Ministry of Irrigation and Water Resources

The Hydraulic Research Centre, Sudan

Strengthening Drought Resilience for Smallholder Farmers and Pastoralists in The IGAD Region (DRESSEA Project)

Drought Contingency Plan for Strengthening Farmers and Pastoralist Communities in Al Salam Locality, White Nile State, Sudan

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This work would not have been possible without the great efforts, cooperation, and dedication of many people who formed the team members.

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Acronyms

AU	*African Union*
DRESSEA	*Strengthening Drought Resilience for Smallholder farmers and Pastoralists in the IGAD region*
EWS	*Early Warning Systems*
EU	*European Union*
FGD	*Focus Group Discussion*
FAO	*Food and Agriculture Organization of the United Nation*
CC	Climate Change
GIS	*Geographic Information System*
RS	*Remote Sensing*
DMP	*Drought management plan*
INGOs	*International Non-Governmental Organizations*
UN	*United Nations*
UNDP	*United Nations Development Program*
WB	*The World Bank*

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Ahmed Siddig – Consultancy Team Leader

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Report Summary

Sudan's Sahelian region, including White Nile State, faces recurring drought challenges compounded by environmental degradation and socioeconomic issues impacting agriculture and pastoralists. Historical droughts have led to famine, displacement, and economic hardship, manifesting in reduced crop yields, degraded pastures, and increased social conflicts, particularly affecting smallholder farmers and pastoralists in the Al Salam locality.

In response, Sudan (represented by the Hydraulics Research Centre - Ministry of Irrigation and Water Resources) is executing the DRESS-EA project (Strengthening Drought Resilience for Smallholder Farmers and Pastoralists in the IGAD Region), which is funded by the Adaptation Fund and implemented by the Sahara and Sahel Observatory (OSS). The project aims to bolster the resilience of communities across the IGAD region against climate change risks, particularly drought. Therefore, one of the project's key goals is developing this response plan for mitigating drought impacts and ensuring sustainable agricultural practices within the locality.

The Drought Emergency Response Plan (DERP) for the Al Salam locality evaluates community vulnerabilities, and current capacities, and proposes targeted interventions. It was developed using a robust methodology that included desk work, literature analysis, site visits, observations, community surveys, and consultations with key stakeholders. The assessment examines community demographics, agricultural and livestock practices, vegetation trends, climate data, water resources, economic activities, institutional support, and perceptions. This comprehensive approach ensured a thorough understanding of the local context and tailoring of interventions to meet specific community needs.

Key drought impacts assessed in the area include reduced crop yields, soil degradation, pest infestations, inadequate irrigation, water scarcity for livestock, diminished forage, high mortality rates, and economic losses. Socioeconomic effects involve economic hardship, food insecurity, migration, community strain, and health issues, particularly affecting women and children. Gaps identified include inadequate skills in drought

resilience, insufficient early warning systems, limited training programs, and a lack of 6tgbresources such as agricultural inputs, livestock support, and financial services. Infrastructure gaps include inadequate irrigation, water storage, and market access, while institutional deficiencies highlight weak coordination, outdated policies, and limited information-sharing.

The comprehensive plan for Al Salam addresses both immediate and long-term scenarios to enhance preparedness and response mechanisms. Immediate actions (short-term) focus on enhancing water harvesting and storage capabilities through rainwater harvesting, constructing farm ponds, and promoting small dams. Establishing a drought monitoring task force is crucial for overseeing early warning systems, rainfall monitoring, and disseminating warnings. Livestock protection involves emergency fodder reserves, health programs, and herd management policies. Support for farmers includes distributing drought-resistant crop varieties, promoting water conservation, and improving credit access. Alternative livelihood programs like poultry farming, beekeeping, and handicrafts training should be initiated, alongside immediate coordination among government agencies, NGOs, and communities for a unified response.

Long-term (i.e. future) priorities include building capacity through training in sustainable agriculture, water management, and establishing early warning systems. Infrastructure development is needed, encompassing extensive irrigation systems, water storage facilities, and improved market access via enhanced transportation networks. Supporting farmers with seed banks for drought-resistant varieties and comprehensive water conservation systems is crucial. Livestock management should establish permanent fodder reserves and breeding programs for drought-tolerant breeds. Encouraging climate insurance programs have also been strongly advocated for to cover/protect both farmers and pastoralist groups. Alternative livelihoods include agroforestry, aquaculture, and vocational training in renewable energy and eco-tourism. Environmental rehabilitation focuses on restoring forest cover and grasslands through reforestation and community-led sustainable land management. Strengthening institutional mechanisms and policy development ensures coordinated strategies and effective information-sharing. Recovery efforts should replenish livestock, rehabilitate rangelands, and water sources, and update contingency plans. Long-term resource mobilization includes cross-border collaboration for pastoralists and funding mechanisms or international partnerships to support resilience initiatives.

Overall, the Drought Emergency Response Plan offers a collaborative and adaptive framework tailored to improve livelihoods and community resilience in the Al Salam locality, effectively

enhancing the socio-economic well-being of its inhabitants. To ensure the long-term sustainability of the drought management plan activities in the Al Salam locality, there were some strategies recommended. Also, the DERP emphasized the importance of the adoption of gender-responsive Strategies, rigorous monitoring and evaluation framework, and paying closure attention to coordination among all stakeholders including communities.

CHAPTER ONE

INTRODUCTION

1.1 Background

Background on Recurring Droughts in Africa and Impacts on Agriculture and Livestock

Africa, particularly the Sahel region, including Sudan, is highly vulnerable to recurring droughts (Noureldeen et al. 2020), which pose serious challenges to both the environment and human livelihoods. Due to infrequent rainfall, high temperatures, and degraded land, the Sahel region often suffers from droughts. Drought, a climatic phenomenon resulting from extended periods of below-average precipitation, is exacerbated by the absence of regular rainfall patterns and rising temperatures due to human-induced climate change (Tate and Gustard, 2000). These factors increase both the frequency and severity of droughts in the region (Ayoub, 1998; Badi, 2004; Badri, 2012).

Historically, Sudan has experienced significant drought events, most notably in 1913, 1940, 1954, 1967,1973,1984, 1993, and early 2006, which led to widespread famine, displacement, and loss of lives (Funk et al 2011; Tambel et al 2012). Understanding the types of droughts is essential to grasp their full range of impacts. Droughts are generally classified into four categories: meteorological, agricultural, hydrological, and socioeconomic (Elhag and Zhang 2018). Meteorological drought occurs due to reduced precipitation, while agricultural drought arises from soil moisture deficits that affect crop growth. Hydrological drought is characterized by a decline in streamflow and groundwater levels, and socioeconomic drought refers to the broader impacts on human populations, such as rising prices and community displacement (Tate and Gustard, 2000; Adam 2002).

According to the National Action Plan (NAP) (2016) report, the White Nile State is among Sudan's most drought-prone regions and is highly affected by climate change-induced droughts. Rising temperatures, declining annual precipitation, and increased variability have led to a gradual southward shift in climatic and ecological zones. As a result, areas that were previously classified as semi-arid, such as much of the White Nile State, are increasingly exhibiting characteristics of arid zones typically found further north due to the progressively hotter climate.

1.2 The impact of drought on agriculture and livestock:

Climate change in general and drought in particular are causing devastating impacts on people and their livelihoods worldwide. Here below we provide a short account of the potential impacts of drought on agro-pastoral communities in the drylands of Sudan:

1. **Agricultural Productivity:** as reported in many resources including IPCC (2022), Drought led to significant reductions in crop yields due to water stress and diminished soil moisture. The increased frequency of drought, primarily caused by fluctuations in annual precipitation during critical growth stages, hampers crop maturation and reduces overall harvests. This, in turn, affects food security and the livelihoods of farmers who rely heavily on rain-fed agriculture. The repeated cycles of poor harvests also make it harder for farmers to recover economically, trapping them in a cycle of poverty. Repeated poor harvests make economic recovery difficult, perpetuating poverty cycles for many farmers.

2. **Livestock Health and Mortality:** Pastoralists suffer immensely during droughts as water sources dry up and pastures degrade, leading to insufficient forage for livestock. Inadequate nutrition weakens animals, making them more susceptible to diseases and reducing their reproductive rates. Increased livestock mortality is a direct consequence, which further impoverishes pastoralist communities whose wealth and sustenance are tied to their herds.

3. **Social and Economic Consequences:** The socioeconomic impact of affected communities unravels as drought-induced hardships force people to migrate in search of better conditions, often causing conflicts over scarce resources. Children and women are particularly vulnerable, as they may have to travel long distances to fetch water, impacting their health and access to education. The economic cost of droughts is staggering, hindering national development and worsening regional disparities.

4. **Environmental Degradation:** Recurrent droughts accelerate desertification processes, leading to the permanent loss of arable land. Without sufficient vegetation cover, soil erosion rates increase, contributing to the decline of land productivity and further straining agricultural systems. The loss of biodiversity in these ecosystems also reduces the resilience of the local environment to recover from extreme weather events. This environmental degradation not only harms local communities but also reduces biodiversity, further limiting the region’s ecological resilience.

In response to these challenges, it is crucial to develop a comprehensive and proactive approach to managing drought risks and mitigating their impacts on farming and pastoralist communities in drylands Sudan.

1.3 Project Objectives and Components:

Sudan is considered one of the Sahelian dry countries with extremely harsh environmental conditions. Sudan is one of known countries for its diverse and rich natural resources, especially natural vegetation cover, but unfortunately, these resources are largely misused, and consequently, local communities are continuously suffering. Additionally, the main development challenges of Sudan are political instability and conflicts, weak governance & institutions, lack of funding, and absence of civil societies (Siddig 2014). On top of these challenges, impacts of climatic changes have been already observed in many areas of Sudan and its socioeconomic consequences in communities are particularly documented. As such Sudan has received and continues to receive great attention from the international community through the provision of aid and technical support from United Nations (UN) agencies, European Union (EU), African Union (AU), governments, and International Non-Governmental Organizations (INGOs).

To strengthen the resilience of the region's populations and ecosystems to drought, the Sahara and Sahel Observatory (OSS) in collaboration with the Global Water Partnership Eastern Africa (GWPEA) and the four riparian countries (Djibouti, Kenya, Sudan, and Uganda) submitted a project to the Adaptation Fund (AF) entitled "Strengthening Drought Resilience for Small Holder Farmers and Pastoralists in the IGAD Region - DRESS EA". The project was approved by the Adaptation Fund Board in October 2019. The project is implemented by the Sahara and Sahel Observatory (OSS) and executed by the Global Water Partnership Eastern Africa (GWPEA) and four riparian countries (Djibouti, Kenya, Sudan, and Uganda). The project focus is on enhancing resilience to drought impacts in the target countries. The overall objective of the DRESSEA project is to increase the resilience of smallholder farmers and pastoralists to climate change risks, mainly those related to drought, through the establishment of appropriate early warning systems and implementation of drought adaptation actions in the IGAD region.

