafood Factory in Yemen**

Burum Seafood Company is a seafood processing firm created in 1994 in Al Shihr, Hardramout. It specializes in fish processing and seafood products packaging. Burum Seafood Company is the leading Yemeni processor and exporter of seafoods to the EU and to Arab and Asian markets. In 2018, it employed 300 workers and sold up to 3,900 tons of fish. The company exports a wide selection of seasonal fresh and frozen seafood to Europe, China, Asia, and the Middle East, and it reached USD15 million of annual sales in 2018. It processes and exports frozen seafood by ship from Mukalla Seaport, overland by reefer trucks/trailers through the Al Wadeha border crossing to Saudi Arabia, or across the Omani border for shipment via air or water to the UAE. The closing of the Al Rayan Airport (nearest to Mukalla), due to the military conflict, has had a negative effect on the timing and quality of exported fresh chilled fish from the Burum Seafood Company. The company has also established fish retail shops in main cities in Yemen to market its products locally.

## **7. ASSESSMENT OF THE FISHERIES MANAGEMENT SYSTEM**

### **7.1. COMPLIANCE AND ENFORCEMENT MECHANISMS**

The Fishing Law 2/2006 and its regulations are still the main legislation framework for fisheries in Yemen, along with the Sea Food Export Services Fees. Compliance to the fishing law and its executive regulations (issued 2006) were at their highest during the first six years, with fishermen paying 8% of the value of their catch. In 2012, fishermen stopped paying the 3% owed to the state, though they still pay some of the remaining 5% of the catch value to the landing site owner, auctioneer, or fishermen cooperatives, showing a clear willingness to pay for tangible services.

The state's authority has weakened since the war's outbreak, and under current conditions effective enforcement of Law 2/2006 seems unlikely. The team attempted to confirm whether other parts of the fishing law were being enforced (e.g., net mesh size, engine power, length of boats, ice storage, cleanliness of holds and fish holds). Whereas MFW officials (and the subsequent three authorities who inherited its role) maintain that a majority of fishermen comply with legal nets and boat cleanliness, the team's observations revealed less compliance from fishermen and inadequate enforcement by officials.

As is typically the case in regions undergoing strife, respect for the law has eroded. Fishing regulations designed for safe and sanitary handling of seafood from catch to table or processing are no exception. In addition, there is corruption among officials along the value chain of Yemeni seafood. Enforcement is a risky business in a country boasting the highest number of guns per capita in the Middle East. Ignorance also plays a role, with fishermen not understanding of the importance of sustaining fish stocks or respecting the breeding seasons.

### **7.2. ILLEGAL, UNREGULATED, & UNREPORTED FISHING; AND COAST GUARDS**

Illegal, unregulated, and unreported (IUU) fishing in Yemeni waters by foreign fishing vessels – from Thailand, Egypt, Eritrea, Somalia, and Iran – was quite frequent prior to 2015 and is highly detrimental to fish stocks. No data is available currently to assess whether or not IUU has abated due to military operations. Yemeni regulators claim that no licenses are being issued to foreign vessels.



The Coast Guard is reported to remain active in monitoring vessel traffic in Yemeni waters, supported by Coalition Naval forces. However, the emphasis is more on nationality and type of cargo being shipped than on compliance with fishing regulations.

### **7.3. QUALITY STANDARDS**

To be able to export successfully to world markets, especially for value-added products and high-end consumers, Yemeni processors must comply with international quality and seafood safety standards (e.g., ISO 9001/HACCP/ISO 22000/EU and US Food and Drug Administration regulations). Quality and hygiene standards and codes of practice should be enforced throughout the full supply chain, starting from fish caught at sea all the way through consumption. The Yemeni General Authority for Standards issues standards for most foods produced in Yemen. They also issue a GMP certificate for Yemeni food processors (including seafood), but it carries less weight outside of Yemen.

Some Yemeni processors underwent the certification process of certification in 2005. However, due to the impact of the 2015 conflict on their businesses, they have not made it a priority to update their HACCP and ISO certifications. At the time of this study, the research team reported that the largest processors in Hadramout and Aden were in the process of updating their HACCP and ISO certifications to be able to attract new buyers from new markets or resume export activities with old buyers.

## **8. INDUSTRIAL FISHERIES**

There are no factory vessels operating in Yemeni waters now. Nearly all Yemeni fish is caught and processed in a traditional way, using small scale fishing vessels as described in the sections above. There is land-based processing of fish, lobster, shrimp, canned and dried fish, fish oil, and dried fish powder.

### **8.1. FISH PROCESSING**

Prior to the war, there were 73 seafood processors, including four canneries and more than 10 fish drying plants. Many have shut down due to the conflict, and the total number now is 24 active processors, including three canneries.

### **8.2. FISH PRODUCT ADDED VALUE**

Several Yemeni processors have diversified into adding more value to seafood processing, mainly in response to importer demand from Arab, Asian, and EU markets. It remains a very small niche market, which only big processors start adopting after they receive a specific order from a buyer.

