Disasters, Conflict, and Displacement

KNOWLEDGE NOTE

Intersectional Risks in South Sudan

GFDRR
Global Facility for Disaster Reduction and Recovery

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The term 'disaster' in this publication refers to events caused by natural hazards.

Cover page:

A community in Ulang County (Upper Nile State) affected by seasonal flooding in 2019. Photograph taken by the Shelter and Non Food Items (SNFI) team during flood response (09 October 2019). © International Organization for Migration (IOM).

Back cover: Konyo Konyo Market, Juba, South Sudan. Photo: vlad_ karavaev.

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Acronyms Part I

ASI	Agricultural Stress Index
CEPO	Community Empowerment for Progress Organization
COD	Common Operational Dataset
DRM	Disaster Risk Management
DTM	Displacement Tracking Matrix
FCV	Fragility, Conflict, Violence
FOD	Fundamental Operational Dataset
FWI	Fire Weather Index
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Risk Reduction
GIEWS	Global Information and Early Warning System
HDI	Human Development Index
ICA	Integrated Country Approach
ICIWG	Inter Cluster Information Management Working Group
IDP	Internally Displaced Person
IOM	International Organization of Migration
MHADM	Ministry of Humanitarian Affairs and Disaster Management
NBS	National Bureau of Statistics
OCHA	United Nations Office of Coordination of Humanitarian Affairs
OSM	OpenStreetMap
R-ARCSS	Revitalized Agreement for the Resolution of the Conflict in South Sudan
RMSE	Root Mean Squared Error
RP	Return Periods
UCDP	Uppsala Conflict Data Program
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
VHI	Vegetation Health Index
WBGT	Wet Bulb Globe Temperature

Acronyms Part 2

ACLED	Armed Conflict Location and Event Data Project
CPA	Comprehensive Peace Agreement
DRM	Disaster Risk Management
DRR	Disaster Risk Resolution
IDMC	Internal Displacement Monitoring Centre
IDP	Internally Displaced Person
FAO	Food and Agriculture Organization of the United Nations
FAW	Fall Armyworm
FCV	Fragility, Conflict, and Violence
FGD	Focus Group Discussion
GESIaWE	Gender Equality, Social Inclusion, and Women's Empowerment
ICPAC	IGAD Climate Prediction and Applications Centre
IGAD	Intergovernmental Authority on Development
IOM DTM	International Organization for Migration's Displacement Tracking Matrix
IPC	Integrated Food Security Phase Classification
IRNA	Initial Rapid Needs Assessment
KII	Key Informant Interview
MSF	Doctors without Borders (Médecins Sans Frontières)
MT	Mobility Tracking
NAPA	National Adaptions Programme of Actions
NGO	Nongovernmental Organization
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PoC	Protection of Civilians
SAF	Sudan Armed Forces
TGoNU	Transitional Government of National Unity
UNDRR	United Nations Office for Disaster Risk Reduction
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNMISS	United Nations Mission in South Sudan
USAID	U.S. Agency for International Development
WASH	Water, Sanitation, and Hygiene
WFP	World Food Programme
WHO	World Health Organization

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Aerial view of Juba. Photo: Phototreat.

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Tackling Intersectional Risks in South Sudan

Background

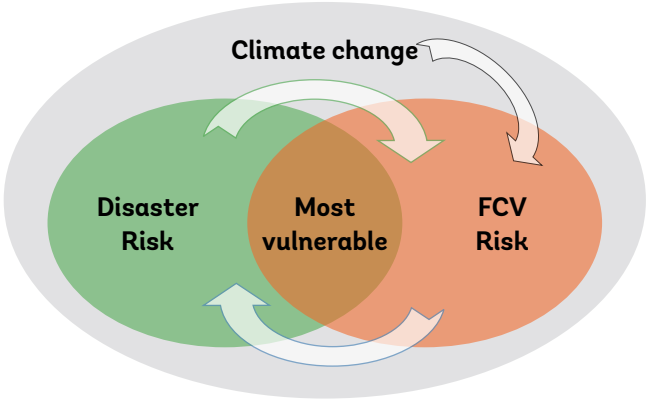
1. **Developing countries face an increasingly complex risk landscape, characterized by interrelated hazards that can undermine the development gains that have been made.** Natural disasters such as floods and extreme weather events destroy crops, deplete livestock assets, and damage water resources, sparking disease and pest outbreaks. Armed conflicts trigger forced displacement, exposing vulnerable people to insecurity, food insecurity and malnutrition. The World Development Report 2017 found that many countries are richer not because they grew faster than poorer ones, but because they have had fewer episodes in which crisis or conflict shrank their economies.[1]

2. **Different types of risks often overlap and interconnect, amplifying the frequency and severity of natural and man-made disasters.** Such risks are described as *compound* or *multidimensional* risks. These risks are characterized by the likelihood and/or severity that one risk is influenced by the likelihood and/or severity of other risks. When these risks interact, they produce a consequence greater than the sum of the individual risks.[2] All too often, assessments focus on single hazards or conflicts in isolation, ignoring the relationship between multiple hazards – both natural and man-made – possibly underestimating the risks.[3]

3. **While all countries face compound risks, poor and fragile countries are particularly more vulnerable.** By 2030, up to two-thirds of the world's extreme poor are predicted to live in fragile, conflict and violent (FCV) settings. Conflicts also drive 80 percent of all humanitarian needs and reduce gross domestic product (GDP) growth by 2 percentage points per year on average.[4] A recent study has found that between 2004 and 2014, 58 percent of deaths from natural disasters occurred in the top 30 fragile states.[5] Almost 500 disaster events in FCV countries[6] affected over 71 million people and caused damage worth over US$16 million between 2009–2019.[7] In other words, the poor are disproportionately more exposed to natural disasters and conflicts, trapping them in a vicious cycle.

4. **Fragility increases vulnerability to various risks.** By definition, fragility is closely linked to high risks of violence and political instability. However, fragile countries or areas are also more vulnerable to a wide variety of natural and man-made disasters, primarily due to their limited institutional capacity and resources, weak policies, and societal divisions that reduce their capacity to mitigate or cope with adverse shocks. Their vulnerability can amplify the impact of adverse shocks on its people, resources, and institutions. The interrelationship between natural hazards and conflict risk is being exacerbated by climate change. Climate change threatens to intensify climate-related natural hazards such as floods and droughts, and in FCV countries, the risk of conflict escalates through intensified threats of food insecurity, economic shocks, and forced displacement.[8]

Figure 1. Analytical Framework of Compound Risks of Natural Disasters, Conflict and Climate Change[9]



Source: World Bank (2019).