1.4 The project-specific objectives are:

- Develop and promote regional investments in drought Early Warning Systems (EWS) and improve the existing ones

- Strengthen and improve the capacity of key stakeholders in drought risk management at regional, national, and local levels
- Facilitate smallholder farmers and pastoralists with inputs to undertake innovative adaptation actions that reinforce their resilience to drought
- Enhance knowledge management and information sharing on drought resilience.

To achieve the above specific objectives, the project has been structured around four main components as follows:

Component 1: Promote investments in Early Warning Systems (EWS) and improve the existing ones.

With the ultimate objective of having efficient and effective EWS in place, this component will enable the establishment of institutional linkages to generate, share, and disseminate early warning information and develop a feedback mechanism. In each member country, the project will identify investment areas in EWS, review existing drought management plan(s), and create awareness and capacity building.

Component 2: Strengthening capacities of key stakeholders at regional, national and community levels.

This will involve undertaking capacity-building programs in drought risk management. Capacity gaps and priorities will be identified and supported. Also, the project will identify key capacity building tools at the national and regional level, including innovative drought adaptation actions and strengthen the capacities of key stakeholders at regional, national and local levels.

Approaches to integrate drought risk management interventions into development plans at all levels will be supported. The project will be inclusive in capacity development on application of drought risk management and local communities of the project will receive training on adaptive measures.

Component 3: Supporting innovative drought adaptation actions.

In this component, concrete and innovative drought adaptation actions will be supported for uptake by stakeholders. They will be identified, improved where necessary, and supported for adoption. In addition, the scale-up strategy will be developed and replicated.

The concrete actions that will be proposed will focus on the innovative aspects and will include modified rainwater harvesting structures and water storage systems e.g., simplified water jars, rock water harvesting techniques; construction of sunken sand dams, water ponds, mini-irrigation systems to support crops during water stress, restoration of degraded water catchments. Innovations in the groundwater management structures, e.g., construction of boreholes and water wells, and roadside water harvesting will be supported. Other interventions will include: the installation of solar pumps and alternative energy sources e.g., solar, energy-saving stoves, etc. Innovations in energy saving, e.g., interlocking blocks and charcoal brackets manufactured from household waste, improved water and soil conservation techniques. The project will also support pasture management, including planting fast-growing pasture varieties and storage as silage or hay for longer-term use by domestic animals, improved livestock breeds of animals (cattle and goats), drought drought-resistant crops will also be considered.

The above measures will help reduce the negative impacts of climate change on natural resources to maintain and preserve ecosystem services.

Component 4: Knowledge management and information sharing

This component will be dedicated to awareness-raising, communication, and capacity building-including knowledge generation and dissemination. This will be achieved through generating knowledge on drought risk management and sharing it through electronic and print media. The project will document, compile, and package good practices, for the benefit of different targeted groups (farmers, pastoralists, and others) and focus on the major challenges and problems facing the project area. Besides, a communication and awareness-raising action plan will be elaborated and will serve as a decision-support tool for the citizens and concerned authorities. This will imply improving and harmonizing existing management tools, studies, and databases, digital and mapping materials.

1.5 Project Area in Sudan and Target Groups:

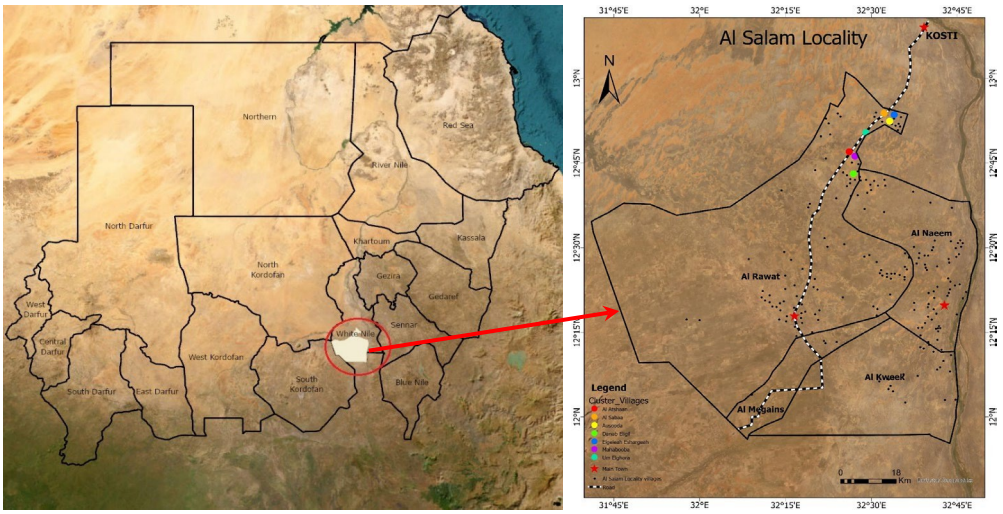
The DRESSEA Project in Sudan is implemented in Al Salam Locality in the White Nile State which is considered a crucial area both geographically and socio-economically. It lies along the eastern boundary of the White Nile River and is bordered to the south by South Sudan, highlighting its strategic importance. Administratively, Al Salam is divided into three units with headquarters

in Al Naem, Al Rawat, and Almigenis, providing a structured governance framework that is critical for managing resources and implementing development initiatives within the locality (figure 1).

The locality's climate is characterized by arid and semi-arid conditions, experiencing low annual rainfall and high temperatures which make it vulnerable to recurrent droughts. These climatic conditions profoundly affect the natural vegetation, which predominantly consists of savannah grasslands and scattered woodland, adapted to survive the harsh environment. This challenging climate has significant implications for the human population and their economic activities.

The population of Al Salam Locality was estimated to be around 136,000 in 2018, largely dependent on agriculture and livestock for their livelihoods. The community practices traditional farming and pastoral activities, which are the mainstay of its economy. However, these activities are frequently disrupted by drought, which reduces agricultural yields and pasture availability for livestock. This necessitates the adoption of innovative drought management practices and resilience-building strategies to sustain their livelihoods.

Moreover, the locality's natural resources, such as fertile lands along the riverbanks, are crucial assets for agricultural productivity. Despite these resources, recurrent droughts present formidable challenges, compelling the community to adapt continuously to environmental stresses. Therefore, efforts to develop comprehensive drought management plans and strengthen drought resilience in Al Salam Locality are vital for mitigating the adverse impacts of climate change and securing the livelihoods of its inhabitants.



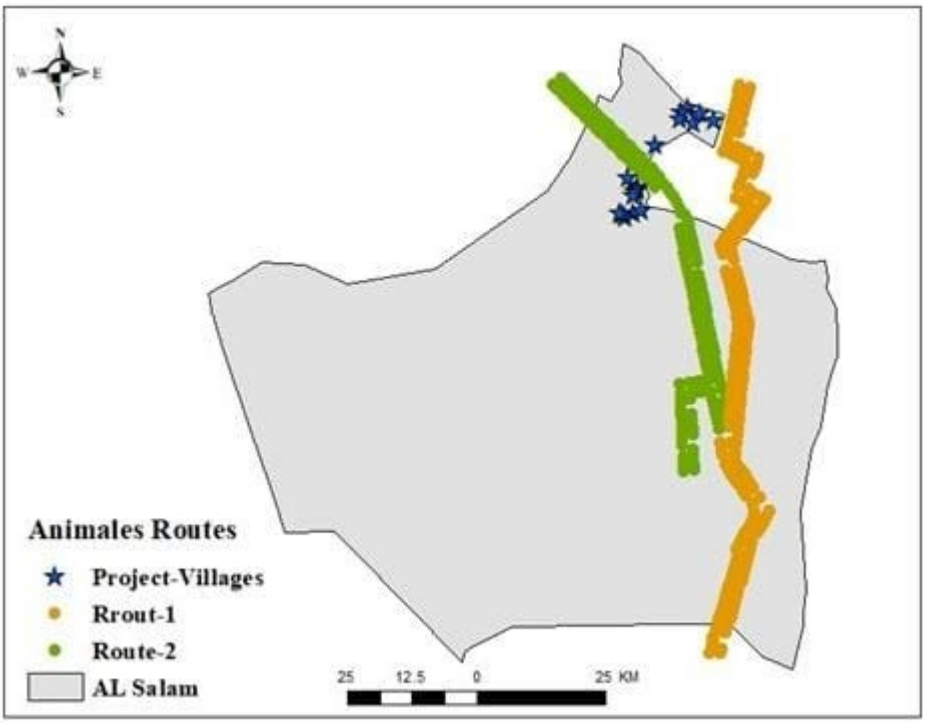


Figure 1: map of the project area, Al Salam Locality in the White Nile State, Sudan (top), and location of animal routes in the project area and their proximity to project villages (bottom).

1.6 Purpose and tasks of the consultancy:

The main tasks of this assignment are to:

1. Develop an emergency response plan for Drought disasters at the national and sub-national levels integrating Climate Change (CC) aspects.
2. Develop training materials and organize sessions on the use of the intervention plan for the benefit of the different actors at the national and sub-national level.
3. Develop DMP as well as an action plan including options and adaptation strategies in the short, medium, and long term to be carried out to reduce current and future climate risks that could affect ecosystems and livelihoods.
4. Produce a methodological guide describing the approach and guidelines for the integration of measures for drought resilience in the process of planning and alternative management, particularly at the level of the strategic axes.
5. Development of Master Plan; and Development and Management Plans.

CHAPTER TWO

DEVELOPMENT OF THE DROUGHT CONTINGENCY PLAN FOR THE AL SALAM LOCALITY

2.1 Purpose and Scope of the Contingency Plan:

The primary purpose of this Drought Contingency Plan is to strengthen the resilience of farming and pastoralist communities in the locality of Al Salam, in the White Nile state, against the severe impacts of recurring droughts and desertification. This plan provides a comprehensive framework for mitigating drought impacts, enhancing preparedness, and establishing efficient response mechanisms. It aims to safeguard livelihoods and promote sustainable resource use in the face of climate variability. The plan's scope encompasses the vulnerable regions within Al Salam, targeting key stakeholders, including farmers, pastoralists, government agencies, and non-governmental organizations (NGOs). The timeframe addresses immediate and long-term drought scenarios, ensuring a systematic approach to early warning, response, recovery, and rehabilitation efforts.