#### **8.2.1 CANNED TUNA**

There are three canneries in Mukalla that can produce up to a total of one million easy-open cans of 100-185 g, each year. Yellow fin tuna (*Thunnus albacores*) is the main species used for canning in Yemen, along with some long tail tuna (*Thunnus tonggol*) and some Indian mackerel (*Rastrelliger Kanagurta*). Three canning factories in the Mukalla area – two privately owned and one partly state owned – are canning yellowfin tuna, mackerel, and some long tail tuna in oil and brine. Cans are produced in two sizes; 100 and 185 gm. A fourth cannery was established in Seyoun, Al-Mahra called Bin Seddon. It initially produced canned and

powdered fish, but currently only does powdering, possibly due to competition from an Omani cannery in Zhofar, Oman.

There is a tradition in Yemen of catching sardines and white bait fish and drying them on the beaches for use as chicken feed. This is depleting tuna stocks, which rely on sardines, white bait, and anchovy as their primary food source. The shortage of tuna may force the three canning plants in Mukalla to run at a loss or shut down completely. As a result, they have lobbied for a ban on the chicken feed practice in Hadramout, as well as on the use of night lamp fishing aimed at attracting sardines. Their efforts are not succeeding in changing these practices, and to further aggravate matters, many processors are using caught pelagic fish for extracting oil and producing dried fish.

#### 8.2.2 FROZEN TUNA FILLETS – VACUUM PACKED (CO/NON CO TREATED)

Frozen tuna fillet is another added value product that is highly sought after by gourmet sushi restaurants in the Gulf countries, especially UAE, and in Egypt and the EU. At present, supply is dominated by Vietnam.

#### 8.2.3 GROUPER FILLETS

The research team found that frozen fillets of grouper fish also are being exported to USA markets through the port of Miami. Aden Gulf Fisheries Co. in Aden ships two containers of frozen fish fillets and other processed products there on a monthly basis.

No coated or breaded fillets are processed in Yemen at this time. They arrive imported from the UAE as Vietnamese bass.

#### 8.2.4 FISH OIL AND FISH MEAL

This added value product uses catches of Indian oil sardine (*Sardinella longiceps*) from which crude fish oil is extracted and packed in 180-200 kg drums for export. The remaining dried fish is packed in 50 kg woven polypropylene bags for use as fishmeal for poultry farms and export. Most canneries use fish waste to extract oil and fish meal. This was the case for a factory in Shihr, which is reported to be closed. Dried shark fins are exported to Asian markets.

### 8.3. AQUACULTURE AND FISH FARMING

The first experimental aquaculture center was established in the coastal city of Al-Breqah in 1984. There were tanks for breeding shrimps (*Penaeus indicus*/*P. semisulcatus*) and four types of fish, including mullet, emperor, cuttle fish, and sarb. But the efforts had little success. The Aquaculture Research Center remains closed and neglected. There is a plan to use its tanks and staff for farming sea cucumber, which has a high value. But the center lacks finance and management staff to restart again.

The existing initiatives that were surveyed by the field research team included the following:

- The Ba Mussalam shrimp farm in Al Lahiyah, located north of Hodeida on the Red Sea coast. It was built in 2004 and became the only successful shrimp farm in Yemen, with 50 tanks producing 400 tons /annum of *Penaeus indicus* shrimp until it was closed by military operations.
- Two licenses were issued for marine aquaculture projects in Lahaj governorate (Khour Omierah and Gadeemah), but they were not implemented.

- Two additional marine aquaculture projects in Mukalla (including Bugshan) were licensed to two Saudi investors but were not realized.
- Al-Morgan Shrimp farm was licensed in Al-Shehr-Hadramout, but reported to have stopped operations after its first cycle.
- A shrimp farm license was issued to Al Gharasy in Sanaa but never operationalized.
- The only currently operational fish farm in South Yemen is a tilapia farm in Turayem, Hadramout Valley, called Bayut Fish Farm. It was started in 2013 and is owned by the Al-Amery family. It currently produces 10 tons of *Tilapia nilotica*, with most of its production exported to Saudi Arabia. The fish is chilled and transported overland by refrigerated/insulated trucks. The study team visited a land-based Tilapia farm at Turaim, in Hadramout Valley near Mukalla. The farm produces 10 tons of tilapia fish each year, and most of it is exported to Saudi Arabia overland through Alwadeeha. The demand for chilled Tilapia in Saudi Arabia and locally is reported to be high. Prices are 1000-1200 Yemeni Riyal/kg (about 2 USD/kg), and the Saudi importers have reported demand for 20 tons/shipment.
- The Aquaculture Research Center in Aden studied the coasts of Yemen and recommended eight locations found suitable for aquaculture along South Yemeni coast. They include Al-Mukha, from Mukha to Zebab, Zeban to Bab-El-Mandab, East Khor Omeirah, Ras Omran, Shugrah, East Beer Ali, and Beer Ali to Mukalla.

#### 8.4. EXPORT

Processors interviewed by the team were reluctant to disclose their current export data and clients. But the team obtained data from the fisheries authorities, which approve exports. Results are presented in Table 10.

<b>Countries</b>	<b>Percentage</b>
14 Arab countries	60%
Asian buyers	30%
EU buyers	5%
Other markets	5%

The leading importers of Yemeni seafood were Saudi Arabia, Egypt, Oman, UAE, and Jordan. Asian buyers were from Thailand, China, and Vietnam. France and Spain topped the EU list, and the team also found evidence of exports of grouper fillets (about 40 tons in 2019) to the USA.

