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**SUPPORT FOR STRENGTHENING CLIMATE CHANGE ADAPTATION PLANNING FOR
SOMALIA PROJECT**

JUBALAND CLIMATE VULNERABILITY ASSESSMENT (CVA)

REPORT COMPILED BY:

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JANUARY 2024

ACKNOWLEDGEMENTS

The Consultants wishes to express his profound gratitude for the time and effort expended by all stakeholders during the vulnerability assessment. This provided valuable insights, candid perspectives, and above all informed the vulnerability assessment findings. The consultant appreciates the guidance, feedback and support of the **Ministry of Environment and Climate Change of Jubaland** throughout the vulnerability assessment. Especial thanks to the project partner **KAALO AID and Development** for their logistical, human resources and financial support for the vulnerability assessment fieldwork. The consultants are equally thankful to the **United Nations Development Programme (UNDP)** and **Green Climate Fund (UNDP-GCF)** National Adaptation Plan (NAP), for their financial support of the Project. The consultants are grateful to the enumerators – this vulnerability assessment would not have been possible without the dedicated support of the enumerators in the data collection process. It is hoped that that this report will inform the design and implementation of subsequent climate change interventions in Jubaland and beyond.

Executive Summary

The Federal Member State of Jubaland was formally established in 2013 and encompasses a total land area of 110,293 km² (42,584 sq mi) which is occupied by an estimated population of 953,045 inhabitants¹. Jubaland consists of three regions that straddle the Juba River i.e. Gedo, Lower Juba and Middle Juba. The coastal city of Kismayo located in Lower Jubba is the capital of the State of Jubbaland while other notable cities towns are Bardhere, Luuq, Beled Haaw, Jamame, Bu'ale and Jilib. A significant proportion of Jubaland is under the active control of the Al-Shabaab Terrorist Group. Jubbaland Borders Kenya to the South, Ethiopia to the West, the Indian Ocean to the East and the South West State to the North. While Jubaland can be categorized as predominantly arid and semi-arid like the rest of Somalia, Middle Jubba and Parts of Lower Jubbaland has significant elevations in the topographic characterizations. At the same time, the Jubba Valley is predominantly agricultural land with irrigated riverine agriculture practiced on the alluvial riverine valley associated with the Juba and Shabelle River.

Somali and Jubbaland are increasingly facing the adverse effects of climate change which are negatively impacting on the livelihoods of communities in Jubbaland as well as the socio-political economy of Jubbaland. The most observable evidence of climate change is the increasingly frequent and longer droughts coupled with sudden onset and unpredictable flooding events. Given the importance of the Juba River and Shabelle River to the livelihoods of riverine farmers, flooding as a result of excessive upstream rains in Ethiopia has often led to crop and animal losses and massive displacements thus exerting pressure on urban centre resources and in particular in Kismayo. As such, there is increasing need for the identification of key risks posed by Climate change as well as to identify the localized vulnerability inducing factors and the most vulnerable socio-political and economic factors in the State of Jubbaland.

Somalia has recently improved its Federal and State Level Climate Change Adaptation and Response policy, legislative and institutional frameworks. It has established critical institutions such as the Directorate of Environment and Climate Change (DECC); developed and adopted key policies such as the National Climate Change Policy, National Adaptation Framework, Initial National Communication 2018, Updated NDC 2021, and NDP 9 2020-2024.

Jubbaland's Stakeholder Inclusive Vulnerability Risk Assessment (VRA) Report is a key step aimed at understanding the climate change vulnerabilities in the State of Jubbaland; it highlights the vulnerabilities of different priority sectors, and informs planning, fund allocation and implementation of strategic Climate Change Adaptation interventions in Jubbaland. Jubaland's Climate Change VRA assessed the sectoral risks and vulnerabilities to climate hazards (extreme temperatures, floods, drought, pest and disease, locust, tsunami, cyclone) in the State. The assessed sectors were water, health, agriculture and food security, livestock, biodiversity, coastal and marine are/resources, public works and education.

The VRA identified Jubaland's vulnerabilities as: (i) decreased crop production, (ii) loss of incomes and livelihoods, (iii) emergence of new and aggressive insects, pests and diseases, (iv) increased population displacements and loss of life. With the identified Climate Change Risks and Vulnerabilities in mind, VRA Report goes a step further and proposes Climate Change Adaptation Options for the State of Jubaland: (i) Enhance Jubaland's Early Warning Systems; (ii) build greater resilience to hydro and meteorological hazards; (iii) Strengthen sectoral climate change adaptation capacities through adoption of climate smart

¹ "Regions, districts, and their populations: Somalia 2005 (draft)" (PDF). UNDP.

technologies and approaches; and (v) Promote reforestation programmes thus restoring ecosystem health in Jubaland's rangelands.

Jubaland's VRA further identifies barriers to Climate Change Adaptation as: (i) lack of access to large areas of Jubbaland (whole of Middle Jubba, Parts of Lower Jubba and Gedo) thus evaluation of climate risk vulnerabilities as well as the implementation of adaptation interventions; (ii) Poor institutional and enabling environment; (iii) low adaptive technology capacity and funding for Climate Change Adaptation; (iv) lack of consistent and updated state level data over time thus seriously effectiveness of new proposed strategies.

Table of Contents

Executive Summary.....	ii
List of Abbreviations.....	vii
List of Tables.....	viii
List of Figures	viii
Definition of Terms.....	ix
I: Introduction and Background	10
Overview	10
Aims and objectives of the Assessment.....	11
Description of the Assessment Area	12
1.1.1 Geographical profile.....	12
1.1.2 Climatic conditions.....	14
1.1.3 Livelihood Zones.....	14
1.1.4 Demographics Profile.....	15
II: Methodology.....	16
2.1.1 Conceptualization of vulnerability	16
2.2 The Assessment design and Approach.....	18
2.2.1 Literature review	18
2.2.2 Consultation with stakeholders.....	19
2.2.3 Data collection and Analysis	19
2.3 Methodological and Technical Limitations of the Vulnerability Assessment.....	22
2.3.1 Data gaps and/or unavailability	22
III: Results of the State-level Vulnerability Assessment	23
3.1 Climate Change Vulnerability and Risks Factors in Jubbaland	23
3.1.1 Drivers of Jubaland’s Climate Change Vulnerability and Adaptive Capacity.....	23
3.1.2 Contributing Factors to the Exposure of Jubbaland State to Climate Change Impacts	26
3.1.3 Current and Future Trends of Climatic Variables in Jubbaland State.....	28
Climate Change Risks, Hazards and Vulnerabilities in Jubbaland State	31
3.1.4 Climate Change Risks and Hazards in Jubbaland State	31
3.1.5 Climate Change Vulnerabilities	31
Sectoral Climate Change Analysis	32
3.1.6 Analysis of vulnerabilities of key sectors to Climate Change	32
3.1.7 Climate Change Impact on the Sectors and their Respective Adaptive Options	36

3.1.8	Gender issues and Adaptive capacity to climate change.....	46
3.1.9	Disaster risk reduction approaches.....	47
IV:	Conclusion and Recommendations.....	48
	Conclusion.....	48
	Key Messages.....	49
	Recommendations To Build a Climate Resilient Jubbaland State	50
	References.....	52
ANNEX	54
	Annex 1: Steps in vulnerability assessment	54
	Annex 2: Scheduled followed for field work data collection in Jubbaland	56
	Annex 3: Tool used for data collection.....	57

List of Abbreviations

CCVA	Climate Change Vulnerabilities Assessments
FGD	Focus Group Discussion
FGS	Federal Government of Somalia
FMS	Federal Member States
GCF-NAP	Green Climate Fund National Adaptation Plan
INDC	Initial Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
MOECC	Ministry of Environment and Climate Change
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
Tour	Terms of Reference
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

List of Tables

Table 1: Distribution of Stakeholders contacted in Jubbaland State.....	21
Table 2: Demographic characteristic of household heads in Jubbaland State.....	24
Table 3: Access to water indicators.....	25
Table 4: Community perceptions and experiences on natural disasters.....	27
Table 5: Common climate related hazards and potential risks in Jubaland.....	31
Table 6: Climate Change Vulnerabilities in Jubbaland State.....	32
Table 7: Identification of the vulnerable sectors to climate change in Jubbaland State.....	33
Table 8: Climate change impacts and potential adaptation options in Agriculture Sector.....	37
Table 9: Climate change impacts and potential adaptation options in Livestock Sector.....	38
Table 13: Climate change impacts and potential adaptation options in Water Sector.....	40
Table 8: List of climate change impacts and adaptation options.....	42
Table 9: Climate change impacts and potential adaptation options in Public Sector.....	44
Table 10: Climate change impacts and potential adaptation options in Biodiversity.....	45
Table 11: List of climate change impact and adaptation options.....	46
Table 15: Approach employed to for disaster risk reduction.....	47

List of Figures

Figure I: Jubbaland administrative map.....	12
Figure II: Jubbaland Population Distribution by Age and Sex.....	15
Figure 3 Vulnerability concept according to the IPCC AR4 (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 2014).....	17
Figure 4: Enumerator Training Workshop during the Jubaland State of Somalia’s CCVRA.....	19
Figure 5: Focus group discussion with men in Jubaland State.....	20
Figure 6: Flooding in parts of the villages sampled in Jubaland State.....	20
Figure 7: High ranking ministry official participating in the validation workshop in Jubbaland State.....	21
Figure 8 Monthly temperatures (High, average, Low) in Jubbaland State.....	29
Figure 9: Precipitation in Jubbaland State.....	30

Definition of Terms

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Climate: Climate of an area or country is known as the average weather over a long period of time. It refers to the characteristic condition of the atmosphere deduced from repeated observations over a long period. More than a statistical average, climate is an aggregate of environmental conditions involving heat, moisture and motion. Climate studies must consider extremes in addition to means, trends, fluctuation, probabilities and their variations in time and space.

Climate change: Refers to a change in the climate system that is caused by significant changes in the concentration of greenhouse gases due to human activities, and which is in addition to the natural climate change that has been observed during a considerable period.

Climate change vulnerability: The degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with adverse impacts of climate change. Impact here refers to a specific change in a system caused by its exposure to climate change.

Sensitivity: Refers to whether the asset or system is located in an area experiencing direct effects of climate variables.

Mitigation: Refers to human interventions to prevent or slow down atmospheric GHG concentrations by limiting current or future emissions, and/or enhancing potential sinks for greenhouse gases.

Sensitivity: Refers to how the asset or system fares when exposed to a climate variable.

I: Introduction and Background

Overview

Climate change is a serious threat to socio-economic development globally and in Somalia. The effects of climate change are wide-reaching, touching nearly every aspect of Federal Government of Somalia's national development. The ordinary rural pastoral, and agro-pastoral Somali is faced with the harsh reality of climate change through increasing frequency of extreme climate change events. Somalia and the Horn of Africa in General are experiencing an increasing frequency of back-to-back extreme climatic events: in Somalia, it is either flooding or the country is facing a biting prolonged drought. The droughts have been increasing in frequency and intensity.

For the State of Jubbaland, strategies aimed at effectively addressing the increasing threats posed by climate change and enhance mitigation and resilience measures require approaches that are targeted and that have specific objectives with clearly defined outcomes (they should be evaluated / monitored by quantifiable and verifiable indicators). Climate Change Vulnerabilities Assessments (CCVA) provide the necessary information needed for the targeted approaches. The need for CCVA is well documented at the global and national levels. The UNFCCC calls on the parties to the convention to take climate change considerations into account in their socio-political, economic, and environmental policies and actions. In doing this, the parties are expected to utilize evidence-based methods such as impact assessments with the aim of minimizing adverse effects of policies and actions on the economy and the environment thereby enhancing climate change mitigation and adaptation. The Paris Agreement requires parties to the Agreement to engage in adaptation planning processes and the implementation of actions including the development of relevant plans and policies; these may include the assessment of climate change impacts and vulnerability with a view to formulating nationally determined prioritized actions, taking into account vulnerable people, places and ecosystems.

Since 2012, Somalia has taken several important initiatives to adopt policies, regulations, and institutional reforms that are essential in the state-building process. Those linked to climate change related actions include the preparation of the 2013 National Adaptation Programme of Action (NAPA), the 2015 Initial Nationally Determined Contributions (INDC) Report to the UN Framework Convention on Climate Change (UNFCCC), draft 2021 National Climate Change Policy, the 2021 National Environment Policy, draft 2021 Environment Act, and the 2018 Initial National Communication (INC) to the UNFCCC. The Green Climate Fund National Adaptation Plan Project (GCF NAP) for Somalia consisted of the following outcomes: Strengthening institutional coordination and capacity for adaptation planning and implementation at the federal level; Enhancing the technical, institutional, and managerial capacity for adaptation planning at the state level; Developing the capacities at the Federal State level by active engagement and contribution to technical and strategic analyses with expert and stakeholder input through a learning-by-doing approach; and the mainstreaming of climate change adaptation considerations into the investment planning processes.

Somalia has been experiencing multiple crisis which include various form of conflict that have driven a protracted humanitarian crisis characterized by weak or insufficient governance structures, chronic food insecurity, massive population displacements, inaccessibility of basic services among other issues. Climate change has served to further increase destitution and vulnerability at the household, community, regional and federal levels. As such, the multiplicity of climate change impacts in Somalia calls for a coordinated and integrated approach to Climate Change Adaptation Planning and Implementation. To foster and

support adaptation in the Federal Member States, the Federal Government of Somalia, and the UNDP, through the Ministry of Environment and Climate Change in the capacity of National Designated Authority (NDA) and KAALO Aid (KAD), are implementing the project **“Support for Strengthening Climate Change Adaptation Planning for Somalia”** funded by the Green Climate Fund (GCF). The project has supported the implementation of the NAP process by strengthening the capacities of academia, decision makers and communities to adapt to the varying climatic conditions, and by facilitating the exchange of knowledge and expertise.

Adapting to the present and future impacts of climate change will contribute to increased resilience of vulnerable communities, in particular those whose livelihoods depend on climate-sensitive sectors, such as the agro-pastoralists, pastoralists, riverine and fishermen of in Jubaland. Thus, as part of the GCF-NAP project, a vulnerability assessment covering several sectors has been undertaken in the State of Jubaland. The rationale for state level vulnerability assessment is based on the need for a comprehensive understanding of the key Climate Change risks and vulnerabilities for each Federal Member State. This will enable the FMS such as the State of Jubaland to prioritize climate action.

Aims and objectives of the Assessment.