2.2 Principles and Objectives of the Plan:

The guiding principles of this Drought Contingency Plan emphasize sustainability, resilience, community participation, and adaptive management. With these principles and objectives, the Drought Contingency Plan seeks to create a resilient agricultural and pastoral sector in Al Salam that can thrive despite the challenges posed by recurring droughts. Furthermore, the integration of these objectives supports broader national and international climate change adaptation efforts, contributing to sustainable development and food security. Therefore, the plan aims to:

1. ***Reduce Vulnerability*:** Enhance the capacity of local communities in AlSalam to withstand and adapt to the adverse effects of drought through sustainable practices and resource management.

2. ***Improve Early Warning Systems*:** Develop and implement reliable drought monitoring and early warning systems tailored to the specific conditions of AlSalam, providing timely information and forecasts to stakeholders.

3. ***Enhance Emergency Response*:** Strengthen coordination mechanisms for efficient and rapid response to drought conditions, ensuring the protection of livelihoods and assets in the White Nile state.
4. ***Facilitate Recovery and Rehabilitation*:** Promote activities and policies that support the recovery and rebuilding of affected communities in AlSalam, restoring agricultural productivity, and enhancing environmental health.
5. ***Foster Collaboration*:** Encourage cooperation among government entities, international organizations, NGOs, and local communities to build a cohesive and integrated approach to drought management in Al Salam.

2.3 Process and Steps of Developing the Drought Contingency Plan:

The development of the Drought Contingency Plan for strengthening farmers and pastoralist communities in Al Salam has been a multi-phase, collaborative process involving various stakeholders. By following these structured steps, the Drought Contingency Plan aims to build a resilient and proactive approach to managing drought risks and mitigating their impacts on the farming and pastoralist communities in Al Salam. The key steps in the development of the plan are outlined below:

1. **Initiation and Stakeholder Engagement:**
    - **Needs Assessment:** Conduct initial assessments to understand the specific needs and vulnerabilities of farmers and pastoralists in Al Salam.
    - **Stakeholder Identification:** Identify and engage key stakeholders including local community leaders, government agencies, non-governmental organizations (NGOs), and international partners.
    - **Forming a Steering Committee:** Establish a steering committee comprising representatives from all key stakeholder groups to oversee the development process.

2. **Data Collection and Analysis**
    - **Baseline Data Collection:** Gather baseline data on historical drought events, current agricultural practices, livestock conditions, water resources, and socioeconomic factors.
    - **Vulnerability Assessment:** Conduct a detailed drought vulnerability assessment to identify the most at-risk communities and sectors within AlSalam.
    - **Gap Analysis:** Identify existing gaps in capacity, resources, and infrastructure that need to be addressed to improve drought resilience.
3. **Drafting the Plan**
    - **Setting Objectives and Priorities:** Based on the data collected, establish clear objectives and prioritize actions that address the identified vulnerabilities and gaps.
    - **Developing Strategies:** Formulate strategies for early warning systems, livestock protection, farmer support, coordination and resource mobilization, response activation, and recovery and rebuilding.
    - **Consultation Workshops:** Hold workshops with stakeholders to ensure that the strategies and actions proposed are practical, effective, and have local buy-in.
4. **Review and Feedback**
    - **Draft Review:** Circulate the draft plan to stakeholders for feedback, ensuring that all perspectives and concerns are considered.
    - **Incorporating Feedback:** Revise the draft based on stakeholder feedback to create a more robust and comprehensive plan.
5. **Finalization and Approval**
    - **Validation Workshop:** Organize a validation workshop to review the final draft with all stakeholders, making any necessary final adjustments.
    - **Approval Process:** Submit the final plan for approval to relevant government bodies and obtain endorsements from key stakeholders.

6. **Implementation and Capacity Building**
    - **Training and Capacity Building:** Develop and implement training programs to build capacity among local communities and stakeholders for effective plan implementation.
    - **Resource Mobilization:** Secure funding and resources necessary to implement the plan, leveraging local, national, and international support.
7. **Monitoring and Evaluation**
    - **Setting Monitoring Framework:** Establish a monitoring and evaluation framework to track the implementation of the plan and measure its effectiveness.
    - **Regular Reviews:** Conduct regular reviews and updates of the plan to incorporate lessons learned and adapt to changing conditions and new information.
    - **Reporting:** Provide regular progress reports to stakeholders, ensuring transparency and accountability throughout the implementation process.

CHAPTER THREE

DROUGHT VULNERABILITY ASSESSMENT IN AL SALAM LOCALITY

3.1 Study Objectives & Rationale

The main objective of this assessment is to evaluate and understand the vulnerability of farmers and pastoralist communities in Al Salam locality, White Nile state, to recurring droughts. The study aims to provide comprehensive insights into the impacts of drought on agriculture, livestock, socioeconomic conditions, and community perceptions, and to propose targeted interventions to enhance resilience. Specific objectives for conducting a drought vulnerability analysis are to:

- Assess the current capacity and resilience of farmers and pastoralists in Al Salam locality to cope with drought conditions.
- Identify specific vulnerabilities and impacts of drought on agriculture, livestock, and socioeconomic conditions.
- Identify the key limitations and inadequacies in capacities, resources, and infrastructures that hinder the ability of farmers and pastoralist communities to cope and adapt to drought risks.
- Develop targeted recommendations for enhancing drought resilience and adaptive capacities.

3.2 Project Area & Settings:

Al Salam locality, situated in the White Nile state, has a semi-arid climate with highly variable rainfall patterns, which can lead to frequent and severe droughts. The locality consists of 17 villages (Fig 1), each with distinctive agricultural and pastoralist practices deeply reliant on seasonal rains.

We used the standard precipitation index (SPI), and standard precipitation evapotranspiration index (SPEI) to calculate drought at varying timescales (3, 6, and 12 months) in the Al Salam locality between 2003 and 2023 (Fig. 2). According to the SPI, the main drought episodes occurred

in 2004, 2007, 2010, and 2015. These drought events are also clearly identified by the SPEI, especially in the SPEI-6 timescale. Few differences were apparent between the SPI and the SPEI series, for the respective varying analysis timescale.

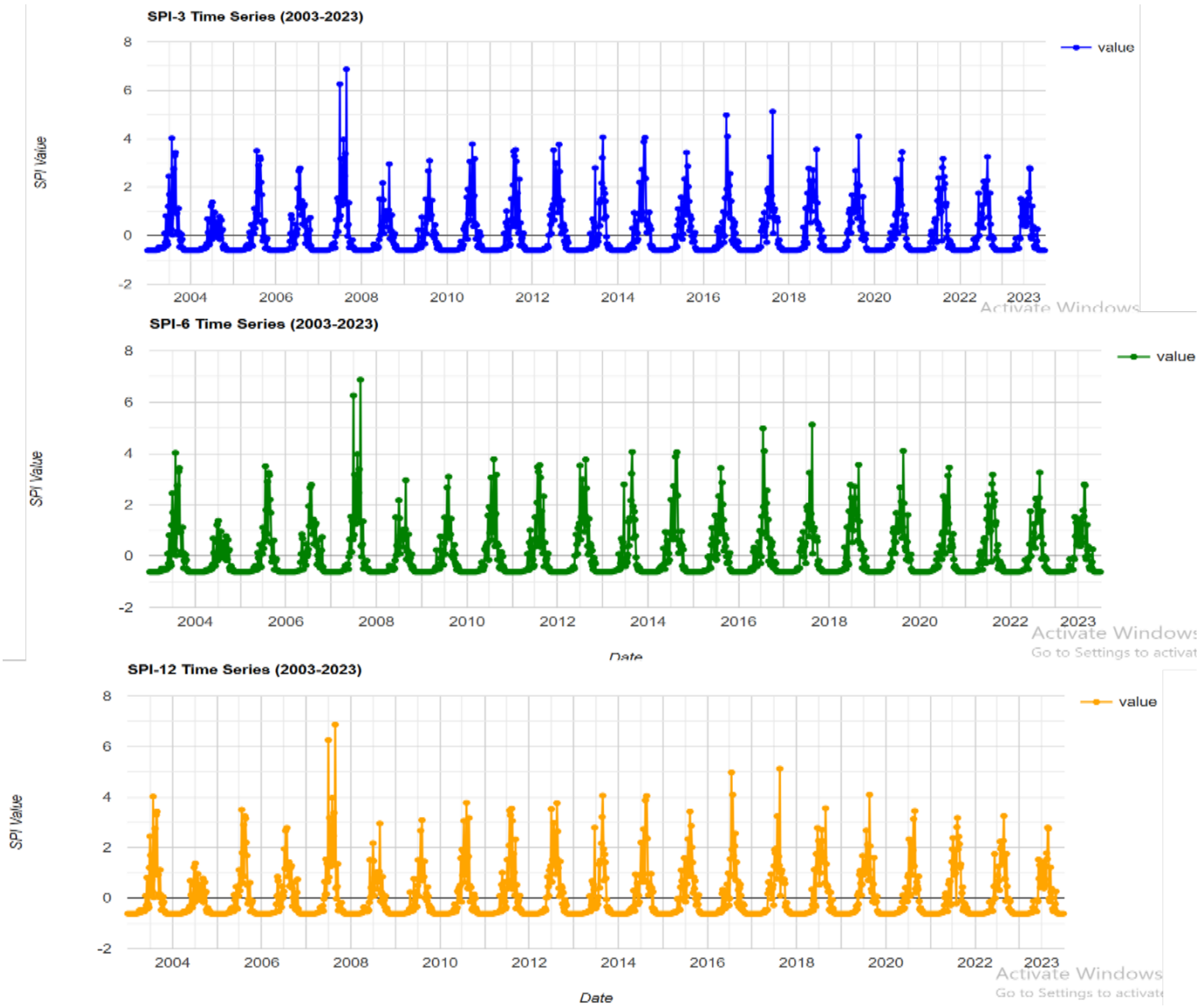


Figure 2: *Spatiotemporal distributions of annual SPI and SPEI series for the Salam locality from 2003 to 2023*

The spatial distribution and changes of vegetation in Al Salam locality (measured by mean NDVI) is presented in Figure 3, which illustrates notable variations in vegetation cover across the area. The analysis shows that the mean NDVI values were generally low to moderate in 2002, with sparse vegetation cover dominating most regions, particularly in the central and southwestern parts. By 2022, the mean NDVI values improved, with increased vegetation

observed in the northern, eastern, and southeastern areas, while some regions continued to experience low NDVI values, reflecting persistent vegetation degradation. The overall trend highlights a positive shift in vegetation cover over the two decades, though challenges remain in areas experiencing negative NDVI changes, necessitating targeted restoration and sustainable land management efforts. Furthermore, this pattern may also inform livestock grazing policy, by allowing animals to spend longer times in these areas with greater cover, especially during the dry season. This certainly helps pastoralists and farmers build resiliency against drought.