The majority of Yemeni seafood exports were chilled, frozen, and trucked overland to Saudi Arabia. Trucks currently pass through the Al Wadeeaa entry border gate, due to the closure of the Medi land border gate on the Red Sea. The next most common form of export was frozen fish exported from Aden and Mukalla seaports. Aden, Rayan, and Seyoun airports can still be used for export of added value seafoods from

Yemen to the world. Currently only Seyoun airport is operational, and there is no confirmation that it is accepting cargo at this time.

A recent ruling (26/2019) has raised fish export fees. The full text of the ruling is in the Annex to this report. Current exports fees are:

15 YAR/kg	Fresh fish
5 YAR/kg	Frozen fish
12-15 YAR/kg	Fillets of Fish
150 YAR/kg	Lobster (live)
100 YAR/kg	Frozen Lobster tails

The new fees are in addition to an annual export license fee of 100-200 thousand YAR along with the costs of lab tests fees.

Logistical costs for transporting fish from Hadramout to Sallalah/Oman also include 1-1.2 million YAR for a 24-ton reefer trailer. Smaller reefer trucks (8-10 tons) from Hadramout to Saudi Arabia through Al Wadeeah land port border cost the equivalent of USD 3,200 to Gizan and USD 3,400-3,500 to Jeddah.

Table II illustrates seafood exports from Mukalla Seaport Hadramout 2017-2019, based on the Mediterranean Shipping Co. (MSC), which is the only shipping line working from Mukalla seaport.

<b>Table II: Seafood Exports for MSC from Mukalla Seaport</b>		
<b>Year</b>	<b>Number of reefer containers</b>	<b>Quantity in tons</b>
2017	40	960
2018	65	1560
2019 until 9/2019	32	768

Some Seafood exporters in Hadramout and Al-Mahra said they prefer to export their frozen seafood from the sea and airport of Salalah in neighboring Oman, which they reach through the border entry land port at Shahn. They prefer this route rather than using the Mukalla seaport, due to its small size, limited number of shipping lines calling, and unavailability of docks as priority is given to coalition vessels.

Table 12 illustrates export Statistics of Yemeni Seafood from Aden Sea Port

Table 12. Exports of Yemeni Seafood from Aden Sea Port		
Year	Exported Quantity in Kgs	Value in USD
2016	1,152,586	\$ 2,641,697.50
2017	3,768,463	\$ 8,679,015.50
2018	5,385,793	\$12,197,788.00
2019 (January-June)	3,113,693	\$ 6,790,408.00

## 9. MAJOR CHALLENGES OF THE FISHERIES SECTOR

The 2015 conflict has had a devastating effect on the fishing sector, including its economic gains. In addition, institutional and market-linkage constraints severely inhibit competitiveness and the realization of robust income generation opportunities from Yemen’s fishery resources. The major bottlenecks impeding the development of the fishery sector include:

1. **Damaged Infrastructure:** The war has inflicted severe damage on the fisheries infrastructure. Several landing sites have been destroyed. Ports and airport traffic are still disturbed. Al Rayan airport in Mukalla is closed. Armed groups frequently block transportation routes, and the resulting unstable conditions have led to reduced export opportunities and the deterioration of fish quality. In addition, the economic crisis causes frequent fuel and electricity shortages, pushing up fuel prices. Fishing sites suffer from insufficient infrastructure and limited capacity to comply with international standards. Ice plants, boat construction factories, and boat engine repair/maintenance workshops have shut down, causing serious gaps in the value chain. All these factors have further weakened the fisheries infrastructure and brought additional hardships to fishermen.
2. **Poor Governance, Ineffective Management, and Disintegrated Information Systems:** The lack of appropriate legislation and inspection in the Gulf of Aden and Arabian Sea have resulted in piracy and a growing trend of IUU fishing, reducing the productivity of local fishermen. With the decentralization of the MFW has come a breakdown in coordination and communication between the Fisheries Regional Authorities and growing conflicts between the MFW, FRA, and the cooperatives. There have been no fisheries management plans to rebuild the infrastructure and help fishermen overcome the sector challenges. Corruption and weakened institutional management have led to a general condition of stagnation.
3. **Weak Compliance and Enforcement of Regulations:** Local and regional fishermen do not comply with international regulations regarding the restricted fishing areas, the seasonality of fishing of specific types of fish, overfishing practices, and more. This is mainly due to the fact that marine and coastal authorities are no longer able to perform their role of inspection and law

enforcement. Most of the coastal authority vessels are damaged and are poorly equipped to protect the coast. The absence of control also has contributed to the increase in corruption.