The aim of the Jubaland VRA was to gain a comprehensive understanding Jubaland’s climate change risks and sectoral vulnerabilities which would in turn inform Jubaland’s and Somalia’s Climate Change Adaptation planning process. The Jubaland VRA within the NAP Framework is informed by the need to: (i) Diagnose the magnitude of climate vulnerabilities in Jubaland as part of the National Adaptation Plan implementation process, and (ii) effectively coordinate federal level policies and legislation on climate change with FMS level climate change adaptation implementation efforts.

Besides, the findings of the vulnerability assessment provide an evidence basis / foundation upon which FMS level climate change interventions and initiatives are designed thus enhancing their relevance and effectiveness. This means that such evidence-based FMS Climate change initiatives will address community level vulnerabilities due to a better sectoral understanding of climate change risks and vulnerabilities. The findings of the assessment will therefore: (i) inform participatory action planning processes that lead to community-driven and owned adaptation; (ii) enhance investments in climate smart livelihood upgrading processes; (iii) identify lower risk areas where climate-resilient alternative socioeconomic activities could be established; and (iv) develop targeted early warning systems, training programs in environmental management and DRR, community capacity building, alternative livelihood strategies, etc; (v) inform future advocacy planning; and (vi) select, prioritize, and design appropriate resilient development options in the targeted member states.

The assessment was conceived and commissioned by the Ministry of Environment and Climate Change of the Somalia Government in collaboration with UNDP and KAALO to:

- (i) Establish the climate change risks, hazards and vulnerabilities in Jubaland state.
- (ii) Establish the probability and impact of climatic hazards currently and in the future in the State.
- (iii) Identify the vulnerable sectors to climate change in the State and identify their respective adaptive capacities.
- (iv) Develop a climate change vulnerability and risk map of the State and develop a list of indicators for the vulnerability to climate change in the State.

Description of the Assessment Area

The assessment was conducted within the geographical boundaries of Jubbaland State. Due to access and funding constraints, data was collected on representative locations in Lower Jubba in line with stakeholder consultations at the Jubbaland Ministry of Environment, the UNDP NAP Team and KAALO’s project implementation team.

1.1.1 Geographical profile

Jubbaland is a Federal Member State in southern Somalia. Jubbaland consists of the Gedo, Lower Jubba and Middle Jubba regions, and lies 40–60 km east of the Jubba River, stretching from Gedo to the Indian Ocean, while its western side flanks Kenya-Somalia border. Jubbaland has a total area of 110,293 km² (42,584 sq mi). Its largest city is Kismayo, which is situated on the coast near the mouth of the Jubba River. (Figure 1). The state of Jubbaland borders the Garissa, Wajir and Mandera County of Kenya on the western side.

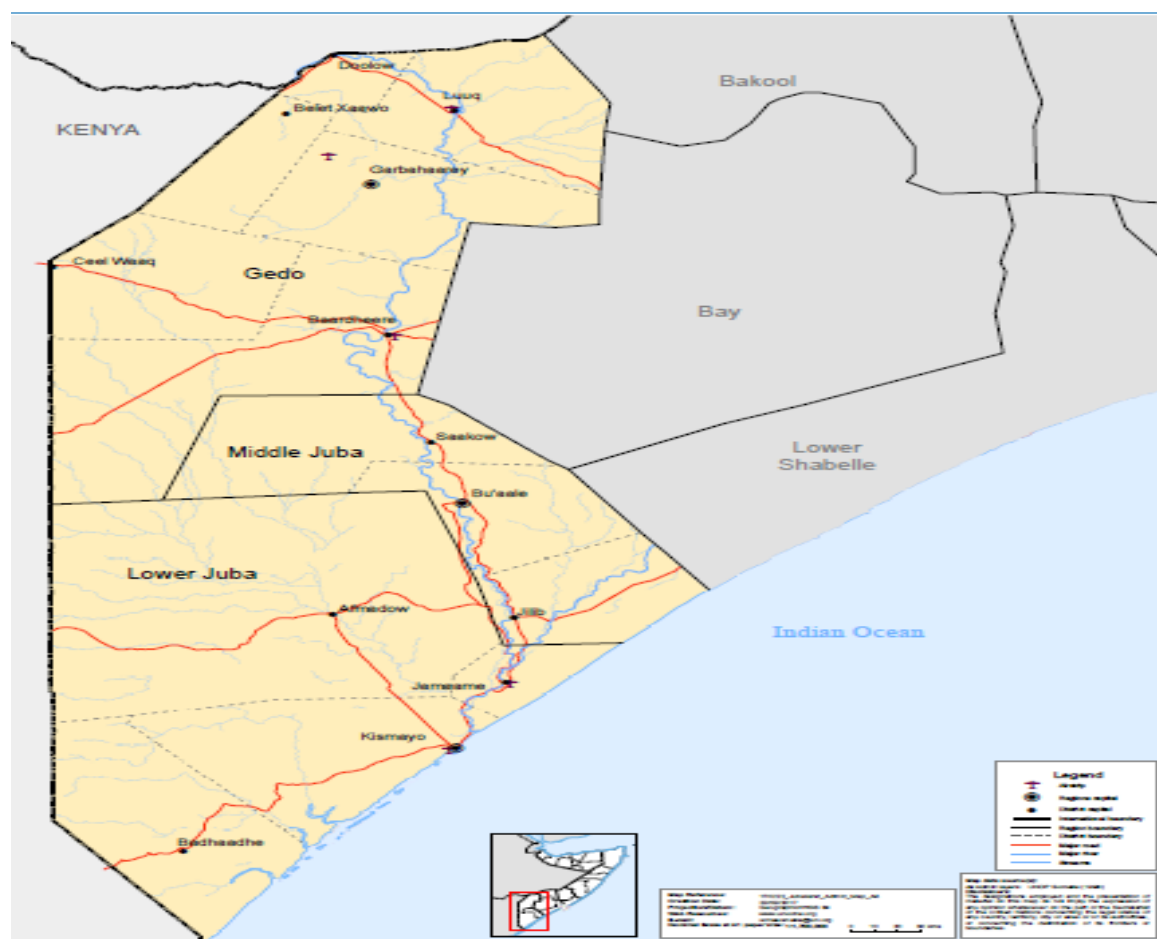


Figure 1: Jubbaland administrative map

The following table 1 summarizes the main geographical features of Jubbaland.

Table 1: Summary of the Geographical Information of Jubbaland (FAO-SWALIM, 2013)

Geographical features Details

<i>Location</i>	Jubbaland consists of the Gedo, Lower Jubba and Middle Jubba regions, and lies 40 - 60 km east of the Jubba River, stretching from Gedo to the Indian Ocean. The state of Jubbaland borders the Garrisa, Wajir and Mandera County of Kenya on the western side. The interim Jubaland Capital is Kismayo which is in Lower Jubba and is the largest city in Jubbaland, and the third largest city in Somalia after Mogadishu and Hargesa.
<i>Land area</i>	110,293 km ² (42,584 sq mi)
<i>Rivers</i>	No navigational rivers. Jubbaland has two major rivers: the Dawa and the Juba, the latter being one of two perennial rivers in the country and one that flows through the country. The River Juba basin is regarded agriculturally, as one of the richest and most fertile Somali peninsula.
<i>Soils</i>	As in Somalia, Jubbaland has various soil types depending on the parent rock. The region has shallow sandy soils or stony and deep lime soils in some areas. In some parts and towards the far south the loamy soils are characterized with high calcium carbonated soils. In some parts, the soils here have poor drainage and high salt contents while in other parts the soil can be described as low plasticity clayey sands to high plasticity silty sands.
<i>Terrain</i>	<p>The terrain generally consists of plateaus and plains particularly the southwestern region is a flat plain banked with a hilly ground. The insitu soils are gravel with sections with sandy silt soils. There are also hilly sections on the southwest with sedimentary rock.</p> <p>The coastline waters of Jubbaland is estimated to consist of 68% of the total marine resources of Somalia, but the fishing industry is hampered by poor road infrastructure from the coastal areas and lacks cold chain storage facilities. In addition, the waters of Jubbaland's coasts are said to be rich in oil and gas.</p>
<i>Climate</i>	Jubbaland has a hot tropical climate, with little seasonal variation and daily temperatures ranging from 30°C to 40°C. As the rest of Somalia, the state has low annual precipitation and four seasons: the rainy seasons are Gu' and Deyr, while the dry seasons are Haggaa and Jiilaal.
<i>Rainfall</i>	Jubbaland is a resource-rich state with comparatively good seasonal precipitation. It is the warmest and rainiest state in Somalia with average annual rainfall between 110 to 200mm. The Lower Jubba is one of the places with high amounts of seasonal rainfall in Somalia (NAPA, 2013). It receives relatively more rainfall during Gu (about 350mm) compared to Deyr (average 250mm) season (Ogallo, et al., (2017))
<i>Agriculture</i>	Agriculture and animal production are regarded as the main economic activities in Jubbaland. The Juba Valley has rich agricultural potential, with huge forests, an expansive coastline and fertile farming lands along both sides of the valley. However, the agricultural sector has suffered from civil war and recurring droughts in the recent years. The pastoral based livestock subsector secures direct job opportunities for over 55% of the total labor force, but the sector has been limited by a lack of procedures for export certifications and the lack of public veterinary services. JSS also suffers from soil degradation, overfishing of some species, and deforestation.

1.1.2 Climatic conditions

In general, the Jubbaland region is arid and semi-arid lands (ASALs) with bi-modal rainfall i.e. (i) Gu Rains (April to mid-June) are the major rains and (ii) Deyr Rains (October- November) which are categorized as the autumn light / short rains (the Deyr rain). Analysis of precipitation data for the period 1981 to 2020 estimates the average monthly volume of rainfall at 20.89mm per month with variations from point to point throughout the state. The periods between December to March and June to September were noted as relatively dry periods. Lower Jubba receives about 350 mm rainfall during Gu (AMJ) season and an average of 250 mm Deyr (SON) season. Lower Jubba saw a general decreasing trend in rainfall during the Gu rainfall season, and a general increasing trend in the Deyr rainfall between 1981 to 2015. The Lower Jubba region has also experienced an increase in occurrence of depressed rainfall usually associated with drought, and a decrease in the frequency of above normal rainfall associated with floods. Lower Jubba has seen increasing trends in the minimum, maximum and average temperature, consistent with the results from many recent studies worldwide. Increase in temperature could also change the ecology of infectious diseases as well as increase temperature related mortality and morbidity of people and livestock. The mean surface temperature of Jubaland throughout the state is 30°C with the hottest months being March through April.

The warm and cool phases of El Niño and La Niña have also had a great influence on the rainfall patterns. During the warm phase of ENSO, the rainfall is above the normal range, while during the cool phase the rain is below the normal range. As Somalia lies on the equator, there isn't much seasonal variation in terms of temperature, and the annual mean temperature is about 30 C°. The rainfall is generally low and unevenly distributed, influenced by the Inter-Tropical Convergence Zone (ITCZ), the north-south movement, which results in two rainy seasons and two dry seasons in a year. January to March is the dry and hot winter season locally called "Jilaal", it results from ITCZ emerging from the dry Arabian Peninsula; followed by major rainy season that usually begins mid-April and lasts till June; Then followed by the dry summer "Xagaa" season from July to September, which is associated with cool sea breezes from the Indian Ocean that results in light coastal — "Xagaa" rains in July and August. The fourth season is the autumn season "Deyr" light rainy season that commerce in October and November. However, as climate change has intensified, Somalia in particular and the Horn of Africa at large experience more frequency and prolonged drought spells that threatened the ecosystem sustainability and the lives and livelihoods of the people.

1.1.3 Livelihood Zones

The state has five diverse livelihood systems: pastoralists, Agro-pastoralists, riverine farming, fishing by coastal communities, urban population including internally displaced people. According to the FSNAU, the main livelihood profiles in Jubbaland are the Jubba Pastoral (Cattle and Goats), Southern Inland Pastoral (Camels, Cattle, Sheep and Goats), Riverine Pump Irrigation, Riverine Gravity Irrigation and Sorghum High Potential². About 49% of the population live in rural areas and about 46% of employed people work in agriculture, 25% in crop cultivation, 9% in herding, 4% in fishing, and 7% in related activities such as forestry and Agro-processing. Pure pastoralists are about 26% of the total population and they live in all rural areas of the country and most of them are nomadic poor. Agro-pastoralists account for about 23% of the population depending on both settled crop production and livestock rearing or only crop production.

² FSNAU and FEWSNET (2016) Somalia Livelihood Profiles

1.1.4 Demographics Profile

The Population Estimation Survey for Somalia 2014 estimates the population of the State of Jubbaland to be 1.36 million inhabitants, with 25 percent residing in the urban, 36 percent in the rural, and 29 percent in the nomadic areas. Internally Displaced Persons from Jubbaland and the rest of Somalia makes up 10 percent of its population while the female population is estimated at 50.14% of the total population. Life expectancy at birth for both sexes is estimated at 58.3 years. The average household size is approximately six (5.9) members per household. The age structure of the household members is typical of a society with a young population. Having one of the highest fertility rates in the world, Jubbaland has a broad-based age pyramid, with 58 percent of household members below 15 years of age. Thirty-four percent of households are headed by women, (29 percent in urban households, 38 percent in rural households, and 48 percent in nomadic households). Forty percent of household members are within the working age population (15-64 years), highlighting the need to create green jobs³ and ensure that training or education offered addresses the labor markets including needs for preserving or restoring environmental quality (JLHDS 2020).

Jubbaland's population is rapidly expanding with an annual population growth of 3% with the FMS recording the fourth-highest fertility rate in the world. Over time, the rapid increase in Jubbaland's population will increase the pressure on the natural resources in the region leading to increased deforestation due to the expansion of settlements, for building materials as well as to cater for the increased populations fuel needs i.e. charcoal demand. People living in cities and towns represent around 25% of the population. Further, in terms of wealth ranking urban areas are wealthier than rural and nomadic areas; 14 percent of the urban households belong to the highest quintile, followed by 2 percent of rural areas while the wealthier households in nomadic areas are less than one percent. This is an indication that the most affluent or wealthier people live in urban settings. Regionally, Lower Juba has a larger proportion of wealthier households at 11 percent than Gedo households at 5 percent (JLHDS 2020).