[1] World Bank. 2017. "World Development Report 2017: Governance and the Law." Washington, D.C.: World Bank.
[2] D. Hyslop and D. Hammond. 2018. "Understanding Multi-Dimensional Risks and Violent Conflict Lessons for Prevention." Washington, DC.: World Bank Group and the United Nations.
[3] K. Peters and M. Budimir. 2016. "When disasters and conflict collide". Overseas Development Institute: London.
[4] World Bank. 2019. "Fragility, Conflict and Violence Strategy". Washington, D.C.: World Bank.
[5] K. Peters and M. Budimir. 2016. "When disasters and conflict collide". Overseas Development Institute: London.
[6] Countries listed on the World Bank Group Harmonized List of Fragile Situations.
[7] World Bank. 2019. "Initiative for Disaster Risk Management in Countries Affected by Fragility, Conflict and Violence Concept Note". Mimeo.
[8] World Bank. 2016. "Disasters, Conflict and Fragility: A Joint Agenda". Washington, D.C.: World Bank.
[9] World Bank. 2019. "Initiative for Disaster Risk Management in Countries Affected by Fragility, Conflict and Violence Concept Note". Mimeo.

Country Context

5. **South Sudan is a characteristic example of an FCV country that suffers from compound risks of natural disasters and violent conflicts.** South Sudan was beset by decades of armed conflicts even before its independence, and these have only become increasingly complex in the years since. Southern Sudan, as the region was called before independence, has been marred by conflict since 1955, just a year before Sudan attained its independence from British colonial rule. The region experienced systematic marginalization and underdevelopment under both British and Sudanese rule, inhibiting it from developing its physical and human capital. At its independence in July 2011, South Sudan ranked almost at the bottom of the global development indicators with little infrastructure, basic services provided almost entirely through humanitarian aid, and an economy completely dependent on oil. Renewed civil conflict broke out in December 2013 and a Revitalized Agreement on the Resolution of the Conflict in South Sudan (R-ARCSS) was reached in 2018. Violence between the main protagonists has declined since and in February 2020 a transitional coalition government was formed as part of the 2018 power-sharing agreement. But as fighting and armed clashes now more at the subnational level continue in many parts of the country, the prospects for lasting peace remain uncertain.

6. **The impacts of violent conflict on South Sudan, its people, and their development have been calamitous.**[10] An estimated 380,000 people died between December 2013 and April 2018.[11] Almost 3.8 million people (over a third of the country's population, with 85 percent being women, girls, and boys) remain displaced from their homes—1.5 million internally and 2.3 million refugees in neighboring countries, many of whom have suffered recurrent displacement. About **6.4 million people (54 percent of the population) are classified in 'Crisis' (**Integrated Food Security Phase Classification [IPC] Phase 3) or acute food insecurity[12] while nearly 7.5 million people rely on some type of humanitarian assistance or protection.[13] Service provision is limited, and much if not all of what exists is provided by external aid agencies, rendering many people reliant on external assistance.

7. **South Sudan's vulnerability to climate change and natural disasters compounds the country's humanitarian situation, jeopardizes post-civil war recovery, and undermines development efforts.** The Global Climate Risk Index ranked the country 125 out of 171 between 1998 and 2018.[14] With a strong reliance on subsistence farming and pastoralism, rural communities are particularly affected by extreme weather events and natural disasters. Historical records show a large year-to-year variability in precipitation, but droughts have become more frequent and widespread since the 1960s.[15] The seasonality and intensity of the rainy season is also changing, resulting in more frequent and extreme flooding in many parts of the country.[16] Climate-related hazards are seen to intensify intercommunal conflict over natural resources, driving population displacement and worsening food insecurity. Exceptionally severe floods in 2019, with 900,000 people affected and an estimated 420,000 displaced, were a stark reminder of the country's vulnerability to natural hazards. The heavy rains and unusual climate conditions have moreover contributed to the serious desert locust outbreak—the worst to hit the Horn of Africa in over 25 years—which is threatening food security and livelihoods across the region and could lead to further suffering, displacement, and conflict.

8. **The compounding effects of climate-sensitive disasters such as the recent floods in South Sudan highlight the need to better understand the complex interplay between disasters, conflict, and forced displacement.** While there is little evidence for a linear relationship between disasters and conflict, there is increasing recognition that their relationship can be mutually reinforcing and that many parts of the developing world are seeing an interrelated nature of natural disasters, conflict, and displacement.

[10] OCHA. 2020. *Humanitarian Needs Overview* 2020. United Nations Office of Coordination of Humanitarian Affairs.
[11] F. Checchi, A. Testa, A. Warsame L. Quach and R. Burns. 2018. *Estimates of Crisis-Attributable Mortality in South Sudan, December 2013–April 2018.* London School of Hygiene.
[12] IPC. 2019. *South Sudan: Acute Food Insecurity and Acute Malnutrition Situation.* Integrated Food Security Phase Classification.
[13] OCHA. 2020. *Humanitarian Needs Overview* 2020. United Nations Office of Coordination of Humanitarian Affairs.
[14] D. Eckstein, V. Künzel, L. Schäfer and M. Winges. 2019. *Global Climate Risk Index 2020.* GermanWatch e.V.
[15] USAID. 2019. *South Sudan Climate Vulnerability Profile.* U.S. Agency for International Development.
[16] ThinkHazard. 2019. *South Sudan.* Global Facility for Disaster Reduction and Recovery (GFDRR).

Objectives of the Study

9. **Funded through the GFDRR DRM-FCV Nexus Program,[17] this report sets out to develop a better understanding of the ways in which disaster- and conflict-related risks in South Sudan interact, reinforce, and compound one another.** The study aims to compile and overlay different data to identify regions which are particularly susceptible to natural hazards, conflict and violence in the country. The study also aims to provide qualitative insights from field research on the compounding effects of natural hazards on vulnerable populations, specifically the forcibly displaced population. Taken together, the study contributes to building a more comprehensive quantitative and qualitative analytical basis on the DRM-FCV nexus in South Sudan.