4. **Supply-driven Production:** Fishermen tend to overfish the species that are available in a given season. Because they lack expertise in the processing of fish products, they sell their catches quickly before they spoil. They sell in bulk and at low prices. The fishermen are supply-driven and lack the basic infrastructure that can encourage them to adopt a market driven approach. They do not have the necessary processing and handling skills, do not follow the changing needs of the market, and do not seem to be ready to invest in adapting their production to market demands.
5. **Overfishing and Environmental Issues:** It is impossible to tell if Yemeni seas have been polluted by the 2015 conflict or face any serious environmental issues, due to a lack of published material on the topic. Moreover, there is no national or regional initiative to assess Yemeni coasts. Signs of overfishing have been observed along the Yemeni coast in the areas used by small-scale fishermen. As a result, access to some fishing areas has been restricted. The fishermen tend to take daily trips to nearby fishing areas. They take in small quantities of fish made up of random mixtures of grown and immature fish, which is compromising the breeding season and sustainability of local stocks.
6. **Increased Operational Costs:** Poor fisheries sector infrastructure has led to an increase in operational costs. Export duties for processors increased twice in 2018. They also have to pay for lab tests required for exported products and the export certificate fees. Fishermen face regular increases in the costs of fuel and generators, with frequent power failures.
7. **Local, Regional, and International Competition:** Competition is harsh at all levels. Locally, fishermen and processors are price takers, and they compete based on the volume of catch/processed products and prices. Processors focus on adopting strategies to upscale their business and increase sales volumes. However, there is no clear business model adapted to help them explore the benefits of value-added products. At the export level, processors prioritize high volume of bulk unprocessed products sold at low prices, and exported mainly to neighboring regional markets, such as Saudi Arabia, Egypt, and Oman. Some Asian markets take advantage of the low prices of Yemeni processed fish products, which they resell to other regional and international markets as products 'made in Asia'. Yemeni processors can no longer export fresh fish product by air, due to the absence of air cargo transportation facilities, missing out on a very lucrative market with increasing international demand. Moreover, the quality and freshness of fresh fish has plummeted due to lack of ice on boats and poor fish handling at landing sites. Exporters report that the fish are failing lab tests due to high levels of histamine caused by poor fish handling.
8. **Absence of Stock Assessments:** There has been no proper assessment of fish stocks since 2015, making it impossible to assess the war's impact on their numbers. Indeed, data have been lacking for years, with reports showing that the last stock assessment was conducted in 2003. As a result, there is conflicting information regarding whether the war has resulted in increases or decreases in fish stocks. According to some reports, foreign fishing vessels no longer venture into Yemeni territorial waters, because of the conflict resulting in increased stocks of fish in deep waters. However, those are areas that remain inaccessible for traditional fishermen. Other reports claim that the chaotic situation encourages IUU practices and piracy, resulting in unregulated and illegal fishing activities. Some industrial fishing vessels have been observed fishing in the Yemeni

waters and landing along Somali coasts. There is no reliable way of reporting on the impact of the war on the fish stock. Likewise, there is a dearth of data on the sector infrastructure; such as the number of operational boats, number of fishermen, quantity of fish caught, and size of the fishing sector manpower. Due to the mismanagement of the sector by the decentralized and unstructured fisheries authorities and insufficient coordination between local actors, the sector stakeholders are unable to gather up-to-date and reliable market information about the fish stock quantity and pricing.

9. **Poor Harvesting Operations:** Maintaining the quality of fish starts at the capture stage. Fishermen undermine the handling processes, because of the high costs of ice and fuel. They prefer selling low quality fish at the landing site to spending more to guarantee better quality. The fishermen do not use sufficient ice or cold storage on their vessels or on shore during catching and harvesting operations. Nor do they apply sound post-harvest handling techniques (e.g., keeping the fish properly stored, handling it appropriately, keeping it clean) to minimize spoilage. This directly impacts the quality of the raw fish, resulting in enormous losses and poor prices. But fishermen do not see the gain from investing in higher quality production.
10. **Limited Processing Operations:** The current study revealed that small and medium fish processing firms face a number of challenges that impede their ability to enhance their competitiveness. One of the main constraints relates to high product loss rates during processing activities, due to the poor quality of raw fish used for processing. Poor hygiene practices significantly contribute to quality loss, as well as poor handling and storage practices. In addition, these firms struggle to reduce production costs, which makes it more challenging for them to compete with high-priced finished products. They tend to focus on specific products, rather than diversifying their lines. For example, the tuna canning factory only produces tuna in oil, and not in water. Other firms have overlooked a profitable opportunity to invest in product diversification by introducing new ready-to-eat value-added fish products. The fish processing firms that do plan to resume export activities to the Gulf regions or Europe face major challenges qualifying for or renewing their quality certification documentation (mainly HACCP).
11. **Strict Standards for International Standards Compliance:** Since the war, exports to the EU – where HACCP and ISO 22000 standards are compulsory – have dried up, while some firms have continued exporting to the Gulf countries and Asia. Fish processing companies are very interested in resuming or bolstering their export activities within their regional markets, but they face high competition, competitive prices, and must meet strict quality and certification requirements. Neighboring markets such as Saudi Arabia and the UAE have moved to require that suppliers demonstrate their competence and capabilities with basic internationally recognized certifications as a pre-requisite for doing business. This is the case even with historical customers in target markets that have expressed interest in the Yemeni company's products. Thus their international market penetration has remained quite limited.
12. **Increased Corruption:** Several reports indicate that enforcement and compliance of Yemeni and foreign fishermen are weak because of corruption among fishery officials, particularly managers, enforcement officers, and monitoring personnel.