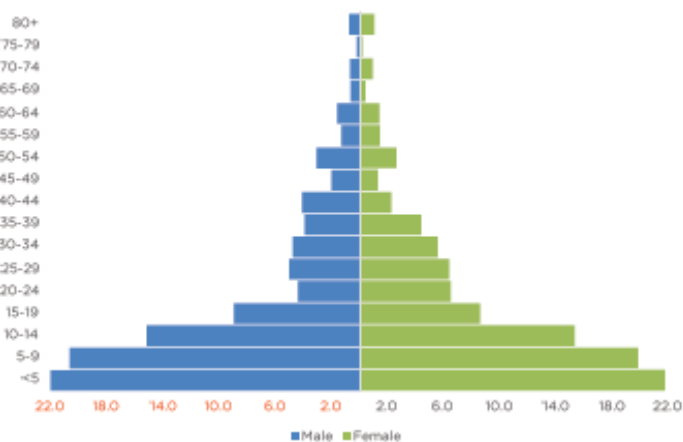


Figure II: Jubbaland Population Distribution by Age and Sex

³ Green jobs are defined as "positions in agriculture, manufacturing, R&D, administrative, and service activities aimed at substantially preserving or restoring environmental quality".

II: Methodology

2.1 Overview

In undertaking the Jubaland VRA, the consultant utilized primary and secondary data to gather key data and frame the VRA. From the beginning to the end of the VRA exercise, the consultant undertook extensive literature analysis and review for the purposes of framing the VRA study as well as for the collection of missing data and complementing the data collected during the field survey. In addition to the secondary data collected during literature review, climatological and weather databases were continuously utilized to draw analytical data and key metrics from which inference was made on climatic patterns over time. This formed the basis for identification of climate risk based on observed patterns and trends over the past 20 years as well as climate risk projections.

At the same time, socio-economic data was gleaned from secondary sources with a view to understanding the socio-economic characterization of Jubaland and ideally identify areas of vulnerability within the socio-political and economic system of Jubaland. Primary data was collected through the field exercise in form of KIIs and FGDs undertaken by Jubaland's Ministry of Environment and KAALO with assistance and coordination support from UNDP NAP Team. The primary data was used to contextual identified vulnerabilities and risk factors with a focus on the 8 sectoral areas identified within Somalia's Climate Change Adaptation policy framework. Further, stakeholder input was important in framing the potential opportunities for adaptation strategies in the identified sectoral focus area. Quantitative data analysis approaches and in particular thematic analysis were utilized using the NVIVO Qualitative Data Analysis software.

The thematic focus area of the thematic analysis of the Qualitative Data focused on the following key themes: socio-political factors, economic factors and physical and environmental sensitivity factors which determine sensitivity / susceptibility of Jubaland to the impacts / outcomes of climate change. The assessment followed the Inter-Governmental Panel on Climate Change (IPCC) 2014 climate risk and vulnerability assessment framework within the context of Jubaland. Following this approach, data was collected on pre-determined specific indicators that were designed to systematically analyze individual contributing factors of climate change vulnerability namely, adaptive capacity, sensitivity, and exposure.

2.1.1 Conceptualization of vulnerability

In line with Intergovernmental Panel on Climate Change (IPCC), AR4 conceptual framework, Jubaland's Vulnerability to Climate Change defines the complex interaction of climate change effects and the susceptibility (risk exposure levels) of a Jubaland's socio-political, economic and enviro-physical system to the impacts of Climate Change. The IPCC sought to elaborate and advance an approach for understanding vulnerability in its Fourth Assessment Report (AR4) as:

the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity|| (Intergovernmental Panel on Climate Change, 2007).

Within this perspective, Jubaland’s Vulnerability to Climate Change is a function of Jubaland’s climate change exposure, sensitivity, and adaptive capacity to cope with climate change effects, as illustrated below:

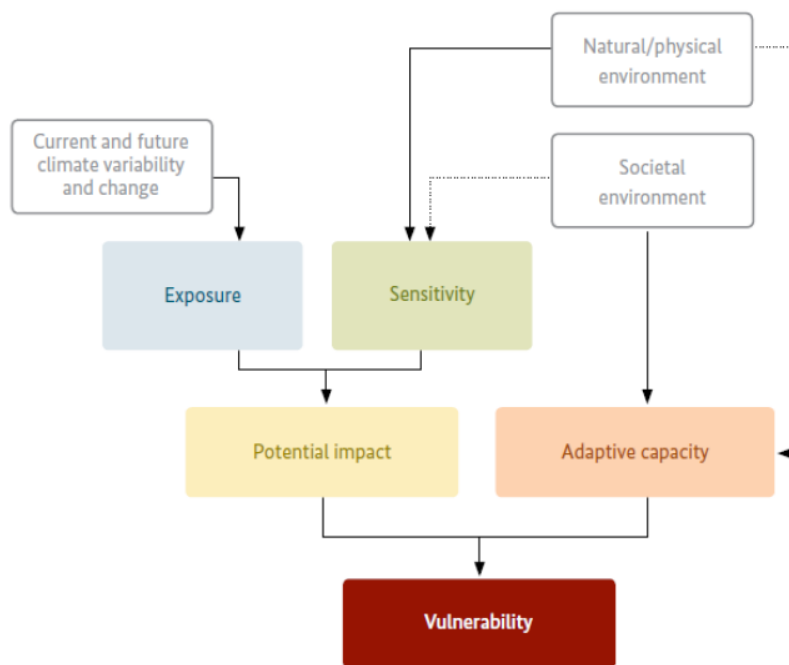


Figure 3 Vulnerability concept according to the IPCC AR4 (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 2014)

Within this conceptual framework:

- **Jubaland’s Exposure** refers to changes in Jubaland’s climatic parameters that might affect socio-ecological systems such as changes in the mean average, spatial and temporal distribution of temperature and precipitation over time.
- **Jubaland’s Sensitivity** refers to the the susceptibility of Jubaland’s physical and natural environment to climate change i.e. to its exposure as well as the ability of the system to withstand such exposure. For example, one of Jubaland’s sensitivity factor is riverine agricultural land use systems which are highly susceptible to seasonal flooding. Riverine agricultural land use systems and communities are at a particularly high risk of exposure from increases in upstream rainfall which will result in beyond normal downstream flooding. and crop loss including the potential for loss of life and displacements.
- **Jubaland’s Potential Impact** is a factor of exposure and sensitivity. In the above example on sensitivity to flooding, increases in precipitation above the mean precipitation means that there is a high risk of crop and animal losses, as well as displacement and loss of human life coupled with AWD / Choleral due to extreme flooding events as has been witnessed from around Oct 2023 to Jan 2024 on account of El Nino and the Indian Ocean Dipole.
- **Jubaland’s Adaptive Capacity** refers, to Jubaland’s socio-political, economic and the psycio-environmental system’s ability to adjust after exposure to increasing climate variability and

extremes, to moderate potential damages, to take advantage of opportunities, and / or to cope with the potential impacts.

2.2 The Assessment design and Approach

The vulnerability assessment was conducted within the geographical boundaries of Jubbaland state. The assessment methodology contextually developed for Somalia and is based on a common harmonized framework, indicators, methodology and guidelines which facilitate individual state-level vulnerability assessments in Somalia. This approach is considered appropriate to achieve comparable results among the FMS. The steps of assessment have been summarized in Annex 1.

2.2.1 Literature review

Climate change is a serious threat to socio-economic development globally and in Somalia. The effects of climate change are wide-reaching, touching nearly every aspect of Federal Government of Somalia's national development. And it is ordinary men and women in Somalia and the Federal Member States (FMS) who are already experiencing the harsh reality of climate change.

To effectively address the threats posed by climate change and enhance resilience to its impacts, there needs to be a targeted approach with specific objectives and defined outcomes. Climate Change Vulnerabilities Assessments (CCVA) provide the necessary information needed for the targeted approaches. The need for CCVA is well documented at the global and national levels. The UNFCCC calls on the parties to the convention to take climate change considerations into account in their social, economic, and environmental policies and actions. In doing this, the parties are expected to employ appropriate methods such as impact assessments with the aim of minimizing adverse effects of policies and actions on the economy and the environment geared towards climate change mitigation and adaptation. The Paris Agreement requires parties to the Agreement to engage in adaptation planning processes and the implementation of actions including the development of relevant plans and policies; these may include the assessment of climate change impacts and vulnerability with a view to formulating nationally determined prioritized actions, taking into account vulnerable people, places and ecosystems.

Since 2012, Somalia has taken several important initiatives to adopt policies, regulations, and institutional reforms that are essential in the state-building process. Those linked to climate change related actions include the preparation of the 2013 National Adaptation Programme of Action (NAPA), the 2015 Initial Nationally Determined Contributions (INDC) Report to the UN Framework Convention on Climate Change (UNFCCC), draft 2021 National Climate Change Policy, the 2021 National Environment Policy, draft 2021 Environment Act, and the 2018 Initial National Communication (INC) to the UNFCCC. The Green Climate Fund National Adaptation Plan Project (GCF NAP) for Somalia consisted of the following outcomes: Strengthening institutional coordination and capacity for adaptation planning and implementation at the federal level; Enhancing the technical, institutional, and managerial capacity for adaptation planning at the state level; Developing the capacities at the Federal State level by active engagement and contribution to technical and strategic analyses with expert and stakeholder input through a learning-by-doing approach; and the mainstreaming of climate change adaptation considerations into the investment planning processes.

The multiplicity of challenges associated climate impacts and conflicts in a diverse country such as Somalia calls for a coordinated and integrated approach to adaptation planning and implementation at the federal level. To foster and support adaptation in the Federal Member States, the Federal Government of Somalia, and the UNDP, through the Ministry of Environment and Climate Change in the capacity of National Designated Authority (NDA) and KAALO Aid (KAD), have implemented a project called Support for Strengthening Climate Change Adaptation Planning for Somalia funded by Green Climate Fund (GCF). The project has supported the implementation of the NAP process by strengthening the capacities of academia, decision makers and communities to adapt to the varying climatic conditions, and by facilitating the exchange of knowledge and expertise. Adapting to the present and future impacts of climate change is crucial to secure little gains and increase the resilience of vulnerable communities, in particular for those whose livelihoods depend on climate-sensitive sectors, such as agriculture, nomadic pastoralism, water, energy, tourism, wildlife, and health.

2.2.2 Consultation with stakeholders.

Stakeholder engagement has been ensured through courtesy visits, KII sessions and focus group discussions, organized at crucial steps of the process, at both community and local administration levels across Jubbaland State. This fieldwork began with a courtesy visit to the Ministry of Environment and Climate Change of Jubbaland made by the KAALO and UNDP-NAP team. The visit and meeting with the Ministry of Environment was aimed at validating the different sectors for which climate vulnerability assessment will be carried out. Deliberations with ministry officials during the meeting prioritized the following key sectors for the assessment in Jubbaland State: Water; Health; Agriculture; and food security; Livestock; Biodiversity; Coastal zone; Public works; Disaster Risk Reduction; and Gender and Education.

2.2.3 Data collection and Analysis

Data was collected through a structured questionnaire designed in Kobo Collect. The study used a combination of primary and secondary methods of data collection. Three methods of primary data collection were used. These were key informant interviews, focus group discussions and direct observations. Primary data collection generated qualitative data, as the focus was on capturing the narratives on the perceptions of changes in climate stress and the corresponding behavioral responses by various actors and stakeholders across the State. In addition, where possible and appropriate, secondary methods of data collection especially desk review were employed to generate secondary data.



Figure 4: Enumerator Training Workshop during the Jubaland State of Somalia's CCVRA

The vulnerability assessment included mixed components (quantitative and qualitative):

- **A quantitative survey** was conducted using structured tools to assess how climate variability and change are experienced at the state level—directly/indirectly through its impact on the prioritized sectors. Ten (10) priority sectors were selected; and 19 respondents representing line ministries and CSOs were interviewed across Jubaland State. The **key informant interviews** were conducted at the state level with state government and community representatives. The goal was to understand the local context.
- **Qualitative focus group discussions (FGDs)** were conducted to discuss several topics on climate change vulnerability and determine more detailed perceptions of changes in climate stress and the corresponding behavioral responses. The outcome of the qualitative focus group sessions helps in the identification of general issues and needs, understanding of the participants’ perceptions on climate change, current and potential future climate-related risks, and identification of capacities, local and indigenous knowledge and assets that can be enhanced to strengthen resilience. For each priority sector, two FGDs were conducted separately, one with men and one with women, ensuring stakeholders engagement and generating a total of 16 FGDs.
- **Direct observation** - The relatively stable and peaceful conditions that characterize Jubaland allowed the study team to travel and physically observe some of the targeted communities in the region. The study team was able to visit IDP camps and peri-urban settlements including government offices. A more in-depth understanding of climate change context in Jubaland was gained by direct observation as a research technique. Observable data included the flooding and displacement in IDP settlements.
- **Validation workshop** - The validation workshop on Climate Vulnerability Assessment Report took place on the 19th February 2024, in Kismayo, Jubaland State of Somalia. The objective of the workshop was to deliberate on the draft findings and validate the Jubaland CVA Report and discuss effective approach towards supporting its implementation. The workshop was attended by high ranking representatives from Jubaland State governments, line ministries, the Academia, and the Civil Society Organizations. The workshop saw the stakeholders taken through the Jubaland CVA Report chapter by chapter guided by the Consultant. The workshop participants were then organised into distinct thematic groups for extensive,



Figure 6: Flooding in parts of the villages sampled in Jubaland State



Figure 5: Focus group discussion with men in Jubaland State

meaningful, and consensus building on the findings of sectorial analysis. During the workshop, the line ministries and all other stakeholders from across Jubaland approved the CVA Report and agreed on its findings providing additional information for the livestock and DRR sectors for inclusions.