10. **By providing a more comprehensive and geodata-informed knowledge base on the interplay between disasters, conflict, climate change and forced displacement, the study also contributes to the broader policy dialogue on addressing the compounded impacts of DRM-FCV more broadly.** In recent years, there has been growing recognition among development organizations including the World Bank that more integrated approaches are needed to capture the complexity of compounding risk in disaster and conflict affected countries. As the necessary conceptual frameworks are being established, this study helps provide tangible insights from South Sudan on how the multiple risks interrelate in practice. The study thus not only supports the international development community in identifying entry points to reduce the vulnerability to compound risks in South Sudan; but importantly, it also contributes to advancing the broader policy dialogue and to developing a conceptual framework that can be applied for both analytical and operational purposes to tackle the intersectional risks.

Methodology and Structure of the Report

11. **The study investigates the intersectional risks in South Sudan through two complementary analytics.** Part I of the report[18] analyzes and maps out the intersectional risks. It compiles different sets of geodata and develops a disaster-fragility index as a measure for the intersectional risk at the regional level for South Sudan. Building on this assessment, Part II of the report[19] explores in greater depth the interrelationship between natural disasters, conflict, and forced displacement. Based on quantitative assessments of displacement monitoring data and field-based qualitative research, this part analyzes the extent of conflict- and disaster-driven displacement in South Sudan and explores the vulnerability of displaced communities to natural disasters as well as their experiences in coping with and responding to the impacts of these disasters.

12. **Part I of the report conducts an analytic mapping of intersectional risks for South Sudan based on existing data and assessments related to natural hazards and conflict/fragility.** By overlaying hazard data (particularly floods and droughts as well as extreme heat, earthquake, and wildfires), exposure data (for example, affected population, settlements, and buildings), and data related to fragility, conflict, and violence (FCV) (such as fatalities, displacement, and food insecurity), this part of the report provides a comprehensive overview of the susceptibility to disaster- and FCV-related risks at the regional (state/county) level. The analysis develops an index-based intersectional risk assessment ('Disaster-FCV Index'), which combines the different components into a composite index score to provide a ranking of administrative units according to their exposure to disaster and FCV. This cumulative overview of the most critical risk factors in the country can be applied to identify or prioritize geographic areas for disaster risk reduction and allows informed targeting of humanitarian relief and prevention efforts based on evidence. This index is however not intended to inform the design of specific measures at the community level, as this would require more granular data and assessment.

13. **Part II of the report explores in greater depth and based on field-based qualitative research the specific interrelationship between natural disasters, conflict and displacement.** The study draws

[17] The Global Facility for Disaster Risk Reduction (GFDRR) launched its initiative for disaster risk management (DRM) in countries affected by fragility, conflict, and violence (FCV) to support a deepening of DRM engagements in FCV settings. Its operational framework for DRM in FCV pursues three objectives: (a) adjust DRM approaches for FCV settings; (b) inject DRM expertise in FCV engagements; and (c) produce and share knowledge, build partnerships, and influence policy dialogues.

[18] South Sudan: Assessment and Mapping of Natural Hazards and Intersectional Risks (Map Report), authored by Mattia Amadio.

[19] South Sudan: Natural Disasters, Conflict and Displacement (Research Report), authored by the International Organization of Migration (IOM).

on primary research (key informant interviews and focus group discussions) conducted with community members and local leaders in nine counties. This is supplemented with a review of secondary data, including datasets on displacement figures and conflict events, research reports, and rapid needs assessments conducted in areas affected by disasters. The report shows that natural disasters have compounded conflict-related risks, including displacement, and heightened the disaster and conflict vulnerabilities at the community level. Although limited to a particular aspect of the wider DRM-FCV nexus, the analysis sheds light on the complex interrelations between disaster and conflict-related risks and highlights the need for more integrated approaches to build capacities to anticipate and respond to compounding crises.

Lessons Learned and Recommendations

14. **The study provides valuable insights and lessons learned for future research on the intersectionality of disaster- and conflict-related risks.** South Sudan, as many other conflict-affected countries, faces the challenge of a scarce and fragmented data environment. Taking stock of and mapping existing data proved to be a useful approach to identify data gaps and entry points for more detailed, quantitative and qualitative analyses. The study, however, also showed that a more comprehensive conceptual framework of the wider DRM-FCV nexus is needed for analyzing the intersectionality of crisis risks. Such a framework can be particularly useful to more clearly delineate the focus of analysis and derive a methodology which can be applied in different contexts.

15. **Finally, three main recommendations can be derived from this study:** For one, the study highlights the importance of integrated analysis for understanding and addressing intersectional risks in disaster and conflict affected countries like South Sudan. Siloed approaches, which only consider one set of risks in isolation, are not able to grasp how disaster and conflict-related risks interact with one another often resulting in compound risks that have grave impacts. Second, in support of more integrated analysis along the DRM-FCV nexus, a cascade approach for data collection is recommended to be able to move from regional to more local levels of analysis. Given the limited availability of both disaster and conflict-related data, there is urgent need to improve the resolution and granularity of data to develop more nuanced insights at the local level. Participatory approaches including community-based risk mapping can prove useful in validating higher-level data and develop more localized assessments of intersectional risks. Third, given the practical relevance of the DRM-FCV nexus for the development support in disaster and conflict-affected countries, the study highlights the importance of closely aligning analytical work and operational engagements. Thorough analyses deliver the knowledge base to inform the design and implementation of operations; in turn, the insights gained from operations can help strengthen the analytical approach towards a better understanding of intersectional risks.

PART I

South Sudan: Assessment and Mapping of Natural Hazards and Intersectional Risks

MAP REPORT

Summary

This map report sets out to conduct an analytic mapping of intersectional risks for South Sudan based on spatial information related to natural hazards and fragility, conflict and violence (FCV). By overlaying hazard data (particularly floods and droughts as well as extreme heat, earthquake, and wildfires), exposure data (for example, affected population, settlements, and buildings), and data related to fragility, conflict, and violence (FCV) (such as fatalities, displacement, and food insecurity), this report provides a comprehensive overview of the susceptibility to disaster- and FCV-related risks at the regional (state/county) level. The study adopts an indicator-based approach to develop exposure and vulnerability indexes. These components are then combined in the form of an intersectional index. This 'Disaster-FCV Index' uses a synthetic score to rank administrative units according to their disaster-fragility. Arithmetic and geometric aggregations are applied to control the trade-offs between indicators.