13. **Underutilization of Fisherwomen:** Women are an active component of the artisanal fishery sector, taking on a wide range of roles. Most fisheries firms visited in the study employed a workforce comprised of 30% to 50% female workers. Women work in the administration, processing lines in canning and gutting, and quality and inspection. When the field researchers visited villages such as Beir Ali and Mayfaa, they saw fisherwomen who were owners of fishing vessels and engaged in processing, such as fish drying and salting. However, the number of active fisherwomen and coastal women working in the fisheries remains small. Further support is needed to encourage women to be engaged in a more substantial way. The fisheries sector represents a significant potential for women to realize economic and social empowerment. Interventions to improve women's fish processing skills can significantly increase women's income as well as improve their social status.
14. **Limited Role of Fisheries Cooperatives and Associations:** Fishermen and fish processing SMEs lack effective support from local and regional fishing communities. Reports indicate the existence of 128 fish cooperatives represented by Yemeni Fishery Cooperative Union at the national level; but there is a clear institutional capacity gap that inhibits these structures from offering tangible and impactful support to a wide network of fisheries stakeholders. Limited institutional and technical capacities dramatically hamper the ability of the cooperatives to provide effective value chain development support to fishermen/women and fish processing firms.
15. **Untapped Aquaculture Potential:** Limited aquaculture also hinders the development of the fisheries sector. The researchers identified only one fish farm initiative in the Seyoun region, which has a limited capacity that cannot satisfy the regional market demand (mainly from Egypt and Saudi Arabia). There have been donor initiatives targeted at providing technical and financial support to fish farm initiatives. But they have failed due to key obstacles, such as the absence of a qualified workforce in aquaculture (since aquaculture is not yet taught in Yemeni universities), lack of farm design and construction experience among Yemeni contractors, and conflicting license issue among several authorities.

## 10. SWOT ANALYSIS OF THE FISHERIES SECTOR

The researchers review of the fisheries sector's strengths, weaknesses, opportunities, and threats resulted in the following SWOT assessment.

### 10.1. STRENGTHS

- Main source of food security, income, and employment to several hundred thousand Yemenis along the southern coast of Yemen
- Major foreign exchange earnings and fiscal revenues for the GOY
- Second most productive sector in Yemen's economy after oil and gas exports
- Contributes 15% of Yemen's GDP



- One of the highest levels of marine productivity in the world
- High level of fishing skills and traditional fishing knowledge of Yemeni fishermen
- Strong fishermen's cooperatives with excellent fishing skills and knowledge of the sector
- Willingness and desire among fishermen to improve fisheries management
- Growing domestic and global demand for fish, especially Tuna, which is abundant in Yemen
- Unexploited potential for marine and land aquaculture

## **10.2. WEAKNESSES**

- Inaccurate data and limited knowledge of stock status
- Poor regulation and law enforcement
- Inadequate fisheries management and increasing rates of corruption
- Absence of strategy to follow up with the restructuring of MFV
- Low fish quality due to poor handling and storage
- Lack of compliance with international standards
- Outdated quality accreditations
- Complex process to get EU number for export
- Seasonality of fishing and insufficient income diversification
- High levels of poverty in fishing communities
- Limited access to financial services to purchase new equipment (larger freezers, processing equipment)

## **10.3. OPPORTUNITIES**

- Improve sustainable fisheries management
- Increase export of processed seafood
- Increase production of value-added seafood products
- Develop untapped aquaculture potential
- Capitalize on the existing fisheries cooperatives and communities and build their capacities to better support the fisheries stakeholders, mainly fishermen

- Strengthen fishermen’s cooperatives or community-based organizations
- Support processors to enhance quality of fish to meet the requirements and the needs of the international markets
- Support processors to attain international quality/health standards (e.g., GMP, ISO, HACCP)

#### **10.4. THREATS**

- 2015 conflict’s impacts are still threatening the economic stability of the country and represents the main threat for the fisheries sector
- Rising conflicts may stop export of seafood products
- Insecurity at sea may stop fishermen from exploring marine coasts and remain in shores
- Piracy is uncontrolled
- Corruption at the MFW and the FRA is high and uncontrolled

## **11. CONCLUSION**

The results of this study suggest that the fisheries sector in Yemen is going through a rapid and comprehensive decline. The field survey has shown that there are important signs of sector deterioration across the full span of value chain, resulting in reduced fish quality and returns. Examples range from low quality or non-existent ice, to unclean boats and fish boxes, poor handling of catch, unhygienic landing stations, faulty cold stores, and unclean transportation to processing or wholesale.

There is a need to engage fishermen cooperatives and MFW/Fisheries Authorities inspectors and regulators in capacity strengthening. Trainings or refresher courses should cover topics such as the supervision of ice plants, ice merchants, managers, fishermen, handlers, and auctioneers at landing sites; landing site management; and transportation with insulated trucks. Infrastructure upgrades are needed to restore boats, landing sites, and auction yards to a higher level of hygienic practices. Processors need to upgrade their operations to meet HACCP/ISO 22000/FSMS and ISO 9001 food safety and quality standards and receive certification. Upgrades are much needed at the aquaculture center near Aden and quality inspection labs in Aden, Mukalla, and Al Mahra. The owners of boat making and engine repair workshops need soft financing to repair war damages, provide fishing industry services in South Yemen, and re-hire workers. Such supports would help reduce unemployment and boost fish production. In addition, the fitting of sorely needed insulated boxes in fishing boats to hold ice for fish preservation post catch would be important for raising the quality of fish caught.