Figure 7: High ranking ministry official participating in the validation workshop in Jubaland State

Table 1: Distribution of Stakeholders contacted in Jubaland State

Mapped sites	Mapped stakeholders (Ministries/ Academia and CSOs)	Focus Group Discussions	Key Informant Interviews
Jubland Ministries Midnimo IDP Madina IDP Dalxis IDP Kismayo local Government Iftin Primary and Secondary school Regional Education Office Juba water supply company Gender and Human rights Khaamkham Village Goobweyn Village Fuma Village	<ul style="list-style-type: none"> ▪ Ministry of environment, range land and Climate change. ▪ Ministry of Disaster Management ▪ Ministry of Livestock, forestry and Rangeland ▪ Ministry of Disaster Management ▪ Ministry of Fisheries and Marine Resources ▪ Ministry of Women and Human Rights Development ▪ Ministry of Public Work ▪ Ministry of Health ▪ Ministry of Education ▪ Civil Society Organizations and as well as ▪ Academia 	<ul style="list-style-type: none"> ▪ Biodiversity (2 FGDs) ▪ Agriculture (2 FDG) ▪ Water (2 FGDs) ▪ Health Centres (2 FGDs) ▪ Livestock (2 FGDs) ▪ Coastal Communities (2FGDs) ▪ Public work (2FGDs) ▪ DRR (2FGDs) 	<ul style="list-style-type: none"> • Biodiversity (3 KII) • Agriculture (3KII) • Water (3KII) • Health Centres (3KII) • Livestock (3KII) • Coastal Communities (2KII) • Gender and Human Rights (3 KIIs) • Education (3KIIs) • Public work (3KIIs) • DRR (2KIIs)
		16 FGDs	29 KIIs

A team of ten (10) enumerators – all locals with extensive knowledge of Jubaland state undertook the data collection and stakeholder engagement under the overall supervision of staff from the Ministry of

Climate Environment and Climate in Jubbaland state, UNDP -NAP SP, NAP regional Coordinator JSS, and KAALO Aid.

The data collected through surveys was uploaded onto the Kobo Collect server, acting as a repository, secured by a two-way authentication passcode. The data was downloaded in Microsoft Excel and analyzed through SPSS using descriptive statistical techniques. Qualitative data analysis involved identification, examination and interpretations of patterns and themes in the data.

Further, different approaches were used to analyze data necessitated by the use of several analytical tools in the study. These analyses carried out are presented below:

- **Analysis of the vulnerability of the physical environment to climate risks:** The analysis of the vulnerability of the physical environment of member states to climate risk based on methodological Guide for Mapping Vulnerability to Climate Risks proposed by the Sahel and Sahara Observatory (OSS, 2013). This method focuses on a combination of a series of vulnerability factors with particular attention on topography and land use. This choice of approach is justified by its suitability or adaption to the Sahelian zones but also to analyse the risks associated with climate change, as well as identifies the most vulnerable zones with a view to informed decision-makers on issues related to sustainable land management and the risks associated with climate change.
- **Analysis of climate rationale:** The scope of the analysis covers past and future climate variability/projections, climate vulnerability impacts; climate vulnerability; and identification, assessment, and prioritization of adaptation options/strategies. The study examined a number of issues key among them the behaviour of precipitation and temperature; climate risk for each sector identified; and identification and map out of relevant adaptation options or strategies used by the local population across sectors to cope with different climate risks in each of the four member states.

2.3 Methodological and Technical Limitations of the Vulnerability Assessment

2.3.1 Data gaps and/or unavailability

Due to missing/unavailable data, some analysis levels maybe incomplete. In some cases, (for e.g. precipitation data), data was available at the national level which was then downscaled to the state level. Data availability for vulnerability assessment remains a challenge and hence, findings were simplified based on data availability and proxies. Future maps were not produced as predicted sensitivity and adaptive capacity data is not available for Jubbaland State. This assessment should be seen as an attempt of systematically unraveling Somalia's vulnerability to climate change.

III: Results of the State-level Vulnerability Assessment

3.1 Climate Change Vulnerability and Risks Factors in Jubaland

Climate change vulnerability is the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with adverse impacts of climate change (IPCC, 2010). Jubaland's VRA identified Jubaland's Climate Change Risk increases in the mean average temperatures over time which are manifested in terms of increasing aridity and desertification through increasing frequency of prolonged drought cycle. The VRA exercise further identified increase in seasonal precipitation at a point in time; manifested by sudden onset and unpredictable flooding events, tropical storms and cyclones as the second Climate Change Risk that Jubaland faces.

According to Reisinger et al, (2020), vulnerability to climate change risk will, results from dynamic interactions between climate-related hazards, exposure of a system to these hazards and the adaptive capacity of the human or ecological systems to the identified hazards / risks. For Jubaland, its Vulnerability is deeply tied to its socio-political, economic and ecological system. This means that while the identified climate related risks are the vulnerability triggers, systemic weaknesses / factors drive Jubaland's vulnerability. The VRA consequently identifies and increases understanding of the socio-political, economic and ecological drivers of its vulnerability to climate change. This represents an important step in initiating Jubaland's climate change adaptation discourse and strategies. This section thus delves into the drivers of climate change vulnerability in Jubaland.

3.1.1 Drivers of Jubaland's Climate Change Vulnerability and Adaptive Capacity

Vulnerability and adaptive capacity are a function of the socio-political, economic and ecosystems factors. This section analyses the drivers of Jubaland's Climate Change Vulnerability and Adaptive Capacity. The section reviews the socio-political, economic and ecosystem characteristics and contextualizes them to Jubaland's vulnerability / adaptive capacity to climate change. These factors are discussed in the section below:

- **Socio-demographic factors:** The households Jubaland are predominantly male headed at 66.5 per cent with 33.5 per cent of the households being female headed. The average size of households in the assessment area is 5.9 people which is below the national mean household size of 6.2 people (SHDS, 2020⁴). The lowest number of people in a household was one and the highest number of people in a household in the assessment area was +9. Most households had an average of six people as shown in Table 2 below. Most household heads in the assessment area attained no education level (53.6%) with most of them having attained some primary school level of education at 26.1 per cent as shown below in table 2. This ultimately increases the household vulnerability to climate change risk while constraining their adaptive capacity as larger households require more resources and are significantly impacted by resource shortages and livelihood challenges associated with climate change. Further, with a majority of the households having no education, their capacity to explore alternative livelihood strategies and to adopt climate smart technologies is limited.

⁴ Directorate of National Statistics, Federal Government of Somalia. The Somali Health and Demographic Survey 2020

Table 2: Demographic characteristic of household heads in Jubaland State

Background characteristics	Percentage distribution (%)
Gender	Male – 66.5% Female – 33.5%
Level of education	No education – 53.6% Some primary education – 26.1% Completed 8th grade at the primary level – 5.5% Some secondary – 1.1% Completed secondary – 8.6% Higher education – 3.8% Don't know - 1.3%
Mean size of households	5.9

Source: JLHDS 2020.

Gender driven household power imbalances increases the vulnerability of sections of the population who are already marginalized such as women and youth to the impacts of climate change. In Somali communities, women and the youth are marginalized and excluded from household and community decision making and resource ownership / control processes thus further increasing their risk exposure as their

input are not captured in climate change adaptation decision making processes. Women and girls are disproportionately affected by the impacts of climate change due to the multiple roles they play in society including childbearing and care, caring for the sick in the household, fetching and cooking food and providing water. Women are also negatively impacted by the humanitarian crises occasioned by disasters such as flooding and droughts. In such situations women and girls suffer most from sexual and gender-based violence, disruptions to health care, water and sanitation which affect their sexual and reproductive health⁵.

As established, most household heads in the assessment area attained no education level (53.6%) with most of them having attained some primary school level of education at 26.1 per cent. The indicator used to determine vulnerability here is the percentage of household heads with an average level of education. For this assessment, the average level of education was derived from the Somalia national mean years of schooling which stands at 1.72 years (UNESCO, 2022). In this assessment, the household heads with 6.6 mean years of schooling were 26.1 per cent (household heads with some primary level of education). Household head's level of education has been found to influence the use of climate change information that is available to them. Household heads with an education are more likely to positively use climate change information available to them to adequately adopt to the impacts of climate change (UNFCCC, 2017).

- **Livelihood Strategies:** A significant proportion of the rural households and communities in Jubaland are dependent on riverine agriculture, agropastoralism, fishing and pastoralism which are natural resource and healthy ecosystem reliant livelihood strategies. derive their income from agriculture (crop and livestock farming). Urban households and communities are dependent on incomes from trading activities, casual labour and other sources of income, employment, fisheries as well as depending on transfers from relatives and other benefactors. As an indicator for adaptive capacity, the livelihood strategies of the households in the assessment were queried by collecting secondary data on the indicators as analyzed in Table 3 below. Households that are dependent on

⁵ United Nations Economic and Social Council report on population dynamics, vulnerable groups and resilience to climate change and disasters

productive ecosystem resources have a particularly high exposure to climate risks such as droughts and floods as these disrupt the productive and livelihood capacities thus pushing them to displacement and destitution while negatively impacting their resilience capacities. At the same time, their adaptive capacities are highly reliant on early warning and early action mechanisms and are particularly at higher risk exposure levels in an environment of increasing and unpredictable climatic weather conditions with non-functional early warning and early action systems.

- **Access to water:** Easy access to a water source may enhance the quantity of suitable drinking water available to a household and therefore also significantly reduce their vulnerability to the impacts of climate change. Source of drinking water for a household is an indicator of how safe it is to consume. Sources that are likely to provide uncontaminated water suitable for drinking are known as improved water sources (Table 3). These include piped water, protected dug wells, tube wells or boreholes, rainwater, and bottled water.

Households’ main sources of drinking water: According to the 2020 SHDS Jubbaland Report, 64 percent of households get their drinking water from improved water sources. Piped water into dwelling/ yard/plot and tanker truck/cart with drum are main sources of drinking water for 32.8 per cent and 12.8 per cent of the households with improved and unimproved water sources respectively.

Fewer households get their drinking water from unimproved water sources at 36.2 per cent with 8.7 per cent of the households accessing their drinking water from surface water. Up to 25.7 per cent of the households’ access drinking water from other sources which include unprotected wells and spring as shown in the table 5 below.

Table 3: Access to water indicators

Background characteristics		Percentage distribution (%)
Main source of drinking water	Improved source (63.8%)	Piped water into dwelling/ yard/plot– 32.8 % Piped to neighbor– 3.9 % Public tap/ standpipe- 6.3 % Tube well/ borehole- 6.5 % Protected dug well – 11.7 % Protected spring - 19 % Rain water - 0.7 % Bottled water - 0.1 %
	Unimproved source (36.2%)	Unprotected well – 10.7 % Unprotected spring - 15 % Tanker truck/cart with drum – 12.8%

		Water Kiosk – 2.2%
		Surface water – 8.7%
		Others – 0.3%

Source: JLHDS 2020

Urban households have marginally better household access to improved water sources and while there are no functional water treatment facilities in Jubaland, bottled water in urban areas provide much needed clean water for human consumption. However, household water is predominantly salty and untreated and will usually be contaminated during flooding events. Rural households are highly dependent on what can be termed as risky water sources and are at a disproportionately higher risk of consuming contaminated water. At the same time, rural communities are disproportionately affected by water shortages as a result of prolonged drought events. In cases of prolonged droughts and water shortages, rural households are forced to migrate closer to water sources especially to cater for their animals or rely on assistance through water trucking initiatives. As such, sustainable and consistent access is an important consideration in enhancing Climate Change Adaptation capacity for rural households and communities.

- **Health:** Significant increase in human and livestock disease incidences in the assessment area are attributed to widespread water scarcity stemming from several seasons of poor rainfall, longer and hotter-than-normal jilaal dry season experienced in the recent past. The water shortages have exacerbated inadequate access to sanitation and hygiene facilities, leaving households vulnerable to diseases like cholera and Acute Watery Diarrhea (AWD). According to the WHO, the number of new cholera cases in early 2022 was higher than previous years, with cases clustered in Banadir Region and in large IDP sites where access to safe water is limited. At the same time, access to health facilities and services is another vulnerability driver especially with regard to treatment for climate change related disease outbreaks such as AWD / Cholera during flooding events and during prolonged periods of water scarcity.

3.1.2 Contributing Factors to the Exposure of Jubbaland State to Climate Change Impacts

Natural vulnerabilities

Discussions with climate change stakeholders (experts in the line ministries, practitioners, and representatives from community groups, CSOs) during the assessment revealed that Jubbaland State, under current climate conditions, is exposed to a multitude of natural hazards such as floods, droughts, infestation of invasive species (*Prosopis juliflora*), locust, tropical storm surges.

- **Droughts:** Experts and community groups consulted in this study observed that drought is one of the biggest problems facing most regions in Jubbaland state. Droughts usually occur every two to three years in the Dayr and every eight to ten years in both the Dayr and the Gu. Eight major droughts in the last four decades have severely affected crop and livestock production in Somalia. The onset of drought in recent years has had a damaging effect on natural resources, notably by drying up water

sources, increasing temperatures, disrupting farming practices and reducing agricultural productivity. By early 2017, the cumulative impact of various failed successive rainy seasons had created a serious humanitarian crisis that threatened to become a famine in a few areas.

- Floods:** Floods have a detrimental effect on people’s lives and livelihoods. It can result in the scarcity of drinking water; damage to sanitation systems; impact health facilities and services; loss of physical infrastructure such as houses, roads, and other facilities. The impact of floods in agriculture is expected to exacerbate human vulnerabilities. For example, in a rural setting of Jubbaland State, agriculture is the key source of employment and income. Human vulnerability is viewed to be high as, floods cause unemployment and/or underemployment. Besides, during the flood period, a number of vector and water borne diseases increase, resulting in morbidity and mortality among the affected population. Flooding is one of the most common natural disasters in Jubbaland that causes greater levels of human vulnerability. The incidence of flooding in Jubbaland is expected to increase in the future.

Projected Climate Impacts Based on Existing Assessments

Through consultations with local expert and Focus group discussions with community groups across sampled study sites in Jubbaland, it was reported that climate change in the future is projected to increase Jubaland’s exposure to a multitude of natural hazards. The main indicator used to determine the exposure of the assessment area to the impacts of climate change is occurrence of natural hazards and vulnerability.

Table 4: Community perceptions and experiences on natural disasters

Focus Group Discussion Findings			
(based on local communities’ observations of climate change impacts)			
Natural hazard	Occurrence in last 5-10 years	Likelihood of future occurrence (next 10 years)	Impact of climatic hazards
Floods	Yes	Likely	Severe
Droughts	Yes	Likely	Severe
Crops pest and diseases	Yes	Likely	Severe
Locusts infestation	Yes	Likely	Severe
Extreme temperatures	Yes	Likely	Severe
Infestation of invasive species (Prosopis juliflora)	Yes	Likely	Severe

Further, these observations by the community climate actors are corroborated by existing studies, indicating that these natural events are expected to become more frequent and severe in the coming decades, as a result of human-induced global warming.

- Seasonal rainfall patterns may become more variable and erratic aggravating severe drought over the study area (Lyon & DeWitt, 2012; Connolly-Boutin & Smit, 2016).
- The intensity of both tropical cyclones and storm surges are likely to increase with rising sea surface temperatures and sea level. The increases in extreme weather and sea conditions are linked to rises in sea surface temperature. A warmer ocean intensifies cyclone activity and heightens storm surges. The destructive impact will generally be greater when storm surges are accompanied by strong winds and make landfall during high tides (Brecht et al. 2012).

