



**Market Systems Assessment Report**

**Greater Upper Nile; select counties in Unity, Upper Nile and Eastern Jonglai State, South Sudan**

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## 1. Executive Summary

This market systems assessment report targets eight counties across three states in the Greater Upper Nile Region of South Sudan and presents the findings on the selected priority sectors the present opportunities for growth whilst improving the livelihoods, food security and resilience amongst its peoples.

The analysis was conducted through a literature review, discussions with expert teams from across the consortium, and primary qualitative data research completed in the target counties by consortium team members and analysed by consultants. The fieldwork carried out across the counties and in Juba was aimed to fill data gaps and validate information found during secondary research focused on representation across four key system components: supply, demand, supporting functions, and the enabling environment.

The Greater Upper Nile (GUN) region of South Sudan—covering Unity, Upper Nile, and Jonglei States—continues to struggle with a series of cascading challenges that undermine both local livelihoods and broader economic activity. Years of conflict, widespread displacement, and frequent climate shocks, especially flooding, have combined to disrupt agricultural production, damage infrastructure, and impede the normal functioning of local markets. In this precarious environment, three particular market systems—Meat (livestock), Fisheries, and Gum Arabic—emerged from assessments as having notable potential to foster food security, generate household income, and enhance resilience.

Despite their differences, these three market systems share several core barriers, such as limited access to finance and services, poor transportation infrastructure, low purchasing power among consumers, and security concerns. Nonetheless, within each system, there are specific strengths and unique entry points for market-based interventions. By addressing these common constraints—alongside sector-specific challenges—humanitarian and development partners can lay the groundwork for gradual but impactful market development.



The GUN region is characterized by deep-seated conflict and recurrent displacement, which have undermined food production and distorted local trade. Households face hyperinflation and persistently low purchasing power, leaving them unable to invest in improved technologies or quality inputs. Frequent floods have also devastated farmland and infrastructure, forcing many families to adopt fishing or reliance on wild forest products in place of more traditional livelihoods. Added to this, transport routes—whether overland or along waterways—are both logistically difficult and often unsafe, which raises the cost of doing business and increases the risk of spoilage, particularly for perishable goods like fresh fish and meat.

### **KEY FINDINGS OF THE MARKET SYSTEMS ASSESSMENT ARE:**

#### **Meat (Livestock) Market System**

- Despite low overall purchasing power, there is **strong demand for red meat** in urban centers (Malakal, Bentiu, Juba) and among institutions (e.g., restaurants, humanitarian agencies).
- Livestock diseases remain common, exacerbated by a severe shortage of trained veterinarians, limited preventive care, and high costs of veterinary drugs.
- Slaughter often takes place in basic, open-air facilities. Limited hygiene standards and lack of cold storage hamper meat safety, reducing consumer confidence and increasing spoilage.
- Informal trade routes connect pastoralist communities to urban markets, but high insecurity and transport barriers raise prices and discourage expansion into more sophisticated processing or packaging.

#### **Fisheries Market System**

- Flooding has made farming less viable in many counties; simultaneously, rising water levels have boosted fish stocks. Households are shifting to fishing for both subsistence and income.
- Fishers lack consistent access to quality nets, boats, and gear. As a result, catches remain below potential, and fishers are highly vulnerable to equipment losses during floods or conflict incidents.
- Post-harvest losses can exceed 40%, owing to minimal cold-chain infrastructure, poor drying facilities (especially during the rainy season), and weak aggregation hubs.
- Road closures and armed checkpoints raise transport costs; most fish are sold fresh at local markets, while dried or salted fish is typically traded informally. Demand is strong in urban centres, but consistent supply remains a challenge.

#### **Gum Arabic (NTAF) Market System**

- South Sudan has abundant Acacia species suited for producing gum Arabic, a globally valued product for food, pharmaceuticals, and cosmetics.
- Most gum Arabic is collected through traditional tapping techniques. Inadequate drying and sorting methods reduce quality and export competitiveness.

- Much of the gum Arabic is smuggled or sold at low prices to traders who blend it with Sudanese gum before export. Producers are often unaware of true market prices, limiting their income.
- Flooding and drought cycles stress Acacia trees and complicate movement of raw gum, while poor road conditions and security risks elevate transport costs.

Based on the assessments presented in this document, an overarching strategy is being proposed below such that it can guide the consortium in identifying systemic opportunities to achieve the goals of the THRIVE project.

**PROPOSED PROGRAMME STRATEGY:**

Efforts to catalyse economic and livelihood opportunities in the Greater Upper Nile region should target the Meat, Fisheries, and Gum Arabic sectors as strategic markets. Each market system, although constrained by conflict, underinvestment, and climatic volatility, exhibits strong potential for growth. By addressing shared challenges—such as the lack of infrastructure, limited finance, and insecurity—alongside the more nuanced issues of each sector in high performance counties, development partners and local private sector actors can foster sustainable market ecosystems.

Furthermore, recognising that South Sudan’s markets are still recovering from devastation caused by conflict and extreme climate conditions, when building out partnerships under each intervention, consortium must consider hybrid programming whereby the participants receive direct support initially and slowly wean off the aid dependency, shifting the burden to the private sector incentives.

This approach not only promises better household incomes and food security but also sets the stage for long-term resilience in a region still grappling with deep humanitarian needs. Through incremental investments in core functions like production, processing, and trade—and by reinforcing the supporting services of finance, transport, and aggregation—these market systems can begin to operate more effectively, ultimately contributing to lasting economic recovery and stability in South Sudan’s Greater Upper Nile region. A summary of interventions proposed at the end of each systems’ assessment is presented in the table below.

*Table 1: Intervention areas and targeted activities proposed for programming*

LIVESTOCK MEAT SYSTEM INTERVENTION AREAS	TARGETED ACTIVITIES
Expand Animal Health Services	<ul style="list-style-type: none"> <li>• Deploy mobile vet clinics and CAHW training in Rubkona (Unity State) and Ulang (Upper Nile State), where livestock populations are growing, yet disease outbreaks remain frequent.</li> <li>• Incentivize private veterinary input suppliers to stock affordable drugs in market hubs such as Bentiu (Unity State) and Malakal (Upper Nile State), linking them to CAHW networks for outreach and large scale suppliers in Juba for regular supply.</li> </ul>
Improve Slaughtering & Processing Infrastructure.	<ul style="list-style-type: none"> <li>• Upgrading basic slaughter points in Rubkona, Bentiu, and Ulang with proper drainage, water access, and cost-effective waste disposal.</li> <li>• Piloting solar-powered cooling units or freezers near populous marketplaces (e.g., Bentiu), enabling butchers to preserve meat longer and reduce spoilage.</li> </ul>

Enhance Market Linkages & Consumer Confidence.	<ul style="list-style-type: none"> <li>Partner with livestock trader cooperatives in urban centers like Bentiu and Malakal to introduce standardized slaughter protocols and disseminate information on best practices.</li> <li>Facilitate buyer-seller forums linking producers in Rubkona and Ulang with large institutional buyers or restaurants in major towns, thereby stabilizing demand and promoting consistent quality.</li> </ul>
FISHERIES SYSTEM TARGETED ACTIVITIES	
Improve Access to Fishing Inputs	<ul style="list-style-type: none"> <li>Support local input dealers or agro-vet shops in Ulang (Upper Nile), Bentiu (Unity), and Kodok (Fashoda County, Upper Nile) to stock essential fishing equipment more reliably.</li> <li>Provide equipment finance (e.g., microloans or subsidized credit) through community structures in areas such as Nyal and Ganyliel (Panyijiar County, Unity State), where rising floods have spurred greater fishing activity.</li> </ul>
Enhance Processing & Storage Facilities.	<ul style="list-style-type: none"> <li>Establishing or upgrading community-based drying racks and shelters in Nyal, Ganyliel, and Kodok, where fishers have limited access to any formal processing sites.</li> <li>Introducing solar-powered cold rooms or small-scale freezers near key landing sites in Ulang and Bentiu, allowing fishers to preserve fresh catch until transport is arranged.</li> </ul>
Strengthen Market Access & Transport.	<ul style="list-style-type: none"> <li>Organizing trader networks in Ulang, Bentiu, and Malakal to coordinate group transport, share fuel costs, and reduce spoilage through quicker routes or consolidated shipments.</li> <li>Supporting or forming fisher/trader cooperatives to pool transport resources and advocate collectively for safer waterways and more predictable checkpoint fees.</li> </ul>
Expand Access to Finance.	<ul style="list-style-type: none"> <li>Scale mobile money solutions for fishers in counties with moderate telecom coverage (e.g., Bentiu, Malakal), reducing reliance on risky cash transactions.</li> <li>Integrate financial literacy and bookkeeping training into fisher group capacity-building, ensuring they can manage and repay small loans effectively.</li> </ul>
GUM ARABIC NTAFF SYSTEM TARGETED ACTIVITIES	
Develop Aggregation & Value Addition.	<ul style="list-style-type: none"> <li>Set up aggregation points in Renk and Fashoda, where gum is cleaned, sorted, and packaged for consistent quality. This reduces reliance on middlemen who exploit scattered producers.</li> <li>Pilot small-scale processing (e.g., manual grinding, sorting) in selected locations—such as Renk—to capture greater value before export and train local youth in these tasks.</li> </ul>
Formalize Trade Channels & Market Information.	<ul style="list-style-type: none"> <li>Promote transparent pricing through radio broadcasts or mobile channels in counties like Renk and Fashoda, informing collectors of current market rates.</li> </ul>

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- Foster trader-producer agreements or pre-financing models, allowing harvesters in remote areas (e.g., northern Unity State) to receive partial payments and plan their harvesting/transport schedules accordingly.
  - Increase trader influence on trade routes by forming and strengthening trader associations.
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## **2. Introduction and Purpose of the Market Systems Assessment**

Mercy Corps engaged consultants to...