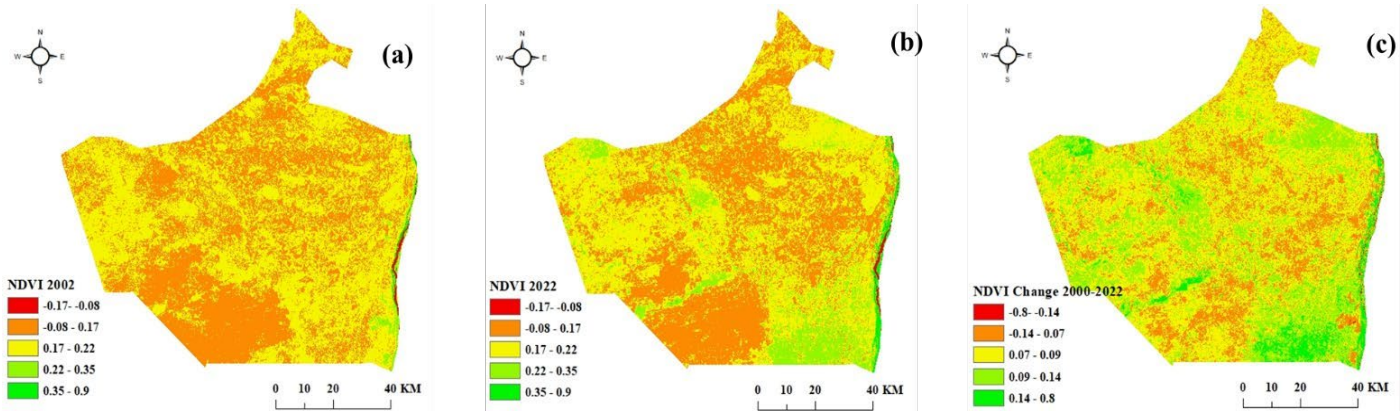


Figure 3: *Spatiotemporal distributions of vegetation (indicated by mean NDVI values) for Al Salam locality from (a) 2002, (b) 2022, (c) and change*

3.3 Required Information:

To conduct a comprehensive drought vulnerability analysis, the following data types are needed:

- **Community Demographics:** Information on the demographic composition of the community (age, gender, occupation, household size, etc.).
- **Agricultural Practices:** Data on current farming practices, crop types, irrigation methods, and input availability.
- **Livestock Management:** Information on herd sizes, livestock health, grazing practices, and water sources for animals.
- **Vegetation condition & trends:** information about Vegetation cover, historical changes, annual biomass production, and its trend in the last 20 – 30 years.
- **Climate Data:** Historical rainfall patterns, temperature variations, drought frequency and severity, and existing early warning systems.
- **Water Resources:** Availability, accessibility, and management of water resources, including irrigation systems and storage infrastructure.

- **Economic Activities:** Income sources, access to markets, financial services, and alternative livelihoods.
- **Institutional Support:** Existing policies, programs, coordination mechanisms, and support provided by government and non-government entities.
- **Community Perceptions:** Community concerns, perspectives on drought impacts, and preferred solutions.

3.4 Assessment Methodology & approach:

The methodology of the assessment involved a combination of qualitative and quantitative approaches not limited to:

1. **Literature Review:** We conducted an in-depth review of existing project documents, previous baseline studies, and relevant literature to gather contextual and historical data on drought impacts in Al Salam. Moreover, we analyzed meteorological data, agricultural records, and socioeconomic surveys.

- **Field Observations:** Site visits were conducted in all 12 representative villages to obtain direct observations of farming practices, livestock conditions, water resources, and community infrastructure. We documented observations through field notes and photographs (e.g., Figure 3 below). Our field observations were useful in verifying and complementing data obtained from surveys and interviews.

Figure 4: *Well and water catchment in Aswedah village*

2. **Community Engagement & Surveys:** During these visits, we interviewed a total of 320 individuals from local communities (i.e. ~ 250 farmers and 80 pastoralists) representing 12 villages (out of 17) to gather firsthand information on their experiences with drought, its impacts on their livelihoods, and their coping mechanisms. Additionally, four focused group discussions (FGDs) were organized in four different villages, involving reasonable gender representation for community members. These FGDs facilitated in-depth discussions to understand community perspectives on drought, perceived impacts, proposed solutions, and the types of assistance required to cope with drought risks. This approach is meant to encourage active participation and input from community members to ensure the data is accurate and contextually relevant.

Figure 5*: Example for interviewing communities by consultancy team enumerators (top men, bottom women).*

3. **Stakeholder Consultation:** this session took place in the DRESSEA office in Al Salam locality and involved key stakeholders such as government agencies representing

administrations like forestry, range, water resources …etc., NGOs, and community leaders to gather their insights and ensure a multi-faceted understanding of the vulnerabilities, gaps, and needed interventions. Figure (6) shows a picture of the stakeholders meeting and a full list of attendees in this meeting is attached in Appendix (3).

Figure 6*: stakeholders consultation meeting, DRESS-EA project office in Al Salam locality.*

3.5 Key findings:

3.5.1. Community structure and demographics:

From social surveys, we report that 67% of the surveyed community members are men and about 60% are youth within the productive age. As for education, 96% of interviewed people are below primary school with only 4% receiving secondary education. Not surprisingly, over 76% of the community are farmers, 10% are animal rearing, and about the same percentage are farmers and owners of livestock while 5% of the people are considering other sources of livelihood (Figure 7).

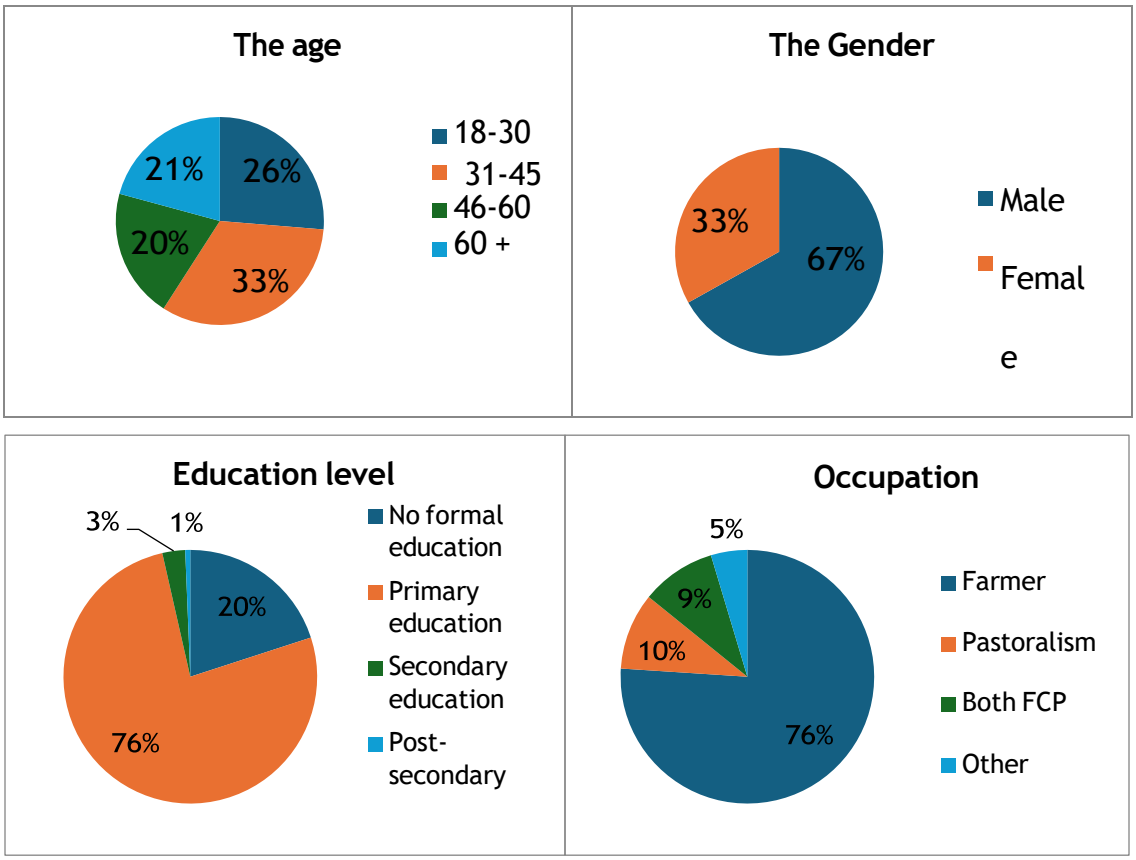


Figure 7: *Some of the demographic and occupation characteristics of the community in Al Salam locality*

3.5.2 Drought impacts in the project area:

This detailed vulnerability assessment reveals the intricate and severe impacts of recurrent droughts on the agricultural and pastoralist communities of Al Salam locality which is indicated in Figure (8 top and bottom) and we summarize in the following list as noted and reported by respondents:

1. **Impact on Agriculture:**

    - **Reduced Crop Yields:** The recurrent droughts have led to significant reductions in crop yields as reported by 70% of respondents interviewed in our study (Figure 8 – bottom). Staple crops like sorghum and millet, which are heavily dependent on rainfall, have seen particularly poor harvests. Farmers have consistently reported experiencing crop yield reductions, with many indicating that their harvests are significantly lower compared to normal years. While specific yield amounts were not quantified in this study, the impact is evident in the widespread crop failures and increased dependency on external food aid. Crop failures have been reported by many

farmers, resulting in food shortages and increased dependency on external food aid.