Restoring the healthy exploitation and benefits of fisheries resources in Yemen faces daunting challenges. The second report from this study will address recommendations and key entry points for targeting interventions along the value chain to help revitalize this critical sector, build more sustainable economic development, and promote greater self-reliance for the people of Yemen.

## 12. REFERENCES

- Ammar Mohammed Al-Fareh. (2018). The Impact of War in Yemen on Artisanal Fishery in the Red Sea. Middle East Center. LSE. [http://eprints.lse.ac.uk/91022/1/Al-Fareh\\_The-impact-of-war\\_Author.pdf](http://eprints.lse.ac.uk/91022/1/Al-Fareh_The-impact-of-war_Author.pdf)
- Angelo BONFIGLIOLI and Khaled Ibrahim HARIRI. (2004). Small-scale Fisheries in Yemen Social Assessment and Development Prospects. Food and Agriculture Organization. The World Bank. <http://documents.worldbank.org/curated/en/603351468168235834/Small-scale-fisheries-in-Yemen-Social-assessment-and-development-prospects>
- Blaha. F. (2008). Exporting Seafood to the EU. International Trade Center. [http://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Exporting\\_Better/Quality\\_Management/Redesign/EQB84\\_Rev%201\\_eng\\_Exporting%20Seafood%20to%20the%20EU\\_FINAL\\_11.08\\_Blaha.pdf](http://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Exporting_Better/Quality_Management/Redesign/EQB84_Rev%201_eng_Exporting%20Seafood%20to%20the%20EU_FINAL_11.08_Blaha.pdf)
- EU. International Cooperation and Development. (2010) Yemen Fisheries Support Program. [https://ec.europa.eu/europeaid/sites/devco/files/aap-fisheries-support-programme-yemen-af-2010\\_en.pdf](https://ec.europa.eu/europeaid/sites/devco/files/aap-fisheries-support-programme-yemen-af-2010_en.pdf)
- FAO. (2003). The Use of Ice in Small Fishing Vessels. <http://www.fao.org/3/a-y5013e.pdf>
- FAO. (2010). Safety at Sea for Small-Scale Fisheries in Developing Countries. <http://www.fao.org/3/al960e/al960e.pdf>
- Haj. Hamba. (1998). The Artisanal Tuna Fishery in Yemen. 7th Expert Consultation on Indian Ocean Tunas, Victoria, Seychelles. <https://www.iotc.org/documents/artisanal-fishery-tuna-yemen>
- IFAD. (2013). Fisheries Investment Project: Supervision Report. <https://operations.ifad.org/documents/654016/36298228-0219-47e1-9a88-607aa768b528>
- IFAD. (2012). Ministry of Fish Wealth National Fisheries Strategy (2012-2025). [https://www.undp.org/content/dam/yemen/PovRed/Docs/Yemen\\_Fisheries%20Strategy.pdf](https://www.undp.org/content/dam/yemen/PovRed/Docs/Yemen_Fisheries%20Strategy.pdf)
- International Fund for Agricultural Development. (2010). The International Fund for Agricultural Development. <https://operations.ifad.org/documents/654016/714428/PDR%20Yemen%20FIP%20Main%20report%20and%20annexes.pdf>
- James Anderson et al. (2015). The Fishery Performance Indicators: A Management Tool for Triple Bottom Line Outcomes. PLOS Journal. [https://digitalcommons.uri.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1018&context=enre\\_facpubs](https://digitalcommons.uri.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1018&context=enre_facpubs)
- Mahboob Mohamed Abdul-wahab. (2003). A Study on Stock Assessment and Fisheries Management of Invertebrates in Yemeni Waters. Marine Science and Resources Research Center Aden, Republic of Yemen. [http://archive.iwlearn.net/persga.org/Files\\_/Common/Fisheries/6\\_StockAssess\\_INVERTEBRATES\\_Yemen.pdf](http://archive.iwlearn.net/persga.org/Files_/Common/Fisheries/6_StockAssess_INVERTEBRATES_Yemen.pdf)

Natheer Alabsi and TeruhisaKomatsu. (2014). Characterization of Fisheries Management in Yemen: A Case Study of a Developing Country's Management Regime. *Marine Policy*, Volume 50, Part A, December 2014, Pages 89-95. <https://www.sciencedirect.com/science/article/pii/S0308597X14001456>

SMEPS. (2009). Analysis of 5 Value Chains – Yemen (Fish, Honey, Coffee, Wheat and Qat). <http://www.bdsknowledge.org/dyn/bds/docs/769/YemenValueChainsStudy.pdf>

Smart Fish Working Papers. (2011). Fish Handling, Quality and Processing: Training and Community Trainers Manual. <http://www.fao.org/3/a-az083e.pdf>

United Nations. (2007). Trade and Environment Dimensions of the Fisheries Sector in the Arab Countries: The Case of Yemen and Oman. <https://www.unescap.org/sites/default/files/ESCWA%20Fisheries%20Study-25Oct07-Final.pdf>

USAID. (2013). Sustainable Fisheries and Responsible Aquaculture. <https://www.crc.uri.edu/download/FishAquaGuide14Jun13Final.pdf>