3.1.3 Current and Future Trends of Climatic Variables in Jubbaland State

Based on data availability, expert feedback and community observations, and emerging trends in Somalia, this assessment focuses specifically on temperature rainfall (precipitation) and their associated impacts. The assessment tries to bridge current information gaps on the subject with the aim of assisting policy planners to address emerging impacts of climate change.

- **Current and Future Trends of Temperature:** Jubbaland has a hot tropical climate, with little seasonal variation and daily temperatures ranging from 23°C to 37°C compared to the mean surface temperature in most months and throughout the country which is about 30°C to 40°C. Time series analysis of temperature data for Jubbaland State show little variations between the maximum and minimum temperatures and between average monthly temperatures as shown in figure 4 below. The hottest months in the State are March and April when average temperatures peak at 33⁰ C and the elevated temperatures for these months peak at 37.1⁰ C. The coolest months are January, July and August when the average temperatures are 29.3 C and the low temperatures for these months drop to 22.7⁰ C.

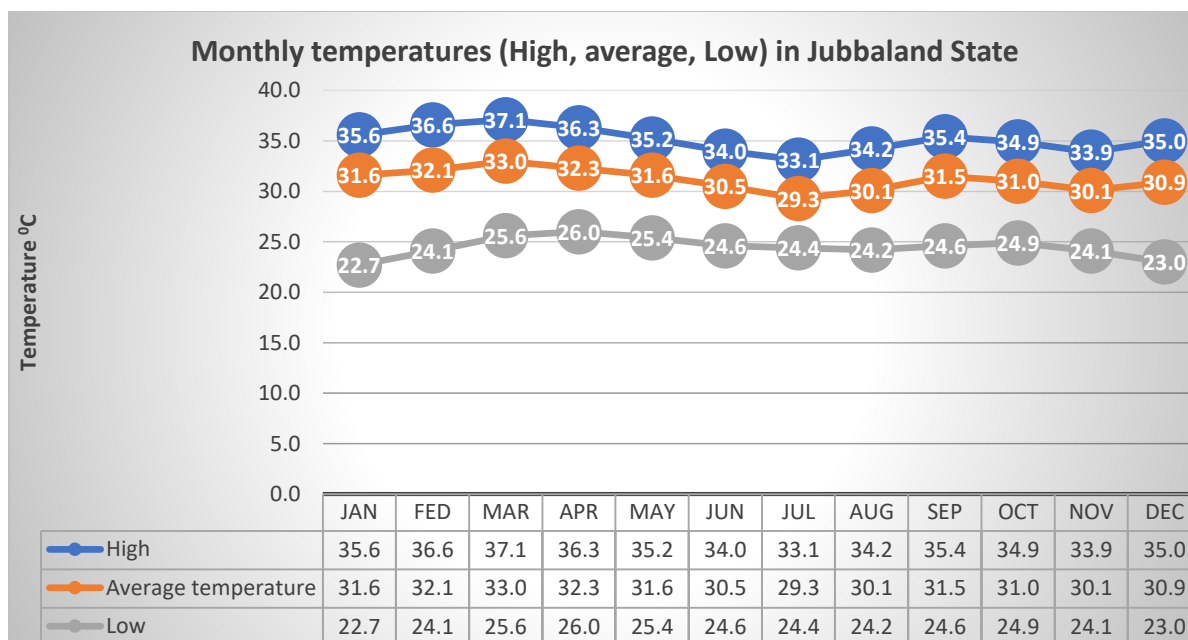


Figure 8 Monthly temperatures (High, average, Low) in Jubbaland State

Source: World Bank Climate Change Knowledge Portal

From the lowest temperature in Figure 4 above, January, July and August are the coldest months while March and April have the highest minimum temperature. From the highest temperature in, July and September shows the coldest months while February and March record the highest maximum temperature. Overall, as seen in Figure 4 above June, July and August record the lowest temperatures while March records the highest maximum temperature. January, February and April also recorded high temperature values overall. The distribution of the mean temperature is quite similar to what is observed in the maximum, and the minimum temperature.

Studies have shown an increasing trend in both minimum and maximum temperatures in the assessment area and at a global and regional level (King'uyu, Ogallo, & Anyamba, 2000; Easterling, et al., 2009; IPCC, 2014; Ogallo, et al., 2017). Results also correlate with studies on the Horn of Africa region that shows an increase in temperature (King'uyu, et al., 2000). IPCC among many other past studies have linked global temperature increase worldwide to climate change induced global warming. Forward into the future, temperature in Somalia is projected to very likely rise between 1.4 - 1.9 °C by 2030, 1.5 - 2.3 °C by 2050 and 1.4 - 3.4 °C by 2080⁶. The projected increase in temperature increases future drought risk in the State of Jubbaland.

- **Current and Future Trends of Precipitation (rainfall).** As the rest of Somalia, the Jubbaland State has low annual precipitation and four seasons: the rainy seasons are Gu' (April to June) and Deyr (October to November which sometimes includes September), while the dry seasons are Haggaa/Xagga (July to

6

https://weatherrisk.org/sites/default/files/document/Climate_Risk_Profile_Somalia_Summary_for_Policymakers.pdf

September) and Jiilaal (December to March). This assessment concentrated within the two main rainfall seasons namely Gu' and Deyr.

Lower Jubba is one of the places with high amounts of seasonal rainfall in Somalia (NAPA, 2013). The precipitation in Jubbaland peaks in the month of November (2.13 mm) and drops to its lowest in June (zero mm) as indicated in Figure xxx below. On the other hand, the month of November brings the rainiest days (5.5). With an average of only 0.1 days, June is the lowest precipitation. Nationally, it rains most often in June with 3.8 days in Somalia.

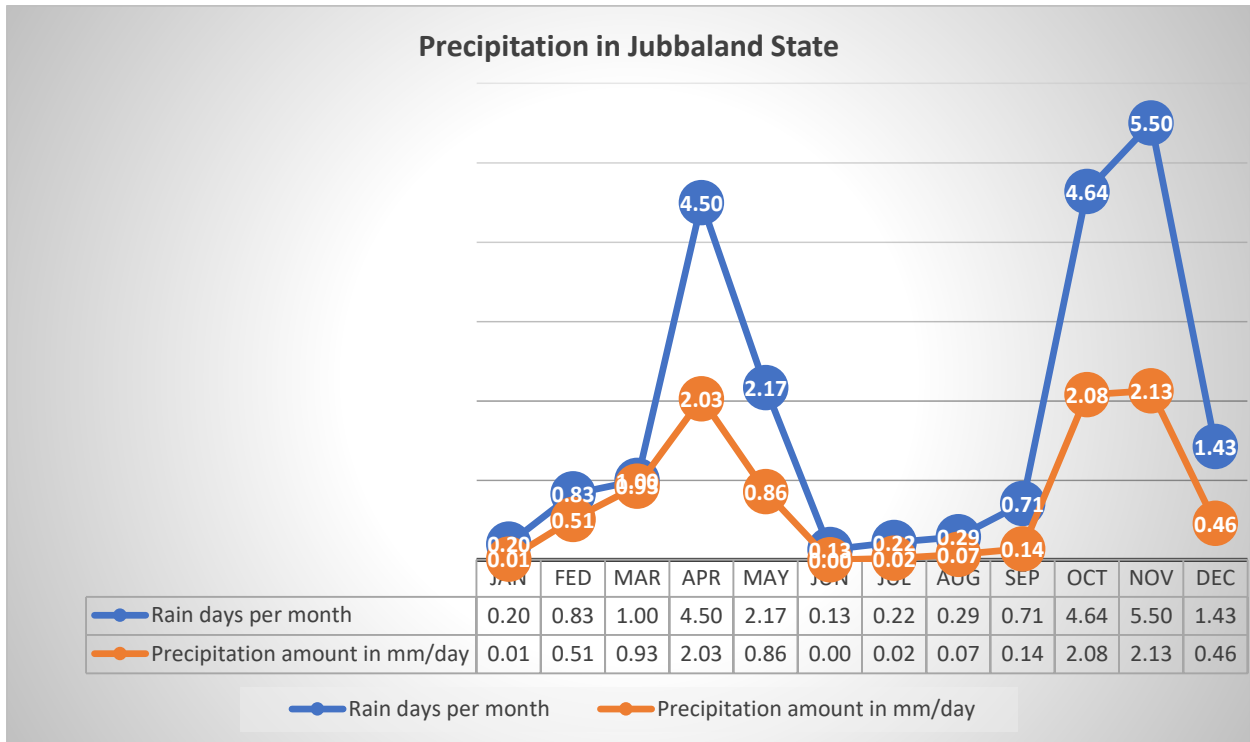


Figure 9: Precipitation in Jubbaland State

Source: World Bank Climate Change Knowledge Portal

Precipitation rates determine the occurrence of both drought and flood hazards. There have been observed increases and decreases in precipitation in Jubbaland in the past three decades. Studies have shown high degree of interannual variability with recurrences in high/low value extremes that are often associated with floods / droughts (Easterling, et al., 2009; IPCC, 2014b; Ogallo, et al., 2017). Some of these extremes occurred during El Nino /La Nina years.

Rainfall in Jubbaland is affected mainly by the Inter-Tropical Convergence Zone (ITCZ), monsoonal winds and ocean currents, jet-streams including the ‘Somali Jetstream’, easterly waves, tropical cyclones, the Indian Ocean and Red Sea conditions, as well as teleconnections with various regional and global scale climate systems. The rainfall is further affected by Quasi-biennial Oscillation (QBO), El-Niño/Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), and intra-seasonal waves (NAPA, 2013). The observed decreases in precipitation have contributed to the occurrence of drought hazard in the region while the observed periodic increases in precipitation have contributed to the occurrence of flood hazards.

Future projections show a likely increase in precipitation in the long run (until 2080)⁷. This projected increase in precipitation, increases future flood risk in some parts in Jubbaland region. However, models show quite some variance in their projections in particular in how strong and reliable this trend will be. What the models agree on is that there will very likely be high inter-annual variability in the amount of precipitation, meaning that there will be both, wetter and drier years.

Climate Change Risks, Hazards and Vulnerabilities in Jubbaland State

3.1.4 Climate Change Risks and Hazards in Jubbaland State

Hazard refers to the potential occurrence of climate-related physical events or trends that may cause damage and loss. The most common climatic hazards in Jubbaland were identified by the experts and community groups. The potential risks from these hazards were also identified. As previously stated in this report, floods and droughts are the most common climate related hazards that occur in the region. In Table 5 below, precipitation and temperature are the climate variables whose impacts results in the identified hazards that have negative impacts on the human and ecological systems in Jubbaland State. The interaction of the climatic hazards with the exposed human and ecological systems in the region results into climate change risks identified in table 5 below. It is observed that precipitation can lead to either of the two identified climatic hazards depending on the magnitude and intensity. For instance, low precipitation leads to drought hazard while high precipitation leads to flood hazard. The risks associated with either occurrence of the precipitation variable is the occurrence of floods and droughts and rise in the river water levels (including Jubbaland coastlines) in the case of high (extreme) precipitation. The temperature variable is mostly associated with drought hazard in the region which exposes Jubbaland State to the risk of frequent drought incidences.

Community perceptions and experiences on climatic change risks and hazards

According to expert discussions and FGDs with community groups across sampled study sites in Jubbaland, floods and droughts are the most common climate related hazards that occur in the region. The potential risks from these hazards were also identified and are described as follows.

Table 5: Common climate related hazards and potential risks in Jubaland

Climatic variable	Climatic hazard	Climatic change risk
Precipitation	Floods	<ul style="list-style-type: none"> Increased flooding incidences Rise in water levels Disease outbreaks
<ul style="list-style-type: none"> High 		
<ul style="list-style-type: none"> Low 	Droughts	<ul style="list-style-type: none"> Occurrence of droughts Disease Outbreaks
Temperature (heat stress)	Droughts	<ul style="list-style-type: none"> Increased Drought incidence

3.1.5 Climate Change Vulnerabilities

Climate change vulnerabilities contribute to the risk of the occurrence of climate change impacts. Jubbaland's climate change vulnerabilities manifest in various forms including decreased crop production,

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https://weatheringrisk.org/sites/default/files/document/Climate_Risk_Profile_Somalia_Summary_for_Policymakers.pdf

loss of income, emergence of new and aggressive insects, pests and diseases, loss of livelihoods and loss of life among others as enumerated in Table 6 below.

Table 6: Climate Change Vulnerabilities in Jubbaland State

Climate Change Risks	Vulnerabilities
(Precipitation) Flooding Rise in water levels	<ul style="list-style-type: none"> • Decreased crop production • Food scarcity • Emergence of new and aggressive insects and pests • Loss of income • Low milk productivity • Livestock diseases • Loss of income • Loss of livelihoods • Inadequate water supply • Spread of infectious and contagious infections • Loss of life
(Temperature) Droughts Airborne diseases	<ul style="list-style-type: none"> • Decreased productivity • Emergence of aggressive and invasive insects and pests • Loss of productive agricultural land • Loss of income • Declining livestock productivity • Loss of livelihoods • Inadequate water for human and livestock use • Loss of life • Spread of contagious and infectious diseases

Sectoral Climate Change Analysis

3.1.6 Analysis of vulnerabilities of key sectors to Climate Change

Based on expert group discussions with stakeholders (experts in the line ministries, practitioners, and representatives from community groups, CSOs) across priority sectors including Agriculture (crop, livestock, and fisheries), Water and Health are identified as vulnerable sectors to the impacts of climate change as shown in Table 7 below. The assets impacted by climate change in the sectors are categorized into natural, physical, human, social and financial assets as indicated in the table below. The assessment further gives a description of the various assets in each sector.