The collection of operational datasets provides a knowledge base to describe the components of the analysis in spatial terms, allowing to produce a spatial-explicit assessment of risk. First, hazard datasets have been collected from different sources to characterize the frequency and the physical features (i.e. intensity) of hazard events. Each hazard has been assessed individually and ranked according to specific intensity thresholds. Due to the scarcity of country-scale assessments, most of the hazard layers are derived from global-scale models and complemented with empirical observations whenever these were found available. Exposure maps and indicators are produced based on available population statistics, land cover description, and location of settlements, roads, buildings and health facilities. When more than one dataset was found available, the best fitting one is selected based on a list of criteria (last update, spatial resolution, scientific quality and reliability). Fragility, conflict and violence indicators were based on spatial information related to conflict fatalities, food security and forced displacement, and complemented with socio-economic indicators in order to produce the FCV index. The individual exposure and vulnerability indicators are elaborated at the scale of counties or states, depending on the quality of the source data; the combined index is projected at the state level.

The results of the analysis contribute to the production of knowledge for disaster risk management (DRM) to support the World Bank's operational teams in their in-country engagements. Specifically, the key findings of this study allow to rank South Sudan states in terms of natural disasters risk, and to identify the most critical components for each area. The output of this assessment includes a geodatabase which contains both the key primary data and all the resulting maps produced by the analysis, allowing risk analysts and managers to explore them in detail using GIS software.

1. Introduction

1.1. Aim of the Study

This assignment aims to conduct an analytic mapping of intersectional risks for South Sudan based on existing data and assessments related to natural hazards and fragility, conflict, and violence (FCV). By overlaying hazard data (particularly floods and droughts as well as extreme heat, earthquake, and wildfires), exposure data (for example, affected population, settlements, and buildings), and data related to FCV (such as fatalities, displacement, and food insecurity), the assignment aims to build a better understanding of the interrelations of disaster- and FCV-related risks in South Sudan.

This analysis will contribute to the production of knowledge for GFDRR's DRM-FCV program to support the World Bank's operational teams in their in-country engagements and to build partnership through knowledge sharing with humanitarian and development stakeholders from disaster, climate, conflict, and peacebuilding fields across regions to influence national and international policy dialogues. Specifically, the outputs and findings of the assignment shall provide a more comprehensive knowledge base for hazard- and risk-informed development of community infrastructure as well as community-led disaster risk reduction measures in vulnerable areas.

The assignment includes the assessment, analysis, and mapping of intersectional risks in South Sudan based on existing geo-referenced data in the following three domains:

(a) **Natural hazards:** Available hazard and risk data among those identified as relevant for the country

(b) **Exposure:** Available data about population, settlements, land cover and infrastructure

(c) **FCV:** Overview on displacement, food security, cattle raiding, and violence.

1.2. Country Overview

South Sudan is a landlocked country in East-Central Africa. It is bordered to the east by Ethiopia, to the north by Sudan, to the west by the Central African Republic, to the southwest by the Democratic Republic of the Congo, to the south by Uganda, and to the southeast by Kenya. The surface area of the country is around 615 km^2. The waters of the White Nile and its tributaries flow from the surrounding highlands into the low clay basin that constitutes much of South Sudan, forming the Sudd, the world's largest contiguous swamp. Forests and grassland cover the rest of the area. The White Nile crosses the country from the South to the North, passing through the capital Juba, which is also the largest and most densely populated city in the country.

South Sudan consists of 10 states and 78 counties. The Abyei Region in the North has disputed status, and it is not accounted in this assessment. South Sudan gained independence from Sudan in 2011 after years of civil war, but violence and conflict continue after the Revitalized Peace Agreement of 2018. The vast majority of the population (11.4–11.7 million people according to 2019 census by the National

Bureau of Statistics [NBS] and United Nations Office of Coordination of Humanitarian Affairs [OCHA]) lives in rural areas. The national gross domestic product (GDP) is largely dependent (98 percent) on oil revenues. Climate variability and hydrometeorological disasters jeopardize post-civil war recovery and undermine development efforts, as shown by the recent floods in 2019. According to figures from the Emergency Disaster Database (EM-DAT), since 2008, 12 flood events affected 2 million people in total. Drought events are less frequent (last events in 2009 and 2016), but their effects on food security are much more widespread and prolonged. As detailed hazard assessments and maps are largely missing, the understanding of hydrometeorological hazards and their associated risks remains limited. Moreover, knowledge concerning the complex interplay between disaster risks and FCV is fragmented. This part of the report aims to close these knowledge gaps by assessing and mapping the prevalent natural disasters in South Sudan and juxtaposing them with FCV-related risks to indicate which parts of the country are most susceptible to compound risks, intersecting the DRM-FCV nexus.

1.3. Summary of Input Datasets

As in the OCHA humanitarian response framework, risk assessment requires both common operational datasets (CODs) and fundamental operational datasets (FODs). CODs are critical geographic datasets that are used to support the work of humanitarian actors across multiple sectors. They should represent the best available datasets for each of the themes, which include administrative boundaries, settlements, transportation network, hydrology, population statistics, and humanitarian profile. FODs are relevant to a humanitarian operation but are more specific to

a particular sector, such as facilities location, flood extents, conflict data, and others. Collected risk data and key background information about past events and previous assessment are presented as follows.

Common Operational Datasets

- **Administrative boundaries:** Polygon features for ADM0 (country), ADM1(state), and ADM2 (county) from OCHA
- **Settlements:** Location points from FAO ICA (2016)
- **Population:** Demographic statistics at the county level from the Inter Cluster Information Management Working Group (ICIWG) and NBS (2019) and total population grid at 1 km resolution from LandScan (2018)
- **Land cover:** Land cover grid at 20 m resolution from ESA (2016)
- **Buildings, land use, and roads:** OpenStreetMap (OSM) polygon features
- **Health facilities:** Location and type of health facilities from the World Bank and OCHA (2009)
- **Base map:** Natural Earth and Google.

Fundamental Operational Datasets

- **Floods:** Modelled hazard maps from FATHOM (2019) and observations of recent flood events (10.2019) from remote sensing (ESA, NASA) and local survey (International Organization of Migration [IOM])
- **Drought:** Agricultural Stress Index (ASI) from FAO-GIEWS[20] at the state level (1984–2018)
- **Wildfire:** Global Fire Weather Index (FWI) grid from Vitolo et al. (2019)
- **Extreme Heat:** Global extreme temperature grid from VITO (2017)
- **Earthquake: Seismic hazard grid from GAR** (2017)
- **Locust invasion:** Reported swarms by FAO Locust Watch (2020.
- **Food security:** FEWSNET and IPC reports and maps at the state level (2020) by FAO
- **Displacement:** IOM Displacement Tracking Matrix (DTM) data and reports at the *payam* level (2013–2020)
- **Conflict:** Fatalities recorded by the Uppsala Conflict Data Program (UCDP) at the county level (2011–2018)
- **Human Development Index (HDI):** Score at the state level (2018).