### 3. Greater Upper Nile Region Context Overview

South Sudan's economy is highly fragile, with oil revenues accounting for nearly 90% of government income. The civil war in Sudan, its largest trade partner, has disrupted oil exports, leading to severe currency depreciation, fiscal debt, and a 40% economic contraction in 2023, making it difficult to fund essential services. Although direct employment in the oil sector is low (less than 1%), its revenues indirectly supported public sector jobs, services, and trade. The country's dependence on oil has made it vulnerable to external shocks, including global price fluctuations and regional conflicts, disproportionately impacting vulnerable populations.

The collapse of agriculture and livestock sectors, along with high inflation, has drastically reduced household purchasing power. In 2019, 79.4% of South Sudan's population lived in extreme poverty, with projections showing only a modest decline to 50.3% by 2043. Traditional coping strategies like cattle trade and farming are no longer viable due to insecurity and climate shocks, forcing communities to rely on fishing and collecting wild foods. As of 2023, 7.1 million people face crisis-level or worse food insecurity (IPC Phase 3 and above), and 91.9% experience multidimensional poverty, lacking access to healthcare, education, and basic services. Frequent flooding and insecurity have made farming nearly impossible, increasing reliance on food aid and other unsustainable coping mechanisms.

The economic decline in Greater Upper Nile is driven by oil dependency, with the conflict in Sudan disrupting exports and leading to a severe fiscal crisis at national and local levels. This has resulted in reduced public spending, salary delays, and business closures, increasing extreme poverty. Additionally, the destruction of oil infrastructure and trade routes has further hindered economic recovery. Agriculture and livestock livelihoods have been devastated by flooding, insecurity, and market disruptions, displacing thousands of farmers in Jonglei and Upper Nile and causing food production in Unity State to plummet. Violent cattle raids and land disputes have made livestock keeping unsustainable, further limiting household income opportunities.

Household incomes across the region have declined sharply, driven by economic instability, displacement, and market disruptions. Hyperinflation has eroded purchasing power, while public sector job losses and salary delays have left families struggling. Alternative income sources such as fishing, non-timber forest products (gum arabic, honey, bamboo), and small-scale trade have been disrupted by insecurity and closed trade routes. The collapse of Sudan-South Sudan cross-border trade has particularly affected border towns like Malakal and Renk, where food and essential goods are now scarce and expensive.

Food security is at crisis levels, with parts of the region classified as IPC Phase 4 (Emergency) and IPC Phase 5 (Catastrophe). Conflict and poor infrastructure have disrupted markets, causing soaring food prices and severe shortages of staple foods. The Juba-Bor-Malakal trade route remains insecure, while flooding and displacement have made traditional food production systems unviable. Many communities depend on food aid, which remains insufficient due to funding shortfalls and logistical challenges.

Climate change has had a devastating impact on the economy, worsening flooding, droughts, and displacement. Jonglei and Upper Nile states have faced unprecedented flooding, destroying farms, infrastructure, and homes. These persistent floods have made land unusable for farming,

while pastoralists struggle to find dry grazing land, leading to livestock losses and increased tensions over resources. In Unity State, droughts have caused water shortages, forcing migration and intensifying competition for grazing land. Weak climate adaptation measures and limited investment in infrastructure have further exacerbated economic losses.

Conflict remains a central driver of economic collapse, crippling trade, markets, and production systems. Major towns like Malakal, Bentiu, and Bor have suffered repeated destruction of businesses and infrastructure. Insecurity and informal taxes along key trade routes on land and in water, has raised transportation costs and vulnerability to looting. This has in turn discouraged commerce and further compromised the local economies.

### **Climate-Related Shocks and Stresses**

The Greater Upper Nile region faces a severe economic crisis with major market breakdowns. The deterioration of agriculture, livestock, and trade has left millions without reliable incomes, deepening poverty and food insecurity. These conditions are increasingly exacerbated due to climate related shocks and stressors that have become cyclical with annual floods causing mass devastation.



Non-Timber Agro Forestry) and identify county level opportunities for income generation, resilience and economic growth in the Great Upper Nile (GUN) region.

## A. LIVESTOCK SECTOR

The livestock sector in South Sudan is a cornerstone of the economy, deeply embedded in the social, cultural, and economic fabric of the country. South Sudan has one of the largest livestock populations in Africa, with cattle, sheep, and goats serving as vital sources of wealth, nutrition, and social capital for millions of pastoralists and agro-pastoralist communities. Livestock contributes significantly to the national Gross Domestic Product (GDP), estimated at approximately 15% of GDP. It provides employment for a large segment of the rural population, playing a crucial role in food security, income generation, and trade. The livestock economy is also a crucial financial asset in many communities, where cattle serve as a form of currency, investment, and social capital used in marriage transactions and conflict resolution.

Trade remains informal, with evidence of cross-border trade found between South Sudan and neighbouring countries including Uganda, Kenya, Sudan, Democratic Republic of Congo and Ethiopia. However, continued insecurity and conflict, climate change, limited animal health products and services and weak market infrastructure including high cost of tariffs and transport are severely impact livestock-based livelihoods.

This is occurring simultaneously to a severe food shortage in the country and an increased use of meat for food security. In addition to cattle trading, livestock marketplaces are increasing offer slaughter services. The meat market system therefore serves as the primary driver for livestock market growth in South Sudan. Demand for meat is increasing in urban centres, driven by population growth, urbanization, and changing dietary habits with future growth opportunities from provision to store meat, meat processing, packaging and cold chain facilities that can increase demand and improve the performance in the meat sub-system.

Given that there is ample attention to the livestock market system with literature available on the overall constraints in the livestock market we focus this assessment on the meat sub-system as a driver of the livestock market system.



The fieldwork conducted during this assessment found that the bulk of the meat demand comes from local households, with red meat (mainly beef) forming a substantial portion of diets. Demand is generally higher in urban centres like Juba, Wau, and Malakal, where there is a concentration of salaried workers and greater purchasing power. Humanitarian organizations, government agencies, and the hospitality sector (e.g., hotels and restaurants in Juba) also purchase meat in bulk, although the supply chains remain inconsistent and high prices sometimes cause shift in their to imported meat (chicken and beef) from neighbouring countries and frozen meats from as far as Dubai. In urban areas, consumers often prefer fresh beef, and there is some (though still limited) demand for

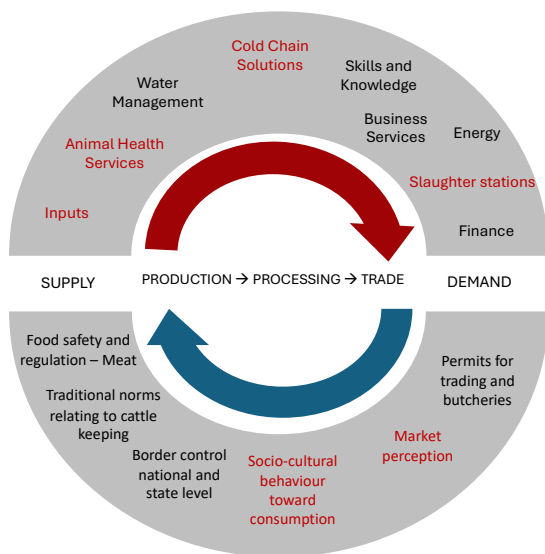
processed or packaged meat products. In rural communities, meat is consumed more intermittently with increased demand during popular religious and cultural ceremonies.

The primary source of meat (the supply) comes from pastoralist and agro-pastoralist communities who raise cattle, goats, and sheep. Historically concentrated in Upper Nile state and Akoba county, more recently changing climate conditions with rising water levels, and increased dry spells have led to a rise in migration. New concentrations are found in the highlands of Unity State, migration from Unity onward to Lakes, Western Equatoria and across border to DRC. Another important pattern is from Nasir and Akoba to Malakal, whilst also supporting the pastoralist communities of Fashoda, Panikang and Renk. The trade in Bor and Juba continues with thriving trade for cattle and meat markets. Many of these producers sell livestock when they need cash or during dry seasons when grazing becomes scarce.

Figure 1 attached presents the summary of the overall livestock meat market sub-system map followed by detailed description of the core functions and support functions. The support functions and rules marked in red represent the priority functions discussed below.

Figure 1: Livestock meat sub-system market map

### LIVESTOCK MEAT SUB-SYSTEM: Cattle and Shoats



SUPPORTING FUNCTIONS in the Livestock System is characterized by a mix of private sector led and civil society managed functions that are enablers to the growth in the sector. However, target populations in the host and refugee communities of Garissa County are not able to access or utilize support services adequately. Access and adoption varies due in part to the purchasing power which is higher for refugees and in part due to restrictions on movement, restrictions are also higher for refugees.

CORE of the Livestock System in South Sudan is a complex supply base, as larger livestock cattle is a social asset and closely protected by clans and pastoralist communities. Traditionally, these are not commercialized. More recently they are used for subsistence to fight extreme food insecurity. Shoats and poultry supply is more open and is increasingly reared as a source of household food. Shoats are traded in animal markets and limited local processing takes place in market hubs. Poultry supply is nascent at a household level and has shown growth in recent past.