- **Soil Degradation:** With the diminished rains, the topsoil in many areas has become dry and prone to erosion. Farmers have reported increasing soil infertility and compaction, which negatively impacts crop growth even in good rainfall years. The loss of organic matter and nutrients has further degraded soil quality and become prone to desertification.
- **Pest Infestations:** Drought conditions have exacerbated pest problems, as weakened plants are more susceptible to attacks from pests like locusts and aphids. The lack of water compromises the plants' natural defenses, making pest management an additional burden. More than half of the farmers have reported an increase in pest incidences as drought becomes more frequent.
- **Lack of Irrigation Infrastructure:** There is minimal irrigation infrastructure in Al Salam, making farmers almost entirely dependent on erratic rainfall. This reliance makes their agricultural productivity extremely vulnerable to drought. The agricultural sector in Al Salam is severely constrained by the lack of adequate irrigation infrastructure. This limitation forces farmers to rely almost entirely on erratic and insufficient rainfall, rendering their agricultural productivity highly vulnerable to periods of drought. The absence of a reliable irrigation system means that farmers are unable to mitigate the adverse effects of drought conditions, leading to significant reductions in crop yields. Consequently, this exacerbates issues such as soil degradation, increased susceptibility to pest infestations, and overall agricultural instability. Addressing this critical gap in irrigation infrastructure could significantly enhance agricultural resilience and productivity, thereby securing the livelihoods of farmers in the region.
- **Access to Inputs:** Farmers report limited access to agricultural inputs, such as drought-resistant seeds, fertilizers, and appropriate farming tools, which further hampers their ability to adapt to changing climate conditions.

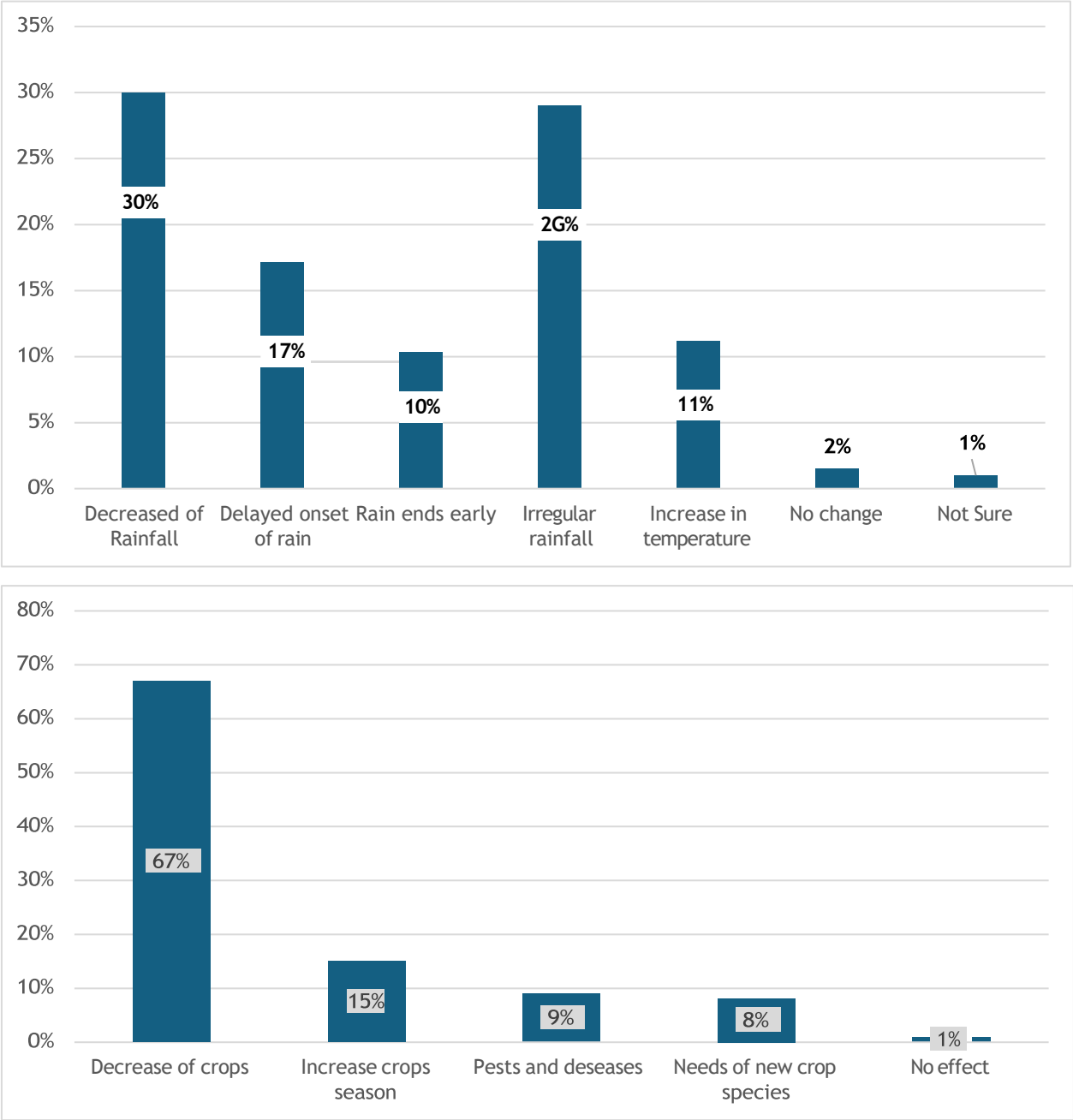


Figure 8: *Observed changes in the climate patterns (top) and impacts on agriculture (bottom) as reported by the community in Al Salam locality.*

2. **Impact on Livestock:**

   - **Water Scarcity:** Water wells and natural water sources such as rivers and ponds have dried up significantly during drought periods, causing acute water shortages

for livestock. Many pastoralists are forced to travel long distances to find water, which increases the stress on both humans and animals (figure 9).

- **Diminished Forage:** The prolonged droughts have led to a severe reduction in pastureland productivity. Grazing land has deteriorated, with much of the natural vegetation failing to regrow. This results in insufficient nutrition for livestock, weakening their health and productivity.
- **High Mortality Rates:** The combination of water and forage scarcity has led to high mortality rates among livestock. Pastoralists have reported losing some portions of their herds, which directly affects their livelihood and economic stability.
- **Health Issues:** Malnutrition and dehydration have increased the susceptibility of livestock to diseases, compounding the loss of animals. Poor health of the livestock leads to reduced milk production and lower market value.
- **Economic Losses:** As livestock are a primary asset and source of income, the loss and reduced productivity of animals have led to significant economic hardship for pastoralist communities.

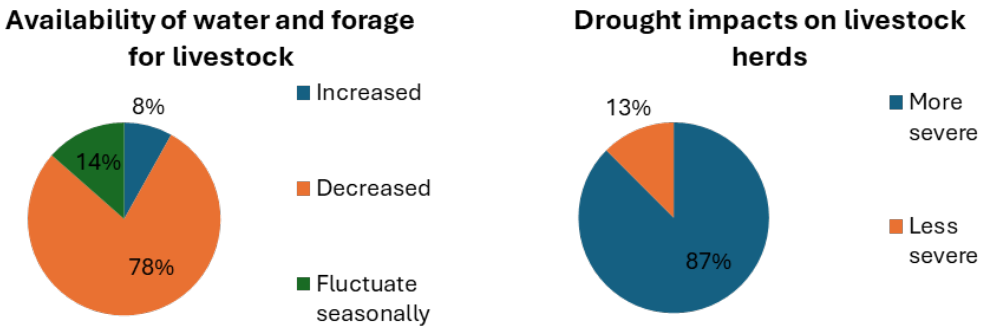


Figure 9: *Observed drought and its impacts on livestock as reported by pastoral community in Al Salam locality.*

3. **Socioeconomic Consequences:**
   - **Economic Hardships:** The combined effects of reduced crop yields and livestock losses have plunged many households into poverty. Agricultural productivity, which is the primary source of income for most rural communities, declines sharply during droughts as crop failure limits marketable produce, while reduced grazing

availability weakens livestock health, lowering their market value. Families reliant on subsistence farming face additional income losses from rising input costs, such as water for irrigation and feed for animals. With the primary sources of income diminishing, families must resort to selling off valuable assets, taking loans, or seeking alternative (often less stable) income sources. Community members reported during focused group discussions that these challenges left many households unable to afford necessities or reinvest in their livelihoods, perpetuating a cycle of poverty.

- **Food Insecurity:** Reduced agricultural productivity leads to food shortages, forcing families to cut down on meal quantities and quality, exacerbating malnutrition, especially among children.
- **Migration and Displacement:** In search of better living conditions, many families migrate to urban centers or other rural areas with better water access and pastures. This migration creates additional social and economic pressures in the origin and destination areas.
- **Community Strain:** As drought conditions persist, the social fabric of communities is being strained. Increased competition over limited resources like water and grazing land has led to conflicts within and between communities. Social cohesion is affected, leading to breakdowns in traditional support systems.
- **Women and Children:** Women and children, often responsible for water collection, must travel longer distances, which exposes them to various risks and reduces their time and energy for other productive activities. Children are often pulled out of school to assist with household chores or income-generating activities, affecting their education and long-term prospects (figure 9).

Figure 9: *Group of Children bringing water to their families in Al Salam locality*

- **Health Impacts:** Reduced access to nutritious food and clean water has also led to deteriorating health conditions. Increased incidences of water-borne diseases and malnutrition have been reported.

3.6 Key gaps & vulnerabilities identified by the study:

Based on consultations with stakeholders, site visits and observations, and community surveys, many gaps and vulnerabilities have been identified. In the following, we state many of these vulnerabilities:

1. **Capacities:**

    - ***Skills and Knowledge:*** Many community members lack essential skills and knowledge on drought-resilience practices, including sustainable agriculture, efficient water management, and livestock health management in response to drought.

    - ***Early Warning Systems*****:** despite few efforts at state level from departments of agriculture and water resources on drought preparedness and early warning, however, there is still a significant gap in the availability and understanding of early warning systems. Communities are often unaware of impending droughts and unable to plan accordingly.

    - **Training Programs:** Inadequate training programs on drought resilience and adaptation methods. Existing programs are limited in scope and frequency.

2. **Resources:**
    - **Agricultural Inputs:** Limited access to drought-resistant seeds, fertilizers, and farming tools essential for maintaining agricultural productivity during dry periods.
    - **Livestock Support:** Scarcity of emergency fodder reserves, veterinary services, and livestock health programs. Pastoral communities struggle to keep their animals healthy and adequately fed during droughts.
    - **Financial Services:** Lack of access to credit, insurance, and financial support systems. Farmers and pastoralists are unable to invest in essential adaptive measures without financial backing.
3. **Infrastructures:**
    - **Irrigation Systems:** Inadequate irrigation infrastructure. Most farming relies solely on rainfall, making agriculture highly vulnerable to drought conditions.
    - **Water Storage and Distribution:** Insufficient water storage facilities and inefficient water distribution systems. Existing structures do not meet the community's needs during extended dry periods.
    - **Market Access:** Poor market infrastructure and transportation facilities limit the ability of farmers and pastoralists to sell their products, especially during crises.
4. **Institutional and Policy Gaps:**
    - **Coordination Mechanisms:** Weak coordination among government agencies, NGOs, and community organizations. Coordination mechanisms need strengthening to ensure a unified and effective response to drought. This recommendation was pointed out during the stakeholders' consultation meetings.
    - **Policy Support:** Inadequate policy frameworks and implementation strategies for drought preparedness and response. Existing policies are either outdated or not effectively enforced.
    - **Information Sharing:** Limited mechanisms for timely dissemination of critical drought-related information to communities, impeding proactive action.