USAID. (2019). Advancing Gender in the Environment: Gender in Fisheries—A Sea of Opportunities. [http://www.wocan.org/sites/default/files/2019-iucn-usaid-fisheries-web\\_0.pdf](http://www.wocan.org/sites/default/files/2019-iucn-usaid-fisheries-web_0.pdf)

USAID. (2017). Manual on Fishery Practice Improvement Throughout The Supply Chain (From Catch to Delivery). [https://www.usaid.gov/sites/default/files/documents/1860/SectorEnvironmentalGuidelines\\_FishAqua\\_2018.pdf](https://www.usaid.gov/sites/default/files/documents/1860/SectorEnvironmentalGuidelines_FishAqua_2018.pdf)

USAID. (2018). Gender Research in Fisheries and Aquaculture. [https://www.seafdec-oceanspartnership.org/wp-content/uploads/USAID-Oceans\\_Gender-In-Fisheries\\_Training-Guide\\_October-18.pdf](https://www.seafdec-oceanspartnership.org/wp-content/uploads/USAID-Oceans_Gender-In-Fisheries_Training-Guide_October-18.pdf)

World Bank. (1991). Fourth Fisheries Development Project. <http://documents.worldbank.org/curated/en/280341468336037500/Republic-of-Yemen-Fourth-Fisheries-Development-Project>

World Bank Policy Papers. (2014). Private Sector Readiness to Contribute to Reconstruction & Recovery in Yemen. <http://documents.worldbank.org/curated/en/371961508411374137/pdf/120538-WP-PI59636-PUBLIC-Yemen-PN-No-3-Edited-clean.pdf>

World Bank Group. (2015). The Republic of Yemen: Unlocking the Potential for Economic Growth. <http://documents.worldbank.org/curated/en/673781467997642839/pdf/102151-REVISED-box394829B-PUBLIC-Yemen-CEM-edited.pdf>

World Trade Organization. (2005). Improved Capacity for Ensuring the Quality and Safety of Yemeni Seafood Products. [https://www.standardsfacility.org/sites/default/files/STDF\\_PPG\\_69\\_Final\\_Project\\_Proposal.pdf](https://www.standardsfacility.org/sites/default/files/STDF_PPG_69_Final_Project_Proposal.pdf)

# ANNEX A: TYPES OF FISH IN THE GULF OF ADEN AND GULF OF ARABIA



## ANNEX B: FACILITIES IN THE LANDING SITES

### LAHJ GOVERNORATE

Landing sites	Basic Service in Landing Sites									
	Auction yard	Fish refrigerator	Fish store	Ice factory	Engine maintenance workshop	Electricity network	Water network	Filling station	Slip way	Breakwater
<b>Khor Umer</b>	Available	X	X	X	X	X	X	X	Available	X
<b>Comments</b>	Fish auction yard was destroyed in the war. No ice factory available. There are facilities in the landing sites in need of restoration and maintenance.									
<b>Ras Alara</b>	Available	X	X	X	X	X	X	Available	Available	X
<b>Comments</b>	Ice factory is out of order. Electric power is weak Engine maintenance workshop in need of rehabilitation									
<b>Al Saqiyah</b>	Available	X	X	X	X	X	X	Available	Available	x
<b>Comments</b>	There is a fish complex that was built with government support in 2013 that has a fish landing yard and office of fish association. Auction yard destroyed in the war 2015, complex is currently in need of restoration.									

## ABYAN GOVERNORATE

Landing sites	Basic Service in Landing Sites									
	Auction yard	Fish refrigerator	Fish store	Ice factory	Engine maintenance workshop	Electricity network	Water network	Filling station	Slip way	Breakwater
Shuqrah	Available	X	X	Available	Available	Available	X	Available	Available	X
Comments	<p>There are 4 Auction yards for 4 fishermen associations</p> <p>There are 2 ice factories that have not been operating since they were supplied by the fifth fish project</p> <p>Electric power is weak. Engine maintenance workshop in need of rehabilitation. Slipway for boats is out of order.</p>									
Al Sheikh Abdulla	Available	X	X	X	X	Available	Available	X	Available	X
Comments	<p>Ice factory does not work. Fish cold store is off. There is a market with tables to sell fish. No transport &amp; disposal equipment available.</p> <p>Fish auction yard was destroyed in the war. Water network and the bathrooms need to be restored. Facilities for a fish complex project have been suspended due to the war. Slipway needs to be asphalted.</p>									
Almutala	Available	X	X	X	X	X	X	X	Available	X
Comments	<p>Destroyed fish auction yard. The slipway needs to be restored.</p>									
Ahwar	Available	X	X	Available	X	X	X	X	Available	X
Comments	<p>A private auction yard is available. Ice factory is out of order. Fish auction market to sell fish in the city in need of restoration Fish cold store not working.</p>									
Maqateen	Available	X	X	X	X	X	X	X	X	X
Comments	<p>Productive gathering of area fishermen &amp; expatriates does not have basic services.</p>									

Landing sites	Basic Service in Landing Sites									
	Auction yard	Fish refrigerator	Fish store	Ice factory	Engine maintenance workshop	Electricity network	Water network	Filling station	Slip way	Breakwater
Hesen Saeed	X	X	X	X	X	X	X	X	X	X
Comments	Directorate of Ahwar									
Hanad	X	X	X	X	X	X	X	X	X	X
Comments	Directorate of Ahwar									
Hesn Balaed	X	X	X	X	X	X	X	X	X	X
Comments	Directorate of Ahwar									