RULES AND NORMS of the Livestock System include socio-cultural dynamics among a diverse group of population that dictate the roles various sub-sets of the population would play in the core and support functions of the livestock sector. Furthermore, regulatory frameworks are favorable but to some degree curtailing inclusive growth in the system, in part due to inefficiencies in the processes.

## CORE FUNCTIONS OF THE LIVESTOCK MEAT SUB-SYSTEM

### Production

Meat production in South Sudan is primarily based on livestock rearing, with cattle, goats, and sheep being the dominant animals raised by pastoralist and agro-pastoralist communities. Livestock keeping is prevalent across the country with limited numbers in Unity State. Recent migration patterns toward highlands in Unity State has increased livestock in Unity State as well. Rising food insecurity has increased livestock production for its meat. Goat and Sheep are popular among women producers and often used for subsistence whilst cattle is increasing slaughtered at livestock markets. Main slaughtering points for meat are at livestock marketplaces in business hubs – Malakal, Renk, Bentiu, Bor and Juba. However, production faces challenges such as **seasonal floods, livestock diseases, limited access to veterinary services, and insecurity**, which can lead to losses and restrict market access. Despite these obstacles, livestock remains a crucial economic asset, with many households depending on it for their livelihoods, food and as a means of financial security.

Many of the challenges relating to the livestock itself are being addressed or at the least targeted by development organisations. The fundamental market challenge is the update within these functions as the limited income ability challenges livestock keepers to adopt improved practices or to increase the use of inputs and veterinary services for disease management. Therefore this assessment increasing the focus on the meat market whereby a demand led approach can catalyse livestock production.

### Processing

Meat processing in South Sudan is largely informal, with slaughtering taking place in local slaughterhouses, open-air butchering areas, and small meat shops in towns such as Ulang, Rubkona, and Bentiu. Butchers and slaughterhouse operators purchase live animals from local traders and process them for sale in markets. Before slaughter, veterinary officers or community animal health workers (CAHWs) conduct health inspections to check for diseases. However, **processing infrastructure is underdeveloped**, with many slaughterhouses **lacking modern equipment, refrigeration, and proper waste disposal systems**, leading to inefficiencies and health concerns. Most meat is sold fresh due to the **lack of freezing and cold storage facilities**, limiting the ability to supply meat beyond immediate local markets. Although there is growing demand for frozen and processed meat in urban centres like Juba and Malakal, the sector remains constrained by the absence of industrial meat processing facilities and refrigeration technology **shifting demand to imported products**.

### Trade

Trade is mainly facilitated by a network of traders with strong ties to producers and markets, with some direct sales from households to consumer markets. The meat trade in South Sudan is cantered around the sale of live animals rather than processed meat, with livestock markets in Rubkona, Bentiu, Kodok, Madeng, and Tonga reported to be serving as key trading points. Traders purchase livestock from herders and small-scale producers, then transport them to larger markets in

Juba, Malakal, and across borders into Ethiopia and Sudan. Some traders engage in fattening livestock before resale, particularly in areas like Tonga and Bentiu, to increase their market value.

Cross-border trade with Ethiopia and Sudan presents a lucrative opportunity, as there is strong demand for South Sudanese livestock.

*The table below showcases specific findings from interviews that provide additional evidence of each of the core functions in the meat market system:*

## PRODUCTION AND MIGRATION

Great Upper Nile  
\*Unity, Upper Nile  
and Jonglei

Large cattle populations. Multiple traders and producers referenced moving livestock to local auctions or state markets such as Malakal, Renk and Maban.

Greater Bahr el  
Ghazal \*Lakes and  
Warrap

Also recognised by interviewees as high livestock zones with some internal trade routes to Sudan. However, information on the specific routes of livestock market hubs were not identified.

## PROCESSING

Rubkona

Butchers slaughter cattle goat and sheep. *‘True “modern” slaughterhouses with refrigeration and strict hygiene standards are rare. Most slaughter is done in open spaces or rudimentary structures. The hides from slaughtered animals are often left to decay due to a lack of processing facilities.’*  
*“.....electricity and water is very limited which creates wastage and hygiene issues.”*

Ulang

Slaughterhouses provide meat to the local community, particularly for restaurants and households. *“Tools (knives, axes, refrigerators) are limited, and flooding restricts market access.”*

Juba, Bor, Malakal

Additional locations with high meat slaughtering and sales include Juba, Bor and Malakal. Most livestock markets slaughter cattle for meat with the largest volumes found in these urban centres.

## TRADE

Urban centres  
\*Juba, Rubkona/  
Bentiu, Malakal  
and Wau

These are considered prominent trade and meat sales hubs by regional traders. They host large and more organized markets *“with higher demand and somewhat better facilities for slaughtering and storing. Traders often transport livestock from rural areas to these urban markets to take advantage of better prices”*. Livestock Traders – Rubkona.

Kodok Market  
(Fashoda County)

Mentioned as a *“notable local auction site where livestock is gathered for onward sale to Renk, Maban, Malakal, and across the border to Sudan prior to trade blocks”*. Livestock Traders – Kodok Payam, Fashoda

Ethiopia border  
(Burbei)

Significant for cross-border trade, especially with cattle and goats. *“We walk animals across to Ethiopian markets or use boats during floods”*. Livestock Traders Madeng

### CONSTRAINTS IN KEY SUPPORT FUNCTIONS OF THE MEAT SUB-SYSTEM

Based on above assessment of the core functions in the livestock meat market system, the following **support functions** were deemed critical for further analysis to understand the system level constraints and opportunities:

1 Livestock Health – medicines and veterinary services

2 Slaughtering Infrastructure and Processing Facilities

3 Perceptions and behaviours

We explore the underlying causes and intervention opportunities for each below.

#### Livestock Health and Veterinary Services

South Sudan faces frequent outbreaks of diseases. These diseases lead to high mortality rates, reduced productivity, and economic losses for livestock-dependent households. Diseases also severely impact the meat market as it impacts the perception and create reluctance in the market to consume for food.

The persistence and spread of these diseases are largely driven by **limited access to veterinary services, weak disease surveillance, and low adoption of preventive measures** such as vaccination and community animal health programs.

South Sudan has a severe **shortage of trained veterinarians**, with many rural areas lacking access to professional animal health workers. The vast and remote geography, coupled with inadequate infrastructure and insecurity in conflict-affected regions, makes it difficult for veterinary professionals to reach livestock keepers. In many cases, community animal health workers (CAHWs) serve as the primary providers of animal healthcare. However, CAHWs face challenges such as a **lack of training, inadequate support from formal veterinary institutions, and an irregular supply of vaccines** and drugs. Although CAHWs play a crucial role in rural animal health systems, their effectiveness is constrained by a lack of supervision and recognition within national veterinary policies.

From fieldwork conducted for this assessment, two major **underlying causes of constraints** were identified; **i) high cost of veterinary drugs and vaccines**, which severely limits uptake among livestock keepers. Many rural households operate on subsistence economies with minimal cash flow, making it difficult to prioritize spending on livestock vaccines and treatments. In areas where vaccines and drugs are available, prices are often prohibitively high due to **weak supply chains**, dependence on imports, and market inefficiencies. The lack of government subsidies or structured veterinary services further exacerbates this issue, forcing many livestock keepers to rely on **informal markets**. Here, they often encounter unregulated, counterfeit, or expired drugs, which are either ineffective or contribute to antimicrobial resistance. Additionally, pastoralists frequently prioritize immediate survival needs over long-term investments in disease prevention. Given the seasonal nature of their incomes, many are reluctant or unable to allocate resources for veterinary services, leading to low demand and further reducing incentives for suppliers to maintain reliable vaccine stocks.

This financial barrier is compounded by the second underlying cause **ii) limited awareness and perceived cost-benefit trade-offs**. Many livestock keepers do not fully understand the long-term economic benefits of disease prevention through vaccination. Instead, they often seek treatment only when diseases have already spread, leading to higher costs in managing outbreaks or low effectiveness from medicines. The absence of structured veterinary outreach and education means that preventive animal health services are not widely promoted, leaving many pastoralists uninformed about their importance. As a result, demand for vaccinations remains low, reinforcing a cycle where **suppliers are hesitant to stock vaccines or invest in distribution in remote areas**, further increasing costs due to limited economies of scale. Interviews in Rubkona and Ulang suggest a demand from livestock traders for improved animal health products and services.

These systemic constraints—high costs, weak supply chains, low awareness, and competing financial priorities—create significant barriers to effective livestock disease control. Addressing these factors requires strategies that enhance affordability, accessibility, and demand generation to shift livestock keepers' behaviour toward preventive animal health practices.

## **OPPORTUNITIES**

### **1 Expand veterinary services network**

- Collaborate with livestock trader groups and other agro or inputs suppliers to enhance veterinary clinics in key livestock producing areas. Explore opportunities in Rubkona and Ulang as quick-win opportunities. Explore mobile units to reach remote areas.
- Increase training and equip more CAHWs to support local disease management. Collaborate with INGOs where they are active. Partner with FAO and others to extend affordable vaccines and deworming treatments.