CHAPTER FOUR

RECOMMENDATIONS FOR DEVELOPING EFFECTIVE DROUGHT CONTINGENCY PLAN

Based on results from the vulnerability assessment and consultation as well as surveys and visits conducted, we propose the following short-term (immediate) and long-term interventions to strengthen the community and build their resilience in the face of drought.

4.1 Proposed Short-term (immediate) Interventions and Assistances:

1. Water Conservation and Storage:

- *Implement Rainwater Harvesting Systems*:
    - Household Level: Provide equipment and training for rooftop and yard rainwater harvesting systems.
    - Community Level: Construct communal rainwater harvesting structures (e.g. Hafires) to capture and store large quantities of rainwater.
- *Construct Farm Ponds and Tanks*:
    - Develop farm ponds and tanks to capture runoff water for agricultural use.
- *Promote the Use of Small Dams and Check Dams*:
    - Build small dams and check dams to capture rainwater and increase groundwater recharge.
- *Use of renewable energy solutions* such as solar pumps for water harvesting and management.

2. Development of Drought Early Warning Systems:

- Establish a drought monitoring task force with representatives from meteorological departments, agriculture ministries, academic institutions, NGOs, and local communities.
- Monitoring rainfall and defining thresholds for declaring drought conditions (e.g., alert, alarm, emergency)

- Providing forecasts on likely drought impact on crops and livestock to facilitate preparedness.
- Communicating early warnings via radio, text messages, and community meetings to ensure timely dissemination of information.

3. Protecting Livestock:

- Maintaining a reasonable number and distribution of rainwater harvesting ponds (pits) in the grazing sites and along the animal routes.
- Establishing emergency fodder/pasture reserves and implementing stockpiling plans (e.g. fodder banks) to prevent shortages during drought periods.
- Implementing livestock vaccination and health programs to prevent disease outbreaks during stressed conditions.
- Developing livestock sales/slaughter policies to manage herd sizes and mitigate financial losses.
- Adopting and distributing drought-resistant goat breeds that proved successful during drought times in other areas in west and east Sudan.

4. Supporting Farmers:

- Adoption of climate adaptation measures such as climate-smart agriculture.
- Distribute drought-resistant crop varieties to farmers to promote immediate adoption of more resilient crops.
- Promote water conservation practices and improve irrigation infrastructure to ensure efficient use of available water.
- Facilitate access to credit, inputs, and insurance during drought to help farmers sustain their operations.

5. Adoption of Climate Insurance

- To bolster the resilience of farmers and pastoralists in the Al Salam locality against the uncertainties of climate variability and drought, adopting Climate Insurance as a risk management tool is essential.

- Climate Insurance offers a safety net by providing financial compensation for losses due to climate-induced events, thereby stabilizing incomes and fostering investment in sustainable practices. Detailed climate insurance benefits and adoption strategy in Al Salam locality are attached in Appendix (2)

6. Alternative Livelihood Programs:

- Encouraging communities to develop home gardens "Gebarik" to help them get household needs from food.
- Start small-scale poultry farming and beekeeping projects which can provide quick returns and require modest initial investments (see appendix 3).
- Provide training in making handicrafts and artisanal products to create immediate alternative income avenues.

7. Immediate Coordination and Resources Mobilization:

- Activate the roles of government agencies, NGOs, and communities to ensure coordinated response efforts.
- Coordinate and develop robust linkages between national and sub-national levels from drought stakeholders.
- Identify and mobilize funding mechanisms to support short-term emergency interventions, especially via emergency aid from international donors working at national and state levels (e.g. UNHCER, FAO, USAID … etc.).

8. Response Activation:

- Implement phased response based on drought severity to ensure timely and appropriate intervention measures.
- Distribute emergency aid and reserves to affected households to mitigate immediate impacts.

4.2 Long-Term Interventions and Assistances:

1. Building Sustainable Capacity (see Appendix 4):

- Invest in long-term training programs on sustainable agricultural practices, water

management, and livestock health.

- Establish community-based early warning systems that can be maintained and operated locally.

2. Infrastructure Development:

- Invest in the development and maintenance of extensive irrigation systems and water storage infrastructure to reduce reliance on rainfall.
- Rehabilitate and maintain existing water sources to ensure long-term water availability.
- Improve market access by enhancing transportation networks and market facilities.

3. Supporting Farmers:

- Establish and maintain seed banks for drought-resistant varieties to ensure ongoing access for future planting seasons.
- Develop comprehensive water conservation systems including rainwater harvesting and efficient irrigation technologies.

4. Livestock Management:

- Create permanent emergency fodder reserves and establish strategic grazing/migration guidelines to sustainably manage rangelands.
- Implement long-term livestock breeding programs aimed at producing drought-tolerant breeds.

5. Alternative Livelihood Programs:

- Develop agroforestry projects that integrate tree crops with traditional farming to provide long-term sustainability.
- Promote aquaculture development to diversify income sources and provide additional nutritional resources.
- Invest in vocational training for alternative livelihoods such as renewable energy solutions, eco-tourism, and value addition to agricultural products.
- Support communities especially women and youth to develop some income generation

activities related to value-adding and processing of some crops (e.g. sesame oil production) and cheese production, honey collection and selling …etc.

6. Rehabilitation and Restoration of Forest Cover and Grasslands:

- Undertake reforestation and afforestation projects to enhance forest cover, improve ecosystem health, and restore degraded lands. This particularly can be achieved via the adoption of Agroforestry projects where forest rehabilitation can be possible but also community needs from food and fodder will be granted in multi-stakeholder's participatory ventures.
- Implement grassland restoration programs to rehabilitate rangelands, control soil erosion, and enhance water retention.
- Engage communities in sustainable land management practices to ensure long-term maintenance and benefits from restored ecosystems.
- Establish nurseries to grow and distribute native tree species that are adapted to local conditions.
- Adopt Community Tree Planting Campaigns or initiatives to restore forest cover and improve ecosystem services.

7. Institutional Strengthening and Policy Development:

- Maintain linkages and communication channels between local, state, and national institutions relevant to project activities.
- Strengthen coordination mechanisms among all stakeholders to ensure a unified long-term strategy. Here we particularly suggest the adoption and organization of a coordination *meeting* to be held twice a year for the project stakeholders to maintain active coordination. Also, governmental agencies must develop and communicate their annual reports and action plans with each other on a regular basis i.e. annually.
- Develop and implement comprehensive policy frameworks focused on drought preparedness, mitigation, and adaptive strategies.
- Create robust information-sharing systems to ensure timely and accurate dissemination of drought-related information.

8. Recovery and Rebuilding:

- Plan for the replenishment of livestock and agricultural inputs post-drought to help communities recover.
- Rehabilitate rangelands and water sources to restore the environment and support sustainable livelihoods.
- Regular evaluation and updating of contingency plans e.g. every 3 – 5 years to incorporate lessons learned and adapt to new challenges.

9. Long-Term Resource Mobilization:

- Foster cross-border collaboration for pastoralists to allow access to broader grazing areas and resources during drought.
- Develop robust funding mechanisms and international partnerships to support long-term resilience initiatives. This particularly aligned with many organizations already working on Sudan such as the FAO, UNDP, WB …etc.
- Seek active involvement from the private sector (Dal group, Savanna, Heggar, … etc.) and financial agencies like national banks (e.g., Framer's Bank and family bank) to develop partnerships with communities and provide them with grants and loans to fund the cropping season and implement successful drought-resilient enterprises.

CHAPTER FIVE

THE INTEGRATION, IMPLEMENTATION, AND SUSTAINABILITY OF THE PLAN

The successful implementation of the proposed plan requires many actions and arrangements including:

5.1 Community Involvement:

- *Participatory Planning*: Conduct participatory planning sessions with community members to identify specific needs, priorities, and culturally appropriate interventions. Ensure representation from all community groups, including women, youth, and marginalized populations. Also, attention must be paid to the balance between farmers and pastoralists represented in community consultations and involvement.
- *Community Education and Awareness*: Develop and implement education and awareness programs to inform community members about the plan's objectives, expected outcomes, and their roles. Utilize local languages and culturally relevant materials.
- *Empowerment and Capacity Building*: Empower local communities by providing training and capacity-building workshops focused on leadership, project management, and technical skills related to drought resilience practices.

5.2 Adoption of Gender-responsive Strategies:

- *Conduct gender-sensitive assessments* to understand the different impacts of drought on men, women, and children, ensuring inclusive participation in planning and implementation.
- *Develop targeted programs* that acknowledge and address the specific burdens women face, such as increased workloads, and ensure equitable distribution of resources.
- *Promote female extension services* to support women's roles in agriculture and facilitate their economic empowerment through greater access to financial services and markets.

5.3 Partnerships:

- *Stakeholder Mapping*: Identify key stakeholders, including government bodies, NGOs, private sector entities, research institutions, and international organizations. Create a comprehensive stakeholder map to understand their roles and contributions.

- *Memoranda of Understanding (MOUs)*: Establish formal agreements and MOUs with partners to define roles, responsibilities, and commitments. Ensure clear communication channels and regular coordination meetings.

- *Inter-Agency Collaboration*: Foster collaboration between different government agencies to create a cohesive approach to drought management, ensuring that agriculture, water resources, health, and social services are all aligned in their efforts.

- *Technical and Financial Support*: Leverage the technical expertise and financial resources of partners to support the implementation of the plan. This may include funding for infrastructure projects, technical training, and provision of essential resources.

5.4 Monitoring and Evaluation:

- *Development of M&E Framework*: Create a detailed monitoring and evaluation (M&E) framework that includes specific, measurable, achievable, relevant, and time-bound (SMART) indicators. The framework should outline data collection methods, frequency of monitoring, and responsible parties.

- *Regular Monitoring*: Implement regular monitoring activities to track the progress of interventions. Use a combination of methods, such as field visits, surveys, community feedback, and remote sensing technologies.

- *Impact Assessment*: Periodically conduct impact assessments to evaluate the effectiveness of the interventions in achieving desired outcomes. Assess changes in agricultural productivity, livestock health, water availability, and community resilience.