1.4. Description of Output

The output consists of three main components:

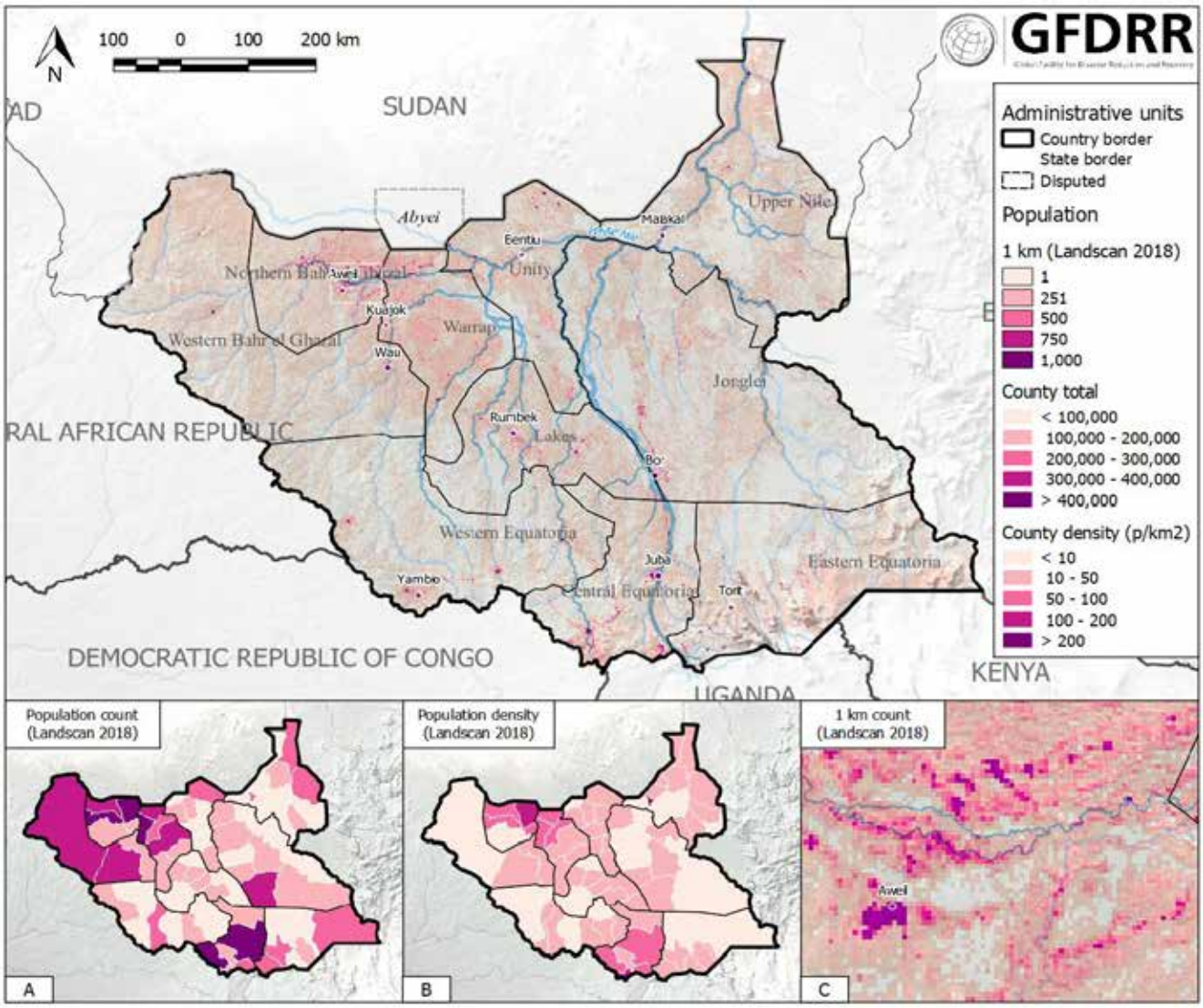
- Maps and technical report (this document)
- Data summary sheet
- Geodatabase

The report includes details about data comparison, processing, and ranking, together with a discussion of gaps and limitations and the explanation of output data. The geodatabase produced for this assignment includes both the input datasets and the output maps shown in this report. In addition, table data are collected and summarized into a sheet file. The data can be combined in several different ways to produce the required statistics and indicators, not limited to those displayed in this report. More detailed information about the structure of output is provided in the Annex A.

[20] FAO: Food and Agriculture Organization of the United Nations; GIEWS: Global Information and Early Warning System.