Table 7: Identification of the vulnerable sectors to climate change in Jubaland State

CLIMATE CHANGE Risks	EXPOSED SECTOR	ASSETS	ASSETS DESCRIPTION	IMPACTED	DESCRIPTION OF IMPACTS ON SECTORAL ASSETS
Precipitation <ul style="list-style-type: none"> • Flooding • Rise in water levels • Drought 	Agriculture (Crops)	Natural	Crops and sources of water for crop farming	Yes	<ul style="list-style-type: none"> • Damage to crops in the fields during flooding. • Outbreak of crop diseases and pests. • Loss of productive agricultural land due to rise in water levels.
		Physical	Access to markets (roads), means of transportation, supporting infrastructure	Yes	
		Human	Level of crop farming knowledge, availability of information on crop farming	No	
		Social	Access to social network e.g. membership to farmer groups, access to extension services	No	
		Financial	Income from crop farming, access to credit	Yes	
	Livestock	Natural	Availability of pasture/fodder and grazing fields.	Yes	<ul style="list-style-type: none"> • Loss of livestock grazing fields due to flooding • Outbreak of fungal diseases due to flooding • Unhygienic conditions in livestock holding spaces/shades/pens due to prolonged wet periods
		Physical	Access to markets	Yes	
		Human	Knowledge and skills in livestock rearing	No	
		Social	Access to community evacuation centers	No	
		Financial	Income from livestock keeping	Yes	
	Water	Natural	Sources of water	Yes	<ul style="list-style-type: none"> • Destruction of water and sanitation infrastructure due to flooding • Increased difficulty in accessing water sources due to destruction of roads by floods
		Physical	Access to water	Yes	
		Human	Skill and knowledge in water sector services; access to traditional water management practices and technologies	No	
		Social	Access to community evacuation centers	No	
		Financial	Income from water and investments in the water sector	No	
	Health	Natural	Occurrence of diseases and types of diseases	Yes	<ul style="list-style-type: none"> • Increased incidences of waterborne diseases due to floods • Destruction of health facilities in flood prone areas
		Physical	Access to health facilities and availability of health facilities	Yes	
		Human	Knowledge and skills in health	No	
		Social	Membership to groups (Community health worker networks)	No	

		Financial	Investments in the health sector.	Yes	<ul style="list-style-type: none"> Increased incidences of infectious diseases in dry periods Increased incidences of injuries and deaths due to flooding Increased vulnerability of those living with terminal diseases
Temperature <ul style="list-style-type: none"> Droughts Airborne diseases 	Agriculture (Crops)	Natural	Crops and sources of water for crop farming	Yes	<ul style="list-style-type: none"> Extreme loss of soil moisture due to elevated temperatures Crop failures due to drought and extreme heat Outbreak of crop pests and diseases. Loss of crop productivity due to long dry spells and droughts
		Physical	Access to markets (roads), means of transportation, supporting infrastructure	No	
		Human	Level of crop farming knowledge, availability of information on crop farming	No	
		Social	Access to social network e.g. membership to farmer groups, access to extension services	No	
		Financial	Income from crop farming, access to credit	Yes	
	Livestock	Natural	Availability of pasture/fodder and grazing fields.	Yes	<ul style="list-style-type: none"> Depletion of livestock water sources due to prolonged droughts and dry spells Loss of income to livestock farmers Loss of pasture and grazing fields
		Physical	Access to markets	No	
		Human	Knowledge and skills in livestock rearing	No	
		Social	Access to community evacuation centers	No	
		Financial	Income from livestock keeping	Yes	
	Water	Natural	Sources of water	Yes	<ul style="list-style-type: none"> Depletion of underground water sources due to prolonged droughts and dry spells Drying up of rivers due to prolonged dry spells and droughts
		Physical	Access to water	Yes	
		Human	Skill and knowledge in water sector services; access to traditional water management practices and technologies	No	
		Social	Access to community evacuation centers	No	
		Financial	Income from water and investments in the water sector	No	
	Health	Natural	Occurrence of diseases and types of diseases	Yes	<ul style="list-style-type: none"> Increased pressure on the health system due to increased
		Physical	Access to health facilities and availability of health facilities	No	

		Human	Knowledge and skills in health	No	incidences of communicable diseases mainly caused by general water scarcity <ul style="list-style-type: none"> • Reduced productivity of the population due to heat stress
		Social	Membership to groups (Community health worker networks)	No	
		Financial	Investments in the health sector.	Yes	

3.1.7 Climate Change Impact on the Sectors and their Respective Adaptive Options

1. *Agriculture (crop and livestock)*

Jubaland's livestock and crop subsectors and the associated livelihoods have been continuously buffeted by increasingly fragile and degraded natural environment and more frequent and severe cycles of drought and floods. These factors, as well as prevailing insecurity and lack of or weak government institutions and the consequent deterioration of the flood control, irrigation, and transport infrastructure in Jubaland have severely impacted food security and livelihoods in the State of Jubaland. Jubaland's VRA established that livestock and crops continue to be the main sources of economic activity, employment and livelihoods in the region especially in the rural population. FGD participants observed that households across Jubaland grow crops for semi-commercial (a part is for own use and another part is sold) purposes. Maize crop is largely grown as the main crops used as food sources by the community while high value vegetables (watermelon, hot pepper, tomatoes, pawpaw, and banana) are targeted for commercial purposes. The households are faced with chronic food crop deficit; as local production fall below the per capita cereal needs. Even in the best agricultural seasons, domestic production provides doesn't meet the per capita cereal needs. Even in normal years, average yields for both irrigated and rainfed crops are very low.

Climate Change Impacts on the Agriculture (crop and livestock) Sector

In this assessment, analysis has established that agriculture remains to be the most exposed sector to the impacts of climate change in Jubaland. Climatic hazards such as floods and droughts directly impact the sector especially on farming activities hence on the livelihoods of people in the region. **Floods** predominantly affect the low-lying areas. **Droughts** have affected most parts of the region due to the intermittent rainfall patterns occasioned by long dry spells. Flooding has led to the loss of productive agricultural land and loss of crop productivity. Loss of soil moisture and soil fertility have been connected to incessant droughts in the region. The sector further faces other challenges including an increase in invasive species that out-compete native grasses, and reduced diversity of plant species. The sector has also been impacted by desert locust infestations and outbreaks destroying cropland and pastures.

Key message on adaptive capacities/ on climatic impacts adoption options for agriculture sector

Despite the exposure of the agriculture sector, communities in Jubaland have significantly low adaptive capacities which have either been built from progressive efforts or are in various stages of planning and implementation. For instance, the Department of Plant Protection, Ministry of Livestock, Forestry and Rangeland has been providing institutional support to farmers geared towards enhancing their access to improved production techniques. These include sensitization of farmers on Climate-smart agriculture; provision of climate information; extension services; among others. In this assessment, the overall finding is that the local communities' lack of adequate information, knowledge and financial ability required to tackle climate change impacts.

In order to increase the resilience of the agricultural sector in the long run, an integrated approach is needed: decreasing sensitivity and increasing adaptive capacity of all actors in the sector by elaborating strategies and implementing adaptation measures.

This assessment engaged local experts for a participatory identification of suitable adaptation options through consultations with actors in agriculture sector in Jubaland State. The urgent climatic impacts adoption options for agriculture sector are highlighted as follows:

Table 8: Climate change impacts and potential adaptation options in Agriculture Sector

Impact	Adaptation options
Low/decreased crop production	<ul style="list-style-type: none"> • Farmers awareness schemes, to educate farmers about climate change risks, best agriculture practice, efficient irrigation systems, use of best available seeds variety, changes in cropping patterns etc, • Adaptation of best agricultural practices; recommendation / use of least water intensive crops, use of climate resilient crops, and water efficient irrigation systems such as sprinkler and drip irrigation, particularly where traditional methods are still being used; and • Greenhouse technologies • Capacity building of line department staff, to educate farmers about climate change risks, climate smart agriculture practices, etc
Inadequate water supply for irrigation	<ul style="list-style-type: none"> • Rehabilitate and/or build medium- to large-scale infrastructure, including dams, diversions for irrigation, livestock watering points, and boreholes. • Build or rehabilitate community-level infrastructure, including berkedes, shallow wells, ponds, and other technologies, ensuring that a mechanism for maintenance is in place. • Soil and water conservation Practices
Crop pests and diseases	<ul style="list-style-type: none"> • Smart agriculture practices such as crop rotation • Integrated Pest Management to protect crops and reduce risks • Crop diversification and rotation; •
Loss of income and livelihoods	<ul style="list-style-type: none"> • Diversification of food production appropriate to the natural ecosystem and introduction of high-value drought-resistant crops and agro-forestry • Establishment of local producer groups - farmers cooperatives, aggregation centres •

2. Livestock Sector

Livestock are the mainstay of rural people’s livelihood strategies in Jubaland State. Interviews conducted with stakeholders in livestock sector revealed that livestock production represents a key source of livelihood for the population. The main purposes for rearing livestock include: milk and meat production, and animal draught power that provide incomes for their subsistence and to support income generation.

The main animals reared were goats, sheep, camel among others. The main sources of fodder for livestock were maize and grass (traditional grazing), and natural seasonal pasture.

The sector is however faced with several constraints, especially climate change. The state has been ravaged by extreme weather events which bring destruction of livestock and crops fields. Additionally, livestock sector is faced with threats from extreme degradation of natural vegetation resulting in major reduction in the quantity and nutritional quality of the vegetation available for grazing in the rangelands. Degradation of natural vegetation is as a result of expansion of localized deserts and barren areas due to overgrazing, intensive collection of fuelwood and building materials, coupled with the increasing expansion of private enclosures into the communal grazing areas.

Climate Change Impacts on the Livestock Sector

Livestock sector is faced with threats of climate change. Climatic hazards such as floods and droughts directly impact the sector especially on production activities hence the livelihoods of people in the region.

Across the study sites, the communities reported loss of livestock to droughts and floods during the past 5-10 years. Also, over the same period participants in all FGDs reported experiencing destruction of the rangeland and forest landscapes in the region which affected the availability of forage and water storage for livestock leading to the reduced potential of livestock sector productivity, translating into loss of livelihoods of local communities. Flooding has been observed to encourage the outbreak of fungal diseases in livestock, destruction of livestock grazing fields and pasture and inundates livestock holding areas, leading to unhygienic conditions in those spaces. Invasive species such as the *Prosopis juliflora* tree that hinder access to the grazing grounds also affect livestock activities in the region.

Key message on adaptive capacities/ on climatic impacts adoption options for livestock sector

Overall, the findings of the assessment clearly demonstrate low adaptive capacities among local communities. However, there are significant government initiative taken to address these constraints, including those led by individuals engaged in livestock activities. The adaptive measures deployed include: capacity building trainings for instance on fodder production and water harvesting and storage, support to livestock farmers towards enhancing access to improved breed and breed improvement. However, for pastoralism to be sustainable, effective rangeland management and ecosystem protection programs must be initiated to increase the resilience of these communities and achieve continuous good livestock production. The following adaption measures are proposed for building adaptive capacities in Jubaland state:

Table 9: Climate change impacts and potential adaptation options in Livestock Sector

Impact	Adaptation options
Low production	<ul style="list-style-type: none"> • Rearing improved varieties of cow, poultry, goat and sheep • Enhanced awareness campaigns about breeding techniques adapted to climate change • Enhancement of training of agro-pastoralists on Good agricultural and animal husbandry

	<ul style="list-style-type: none"> • Creation or strengthening of existing institutions or bodies with mandates (at different levels) to enforce policies, laws and traditional systems to rehabilitate and manage rangelands already increasingly becoming degraded
Pasture shortage and grass/browse	<ul style="list-style-type: none"> • Enhance fodder production – promotion and adoption of FMNR techniques, seed balking etc • Build storage facilities for fodder, including stockpiles of emergency relief items. • Establish systems for range, forest, and wildlife management. • Promote sustainable rangeland management methods, such as grass banks, drought refuges, conservation easements, and reciprocal grazing arrangements. • Capacity building to promote rangeland management practices
Livestock diseases outbreak	<ul style="list-style-type: none"> • Improve livestock health services and increase productivity (both smallholders and large producers). • Strengthen investments in animal health and disease prevention through improved provision of veterinary services • Improve animal nutrition (including exploration of various feed sources and watering • Raise awareness on the use of vaccination •

3. *Water Sector*

Jubbaland is characterized as predominantly arid to semi-arid with water scarcity and shortage being a significant issue that often triggers conflict between nomadic pastoralists and agro-pastoralists. Water infrastructure to harness river water and extract groundwater has severely deteriorated since the outbreak of the civil war in the Southern regions, as a result of lack of regular maintenance and repairs, prolonged insecurity, weak government institutions, and the absence of effective community organizations. Climate change has further exacerbated water shortage, with Jubaland’s water potential standing at less than 500 m³/per capita/year, below the 1000 m³ global water scarcity threshold.

The insufficient prewar water infrastructures remain to be the only functional water infrastructure and while numerous efforts have been made to expand water access, these efforts have often be unsustainable and have additionally not been not been strategically developed with climate change resilience and adaptation in mind. As a result, livestock survival during severe droughts has become dependent on very costly and often unaffordable privately owned water tankers, and the cultivated area under irrigation has shrunk to only about half the estimated 222,950 hectares before the war, with the most recent drought reducing it even further. Deteriorated rainwater harvesting infrastructure and capacity have reduced the total rainfed area under cultivation. Under rainfed farming, the local smallholder farmers have adopted a production system geared mainly to meet subsistence needs of rural households with the major crops grown identified as sorghum, cowpea, and, to a lesser extent, maize and sesame.

The main constraints faced by rainfed farming systems include (a) lower and more erratic rainfall than in the past, resulting in more frequent and intense cycles of droughts and floods; (b) deteriorated water

harvesting and storage infrastructure; (c) poor soil management, resulting in very low moisture retention and inadequate internal drainage; and (d) very low-input farming techniques.

Impacts of Climate Change on the Water Sector

With the direct heavy dependence of the population on natural water sources, the water sector remains highly exposed to the impacts of climate change. Analysis has shown that all respondents contacted during the assessment recognized the impact of climate hazards on the water sector in the past 5-10 years in Jubaland State. These climatic hazards were identified as extreme temperature, drought, floods and tsunami. The impact of climate hazards is mostly related to water shortage, limited water availability, destruction of water infrastructure (floods), etc.

Climate-related events result in increased water logging, affecting water, and sanitation and hygiene systems (WASH), access to safe and clean drinking water, access to water for domestic cooking and cleaning purposes, and access to water for irrigation.

Key message on adaptive capacities/ on climatic impacts adoption options for Water sector

Enhanced availability of and access to water remains crucial for local communities in Jubaland State. Despite some efforts towards this, the State has a large part of its population accessing water from unsafe sources (boreholes/tubes and dams) with parts of the majority of the population facing acute water shortages due to overdependence on rainwater and also lack of water storage options.

- None of community’s main water source is available all year round
- An increase in duration and intensity of droughts may result in greater irrigation needs for crops and may also hamper crop production in the region.
- Low rainfall in the dry period is expected to further dry up rivers and water sources.
- Over-extraction of groundwater will lead to further decline in ground water levels and a reduction in the capacity of surface water reservoirs, e.g., boreholes/tubes and rivers.