- *Feedback Mechanisms*: Establish feedback mechanisms to gather input from community members and stakeholders. Use this feedback to make necessary adjustments to the plan and interventions.

- *Reporting and Transparency*: Prepare regular progress reports to share with all stakeholders. Ensure transparency in the reporting process to build trust and accountability.

- *Adaptive Management*: Use the findings from monitoring and evaluation to adapt and refine implementation strategies. This iterative process ensures that the plan remains flexible and responsive to emerging challenges and opportunities.

5.5 Capacity Building and Continuous Learning:

- *Training Programs*: Conduct continuous training programs for community members and stakeholders on best practices for drought resilience, sustainable agriculture, water management, and alternative livelihoods.
- *Exchange Visits*: Organize exchange visits and study tours to other regions or countries with successful drought resilience programs to facilitate knowledge sharing and learning.
- *Knowledge Management*: Develop a knowledge management system to document experiences, lessons learned, and best practices. Share this knowledge widely through workshops, publications, and online platforms.

5.6 Resource Mobilization and Sustainability:

- Innovative Financing: Explore innovative financing mechanisms such as climate resilience funds, public-private partnerships, and community savings groups to ensure sustainable funding for interventions.
- Resource Allocation: Ensure that adequate resources (financial, human, and technical) are allocated to priority areas. Establish a clear budget and resource allocation plan.
- Long-Term Planning: Integrate the drought contingency plan into broader community development plans and local government strategies to ensure long-term sustainability and alignment with national policies.

5.7 Recommendations for Sustainability of Plan Activities:

To ensure the long-term sustainability of the drought management plan activities in the Al Salam locality, it is essential to focus on the following key strategies:

1. **Community Engagement and Ownership**: Empower local communities by actively involving them in the planning, implementation, and monitoring of drought management activities. Building capacity through ongoing training and fostering a sense of ownership can ensure that community-centered solutions are effectively maintained. Additionally, integrating traditional knowledge and practices will strengthen community buy-in and adaptability.
2. **Integrated Water Resource Management**: Develop a holistic approach to water resource management that combines traditional water conservation techniques with modern

technologies. Initiatives such as small-scale water storage systems, like water jars and sand dams, should be configured to include maintenance plans and user training to prevent system degradation over time.

3. **Robust Financial Mechanisms**: Establish financial sustainability by creating a local drought management fund that can support ongoing activities. This fund should leverage contributions from the government, international donors, and community savings schemes. A diversified funding approach will provide resilience against economic uncertainties and ensure continuous support for critical projects.

4. **Monitoring and Adaptive Management**: Implement a rigorous monitoring and evaluation system using GIS and remote sensing tools to provide ongoing assessments of drought conditions and the effectiveness of strategies. This system should enable adaptive management, allowing modifications to be made to activities based on new data and changing environmental conditions.

5. **Education and Awareness Programs**: Implement continuous education programs to raise awareness about drought resilience and sustainable practices. These programs should target various stakeholders, including schools, local leaders, and farmers, promoting a culture of resilience through shared knowledge and cooperative efforts.

6. **Policy and Institutional Support**: Advocate for supportive policies at national, regional, and local levels that prioritize drought resilience and resource management. Strengthening institutional frameworks and building networks among government agencies, NGOs, and local communities will enhance collaborative efforts and policy implementation.

Table 1: Action plan for implementing the drought emergency plan in Al Salam locality, White Nile state, Sudan:

Objective	Action	Responsible stakeholders	Timeline	Resources Needed	Expected Outputs	Example of Indicators to be measured/monitored
(1) Community Involvement						
Engage and empower the local community for effective participation in the plan.	Organize participatory planning workshops.	Local government, NGOs	Month 1-2	Facilitation materials, venue	Community needs and priorities identified	Number of workshops held; percentage of community groups represented
	Develop culturally relevant education and awareness programs.	Community leaders, educational teams	Month 3-4	Educational materials, translators	Increased community awareness and understanding	Percentage increase in community awareness post-program
	Conduct leadership and technical skills training.	Training institutions, NGOs	Ongoing from Month 2	Trainers, training materials	Enhanced community leadership and technical skills	Number of training sessions held; improvements in skills assessments
(2) Partnerships						
Establish and strengthen partnerships for resource mobilization and implementation.	Conduct stakeholder mapping exercise.	Local government, consultants	Month 1	Research tools, database software	Comprehensive list of stakeholders identified	Number of stakeholders mapped; stakeholder engagement level
	Develop and sign MOUs with key stakeholders.	Local government, legal advisors	Month 3-4	Legal documents, negotiation teams	Formalized roles and responsibilities with partners	Number of MOUs signed; clarity in role delineation

Objective	Action	Responsible stakeholders	Timeline	Resources Needed	Expected Outputs	Example of Indicators to be measured/monitored
	Establish inter-agency collaboration committees.	Government departments	Month 2-3	Meeting spaces, communication tools	Strengthened inter-agency collaboration	Number of committee meetings held, collaborative initiatives launched
	Engage technical and financial partners for support.	Project coordinators	Ongoing	Proposals, budget plans	Secured technical and financial resources	Amount of funds secured, number of technical support agreements
(3) Monitoring and Evaluation						
Develop and implement an effective M&E system.	Design a comprehensive M&E framework.	M&E experts	Month 1-2	Framework templates, M&E tools	Defined and structured M&E system	Completion and approval of M&E framework, indicators clearly defined
	Conduct regular monitoring activities.	M&E team, community volunteers	Monthly from Month 3	Transport, data collection tools	Continuous progress tracking	Frequency and timeliness of monitoring reports, adherence to data collection schedule
	Organize impact assessment workshops.	Research institutions	Quarterly	Assessment tools, venues	Detailed evaluation of plan effectiveness	Number of impact assessments conducted, evaluation reports generated
	Establish feedback mechanisms.	Communication officers	Ongoing	Feedback tools, outreach materials	Regular community and stakeholder feedback	Amount and timeliness of feedback received; responsiveness to feedback
(4) Capacity Building and Continuous Learning						

Objective	Action	Responsible stakeholders	Timeline	Resources Needed	Expected Outputs	Example of Indicators to be measured/monitored
Enhance capacity and promote continuous learning.	Implement ongoing training programs.	Training providers	Ongoing	Curriculum, training facilities	Improved skillset among community and stakeholders	Number of participants trained; percentage reported skill improvements
	Organize exchange visits and study tours.	Coordination team	Yearly	Travel arrangements, host partners	Knowledge sharing and learning from other regions	Number of exchange visits conducted, lessons learned documented
	Develop and maintain a knowledge management system.	IT specialists	Month 5 onwards	Software, documentation tools	Centralized and accessible knowledge repository	Knowledge management system implemented, usage statistics
(5) Resource Mobilization and Sustainability						
Secure and manage resources for sustainable plan implementation.	Explore innovative financing options.	Financial advisors, NGOs	Month 3-4	Financial models, partnership proposals	Diverse and sustainable funding sources secured	Number of financing mechanisms engaged; total funds raised
	Develop a comprehensive resource allocation plan.	Budgeting team	Month 2	Budget templates, financial software	Efficient allocation of resources to priority areas	Completion of resource allocation plan, percentage of budget utilized effectively
	Integrate plan into local and national strategies.	Policy makers, local government	Month 4-5	Policy documents, strategic plans	Alignment of the plan with broader policy frameworks	Number of strategies integrated, policy harmonization achieved

CHAPTER SIX

CONCLUSIONS

Here are five potential conclusions that can be drawn from the Drought Emergency Response Plan for Al Salam locality:

1. ***Potential for Enhanced Community Resilience:*** The proposed Drought Contingency Plan presents a strong potential to improve the resilience of local communities in Al Salam, particularly smallholder farmers and pastoralists. By implementing targeted interventions in water management, crop and livestock adaptation, and alternative livelihoods, the plan aims to effectively mitigate the impacts of future droughts and secure sustainable livelihoods.

2. ***Improvement in Early Warning Systems and Preparedness:*** The establishment of comprehensive Early Warning Systems (EWS) is expected to significantly enhance the community's preparedness for future drought conditions. By utilizing real-time climate data and monitoring capabilities, the plan proposes to facilitate a proactive response that reduces vulnerability and protects agricultural and pastoral systems.

3. ***Strengthening Multi-Stakeholder Collaboration:*** The plan's future implementation emphasizes building robust partnerships with government entities, NGOs, and community organizations. This collaboration is intended to develop cohesive and resource-efficient strategies, ensuring effective execution and resource mobilization for drought resilience initiatives.

4. ***Infrastructure and Institutional Enhancements*:** The recommendations include developing essential infrastructure, such as rainwater harvesting systems, improved market access, and strengthening institutional frameworks. These measures are poised to address significant resource and policy gaps, supporting both immediate drought response and long-term development.

5. ***Focus on Capacity Building and Adaptation*:** The proposed training and knowledge-sharing initiatives are designed to empower communities with the necessary skills and information to adapt to changing climatic conditions. Emphasizing continuous capacity building establishes

a foundation for a resilient community capable of innovating and adjusting to future environmental and socioeconomic challenges.

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Appendices

Appendix 1: Questionnaire:

a) Improving water harvesting/storage
b) Practicing mixed/intercropping
c) Receiving extern assistance (seeds etc.)
d) Other [please specify]: _____

1. **What type of government/donor support is most needed?**
   a) Access to drought-resistant seed varieties
   b) Agricultural extension services and advisors
   c) Access to credit inputs
   d) Post-harvest storage infrastructure
   e) Reliable irrigation infrastructure
   f) All of above

Questionnaire: Section 3 - Pastoralist Community

1. **What types of livestock do you typically raise?**
   a) Cattle b) Goats c) Camels d) Sheep e) All of the

2. **How have grazing patterns and routes changed over the past 10-20 years?**
   a) Routes have expanded
   b) Routes have contracted
   c) Patterns have be fixed
   d) No significant change
   e) Unsure

3. **Availability of water and forage for livestock has:**
   a) Increased
   b) Decreased
   c) Remained stable
   d) Fluctuated seasonally
   e) Unsure

4. **Drought impacts on livestock herds in recent years have been:**
   a) More severe b) Less severe c) About the same d) Unsure

5. **Adaptation strategies used include: (select all that apply)**
   a) Changing livestock species
   b) Adjusting herd sizes
   c) Finding new gr
   d) Developing water sources
   e) No changes made
   f) Unsure

6. **What are the main challenges to effectively implementing adaptation strategies?**
   a) Lack of resources/funding
   b) Restrictions on movement
   c) Limited information/trainin
   d) Conflicts over resources
   e) All of the above
   f) Other [please specify]: ___

7. **What type of government/donor support is most needed?**
   a) Access to veterinary services and animal health
   b) Improved access to water sources and infrastructure
   c) Alternative livelih opportunities/skill
   d) Cash transfers or restocking programs after drought
   e) All of the above

Appendix 2: Adoption of Climate Insurance for Farmers and Pastoralists in Al Salam locality

To bolster the resilience of farmers and pastoralists in Al Salam locality against the uncertainties of climate variability and drought, adopting Climate Insurance as a risk management tool is essential. Climate Insurance offers a safety net by providing financial compensation for losses due to climate-induced events, thereby stabilizing incomes and fostering investment in sustainable practices.