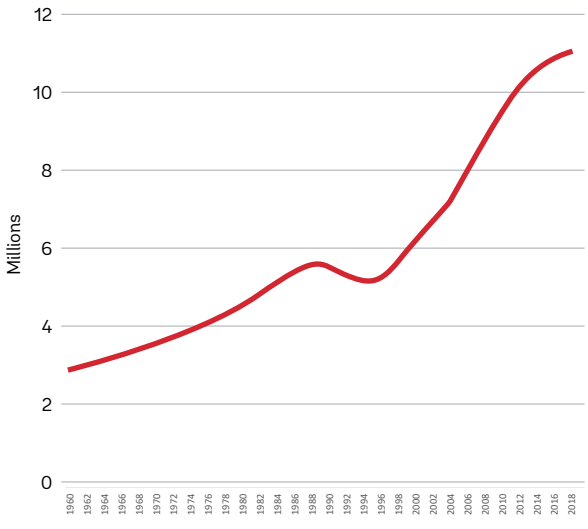
2. Common Operational Datasets

2.1. Population



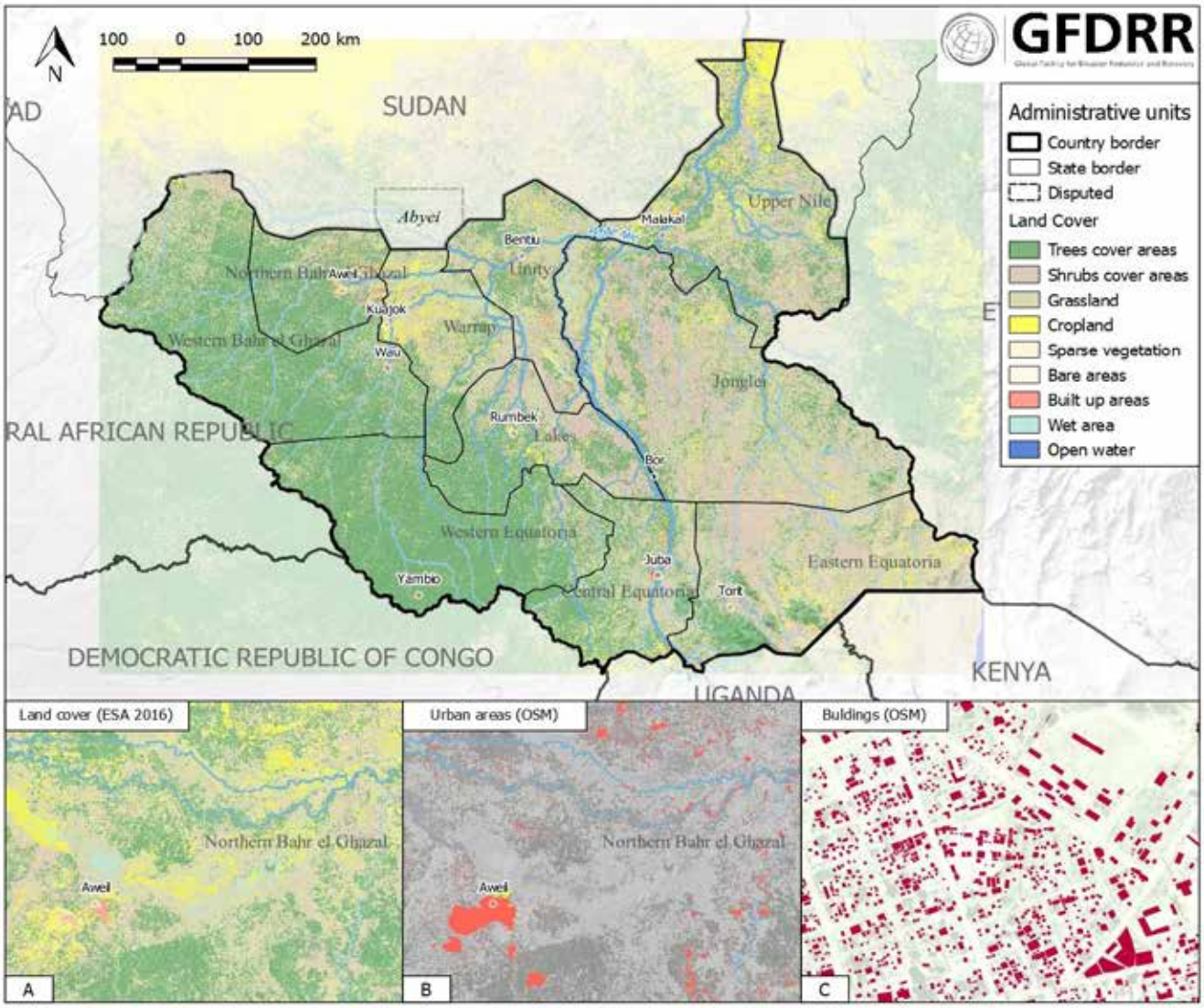
South Sudan has an estimated population of about 11.7 million people in mid-2020, half of which are under 18 years old (ICIWG). About 36 percent of the population belongs to the Dinka ethnic group, the rest are Nuer, Shilluk, Azande, Bari, or others. The vast majority of the population (80 percent) lives in the sparsely populated rural areas and relies on cattle herding or agricultural activities. The largest ethnic groups are traditionally cattle herders, a minority of groups are seasonally migrating, and a few are entirely nomadic. This creates challenges when trying to capture the demographic distribution. The average population density is estimated at 18 people per km2 (compared to an average of 36 for Sub-Saharan Africa). The most densely populated states are located in the North (Warrap and Northern Bahr el Ghazal) and in the South (Central Equatoria). Around 20 percent of the population (2.3 million people in 2020) lives in urban areas (WB data). The most populated cities are Juba, Wanyjokn, Malakal, Wau and Yei.

Figure 1. Population trend in South Sudan



Note: The population has increased from about 3 million people in 1960 to almost 12 million today. It is expected to double over the next 30 years according to UN population prospects (2019).

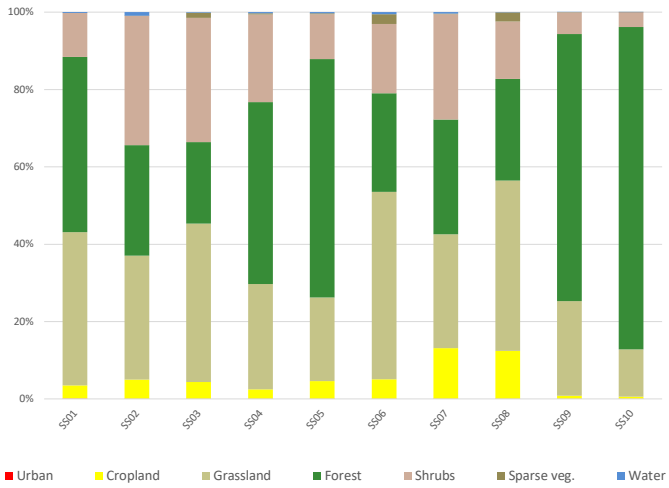
2.2. Land Cover



The land cover map displays the combination of three datasets: ESA grid at 20 m resolution (Panel A), OSM urban perimeters (Panel B), and OSM building footprints (zoom on Aweil) (Panel C).