### **2 Early warning systems for prevention**

- Create early warning systems to support livestock producers with disease monitoring, flood warnings for migration.
- Use the same digital platforms to increase knowledge on the benefits of prevention and disease control

## **Slaughtering infrastructure and processing facilities**

Growing demand for meat for food has led to an increase in slaughtering and sales of meat at the local and regional markets. The main slaughtering locations were reported to be Rubkona, Ulang, Bentiu, and Tonga, where butchers process cattle, goats, and sheep for direct sale to consumers using rudimentary tools that are not always properly cleaned or sanitized with no packaging solutions to protect the meat. Slaughtering in local markets typically occurs in open-air spaces or small slaughterhouses with little to no drainage systems, creating a high risk of contamination. Cold storage or refrigeration is non-existent, forcing butchers to sell meat immediately or risk spoilage. Additionally, animal waste disposal is poorly managed, with bones, hides, and intestines often left in the open, attracting flies and increasing the risk of disease transmission. After slaughter, meat is sold in open-air butcher stalls or small market shops using wooden tables or hung in the open or spread of a tarpaulin sheet, where hygiene conditions are inadequate.

In urban centres like Juba, Malakal, and Wau, slaughtering and meat sales conditions are somewhat better than in rural markets, though significant challenges remain. Some urban slaughterhouses have basic meat processing infrastructure, including metal tables, knives, and water sources for cleaning, which help improve hygiene compared to local markets. Veterinary inspections are more frequent, though enforcement is inconsistent, leading to variations in meat safety standards. Unlike in rural areas, hides and skins from slaughtered animals are often collected for sale, reducing waste.

Meat sales in urban markets take place in crowded but more structured environments, where butchers operate in designated meat-selling areas. While some butcher shops have refrigeration facilities, power supply issues often force sellers to rely on fresh meat sales with limited storage options. Hygiene standards are relatively higher in some locations, with cleaning water access, plastic coverings for meat, and the use of gloves and sanitized knives. However, water supply inconsistencies and weak regulatory enforcement continue to pose sanitation risks. Although urban meat markets benefit from better infrastructure and oversight compared to rural areas, the overall hygiene and safety conditions still require significant improvement to meet public health standards.

The poor slaughtering infrastructure and hygiene conditions stem from multiple underlying causes including; financial limitations, weak regulatory enforcement, inadequate infrastructure, logistical barriers, and cultural practices. **Limited investment from both the government and private sector** has left slaughterhouses underdeveloped, with butchers lacking access to credit or financial support to improve their facilities. The **high costs of building** proper slaughtering and cold storage infrastructure further discourage traders from making necessary upgrades. The lack of investment can be associated with the limited business case. The market is still nascent and with trade networks disconnected, there is very little incentive for investment.

Compounding this issue is **weak regulatory enforcement**, where hygiene laws exist but are rarely implemented due to insufficient veterinary inspectors and corruption, allowing unsanitary slaughtering practices to continue unchecked. **Logistical challenges**, such as flooded roads and high transport costs, force traders to slaughter livestock in informal locations closer to markets rather than at centralized facilities.

On the demand side, **cultural preferences** for fresh meat and reliance on **traditional slaughtering** methods discourage investment in modern processing techniques and refrigeration, reinforcing a market dynamic where meat must be sold immediately, regardless of hygiene conditions. These combined factors contribute to unsanitary meat production and distribution, posing significant public health risks and limiting the growth of the meat industry.

## **OPPORTUNITIES**

### **3 Expand veterinary services network**

- Collaborate with livestock trader groups and other agro or inputs suppliers to enhance veterinary clinics in key livestock producing areas. Explore opportunities in Rubkona and Ulang as quick-win opportunities. Explore mobile units to reach remote areas.
- Increase training and equip more CAHWs to support local disease management. Collaborate with INGOs where they are active. Partner with FAO and others to extend affordable vaccines and deworming treatments.

### **4 Increase the capacity of slaughterers and butchers at livestock markets**

- Collaborate with INGOs and livestock trader groups to increase the knowledge and awareness of hygiene practices and adoption of techniques and technology for improved market access.

## **Perceptions and behaviours**

Recent interviews highlight the integral role that meat plays in both rural and urban markets. In Rubkona County, the existence of active slaughterhouses, as well as butchers' interactions with local traders and transporters, clearly point to an established, ongoing consumer demand. Similarly, in Ulang town, daily slaughter rates for cattle and shoats have increased notably—from 2–3 cattle and 3–6 shoats per day to as many as 5 cattle and 12–15 shoats—demonstrating growing consumer appetite. Meanwhile, traders in Bentiu emphasize that livestock sales often generate higher incomes than other livelihood activities, reinforcing the high value of meat in local economies. In urban centres the demand is even higher with waged workers and growing trading sector. However, a series of **underlying causes lead to fluctuating demand and high price elasticity of demand** – with the smallest fluctuation in prices demand shifts to alternatives. The availability of fish as a **cheaper alternative** is one such shift, particularly in areas where fishing is common. During certain seasons, the fish market becomes more competitive, lowering the demand for meat. This affects the profitability of slaughterhouses and butchers, who struggle to maintain sales.

Other causes of fluctuating demand include affordability and **low purchasing power**. Interviews note that in rural communities only a few animals are slaughtered on a daily basis and meat prices can spike during droughts, floods, or conflict when livestock supply becomes uncertain, putting local meat out of reach for lower-income households. Similarly, changing weather patterns can **increase transport costs** for livestock and therefore meat prices in urban centres, who quickly deviate to alternatives such as fish or meat from international sources when those become competitive or more readily available.

Because of **minimal storage and refrigeration**, consumers often buy and cook meat on the same day it is slaughtered to ensure freshness. Interviewees mention that substandard slaughter practices and lack of inspection services can create doubts about meat safety, especially in areas where water supply or veterinary checks are not consistent reducing consumer demand.

## OPPORTUNITIES

### 1. Demand generation

- Increase awareness of hygiene practices to boost consumer confidence
- Create storage solutions to make meat supplies more consistent

### 2. Improved meat handling practices at slaughterhouses

- Increase the oversight for hygiene and meat handling, explore certification options
- Collaborate with slaughterers to improve the adoption of hygiene practices
- Increase trade links to new markets – hospitality sector, refrigerated shops

## B. FISHERIES SECTOR

The fisheries sector in South Sudan is an essential pillar of both food security and economic livelihoods, especially in flood-affected regions where agriculture has become unviable. Fish serves as a primary protein source for many households, and local demand remains strong, particularly in

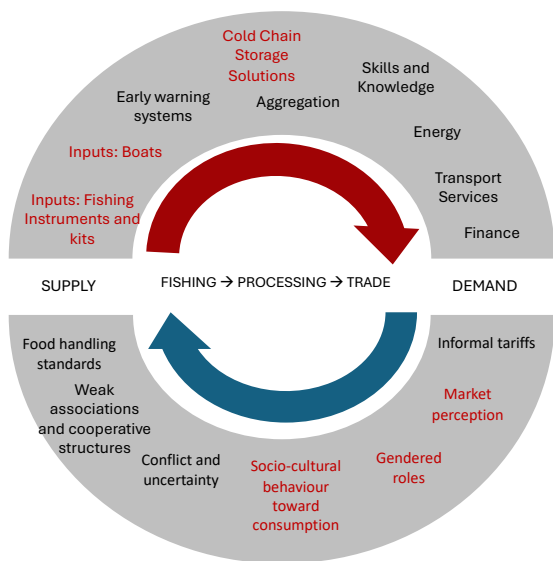
major towns such as Juba, Bor, Malakal, and Nasir. Beyond domestic consumption, salted and dried fish exports to Uganda, Kenya, and the Democratic Republic of Congo highlight the sector’s regional trade potential.

However, the supply side is plagued by inefficiencies, including seasonal variations, weak market linkages, post-harvest losses, and limited infrastructure. Seasonal fluctuations lead to high fish availability during the dry season (November to June) but supply shortages in the wet season (July to October), causing price volatility and income instability. The lack of cold storage, processing facilities, and structured market access further limits the ability of fishers to fully exploit available resources.

Figure 2 presents the fisheries market systems map followed by a discussion of the core and support functions of the system under.

Figure 2: Fisheries market system map

### FISHERIES MARKET SYSTEM MAP



**SUPPORTING FUNCTIONS** in the Fisheries System is characterized by a needs based adoption of rudimentary inputs and make-shift boats to addressing the pressing food requirements along areas around rivers. The sector is severely limited in its growth due to disconnected market links and transport services to enable large scale sales by fisherfolk, causing reported 40-60% of the catch not making it to markets. Limited to no cold chain storage solutions means that at least 40% of the catch rots and is wasted with high contamination and health issues to follow.

**CORE** of the Fisheries system is driven by the increase in fish flowing through the river basins in South Sudan due to an extreme change in weather patterns causing floods. This increase has led to a mix of development aid and community driven fishing for food security. The demand is incremental as fish is a cheaper alternative protein to meat and is heavily supported by the development sector in accessing boats and fishing kits. Limited trade and processing takes place outside of fishing towns and their neighbouring rural areas. Smoking and drying fish using natural sun is a common process to increase the lifespan of fish for food.

**SOCIAL NORMS** are traditional and dictate gendered roles with fishing and boat ownership concentrated among men. Fishing is still a nascent sector with very limited policy or regulation to address standards and sustainable practices which have social and environmental impact but also limits international market uptake.