The multiple impacts of climate change across sectors most severely affects the poor, marginalized, women, the elderly, children and the disabled, resulting in forced migration, increased vulnerabilities, and death. This situation is aggravated by the heavy degradation of water infrastructure that supplies households with water coupled with insufficient urban and rural water harvesting and treatment infrastructure. At the same time, there is lack of a harmonized strategy towards the development of water infrastructure in Jubaland resulting to an adhoc unsustainable developments and investments in Jubaland’s water sector. Overall, Jubaland’s VRA indicates that local communities have inadequate knowledge and adaptive capacity in the water sector. Urgent potential adaptation options for the water sector are therefore required outlined as:

Table 10: Climate change impacts and potential adaptation options in Water Sector

Impact	Adaptation options
Water shortage for domestic use	<ul style="list-style-type: none"> • Establish strategic water points (boreholes) to increase water availability during dry seasons.

	<ul style="list-style-type: none"> • Improve groundwater recharge and discourage groundwater abstractions • Capacity building of local communities, to enhance urban and rural rain water harvesting – water storage systems • Strengthen climate change education and awareness creation • Building multi-use water infrastructure in the rural communities serving livestock, and/or irrigation as well as domestic uses. • Enhance capacities for urban and rural rain water harvesting.
Loss of water for irrigation	<ul style="list-style-type: none"> • Improve water resource management through watershed management, and water harvesting techniques • Capacity building initiative at an institutional and communities level to increase knowledge relating to climate change impacts. • Rehabilitation/expansion of water infrastructure based on climate change inclusive hydrological modelling, considering climatic risks to water infrastructure in the region • Adaptation of best water management practice, such as rain water harvesting technologies • Establish well managed operation and maintenance for water sector actors, to avoid water losses • Improve natural resource management, for instance, growing of more trees to control temperature and to reduce water losses •
Destruction of sanitation and hygiene systems (WASH)	<ul style="list-style-type: none"> • Improve maintenance and promote the use of climate-resistant materials in the construction of water supply systems. • Building or rehabilitation of community-level infrastructure, including berkedes, shallow wells, ponds, and other technologies, ensuring that a mechanism for maintenance is in place

4. Health

The assessment findings indicate that impacts of climate hazards on health sectors are diverse in Jubaland State. They are mostly at the origin of increasing disease prevalence and loss of life because during floods, health diseases like cholera and malaria increase due to water pollution and water scarcity. The assessment also found that floods contribute to the increase vectors borne diseases and gastro-intestinal diseases because of the increased prevalence of vectors.

Impacts of Climate Change on the Health Sector

Climatic hazards expose the health sector in Jubbaland region to the impacts of climate change. Respiratory illnesses and waterborne diseases caused by climatic hazards such as droughts and floods have an implication on the health service provision in the state particularly on the human resources and financial outlay needed to adequately contain the spread of such diseases when they break out. A common illness in the region that can be directly attributed to climatic hazards is cholera which thrives in both dry and wet conditions resulting from the compromised hygiene situations that prevail whenever there is a large-scale occurrence of droughts and flooding.

Focus Group Discussion Findings				
(based on local communities' observations of climate change impacts)				
FGDs conducted with communities in Madino IDP and Balcad revealed that annual deaths of family members from respiratory illnesses and waterborne diseases. Summarized cases of reported illness/deaths caused by climatic hazards such as droughts and floods for the past 5 years are highlighted below.				
Village/community	Extreme temperature-related illnesses or deaths	Drought-related illnesses or deaths	Floods-related illnesses or deaths	illnesses or deaths-related to malaria, Degue or RVF
Kismayo	85	800	450	250
Kismayo	1,000	300	1,000,000	-
Madino IDP	100	1,000	400	150,000
Midmo health centre	105	5,871	9,835	783

Key Message Climate Change Impacts and Adaptive Capacities / Options for Jubaland's Health Sector

Climatic hazards affect the physical health infrastructure in the State. This is mainly due to the incidences of extreme precipitation that results in floods that destroy the existing health facilities in the flood prone areas.

Reduced rainfall and inadequate food availability increase malnutrition risks. Pregnant and breast-feeding women, young children and the elderly are particularly vulnerable to malnutrition, which can have long-term developmental consequences for children, resulting in stunted growth and development. Stress caused during disasters can also affect mothers' breast milk production and breast-milk substitutes pose serious health risks where clean water is not available. Uneven accessibility, affordability and quality of health services across the State only exacerbates climate-related health risks. Older people, especially older women and people with a disability, face additional challenges accessing health services.

Table 11: List of climate change impacts and adaptation options

Ranks of climatic impacts	Potential adaptation options
1. Malnutrition 2. Heat stock/ excessive sweating 3. Emerging and reemerging infectious diseases [dengue, malaria etc] 4. Water-borne diseases (diarrhoea, typhoid, skin diseases) 5. Increase in chronic disease	<ul style="list-style-type: none"> • Expand community-level nutrition programs • Enhance surveillance of disease outbreaks and provide rapid responses to control epidemics. • Improve modern technology and medical equipment • Raising funds for climate-induced disease response • Enhance waste management capacity • Put in place contingency plans to develop climate change-resilient health systems. • Promote public health awareness campaigns targeted to rural areas • Improve coordination between stakeholders [NGO, Govt., communities] • Develop human resources and skills

5. Education

Climate impacts are inextricably linked to Jubaland’s education sector vulnerabilities. Main climatic hazards impacting education sector in Jubaland State were identified as floods, drought and extreme temperature. The assessment team visited Iftin Secondary School in Kismayo, Plasma University and Ministry of education for consultations. The vulnerability assessment focused on education access by learners including education infrastructure. The education sector is a pillar of development in Jubaland State.

Impacts of Climate Change on the Education Sector

Climate hazards impact the education sector in different ways. In all the learning institutions visited, consultations observed that climate hazards have mainly negative impacts on the education sector. The impacts varied across actors and stakeholders in the education sector. The assessment found that droughts impacted learners (secondary and university) in the form of increased drop out/decline of retention rates, low enrolment, low achievement, limited facilities, displacement and migration, and health problems. Parents were impacted through loss of livelihoods, decrease of income of families leading to inability to pay school fees, displacement and migration, and health problems. For school staff, the climate hazard has resulted in loss of livelihoods, low morale, displacement, migration, and health problems. For school infrastructure, climatic hazards have mainly damaged the school infrastructure and water supply.

Extreme temperatures have resulted in reduced contact hours between teacher-pupil, roofs wasting away/rusting, increased water needs, among others. Flooding has resulted to classrooms destruction, buildings destruction and waterways destruction.

Key message on adaptive capacities/ on climatic impacts adoption options for Education sector

Direct and indirect climate impacts on availability and access to critical education infrastructure disproportionately affect girls and women, who are more likely to forgo education, engage in risky coping mechanisms as a result. Youth are also put at risk by climate-related displacement, and the resulting hopelessness and marginalization among young men can necessitate drop out from schooling.

6. Public works

The assessment team visited the Ministry of Public Works and Housing,⁸ and Eastern construction contractor and company in Kismayo for consultations with the Assessment team. It was observed that Climatic hazards such as extreme temperatures or heat stress, droughts, floods, tropical storm, among others hazards to have significant impacts on the public works sector in Jubaland State.

Impacts of Climate Change on the Public Sector

In flood prone areas of Jubaland State, flash floods frequently damage educational institutions, culverts, houses, and local earthen roads, which are inundated or blocked by flood water. Sensitive groups include women, children, elderly people, students, and low-income people. The lack of regular maintenance and repairs of physical infrastructure especially water and roads call for increased adaptation options to be practiced at a larger scale to reduce climate risk and vulnerability.

Climatic impacts and potential adaptation options for the resilient development of physical infrastructure vulnerability in Jubaland (by the local experts) are identified as follows:

Table 12: Climate change impacts and potential adaptation options in Public Sector

Ranks of climatic impacts	Potential adaptation options
<ol style="list-style-type: none"> 1. Damage of road crust due to floods, high temperature and erratic rainfall 2. Damage of educational institutions 3. Loss due to floods in some areas 4. Damage to bridges, culverts and roads 5. Loss due to riverbank erosion 6. Damage of houses and livestock holding areas 7. Damage to local roads due to floods 	<ul style="list-style-type: none"> • Assess the inclusion of climate change adaptation in school curricula. • Design appropriate educational material with climate change issues • Integrate climate change adaptation issues into the formal education curriculum. • Integrate climate change adaptation into the education policy. • Develop and implement a public awareness mechanism for climate change adaptation • Constructing Climate Resilience buildings - flood proof/resilient housing • Introducing Greening Schools and School farming to adapt the climate change • Promoting water Harvesting practices to schools •

Key Climate Change Impact and Adaptive Capacity Messages for Jubaland’s Public Infrastructure Sector

The lack of regular maintenance and repairs of physical infrastructure especially water and roads due to the prolonged insecurity, weak government institutions, and the absence of effective community organizations is serving to exacerbate the impacts of climate change in Jubaland. Both water and road infrastructures are still functional in the region, but they are far from adequate to meet needs. The continuing deterioration of physical infrastructure in the region makes access to farms and market outlets

costly, and unprofitable. Such conditions also make interventions by aid agencies extremely challenging in supporting other interventions in other sectors.

7. Biodiversity

The assessment team visited the Ministry of Environment, Rangelands and Climate Change, and the Green Youth Union CSO for consultations with the Assessment team. It was observed that Climatic hazards such as extreme temperatures or heat stress, droughts, floods, tropical storm, among others hazards to have significant impacts on the biodiversity sector in Jubaland State.

Impacts of Climate Change on Biodiversity

The opinions of Jubaland’s stakeholders on climate change impacts and the adaptive capacity of biodiversity have been prioritized summarized in table 11 below. For instance, the impact of climatic hazards on rangelands (natural grasslands, wetlands, etc.) were biodiversity loss and degradation of rangeland. For the forest biodiversity (flora and fauna), main impacts of different climate hazards on this sector included biodiversity loss, wildlife habitat destruction.

Table 13: Climate change impacts and potential adaptation options in Biodiversity

Potential impacts	Adaptation options
<ol style="list-style-type: none"> 1. Damage to ecosystems 2. Change in patterns of ecosystems. 3. Penetration by invasive alien species which threaten existing indigenous species. 4. Change of habitats. 5. Degradation of rangeland/biodiversity loss. 6. Forced change in livelihood options. 7. Possible increase of epidemic diseases 8. Decrease in water flows. 	<ul style="list-style-type: none"> • Increase the coordination and capacity of implementing agencies. • Prepare and implement plan for the conservation of biodiversity. • Implement different rules and regulations – including local/traditional • Build awareness and capacities of the communities - conservation • Incorporate biodiversity in all development planning. • Increase the forest lands through afforestation – ingenious trees

Key message on adaptive capacities/ on climatic impacts adoption options for Biodiversity sector

Environmental degradation and climate change pose new challenges to biodiversity in Jubaland. Climate change threatens not only the development and growth prospects but also the viability of local’s livelihoods in Jubaland State. Community participation in local initiatives to protect biodiversity is paramount to enhance protection of the biodiversity. Community participation can be enhanced through training, awareness campaigns, local stakeholder meetings, IEC material distribution, etc.

8. Coastal And Marine Areas / Resources

Impacts of Climate Change on Coastal Marine resources

Discussion with Ministry of Fisheries and Blue Economy staff and local community during the study established that adverse impacts of climate change on coastal and marine resources are perceived differently among the local communities in Jubaland State. Identified adverse impacts of climate change include fish reduction, migration, extinction of some species leading to loss of livelihoods among the fishing households. The impact was also felt on the mangroves by their reduction and destruction of coral reefs habitat among others. The impact of floods on the coastal communities were also visible with reduction of fishing activities, fishing species, fish availability, and loss of livelihoods.

Table 14: List of climate change impact and adaptation options

Potential impacts	Adaptation options
<ol style="list-style-type: none"> 1) Drying up of small water bodies due to drought 2) Reduced production of fish species. 3) Increase in fish diseases due to the climate change induced salinity. 4) Change in fish breeding season (early breeding). 5) Change in habitat of fish/migration of aquatic animal. 	<ul style="list-style-type: none"> • Capacity building initiatives for fishing communities and organized groups • Innovation and dissemination of resilient fish varieties • Development of policies regarding the management of marine resources; shoreline management and coastal protection action plans • Conduct training of fisheries on knowledge of climate change • Arrange training for the fishers on fish culture and management. • Undertake fisheries resource inventory to create baseline data. • The fisher folks be provided with stronger boats equipped early warning systems tools

Key Messages on Jubaland’s Adaptive Capacities for Coastal Marine Resources

The coastal communities of Jubaland State have traditionally relied on fishing for both their food security and their livelihood. Projected increases in sea temperature and sea level will negatively affect coastal fish nesting and fishing grounds and increase the frequency and severity of flooding of low-lying coastal lands, estuaries, deltas, and salt marshes. Moreover, weak or absent governments and lack of active fishery management have allowed both artisanal fishing and (legal and illegal) fishing activity by foreign vessels to expand without controls. The result has been severe degradation of both marine and coastal environments.

3.1.8 Gender issues and Adaptive capacity to climate change

The impacts of climate change on agriculture have differentiated effects on men and women in Jubaland State. Men lose their livelihoods; food insecurity increases and their socio-economic condition changes. However, women are differentially affected by impacts on agriculture, from men. Women generally do not own productive assets such as land and livestock. They also have limited access to information, services,

and other productive resources, along with limited decision-making power. Most women are also not involved in the marketing of their agricultural produce.

The present study recommends gender focused initiatives to increase women’s adaptive capacity and decrease their sensitivity, based on data collected from the field. Increasing technological and logistical support for women involved in agro-farming would go a long way in increasing capacity of the local women. Inducing marketing systems for all goods produced by local men and women at the regional level will diversify their income sources. Arranging income generating training will open up opportunities to participate in other employment options, while reducing their vulnerability to climate change impacts on agriculture. Farmers’ education and awareness, regular technical and institutional support, and the enforcement of enabling policies are necessary as supportive options to improve adaptive capacity.

3.1.9 Disaster risk reduction approaches

The communities in the state perceive drought, floods associated with rising rivers and sea levels as the common disasters faced by local communities over the past 5-10 years. Main common approaches adopted by both the communities and the government officials are aimed at preventing or reducing the loss of life and property by mitigating the impact of disasters. Table 15 presents a summary of the steps in disaster risk reduction and associated relevant approaches.