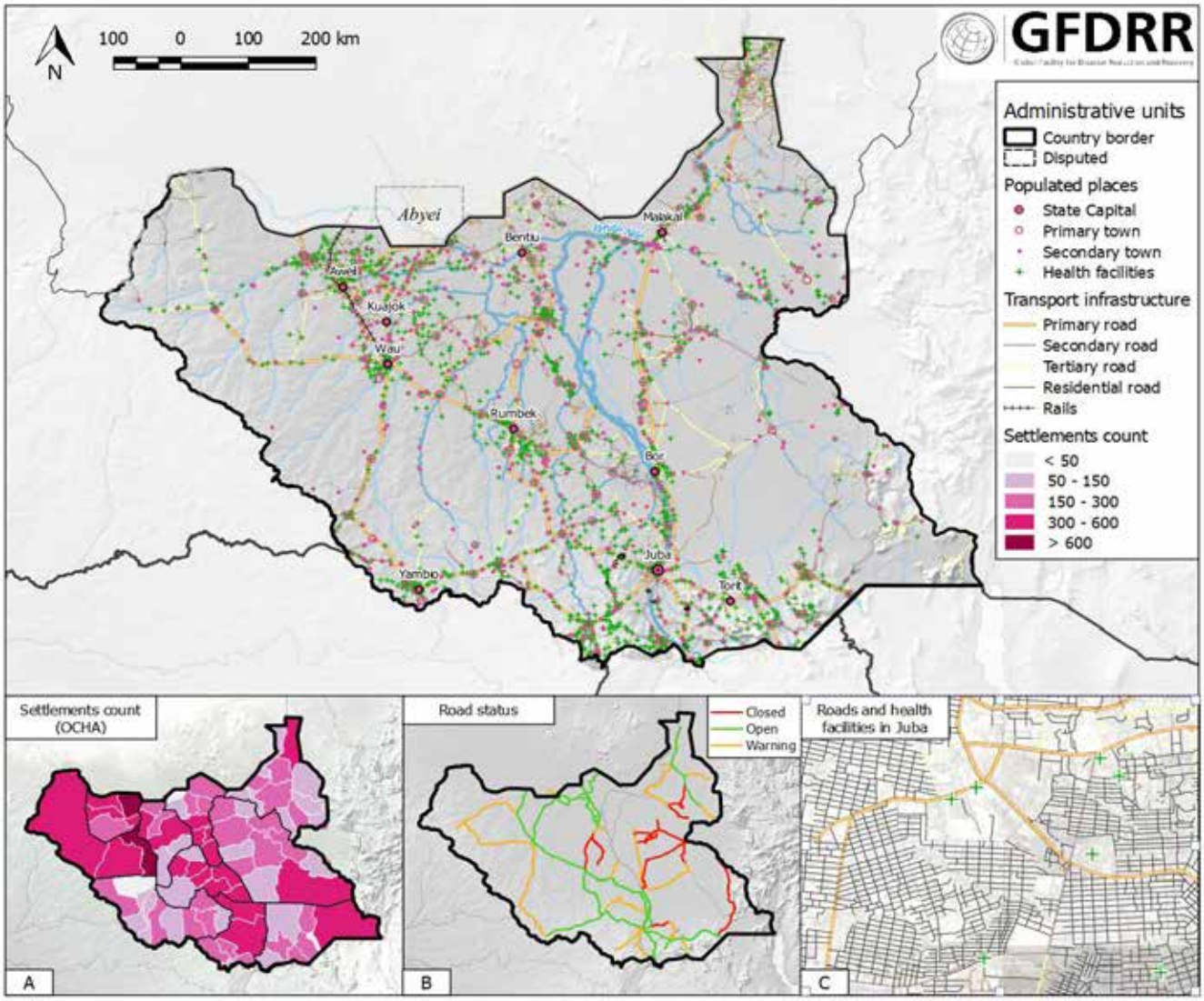
Urban areas account for about 342 km^2, although a large portion of the low-density urban areas may have been misidentified as grassland or shrubs. Only 4.3 percent of the land area is periodically cultivated, with the annual share ranging between 1 percent and 2 percent (0.65–1.30 million ha). Competition over land and water resources during the dry season is a source of conflict between nomadic pastoralists and settled farmers. Shrubs and grassland together cover about 62 percent of the land area, mostly located within Jonglei, Eastern Equatoria, Upper Nile and Unity. Forests cover one-third of the country and are mostly located in Western Bahr el Ghazal and Western Equatoria.

Figure 2. Land cover % according to ESA 2016



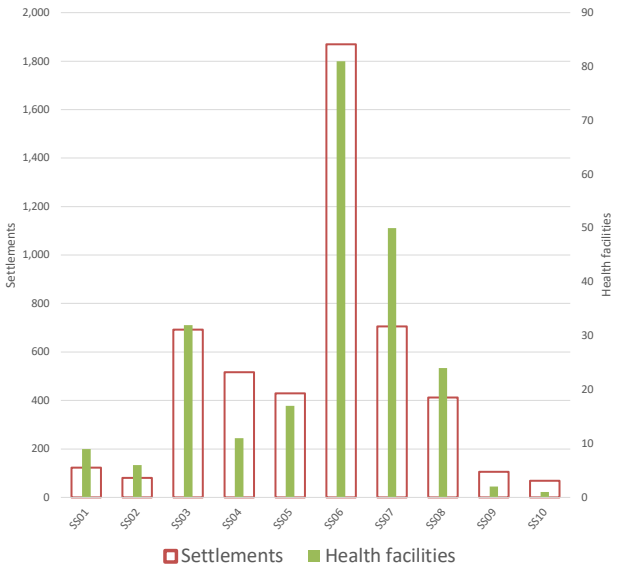
Note: SS01 = Central Equatoria; SS02 = Eastern Equatoria; SS03 = Jonglei; SS04 = Lakes; SS05 = Northern Bahr el Ghazal; SS06 = Unity; SS07 = Upper Nile; SS08 = Warrap; SS09 = Western Bahr el Ghazal; SS10 = Western Equatoria.

2.3. Roads, Settlements, and Health Facilities



The large panel shows roads (OSM), rails (OSM), health facilities (OCHA), and settlements (FAO ICA), with Panel A displaying the number of settlements per county, Panel B roads accessibility status, and Panel C transport and health facilities detail (ʒoom on Juba). There are around 18,000 villages, 750 secondary towns, and 100 primary towns in South Sudan (FAO 2019). Health facilities were mapped by World Bank and the Ministry of Health (2009) including different types of hospitals and clinics, both public and private, for a total of about 1,500 structures. Road transport is the primary means of transportation, although roads have been extensively mined and bridges destroyed during the civil war, and most of them have not since been maintained. Roads and highways are almost entirely unpaved with the exception of the Juba-Nimule highway, which is currently the most important road connecting the capital to the neighboring countries of Kenya and Uganda.