### CORE FUNCTIONS OF THE FISHERIES MARKET SYSTEM

#### Fishing

Fishing is a lifeline for many South Sudanese households, particularly in flood-prone areas where traditional farming has been rendered impossible, and floods have brought natural fish in the waters of the Sabot River. In regions such as Ulang County, Akobo, Nyal, Bentiu, and Ganyiel, fishing has become the primary income source, with some fishers depending on it for 60-90% of their total earnings. According to a fisherman in Nyal, fishing became his sole livelihood after his farmland was

submerged by flooding: *“Before the flooding time, I had farmland for cultivation, but now it is completely underwater. That is why I concentrate only on fishing.”*

Rural communities are mostly fishing for local consumption and food security with those closer to urban centers or links are exploring trade options. Some consumption patterns found during the field work are as follows:

- **Panyijiar County (Nyal, Ganyliel):** Many fishers here rely on small-scale fishing primarily to meet local food needs, with any surplus sold in nearby rural markets.
- **Fashoda County (Kodok):** Fishermen focus largely on fresh consumption within local markets. Though some traders travel through or buy small volumes, longer distance trade activities remain low.
- **Other Flood-Prone Areas (e.g., Madeng):** In communities where seasonal access is minimal, most fishing is for direct household consumption or very local trade.

Fishing methods across the counties remain traditional, with most fishers relying on hand-rowed canoes and gill nets due to the high cost of motorized boats. In many areas, fish production is limited not by natural availability but by access to proper fishing gear. *A fisherman in Kodok noted: “We could catch more fish if we had better nets and more boats. Right now, we rely on what little we can afford.”* Where gear is available fishers may be able to benefit from the increased fish breeding, floods have disrupted access to fishing camps, destroyed equipment, and displaces fishers. A fish trader from Ganyliel remarked: *“This flood has increased fish productivity, but it has also made it harder for us to reach markets.”*

### Processing

Processing remains one of the weakest links in the fisheries value chain, with post-harvest losses estimated at 40-62%. The primary challenges include a lack of drying infrastructure, absence of cold storage, and reliance on inefficient traditional methods. Many fishers rely on sun-drying, smoking, or salting, but these methods often lead to contamination, spoilage, or market rejection.

Women play a crucial role in processing and retailing fish, yet they face financial barriers, limited access to credit, and poor market structures which make drying and processing fish more challenging during the long rainy season. According to a post fishing handler in Nyal: *“Women are the ones drying and selling fish, but we struggle because there are no proper facilities. When it rains, everything spoils.”* Another fisher commented: *“We lose a lot of fish in the rainy season because there are no cold storage facilities. If we could store them, we would sell more and waste less.”*

To address these issues, solar-powered refrigeration, improved drying racks, and access to modern processing techniques are needed to reduce losses and improve fish quality for both local and export markets.

Efforts by the international NGO sector have introduced some refrigerators and other support products and services however, there have been incidences of illegal confiscation of refrigerators at

checkpoints if these are placed on boats. Exploring and addressing the regulatory and governance structures could play a major role in the success of support functions in this sector.

## Trade

National-level tracking of fish trade in South Sudan remains inconsistent, as much of the sector operates informally and with minimal official oversight. While some records may exist for larger shipments heading to urban markets like Bor, Wau, Juba or Malakal, most transactions—especially those starting in more remote counties—tend to go unregistered. Traders frequently move fish (both fresh and dried) from counties to regional hubs within South Sudan, and there is anecdotal evidence of cross-border exports to Uganda and Sudan.

As a result, most fish crossing county lines or national borders is sold through informal channels, with little systematic data collection along the way. Despite higher prices in neighbouring countries, many small-scale fishers and traders do not export directly due to prohibitive transport expenses and the risk of spoilage or loss enroute. Larger or better-capitalized traders are reported to occasionally arrange exports by truck or river barge when roads are impassable.

The major trade routes identified during the assessment include:

### 1. Internal River Routes (Nile Basin):

- Fishers use barges and motorboats along the White Nile, Bahr el Ghazal, and Sobat Rivers to reach urban centres like Juba and Malakal.

### 2. Road Corridors to Urban Hubs:

- Remotely caught fish moves by truck or motorcycle to markets in Wau, Bentiu, and Juba. Long journeys have led to more dried fish trade.

### 3. Cross-Border Exports (Uganda & Sudan):

- Some fish heads south via the Juba-Nimule Road into Uganda, or north across the border into Sudan. Renk, Malakal and Wau are important hubs.

### 4. Lakes Region to State Capitals:

- Fishing communities around Lakes State supply Rumbek, Wau, and Juba by road. During rainy season trade becomes localized or shifts to dried fish.

For smaller scale traders and fishers in particular, market access remains a major barrier, despite high demand for fish both within South Sudan and in regional markets. Fish from remote fishing camps in Ulang, Bentiu, and Kodok is often bought by middlemen, who transport it to urban centres. However, the lack of roads, high transportation costs, and security risks mean that many fishers sell at low prices to avoid the costs and dangers of moving fish to larger markets. A fisherman in Kodok described the challenge: *“The buyers at the riverside pay little, but if we try to transport fish to Juba or Malakal, we face high taxes, checkpoints, and insecurity on the way.”*

Additionally, the absence of formal cooperatives or aggregation centres limits fishers’ ability to negotiate better prices or access regional and export markets efficiently. Many fish traders also lack financial capital to expand their operations, further restricting market reach. Export markets present

an untapped potential, particularly for salted and dried fish, which are in high demand in Uganda, Kenya, and the DRC. A trader in Nyal explained: *“There is more demand for dried and salted fish in Congo and Uganda. If we had better transport and market organization, we could make good money.”*

Other constraints include regulatory constraints such as formal and informal taxation, and security concerns continue to hinder trade efficiency, making cross-border fish trade more informal and less profitable.

### CONSTRAINTS IN KEY SUPPORT FUNCTIONS

Based on above assessment of the fisheries core market system functions, the following **support functions** were deemed critical for further analysis to understand the system level constraints and opportunities in the fish market system:

- 1 Fishing instruments and other inputs (boats, fish nets and fishing kits).
- 2 Aggregation and Storage
- 3 Transport Services
- 4 Access to finance
- 5 Skills

We consider each of these support functions in detail below with their constraints analysis.

#### Fishing instruments and other inputs (boats, fish nets and fishing kits)

Critical inputs for fisherfolk include boats, nets and lines, hooks, traps and other gear that are critical for fisherfolk to catch their fish. As fish has a demanding post catch stage where proper care is required immediately after catching, other important inputs for post catch handling include tarpaulin sheets and baskets for hygiene.

Small wooden canoes are the most common form of boat used for fishing. These are made by local carpenters with limited durability. In some cases, where fishers with more resources use fiberglass or motorized boats. Wooden canoes are typically made by local carpenters, some fishers barter fish or labour in exchange for the canoe’s construction. Boat owners will rent or share the boat with smaller fisherfolk with barter agreements or share of their catch. Some fishers receive nets or boats on loan from better-capitalized fishermen or traders (mostly male), agreeing to sell back their catch at predetermined, often lower prices to repay the debt.

Gillnets, cast nets and simple handlines are standard and supplied in limited and adhoc manner by inputs suppliers in larger market hubs such as Bentiu as reported during the inputs suppliers’ interviews. Inputs suppliers are reluctant to consistent and larger supplies, firstly because it is difficult for them to access the supplies and second, they do not perceive a regular or high demand for these items.

Affordability remains a key challenge for fishers and therefore quality is not of high focus among inputs dealers. Most fishing nets used are monofilament nets and many fishers continue using old or damaged nets for lack of affordable replacements, which lowers catch efficiency and likely has a very high environmental impact in the waters. Where fishnets are not affordable at all, basic hooks and lines are used by individual fishers. Some communities such as reported by fishers in Nyal, employ fish traps, but these are less common. Access to fishing gear is irregular through local suppliers. Small shops or travelling vendors in market towns such as Malakal or Bentiu often bring nets and hooks from Uganda or Juba. Fisherfolk buy on a small scale with limited variety or quality check. Wealthier fishers with savings or small trader networks sometimes pool money to buy bulk fishing gear from Juba or border markets in Uganda which creates supply in the short run, is unreliable and very expensive.

In the past, development programmes have distributed fishing kits which have created a local supply in some counties, but coverage has been sporadic and not guaranteed from one year to the next.

Several **underlying root causes** persist in the system that are curtailing the access to inputs and services. Inputs networks perceive weak demand for fishing inputs and thus hesitate to invest in supplying the fishing sector. In part, fishers have very limited purchasing power and operate in small, seasonal, or flood-prone localities. Because of frequent income fluctuations and few financing options, fishers often cannot afford modern gear or larger equipment like motorized boats. As a result, ***input demand appears too sporadic and small-scale to justify a robust supply chain*** or large inventory investment.

Furthermore, since most fishing in remote areas is geared toward subsistence and local sales, fishers focus on low-cost, often second-hand gear. This fuels ***a cycle of disincentive*** in which input suppliers see only small, ad hoc purchases at irregular intervals, and thus remain reluctant to establish consistent distribution networks or bulk import quality gear. Poor roads, flooding, and insecurity also make delivering fishing equipment expensive and risky, driving up retail prices and further depressing overall demand. In effect, limited buying power and high operational costs jointly create the perception of insufficient market demand among potential suppliers, perpetuating input shortages.

Similarly, boats are not built with sufficient size and quality to endure high flood seasons. The traders and carpenters are not invested in quality as the market opportunity is deemed limited.

Access to financial services are severely limited which services as a related underlying cause of the constraints in the inputs function. We discuss this separately below.

## OPPORTUNITIES

### 3. Increasing local supply of boats and inputs

- Many fishers currently depend on costly, imported gear. Expanding local production capacity (e.g., net-making, boatbuilding, or basic fiberglass repair) can lower costs and ensure more reliable supply. This approach also creates local jobs and reduces logistical barriers related to transport and import duties.
- Engaging traders and inputs suppliers to better understand market demand, exploring business models that can make supplies more affordable for fishers and creating

incentive schemes for demand generation can trigger an increase in localized supply of critical inputs.