## SHABWA GOVERNORATE

Landing sites	Basic Service in landing sites									
	Auction yard	Fish refrigerator	Fish store	Ice factory	Engine maintenance workshop	Electricity network	Water network	Filling station	Slip way	Breakwater
Beer Ali	Available	X	X	Available	Available	Available	Available	Available	Available	X
Comments	There are auction yards for 4 associations. There is one ice factory. There are private 2 engine maintenance workshop									
Albayda	X	X	X	Available	X	X	X	X	Available	available
Comments	No basic services. There is one ice factory producing 10 T/day.									
Jlah	X	X	X	Available	X	X	X	X	X	X
Comments	N/A									
Ain Bamabed	Available	X	X	X	X	Available	X	X	Available	X
Comments	Auction yard is dilapidated and not operational.									
Aragh	X	X	X	X	Available	X	Available	Available	X	X
Comments	Auction yard is not managed by fish associations. Engine maintenance workshop established by the gas company stopped functioning in 2015, and has been handed over to the existing fish associations. Petrol station is privately owned and away from fishermen gatherings.									
Hoora Al sahel	X	X	X	X	X	X	X	X	X	X
Comments	No basic services.									

## MAHRA AND HARDRAMOUT GOVERNORATES

Landing sites	Basic Service in landing sites									
	Auction yard	Fish refrigerator (Chiller)	Fish cold store	Ice plant	Engine maintenance workshop	Electricity network	Water network	Filling station	Slipway	Breakwater
<b>Muhaiff</b>	<b>Available</b>	<b>X</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>X</b>
<b>Nashtoon</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>	<b>X</b>	<b>Available</b>	<b>X</b>	<b>Available</b>	<b>Available</b>	<b>Available</b>
<b>Dhaboot</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Feidimi</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>X</b>
<b>Yaroub</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Hiswinn</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>X</b>
<b>Hardhanout</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Khiseet</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Jedwah</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Hejour</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Hoof</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>X</b>
<b>Al-Fetk</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Damgout</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>Available</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

Landing sites	Basic Service in landing sites									
	Auction yard	Fish refrigerator (Chiller)	Fish cold store	Ice plant	Engine maintenance workshop	Electricity network	Water network	Filling station	Slipway	Breakwater
Sayhout	Available	X	X	Available	X	Available	Available	X	Available	X
Katar	Available	X	X	X	X	X	X	v	X	X
Etab	Available	X	X	X	X	X	X	X	X	X
Rakhout	Available	X	X	X	X	X	X	X	X	X
Yahoot Al-eiss	Available	X	X	Available	X	X	X	X	X	X
Damakh	Available	X	X	X	X	X	X	X	X	X
Qishn	Available	X	X	X	X	X	X	X	X	X
Darjah	X	X	X	X	X	X	X	X	X	X
Leen	X	X	X	X	X	X	X	X	X	X

## ADEN GOVERNORATE

Landing sites	Basic Service in Landing Sites							
	Yard Auction	Cold Store	Docking boats	Ice factory	Electricity network	Water network	Slip Way	Fuel Station
Dockyard	Available	Available	Available	Available	Available	Available	Available	Available
Seera	Available	X	X	X	Available	Available	Available	Available
Aldarba	Available	X	X	Available	Available	Available	Available	X
Foqum	Available	X	X	X	Available	Available	Available	Available
Emran	Available	X	X	X	Available	Available	Available	Available
Kawa	Available	X	X	X	Available	Available	Available	X

## ANNEX C: LOCATION OF LANDING SITES

Governorate	No	Name	Latitude	Longitude	Remarks
<b>LAHJ</b>	1	Al Saqiyah	12° 44.971' N	043° 35.942' E	Landing site, one fisheries association
	2	Ras Alara	12° 37.770' N	043° 54.947' E	Landing site, one fisheries association
	3	Khor Al Umaira	12° 39.319' N	044° 09.558' E	Landing site, one fisheries association
<b>ADEN</b>	4	Kawa	12° 40.244' N	044° 24.933' E	Landing site ,one fisheries association ( Kawa Village)
	5	Ras Emran	12° 44.994' N	044° 43.318' E	Landing site, tso fisheries associations
	6	Faqum	12° 45.194' N	044° 49.662' E	Landing site, one fisheries association
	7	Al Darba	12° 49.097' N	044° 54.938' E	Landing site, two fisheries associations
	8	Dockyard	12° 47.820' N	045° 00.140' E	Landing site for big traditional boats from all over the country,
	9	Seera	12° 46.700' N	045° 02.861' E	Landing site, one fisheries association
<b>ABYAN</b>	10	Al Muthalaa	13° 02.999' N	045° 21.306' E	Landing site, one fisheries association (office in Zingebar)
	11	Sheikh Abdullah	13° 04.522' N	045° 24.143' E	Landing site, one fisheries association
	12	Shuqrah	13° 21.346' N	045° 42.392' E	Landing site, four fisheries associations
	13	Maqateen	13° 24.825' N	046° 25.970' E	Camp site in winter for boats from different locations
	14	Ahwar Al Bandr (Ahwar Beach)	13° 27.240' N	046° 45.315' E	Landing site, two fisheries associations