A. Benefits of Climate Insurance:

- **Financial Security**: Provides financial support to farmers and pastoralists during adverse climate events, enabling them to recover more quickly and reducing the economic burden of droughts and crop failures.
- **Risk Mitigation**: Encourages the adoption of innovative farming and pastoral practices by lessening the perceived risk, thereby promoting sustainable agriculture and natural resource management.
- **Incentive for Sustainable Practices**: By linking insurance premiums to sustainable practices, farmers and pastoralists are incentivized to adopt methods that reduce vulnerability to climate impacts.

B. Implementation Strategy:

1. **Stakeholder Engagement**: Collaborate with insurance providers, government agencies, NGOs, and local communities to develop tailored Climate Insurance products that address the specific needs and conditions of the locality.
2. **Awareness and Education**: Conduct workshops and information sessions to educate farmers and pastoralists about the benefits and workings of Climate Insurance, including guidance on claim processes and sustainable practices.
3. **Subsidies and Incentives**: Explore options for government subsidies or donor support to make insurance premiums affordable for smallholder farmers and pastoralists, ensuring broad access and participation.
4. **Integration with Existing Programs**: Align Climate Insurance with existing drought management and agricultural extension programs to create a cohesive strategy that amplifies resilience.

Appendix 3: Alternative Livelihood Programs:

1. **Beekeeping (Apiculture):**
    - **Overview:** Beekeeping involves the maintenance of bee colonies to produce honey, beeswax, and other by-products. It is a low-maintenance, high-reward activity that can thrive even in semi-arid regions.
    - **Benefits:** Provides an additional income source with minimal water requirements. Pollination by bees can also improve crop yields in surrounding areas.
    - **Support Needed:** Training in modern beekeeping techniques, provision of starter kits (hives, protective clothing, tools), access to markets for honey and wax, and community organization into beekeeping cooperatives.
2. **Poultry Farming:**
    - **Overview:** Small-scale poultry farming can be a sustainable source of income and nutrition. Species such as chickens, ducks, and guinea fowls can be reared for eggs and meat.
    - **Benefits:** Provides quick returns (within a few months), and eggs/meat are valuable nutrition sources. Requires less space compared to larger livestock.
    - **Support Needed:** Training on poultry management, disease control, and feeding. Initial supplies such as chicks, feed, and simple housing structures. Development of local hatcheries and market access.
3. **Handicrafts and Artisanal Products:**
    - **Overview:** Creating and selling handmade crafts (e.g., baskets, pottery, textiles) can preserve cultural heritage while generating income. Products can be sold locally or accessed through larger markets.
    - **Benefits:** Uses locally available materials, supports cultural preservation, provides income particularly for women, and requires minimal upfront investment.

- **Support Needed:** Skills training in various crafts, establishing local cooperatives for collective production and sales, and marketing assistance to access broader markets.

4. **Aquaculture:**
    - **Overview:** Fish farming in controlled environments such as ponds or tanks. It can utilize perennial water sources or harvested rainwater.
    - **Benefits:** Provides a high-quality source of protein and can be an effective way to utilize available water efficiently.
    - **Support Needed:** Training in fish farming techniques, provision of fingerlings and feeds, pond construction or tank setup, and marketing channels for fish products.
5. **Agroforestry:**
    - **Overview:** Integrating trees and shrubs into agricultural landscapes. Trees can provide fruits, nuts, fuelwood, and other products while enhancing soil health and water retention.
    - **Benefits:** Diversifies income sources, improves ecosystem health, and contributes to long-term sustainability through soil stabilization and carbon sequestration.
    - **Support Needed:** Training on agroforestry practices, access to saplings and seeds, and technical support for integrating tree crops with current farming systems.
6. **Value Addition to Agricultural Products:**
    - **Overview:** Processing agricultural products to increase their value before sale, such as milling grains into flour, making dairy products, or drying and packaging fruits.
    - **Benefits:** Increases income from existing agricultural activities, reduces post-harvest losses, and creates job opportunities within the community.
    - **Support Needed:** Training in processing techniques and food safety, provision of simple processing equipment, and access to markets where value-added products can be sold.
7. **Solar Energy Solutions:**

- **Overview:** Utilizing solar power for various applications like solar drying of crops, solar-powered pumps for irrigation, or even small-scale solar power systems for homes and businesses.
- **Benefits:** Reduces dependency on non-renewable energy sources, promotes energy security, and can power other livelihood activities.
- **Support Needed:** Training in solar technology installation and maintenance, provision of solar panels and related equipment, and financing mechanisms to support initial investments.

8. **Eco-Tourism:**
   - **Overview:** Leveraging natural and cultural heritage to attract tourists. Small-scale initiatives can involve guided tours, cultural performances, and homestays.
   - **Benefits:** Diversifies income, promotes cultural exchange and preservation, and can be sustainably managed to enhance community involvement.
   - **Support Needed:** Training in hospitality and tour management, marketing support to attract tourists, and development of infrastructure like visitor centers or eco-lodge facilities.

Implementing Alternative Livelihood Programs:

To ensure the success of these alternative livelihood programs, the following steps are recommended:

- **Community Involvement:** Engaging community leaders and members in the design and implementation of programs to ensure they are culturally appropriate and widely accepted.
- **Capacity Building:** Providing continuous training and support to community members, ensuring they have the skills and knowledge to sustain and grow their new livelihoods.
- **Access to Finance:** Establishing microfinance schemes or revolving funds to help community members invest in new livelihood activities.

- **Market Access:** Developing linkages with local, national, and international markets to ensure products can be sold at fair prices. This might involve creating cooperatives or partnerships with established businesses.
- **Monitoring and Evaluation:** Establishing a framework for monitoring progress and impact, ensuring that livelihood programs are achieving their intended goals, and making necessary adjustments based on feedback and results.

By implementing these detailed alternative livelihood programs, the communities in AlSalam can diversify their income sources, reduce their dependency on climate-sensitive agriculture and livestock, and enhance their overall resilience to drought.

Appendix 4: Proposed Training and Capacity Building

Training and capacity building are crucial for enhancing resilience and equipping communities and stakeholders with the necessary skills and knowledge to respond to drought conditions effectively. Here are some suggested training programs and courses for both communities and other project stakeholders:

A. For Community Members (Farmers and Pastoralists)

1. **Sustainable Agricultural Practices:**
    - **Course Content:** Principles of conservation agriculture, crop rotation, cover cropping, reduced tillage, and organic farming practices.
    - **Objective:** To improve soil health, increase crop yields, and reduce vulnerability to drought.
2. **Water Conservation and Management:**
    - **Course Content:** Techniques for rainwater harvesting, efficient irrigation methods (drip and sprinkler systems), water storage solutions, and watershed management.
    - **Objective:** To ensure sustainable use of water resources and enhance water availability during drought periods.
3. **Livestock Management and Health:**
    - **Course Content:** Livestock feeding and nutrition, disease control and vaccination, emergency fodder management, and sustainable grazing practices.
    - **Objective:** To improve livestock health and productivity, reduce mortality rates, and manage forage resources efficiently.
4. **Drought-Resilient Crop Varieties:**
    - **Course Content:** Introduction to drought-tolerant crop species, seed selection, and best practices for planting and managing these crops.
    - **Objective:** To enhance crop resilience to drought conditions and ensure stable food production.

5. **Alternative Livelihood Skills:**
    - **Course Content:** Beekeeping, poultry farming, handicrafts making, aquaculture, and agroforestry.
    - **Objective:** To diversify income sources and reduce dependency on drought-vulnerable activities.
6. **Early Warning Systems and Response:**
    - **Course Content:** Understanding early warning signals, interpreting weather forecasts, and implementing timely response actions.
    - **Objective:** To enable communities to respond proactively to early warnings and mitigate potential impacts.

B. For Project Stakeholders (Government Agencies, NGOs, Community Leaders)

1. **Community-Based Disaster Risk Management:**
    - **Course Content:** Risk assessment, risk reduction strategies, community mobilization, and emergency planning.
    - **Objective:** To build the capacity of stakeholders to manage disaster risks effectively at the community level.
2. **Drought Vulnerability and Impact Assessment:**
    - **Course Content:** Techniques for assessing drought vulnerability, tools for measuring drought impacts, and data collection methods.
    - **Objective:** To enhance stakeholders' abilities to conduct thorough assessments and develop targeted interventions.
3. **Integrated Water Resource Management (IWRM):**
    - **Course Content:** Principles of IWRM, multi-sectoral water management approaches, policy formulation, and implementation.
    - **Objective:** To promote sustainable and coordinated management of water resources across different sectors.

4. **Climate Change Adaptation Strategies:**
    - **Course Content:** Understanding climate change, its impacts on agriculture and livelihoods, adaptation measures, and policy integration.
    - **Objective:** To equip stakeholders with knowledge on climate adaptation to implement resilient practices and policies.
5. **Participatory Development Approaches:**
    - **Course Content:** Techniques for participatory planning, stakeholder engagement, community empowerment, and gender-sensitive approaches.
    - **Objective:** To ensure inclusive and participatory development processes that address the needs of all community members.
6. **Monitoring and Evaluation (M&E):**
    - **Course Content:** Principles and practices of M&E, designing M&E frameworks, data analysis, and reporting.
    - **Objective:** To strengthen the capacity of stakeholders to monitor and evaluate the effectiveness of drought mitigation programs and interventions.
7. **Resource Mobilization and Fundraising:**
    - **Course Content:** Strategies for resource mobilization, proposal writing, building partnerships, and accessing funding opportunities.
    - **Objective:** To enable stakeholders to secure resources and funding necessary for implementing drought resilience initiatives.
8. **Conflict Resolution and Management:**
    - **Course Content:** Conflict analysis, conflict prevention, mediation techniques, and resolution strategies.
    - **Objective:** To manage and resolve conflicts that may arise over scarce resources during drought conditions, promoting peaceful coexistence.