#### 4. Input Distribution Hubs or “One-Stop Shops”

- Reliable distribution networks in regional towns with strong inward and outward linkages—offering a variety of fishing inputs (nets, hooks, lines, spare parts)—could streamline fishers’ purchases and reduce the piecemeal buying that currently dominates. Bulk purchasing or aggregator models might drive down per-unit costs and expand choices for fisherfolk.

#### 5. Partnerships with NGOs and Cooperatives

- Development organizations often seek to strengthen local value chains and market systems with a particular focus on creating access to inputs. From recent interactions, WFP and FAO at least have programmes that support the provision of inputs in the fisheries system. Joint ventures with cooperatives or fisher associations to link them to supplies in the country can secure a ready customer base, lower marketing expenses, and potentially qualify for grants or subsidized financing to expand operations into underserved fishing communities.

### Aggregation and Storage

Aggregation centres and storage facilities are crucial to South Sudan’s fisheries sector yet remain limited or unavailable in most regions. Fisherfolk and traders typically store fish using makeshift or traditional methods—like sun-drying or short-term smoke-drying—near landing sites, and these do not function as true aggregation hubs. Larger-scale aggregation points where fish could be bulked, chilled, or stored for onward transport are rare, especially in rural areas, forcing most trade to remain informal and small-scale. During fieldwork across the 8 counties targeted under THRIVE, no clear evidence was found of a single, centralized aggregation point for bulk buying or export of fish. Instead, traders and larger buyers often converge on a handful of urban markets—especially in Juba, Malakal, and other state capitals—to purchase fish in bulk. These sites sometimes function as de facto aggregation hubs (where fish is collected from multiple suppliers), but they are not formally designed or equipped as industrial-scale aggregation centres.

When it comes to storage conditions in these hubs, the consensus from interviews (KIIs) and documentation is that cold-chain infrastructure remains minimal. Most storage still relies on basic methods—ice blocks, small freezers powered by generators, or short-term sun-drying and smoking. Any cold rooms or large-scale ice plants in urban areas tend to be limited, privately owned, and rarely accessible to most small-scale fishers. Consequently, even in these central markets, fish is generally sold or processed quickly to prevent spoilage, rather than being held in long-term storage.

**Several underlying root causes** persist in the system that are curtailing the access to aggregation and storage services. Primarily, this is associated with poor infrastructure – facilities and energy services. Most landing sites lack ice plants or cold rooms, causing high spoilage of fresh fish and forcing fishers to rely on drying or smoking. The drying and smoking processes also are impacted in

the rainy season where drying times are extended and the risk of bacteria and mould increases. There are no adequate dry storage facilities either to enable fishers and small traders to stock and trade across the changing seasons.

Another related and critical support function is of **energy services**. Even where storage facility is possible, lack of reliable electricity and low access to and affordability of alternatives such as generators and fuel, reduce the ability for cold storage. Some traders reported purchasing and installing refrigerators on boats to transport fresh fish, but these were quickly looted at informal river checkpoints.

Capital among fisherfolk and traders is very low with minimal or no **access to credit**. High interest rates, lack of collateral, and minimal formal lending keep fishers and traders locked into small-scale operations. This perpetuates a cycle wherein no one can afford the upfront costs of proper aggregation hubs or modern storage.

Coupled with the limited access to credit is the **weak cooperatives and associations structures** that limit group advantages for accessing markets and finance, among other potential services. Whilst no clear cooperative or association was identified during the interviews, development initiatives support informal and semi-formal groups are emerging across the country. There such associations identified for further exploration as entry points include:

1. EC/PUMP Project Cooperatives under SNV Producing for Urban Markets Project, some fisherfolk formed small cooperatives and received business training to improve market access and organizational capacity.
2. In counties such as Nyal, Ganyiel, Bentiu, Kodok, and Madeng, small associations or informal clusters of fishers coordinate on gear-sharing, drying, or transport arrangements. These are often referenced in KIIs and FGDs as “fisher groups” rather than formal cooperatives.
3. In some areas, women involved in smoking and sun-drying fish have organized into small groups to pool labour and occasionally negotiate with traders. These collectives do not always register as cooperatives, but they function similarly for mutual support. They were originated during a UNIDO – Global Affairs Canada project that ran up to 2021. The groups have continued informal coordination since then.

## OPPORTUNITIES

1. **Reducing Spoilage and Extending Shelf Life by improving storage services:**
  - Increasing availability of cold rooms, and critical products such as solar-powered freezers, would allow fishers to hold fresh catch longer, especially when transport is delayed. This can help secure better prices rather than rushing to sell at lower rates.
  - Effective aggregation system by attacking traders to become regionally stationed aggregators with adequate facilities, could also facilitate proper handling—washing, cleaning, and icing—that extends fish freshness and preserves quality. Bentiu, Wau,

Melakal, Bor and Juba should be explored for such increasing aggregation capacities with strong links to county level fisherfolk.

- Traders make good entry points for aggregation system as they not only provide a market access but also enable the transmission of best practice during fishing, post catch handling, storage, hygiene and processing where needed. All these practices can lead to better quality, improved onward market access and value.

## 2. Enabling Bulk Sales and Market Access and post catch practices:

- By collecting fish in larger volumes, fishers can meet consistent demand from bigger markets, including the newly catalysed aggregation hubs mentioned in point 1 above. Increasing the bottom-up aggregation capacity will enable fisherfolk to have more control on their catch and the regional markets.
- Improved incentives among fisherfolk will incentivise improved post catch practices.
- Aggregation also helps traders pool transport resources (like trucks or barges), lowering per-unit transport costs.

## 3. Promoting Cooperative Organization:

- Aggregation points can serve as a platform for fisher groups and cooperatives, encouraging shared investments in processing or storage technology over time. Such cooperation can improve negotiating power with both buyers and transporters.

### Transport Services

The transportation function in South Sudan's fisheries market system—covering both fresh and dried fish—struggles to operate efficiently due to a convergence of infrastructural, economic, and security-related challenges. Most fishers rely on wooden canoes, motorbikes, or, for larger traders, pickup trucks and boats to move fish from remote landing sites to urban centres. However, unpaved roads become impassable during the rainy season, causing delays and heightening the risk of spoilage. High fuel costs and frequent vehicle breakdowns further drive-up transport expenses, often forcing small-scale operators to sell their fish locally at lower prices rather than taking on the risk and cost of reaching higher-value urban or cross-border markets.

Recent flooding in South Sudan has paradoxically both forced more reliance on river transport—because many roads become impassable—and increased the difficulties of moving goods by boat. When water levels rise significantly, previously navigable channels can become dangerous, strewn with debris or blocked by vegetation, and landing sites for offloading fish may be submerged or inaccessible. Although traders sometimes switch from trucks to barges and canoes during the rainy season, heavy floods have, in recent years, made even river routes unpredictable and slow.

In areas prone to extreme flooding, landing points can shift, meaning transporters must offload fish farther from stable ground and potentially pay extra handling costs. Security concerns along the Nile and its tributaries also intensify during flood seasons, as travel times lengthen, and riverbanks become more difficult to patrol. Traders cite informal checkpoint fees and sporadic banditry as added risks, often compelling them to reduce volumes of fresh fish shipped—or switch to dried fish

methods entirely. Combined, these factors have constrained fishers' ability to reliably access larger markets, thereby undermining incomes and contributing to higher spoilage rates.

**Several underlying root causes** keep these constraints firmly in place. Limited government investment in **road infrastructure** leads to few paved routes and chronic maintenance gaps, creating substantial travel disruptions when seasonal floods occur. **Seasonal flooding** inundates roads, destroy bridges and disrupt even waterway transport. High water levels may appear beneficial for navigating but debris and dangerous currents often render river routes equally risky or impassable. Fast changing weather patterns create **unpredictability** and limits planning.

Heavy reliance of water transport requires quality boats, which are **expensive and difficult to manufacture** locally with **limited incentive** from traders to create durable products.

Insecurity and disruption along key **transport corridors** (export oriented and on a state level) not only poses physical risks but also raises costs through unofficial checkpoint fees. Traders frequently pay multiple "fees," reducing margins and deterring long-distance transport.

The absence of widespread mobile **cold-chain facilities**—exacerbated by inconsistent electricity and scarce refrigeration—pushes traders to sell quickly or rely on traditional preservation methods, which shortens the market reach for fresh fish. Small scale refrigerators are used in limited quantities only due to lack of availability but also **high cost of fuel**.

## OPPORTUNITIES

4 **Improve information relating to changing water levels and flood patterns to enable fisherfolk and traders to plan**

5 **Introduce lower cost cold chain solutions**

To combat the high costs of refrigeration, introduce solar powered refrigerators and improve the cold storage conditions led by larger scale fish traders at docks. Given the highly volatile and thin market conditions. Initial introduction of solar powered refrigeration solutions may need to be NGO led. Partnerships with existing and new programmes dedicated to energy solutions will be critical in enabling this intervention. Bentiu and Ulang may be important linking points with bulking stations and cold storage solutions. Regional hubs will help fisherfolk and traders to preserve fresh catch longer, making it viable to reach distant markets without spoilage losses.

Furthermore, the primary source of energy is from diesel fuelled generators. These are costly, frequently breakdown and have a high cost of operation due to high fuel prices. Exploring solutions that combine with solar power would increase the viability of the business models locally with possibilities for micro storage solutions.

6 **Using aggregation models to connect across the transport corridors**

Strengthening trader networks, organizing traders and building their capacity to store and transport fresh fish can create a significant advantage to the fresh fish market.