Table 15: Approach employed to for disaster risk reduction.

Steps of disaster risk reduction	Approach/actions employed
Mitigation	<ul style="list-style-type: none"> • Construction of strategic warehouses • Early Warning Systems • Community awareness and orientation • Better preparation towards disaster recovery from a major natural catastrophe, • Community trained on good agricultural practices (climate hazard in agriculture and livestock sector) • Rangelands restoration including tree planting
Preparedness	<ul style="list-style-type: none"> • Awareness raising campaigns on community early warning system. • Prepare policies, strategies, awareness system, financial and equipment support to face the disaster. • Livestock’s vaccination • Measures to control pests and diseases (usage of pesticides and insecticides) • Communicate with the government about potential disaster risk. • Community awareness • Provide lifesaving. • Smart climate agriculture e.g. drip irrigation
Response	<ul style="list-style-type: none"> • Provision of food, non-food items and shelter to affected communities • Community mobilization for support • Livestock treatment campaigns • Evacuation of affected communities through coordinated multi-agency including local government authorities

Recovery	<ul style="list-style-type: none"> • Financial support pastoralist and agricultural communities (restitution) including the fishing communities • Diverse support for affected communities (food, mosquito net, hygiene kit, drinking water, health, construction of shelters etc. • Multi-agency coordinated resource mobilization development partners, NGOs (local and international), well-wishers etc. • Rehabilitation of public infrastructure affected – roads, schools, health facilities, markets, and other facilities • Providing shelter to affected communities • Developing recovery strategies and plans • Rehabilitation of community water points- boreholes
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Key Messages on key approaches for Disaster Risks Reduction

For mitigation to be effective action must be taken before the occurrence of disaster to reduce the human and financial consequences. Community discussion revealed a general lack of capacities to cope with the local disasters such droughts, floods caused by heavy rains, including winds. For response, evacuation of affected communities, existing early warning and response systems (such as the Food Security and Nutrition Analysis Unit of the United Nations Food and Agriculture Organization) and government institutions should support analysis, coordination and response initiatives. The following specific actions and or/options are recommended to build community resilience in coping with climate-related disasters in Jubaland:

- Financial support impacted or at risk communities (restitution)
- Diverse support for affected communities (food, mosquito net, hygiene kit, drinking water, health, construction of shelters etc.
- Multi-agency coordinated resource mobilization development partners, NGOs (local and international), well-wishers etc.
- Rehabilitation of public infrastructure affected – roads, schools, health facilities, markets, and other facilities
- Developing and implementation of recovery strategies and plans
- Rehabilitation of boreholes.

IV: Conclusion and Recommendations

Conclusion

Jubaland’s VRA is a key milestone in reviewing, summarizing, and understanding the climate change vulnerabilities that the people of Jubaland are face by. The VRA focused on different priority sectors i.e. water, health, agriculture and food security, livestock, biodiversity, coastal and marine are/resources, public works, and education. The VRA linked the sectoral exposure to differentiated climate change risks / hazards i.e. extreme temperatures, floods, drought, pest and disease, locust, tsunami, cyclones etc and ultimately identified not only the vulnerability inducing factors but also potential adaptation pathways.

Jubaland's VRA exercise is an essential step to establish Jubaland's state-level climate risk profile. The established Jubaland climate risk profile is an important guiding and decision tool for decision-makers to better understand the vulnerabilities of different priority sectors, and inform planning, fund allocation and implementation of Jubaland's humanitarian and development interventions accordingly. At the same time, the VRA is a critical evidence base which can be used to by policy makers to guide strategic climate change responsive policies that will enhance sustainable development and resilience building in Jubaland.

Jubaland's VRA findings point to a high vulnerability profile to impacts of climate change, across the selected sectors. The assessment identified vulnerabilities in the considered priority sectors that were targeted in Jubaland's VRA i.e. i.e. water, health, agriculture and food security, livestock, biodiversity, coastal and marine are/resources, public works, and education. Further, the assessment identified adaptation options that should be considered as a response to the identified vulnerabilities. Water resources are fast depleting, agriculture and livestock sectors are heavily affected, and local populations are highly disaster prone. Extreme temperatures will be a major issue in the coming decades. With the information on the outlook towards the future, if the State does not adapt to climate change, vulnerability will be pushed to critical levels.

Key Messages

Given the findings from Jubaland's VRA, the key messages for Jubaland are:

1. Climatological data and trends point to a continuation and worsening of climate change risk especially in the Horn of Africa and Jubaland in Particular. Without adaptation measures being put in place and given the high exposure risks for the state of Jubaland and the weak Socio-political, economic and environmental systems, the entire Jubaland is highly vulnerable.
2. Jubaland's socio-political, economic, and environmental challenges are key drivers of Jubaland's Vulnerability to Climate Change Risk. Immediate efforts must be made to address these challenges across household, community, regional and state levels. A stakeholder driven contextual approach to building Jubaland's adaptation capacity to climate change will be critical.
3. Jubaland's stakeholders should intensify ongoing efforts by local communities and institutional initiatives to cope with the adverse impacts of climate change. There is a general sense of urgency among the actors and stakeholders that the State needs to intensify its efforts to become less vulnerable to climate change.
4. Jubaland should endeavor to increase investments in its adaptive capacity thus reducing vulnerability. Measures to reduce exposure to hazards, for instance investment in increasing the adaptive capacity of people and sectors including the State are available, such as provision of weather information, extension services, livelihood support programs (provision of planting materials to farmers) and so on.
5. Systemic marginalization is deepening societal vulnerabilities to Climate Change Risk in Jubaland. As such, stakeholder inclusive measures must be taken to address systemic marginalization and reduce gender imbalances and other marginalization bottlenecks that leave a significant proportion of Jubaland's society (women, girls, youth, minority clans, IDPs, PWDs etc) highly vulnerable to climate change impacts.
6. The good will among stakeholders to provide sound information about climate vulnerability is much needed to support decision making for adaptation planning in Jubaland State.

7. This assessment provides the possibility to compare the climate vulnerability of different sectors so that funding allocation of new projects under various streams of climate finance can be supported.

Recommendations To Build a Climate Resilient Jubaland State

Jubaland's VRA points to a high vulnerability score to the impacts of climate change, across the selected sectors (water, health, agriculture and food security, livestock, biodiversity, coastal and marine are/resources, public works, and education). The assessment has identified vulnerabilities and further identified contextual Jubaland specific adaptation options that should be considered in response to the identified vulnerabilities. Clearly, with the information on the outlook towards the future, if the State does not adapt to climate change, vulnerability will be pushed to critical levels. Based on the VRA Findings, the following are the key recommendations for building/enhancing climate resilience in the state of Jubaland:

I. Climate Risk Management and Action

- a. Develop a climate risk map/atlas – a risk-informed decision-making toolkit to be used to map critical vulnerabilities at the local administrative levels.
- b. Establish a climate risk commission or department with mandate to mainstream climate risks in a decentralized manner.
- c. Enhance Early Warning Systems to build greater resilience to hydro and meteorological hazards.
- d. Enhance local knowledge and biological cues management on forecasting weather and taking proper actions before the intervention of the public sector.

II. Focused Investments Towards Climate Change Adaptation

- a. Develop Climate Smart Agriculture to strengthen resilience in the agriculture and food, livestock Sectors.
- b. Integrate climate vulnerability-based financing instruments into investment decision-making.
- c. Build climate risk-informed infrastructure (roads, schools, and health institutions), improve awareness raising among the local people living on disaster prone areas, and provide support for resettlement.

III. Deal with Systemic Climate Change Adaptation Bottlenecks

- a. Develop and enhance the funding opportunities for the at-risk people; both financial institutions (suppliers) and demanders (farmers organisations, cooperatives, entrepreneurs, small businesses operators (SMEs), women and youth on green climate financing to enable the at-risk local people access loans for their small businesses.
- b. Develop enabling environment and instruments that will foster coordination between the relevant ministries in the priority sectors seriously affected by climate disasters, with the support of relevant stakeholders (private sector, civil society organisations, INGOs, Bilateral and Multilaterals, Funding mechanisms, etc.
- c. Restore the landscape to rehabilitate and reintegrate natural ecosystems by trees planting, creating forest and rangeland ecosystems.

IV. Collaborative and Synergistic Stakeholder Engagement for Climate Change Adaptation

- a. Encourage ownership by community mobilization of local development problems as they relate to climate related events so that they become more active participants in developing solutions.
- b. Improve participation on issues of climate change from conceptualization to realization and restitution.

- c. Encourage the creation of sustainable advocacy platforms through capacity building in the domain.

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ANNEX

Annex 1: Steps in vulnerability assessment

Step	Approach	<ul style="list-style-type: none"> • Methodology/Details of vulnerability assessment
Planning the assessment	Setting of scope	<ul style="list-style-type: none"> • This is the first step in adaptation planning. Current climate vulnerability will be considered. • To develop vulnerability indicators for states and highlight the drivers of vulnerability.
	Selection of type of vulnerability assessment	<ul style="list-style-type: none"> • Integrated vulnerability assessment (based on biophysical, socio-economic, and institution and infrastructure-related vulnerability indicators). • Evaluate the existing tools on vulnerability and disaster risk assessment in terms of their alignment with the 4th Assessment Report of Intergovernmental Panel on Climate Change (IPCC-AR4) and the framework adapted; and to align with the National Adaptation Plan (NAP).
	Selection of sector, spatial scale, community/system, and period of vulnerability assessment	<ul style="list-style-type: none"> • Sectors: Climate-related sectors particularly: Water, Health, Agriculture and food security, Livestock, Biodiversity, Coastal zone, Public works, Education, Disaster Risk Reduction, Gender and Education; and general indicators; • Spatial scale: State-level assessment conducted • Period: Based on the availability of data
	Identification and selection of indicators for vulnerability assessment	<ul style="list-style-type: none"> • State-specific assessments will be based on sets of common indicators to capture state-specific characteristics.
Gathering data	Data collection methods	<ul style="list-style-type: none"> • A mix of primary and secondary data
	Field assessment and stakeholder consultations	<ul style="list-style-type: none"> • Will be carried out using participatory methods such as focused group discussions (with local community), one to one consultations in the form of key informant interviews (with line ministries, NGOs and local authorities), etc. • Field assessments will also be used for identifying potential adaptation measures and also capture mitigation benefits (as co-benefits) options.

Analysis and interpretation	<p>Quantification and measurement of indicators</p> <p>Representation of vulnerability</p> <p>Identification of drivers of vulnerability for adaptation planning</p>	<ul style="list-style-type: none"> • All indicators will be quantified using a mix of primary and secondary sources of data, where appropriate. The database used in the assessment along with its sources will be provided in main report. • Table, graphs, and spatial maps will be used to represent vulnerability and its drivers.
Elaborating the VRA report	<p>Potential adaptation measures/options</p>	<ul style="list-style-type: none"> • These options will be prioritized based on – Environmental and Social (E&S) and gender impacts as identified from field assessment by the local community and other stakeholders consulted. • Vulnerability assessment reports with state-level indicators generated and presented per member state but based on the availability of data
VRA report validation	<p>Validation workshop</p>	<ul style="list-style-type: none"> • State-level validation workshop will be conducted per federal member state where relevant stakeholders from line Ministries and Departments will be invited including other key stakeholders. •
Revised and final report	<p>Report preparation and revision</p>	<ul style="list-style-type: none"> • Based on the inputs received, the consultant will finalise the VRA reports incorporating all comments, recommendations received from all consultation workshops, KAALO, UNDP team, and line ministries.

Annex 2: Scheduled followed for field work data collection in Jubaland

Date	Location	Sector	Days	FGDs/KII
26 th – 28 th Nov , 2023	KAALO	Uploading tool to Kobo data collection	2	KAALO
9 th Dec 2023.	Madina Hotel	Training enumerators and Consultation workshop	1	ALL
10 th Dec 2023.	KISMAYO	16KIIs data collection for line ministries Academia , business and CSOs	1	16 KIIs
11 th Dec 2023.	Qaamqaam	<ul style="list-style-type: none"> Biodiversity (2 FGDs), (1 KII) 	1	(2 FGDs), (1 KII)
11 th Dec 2023	Goobweyn/Loglow	<ul style="list-style-type: none"> Agriculture (2 FDG) , (1KII) 	1	(2 FGDs), (1 KII)
	Midnimo IDP	<ul style="list-style-type: none"> Water (2FGDs) (1KII) 	1	(2 FGDs), (1 KII)
12 th Dec 2023				
12 th Dec 2023	Midmo Health Center	<ul style="list-style-type: none"> Health Centres (2 FGDs) (1 KII) 	1	(2 FGDs), (1 KII)
13 th Dec 2023	Fuuma	<ul style="list-style-type: none"> Livestock (2 FGDs) (1KII) 	1	(2 FGDs), (1 KII)
13 th Dec 2023	Koyamo	<ul style="list-style-type: none"> Coastal Communities (2FGDs) (1KII) 	1	(2 FGDs), (1 KII)
14 th Dec 2023	Kismayo	<ul style="list-style-type: none"> Gender and Human Rights (2 KIIs) 	1	(2 KII)
14 th Dec 2023	Kismayo	<ul style="list-style-type: none"> Education (2KIIs) 	1	(2 KII)
16 th Dec 2023	Kisamyo	<ul style="list-style-type: none"> Public work2FGD (2KIIs) 	1	(2 KII)
16 Dec 2023	Kismayo	<ul style="list-style-type: none"> DRR 2FGD(1KIIs) 	1	(1 KII)
15 th Dec 2023	MECC	<ul style="list-style-type: none"> De-briefing 		ALL

Annex 3: Tool used for data collection

PART A: For COMMUNITIES (FGDs and KIIs)



Agriculture Part
A.docx



Biodiversity Part
A.docx



Coastal Sector Part
A.docx



Disaster Risk
Reduction-Part A.docx



Health Sector- Part
A.docx



Livestock Sector_Part
A.docx



Water Sector Part
A.docx



Education Sector Part
A.docx

PART B: Line ministries, Civil Society Organizations engaged in conservation (KIIs)



Agriculture Part
B.docx



Biodiversity Part
B.docx



Coastal Sector Part
B.docx



Disaster Risk
Reduction B.docx



Education Part B.docx



Health Sector Part
B.docx



Livestock Part B.docx



wATER Sector Part
B.docx



Public Work_PART
.docx



Gender.docx