For dried fish, traders need dry storage and transport capabilities which would require strengthening their own trade network using the same model. Malakal and Bentiu will be important regional hubs to strengthen and link to Bor and Juba markets.

## 7 Formation of Transport Cooperatives or Associations

Pooling resources among fishers, traders, and transporters can lower per-unit costs for fuel and vehicle maintenance. Cooperatives could also coordinate schedules, share trucks or barges, and advocate collectively for better infrastructure and policies. Forming for collective bargaining power and strengthening the voice of the sector across cultural divides can also influence the security in the waterways. Cooperative structures and locations have already been discussed above in the aggregation support function.

### Access to Finance

Access to finance in South Sudan's fisheries sector remains limited and informal. Commercial banks consider fishers too high-risk to lend to, while microfinance institutions only operate in a few urban areas, charging interest rates many fishers cannot afford. Geographic isolation and poor infrastructure hamper outreach and incentive by financial institutions to target remote communities. According to fishers in Kodok, travel costs to open or service accounts on top of high costs, deter fishers in remote counties to attempt formal finance.

Instead, most rely on village savings and loan associations (VSLAs) for small loans or turn to informal credit from traders who demand unfavourable repayment terms. These are often insufficient for larger investments like motorized boats or cold storage.

Consequently, even those able to borrow face high interest rates, small loan sizes, and irregular terms, restricting their capacity to improve equipment, establish cold-chain facilities, or otherwise scale up their businesses.

*The underlying root causes of the restricted access to financial services include **low literacy rates, informality in businesses and lack of clear plans to repay principal investments**. The sector is also challenged by disconnected markets and **little to no digital services** to increase access to finance.*

### OPPORTUNITIES

Given the understanding of the fisheries market system, the financial services solution to be prioritized is the digitization of financial services. The feasibility of this is yet to be tested however, in Juba, mobile phones and mobile money is active and successful. There are weak telecommunication links however these exist providing the foundation for catalysing digital financial services. There are three opportunities to increase access to financial services:

## 8 Catalyse expansion of digital services

- Since some traders supply fish to Juba and export to Uganda or Congo, there is a potential opportunity for mobile payments and digital financial services to ease cross-border transactions.

#### 9 Increase financial literacy

- If mobile banking combined with financial literacy programs were introduced, more fishermen and traders could store money securely, access credit, and manage savings more efficiently.

#### 10 Strengthen local community savings groups

### C. NON-TIMBER AGRO FORESTRY (NTAF)

Non-Timber Agro Forestry (NTAF) comprises a range of active sub-systems in the 8 target counties including Gum Arabic, Bamboo, Lulu (Sheabutter), honey and the fruits and vegetables sub-systems. We divided these in two categories based on their sourcing; i) systems reliant on harvest which include Gum Arabic, Bamboo and Lulu with some wildflowers harvesting and ii) systems that require production honey and fruits and vegetables.

We then consulted the expert staff from within the consortium to identify those sub-systems that presented opportunities for feasible programming. For this we considered the availability of adequate market information and at least 1 market actor. This allowed us to further narrow our focus on actionable research. We found that in the first category of harvesting, Gum Arabic has significant market activity and potential. From the second category fruits and vegetables and honey present varying opportunities based on the county in which programming is held.

For the opening portfolio we introduce the Gum Arabic sub-system below for opening portfolio from which THRIVE will be able to enter the markets and expand its programming to other sub-systems as more information and market access becomes available.



#### Gum Arabic sub-system

Precise data on South Sudan's gum Arabic market size is limited, however the global market is valued at over \$1 billion, with a steady annual growth rate due to its increasing use in natural food additives and pharmaceutical products. Neighbouring Sudan has been one of the largest suppliers of Seyal variety of Gum Arabic which is popular in the international market. With disruptions in trade and increased conflict in Sudan, the supply of Gum Arabic has become scarce in the international market. South Sudan, given its untapped reserves of Acacia trees, has the potential to become a significant player in the market. The country exports little to no processed gum, with much of its production being absorbed by informal trade networks,

*“Gum Arabic provides us with money used in payment of school fees, buy food, treatment, buying livestock for marriage and cultural events. Sometimes, due to locust infestation and drought which affect Gum Arabic production, we get varied incomes.”* Speaking of their challenges, they share: *“Lack of capital... Tools and capital is our main challenge.”*— *Group of Gum Arabic Producers, Banyjang.* In another instance they share: *Gum Arabic income is much higher compared to other sources, but it depends on the management.”* Jhalak.

some into Sudan and the rest through micro trader channels to Juba. Naturally available trees provide local communities the much-needed support to earn their livelihoods. Communities in counties where *Accacia* trees are found in reasonable numbers, communities engage in a range of livelihoods activities including gathering, harvesting, post-harvest processing and trade.

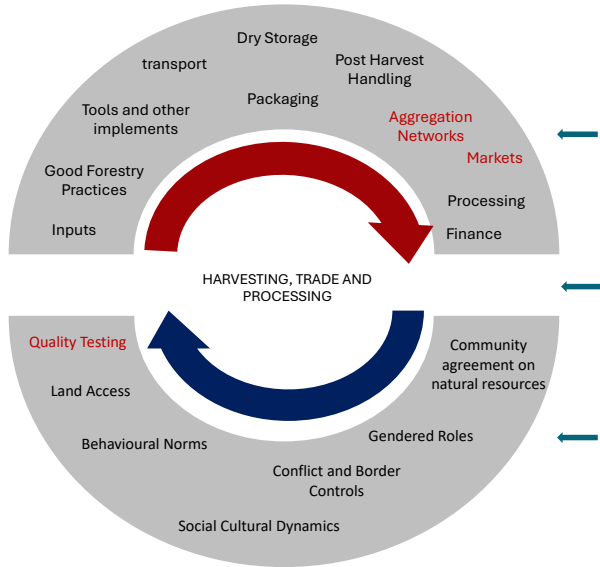
The demand for Gum Arabic is driven by its diverse applications in the food, pharmaceutical, and cosmetics industries. Globally, gum Arabic is a key ingredient in products such as soft drinks, confectionery, emulsifiers, and pharmaceuticals, making it a high-value commodity. While Sudan dominates approximately 80% of global supply, South Sudan has the potential to enter the market competitively, provided it can meet international quality and certification standards. There is also regional demand, particularly in neighbouring countries such as Uganda and Kenya, where gum Arabic is used in both industrial and artisanal applications.

The supply of Gum Arabic largely depends on the availability of *Acacia Senegal* and *Acacia Seyal* trees, which are predominantly found across the THRIVE's target states – Upper Nile, Jonglei, and Unity States. These trees thrive in arid and semi-arid regions, making them well-suited to South Sudan's environmental conditions. However, deforestation, climate change, and land use conflicts have significantly reduced the availability of these trees. During the assessment, interviews suggest high presence of these trees in Renk, some in Fashoda and Panikyang and northern points in Unity State. Ulang also reported engaging in gum Arabic activities. Harvesting is conducted mainly by micro traders and pastoralists, who rely on traditional tapping techniques to initiate the extraction of the gum. While sustainable harvesting practices such as rotational tapping are employed in some areas, the lack of organized resource management has led to concerns about overexploitation. Furthermore, insecurity and displacement have disrupted access to traditional harvesting areas, affecting the consistency of supply.

Figure 3 below presents the Gum Arabic market system map with critical core and support functions in red followed by a discussion of each under.

*Figure 3: NTAf Gum-Arabic sub-system market map*

## NON-TIMBER AGRO FORESTRY: GUM ARABIC



SUPPORTING FUNCTIONS in Gum Arabic sub-system are weak with little to no effort put toward the development of the sub-system. Gatherers and traders working mobile traders to aggregate and export in an informal and opportunistic manner. Formalising this system will provide a pathway to catalyse growth across a range of support functions to support the gum Arabic subsystem.

CORE of the Gum Arabic sub-system is dictated by the widespread natural presence of Accacia trees producing both Seyal and Senegal varieties of gum Arabic. South Sudan does not have the infrastructure for processing and therefore gathers and exports through a network of micro to medium scale enterprises that harvest, trade and export raw Gum Arabic.

RULES AND NORMS are informal with a heavy impact on the sector due to the conflict with Sudan and the disruption at the border. Signs of informal trade through Renk is likely but no evidence was found to this effect. One of the critical regulatory and policy oversight needed in the sector relates to the ability to conduct early processing and quality testing to unlock formal trade routes and opportunities.

## CORE FUNCTIONS OF THE GUM ARABIC MARKET SYSTEM

### Harvesting of Gum Arabic in South Sudan

Gum Arabic harvesting in South Sudan is traditionally carried out through tapping techniques, where collectors make incisions on Acacia trees to stimulate gum exudation. Once these incisions are made, gatherers wait **two to six weeks** before collecting the hardened gum nodules, which are then dried and sorted for sale. The harvesting season typically runs from **November to March**, as dry conditions improve gum flow and facilitate easier collection. Some harvesters practice **rotational harvesting**, allowing trees to recover and ensuring continued production. Despite these efforts, **unsustainable harvesting practices, deforestation, and land-use conflicts** pose a significant threat to the long-term viability of Gum Arabic production.

*“Extraction of the Gum Arabic on acacia trees... putting some injuries on trees for gum Arabic production... transportation... price determination.”*

*“The buyers who know external market can exploit local producers. If we had more information and finance, we could export by ourselves.”*

*– Gum Arabic Producer and Gatherer, Renk*

### Processing and Storage of Gum Arabic

Post-harvest handling of Gum Arabic in South Sudan remains traditional and underdeveloped, limiting its competitiveness in processed markets. After collection, gum is **sun-dried, manually sorted, and cleaned**, with lighter-coloured gum fetching higher prices. Storage in polypropylene bags helps prevent moisture absorption, but many producers **lack proper storage supplies or facilities**, leading to quality deterioration. Unlike Sudan and Chad, which have **modern grinding**

**and spray-drying facilities**, South Sudan exports mostly raw gum, missing out on higher returns from value addition.

The **lack of modern processing equipment** is a key barrier, as manual grinding, sieving, and windowing are inefficient and time-consuming. **Inconsistent employment and earnings**, along with quality control issues due to a lack of standardized grading, further destabilize the sector.

Processing is also hindered by irregular raw material supply, caused by **delays in harvesting and transportation**. Additionally, poor infrastructure and inadequate storage lead to moisture damage and contamination, reducing commercial value. Without investments in processing facilities, quality standards, and market linkages, South Sudan's gum Arabic sector remains less competitive in international markets. *“My role is grinding, sieving, and windowing gum Arabic before it is exported.”* and *“Processing is hard work that requires energy, but the payment is low—hard to support my family and save anything. I have no capital to start my own business.”* – Gum Arabic Processor, Renk

### Trade of Gum Arabic in South Sudan

The trade of gum Arabic in South Sudan is heavily constrained by weak infrastructure, informal trade routes, and security challenges. Most of the gum harvested in South Sudan is smuggled into Sudan, where it is mixed with Sudanese gum and exported under Sudan's label. This denies South Sudanese producers' fair market prices and recognition in global trade. The lack of clear trade policies, high export taxes, and weak quality control mechanisms further hinder formal exports. Moreover, the poor road network and insecurity make transportation costly, reducing profitability for local traders. Despite these challenges, gum Arabic remains a high-potential export commodity for South Sudan. Strengthening market linkages, improving certification standards, and formalizing trade channels would enable the country to fully capitalize on its gum Arabic resources and increase its global market share. *“The major challenge is the exploitation of local Gum Arabic traders by external traders... The buyers who know external market [prices] can exploit me in my product.”*

– Producer & Trader, Renk

### CONSTRAINTS IN KEY SUPPORT FUNCTIONS

Based on above assessment of the Gum Arabic core market system functions, the following **support functions** were deemed critical for further analysis to understand the system level constraints and opportunities:

- 1 Climate Variability
- 2 Labour Markets
- 3 Transport solutions

We consider each of these support functions in detail below with their constraints analysis.

#### Climate Variability

A major **systemic barrier** is **climate variability**, which disrupts the natural gum production cycle. Excessive rainfall can wash away newly exuded gum, while extended droughts weaken tree health, reducing yields. With **deforestation and soil degradation** accelerating due to competing land-use activities, the number of viable Acacia trees available for tapping is steadily declining. This forces

gatherers to travel longer distances, increasing their workload and **transportation costs**. Additionally, security challenges in some regions have restricted access to prime harvesting areas, leading to inconsistent supply and missed economic opportunities. Lack of storage reduces control over their harvest and forces immediate transport, reducing their resilience against climate shocks.

### Labour markets

The **labour-intensive nature** of Gum Arabic collection further compounds the challenges faced by harvesters. Many work **individually or in small groups**, relying on **traditional tools and outdated techniques**, which are not only inefficient but can also damage the trees, reducing future productivity. **Physical exhaustion and health risks** associated with prolonged exposure to harsh conditions make harvesting an unattractive livelihood option for younger generations, threatening the sustainability of the trade. The absence of affordable modern tools and protective gear places additional strain on gatherers, limiting their productivity and long-term economic prospects.

### Transport solutions

Once harvested, **poor infrastructure and inadequate transportation networks** create significant obstacles in getting raw gum to local markets or exporters. Many harvesting areas are **remote and difficult to access**, leading to **high transportation costs** and a reliance on middlemen, who often dictate prices and reduce earnings for primary producers. This **weak market linkage** discourages investment in improved practices, as harvesters see little incentive to upgrade their techniques when they receive **low and fluctuating returns**. The dominance of **informal and middlemen-controlled trade** further exacerbates the problem, as there is little transparency in pricing, quality standards, or support mechanisms for small-scale producers.

Several underlying root causes perpetuate these constraints in harvesting. **Poor road networks and transportation challenges** reduce market accessibility, make trade costly and inefficient, **low storage solutions** make transport critical immediately rather than allowing gatherers more control, lack of a regular **supply chain for tools and technology** force gatherers to adopt inefficient labour-intensive techniques which also reduce the sustainability of the natural forest resource. **Reduced market links** about cause exploitation by middlemen and conflict and land use rights continue to destabilize the supply chain.

Several of these issues are dominated by **disconnected markets**. Enables solutions that create a network of traders that can provide inputs and outputs market functions could potentially catalyse multi-fold solutions for the Gum Arabic market system.

## OPPORTUNITIES

In the Gum Arabic Market System one support function is most critical to catalyze system change: aggregation and trade.

### 1 Driving Systemic Change Through Market Linkages and Trade Networks

Strengthening **market linkages and trade networks** presents a transformative opportunity for South Sudan's Gum Arabic sector, enabling both **efficient output movement to export markets** and improved **input accessibility** at the production level. Currently, weak trade connections and

reliance on middlemen limit the ability of producers to directly access high-value international buyers. By **enhancing direct market access and formalizing trade networks**, Gum Arabic can move more efficiently from harvesters to exporters, ensuring better prices, reduced dependency on intermediaries, and increased revenues for producers.

A well-integrated trade system does more than just improve **gum Arabic exports**—it also facilitates **the movement of critical inputs** such as **modern harvesting tools, processing equipment, storage solutions, and transportation services** back to the source. By leveraging the **same trade routes and distribution channels**, businesses can introduce **affordable technologies** that increase efficiency and quality at every stage of the value chain. Improved **transport infrastructure and coordinated logistics** will further enhance the **flow of raw gum to processing centers and export hubs**, reducing post-harvest losses and stabilizing supply.

Strengthening **trader networks** also creates opportunities for **financing and investment partnerships**, as better market organization attracts buyers and financial institutions willing to invest in upgrading **processing facilities and storage infrastructure**. This shift toward a **more structured and efficient market system** will not only **boost South Sudan’s competitiveness in the global gum Arabic industry** but also ensure long-term **sustainability and resilience** in the sector. By **aligning market systems with input supply chains**, South Sudan can **break cycles of inefficiency and low profitability**, ultimately **empowering producers, processors, and traders to drive lasting economic growth**.

## 5. Next Steps

This assessment provides the overview of each target sector’s activities, core functions and support functions on the county level to identify the market systems constraints. It further identifies intervention areas that present an opportunity for growth in the sectors whilst improving livelihoods in communities the county level.

A design workshop to form these ideas into actionable interventions and partnerships is suggested at the completion of this exercise. The design workshop should focus on identifying practical partners including development sector that can catalyse initial market activity with a consideration to a longer-term transition to partnerships with the private sector.

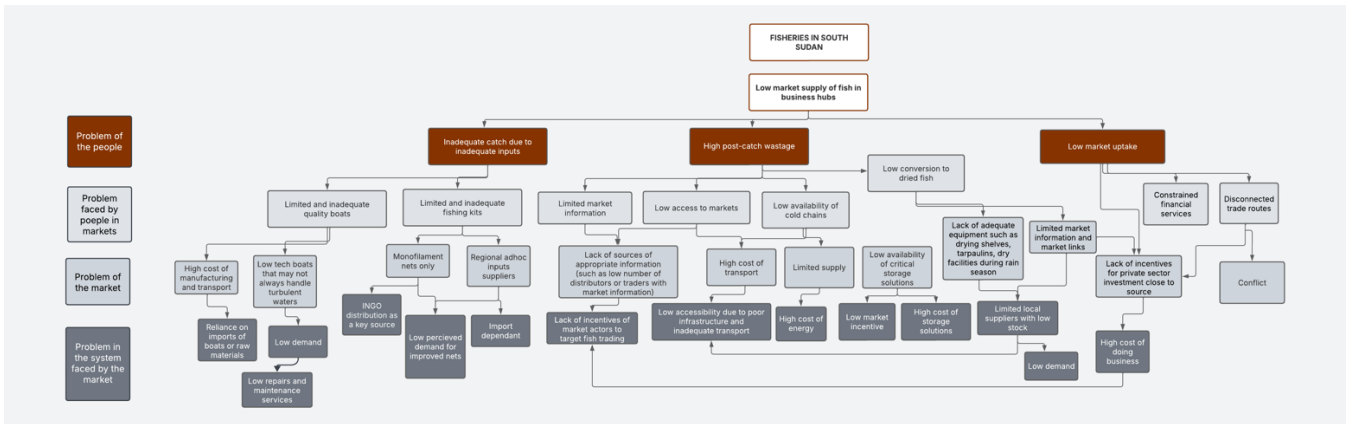
In addition, upon request, the data found against other sub-sectors not covered in the assessment can be synthesised to develop brief rapid assessments to guide future programming.

## 6. Annexes

### Annex 1: Constraints Trees for each of the three market systems

#### LIVESTOCK MEAT MARKET SUB-SYSTEM CONSTRAINTS ANALYSIS

#### FISHERIES MARKET SYSTEM CONSTRAINTS ANALYSIS



#### NTAF GUM ARABIC SUB-SYSTEM CONSTRAINTS ANALYSIS