Figure 3. Number of settlements and health facilities

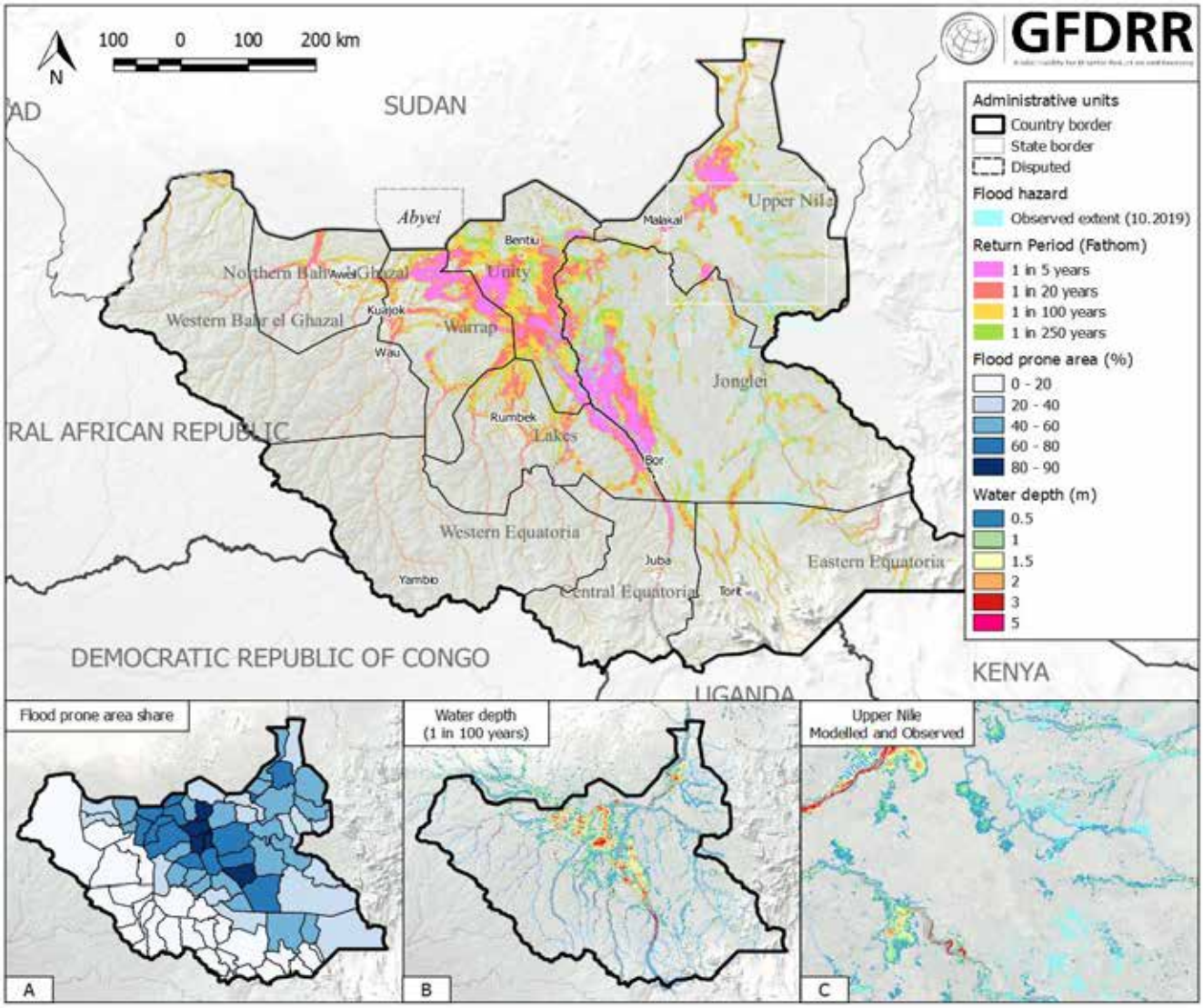


Note: SS01 = Central Equatoria; SS02 = Eastern Equatoria; SS03 = Jonglei; SS04 = Lakes; SS05 = Northern Bahr el Ghaʒal; SS06 = Unity; SS07 = Upper Nile; SS08 = Warrap; SS09 = Western Bahr el Ghaʒal; SS10 = Western Equatoria.

3. Natural Hazards

3.1. Floods

With the White Nile discharging seasonal rainfalls across the country and spreading through the Sudd marsh region, river floods are a recurring hazard in South Sudan. According to EM-DAT, from 2008 to 2019, floods in South Sudan affected more than 2 million people, killing 166 and causing widespread direct and indirect losses. Intense rainfall along the primary and secondary catchments can also trigger sudden local flash floods. The large panel shows a combination of four modelled scenarios of hazard probability (once in 5, 20, 100, and 250 years) according to FATHOM Global Flood Model (2019) and observed flooded extents and settlements during the event of October 2019, when intense precipitation affected the country, triggering extensive flooding. Locations affected by the 2019 floods are available from the IOM—a total of about 140 bomas distributed in 18 counties. About 45 locations include lon-lat information and thus could be mapped as points. The floods affected around 800,000 people in seven states, with Bahr El Ghazal, Greater Upper Nile, and Greater Equatoria being flooded for months. As of late October, Ayod, Maban, Duk, Mayom, Nyirol, Pibor, and Uror in Greater Upper Nile were among the counties most heavily hit by the floods. Enormous losses were inflicted on crop production and farm animals. Flood extents defining the October 2019 event from remote sensing are shown in cyan in the large panel.

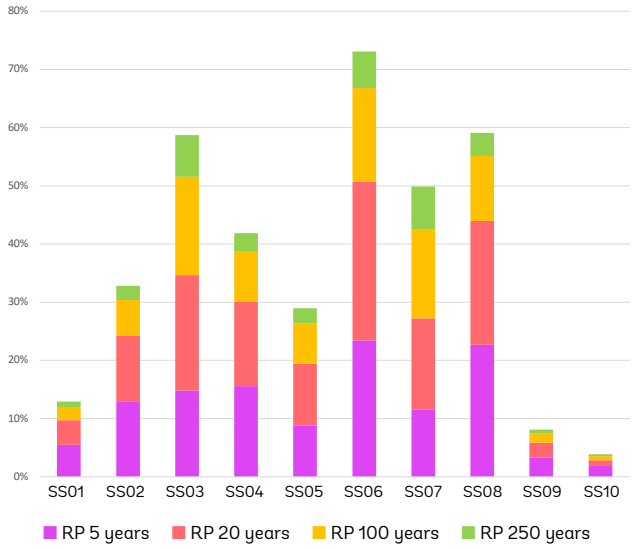


Panel A: Share of flood prone area at the county level; Panel B: Maximum water depth for scenario 1 in 100 years; Panel C: Zoom on locations flooded in 2019 in Upper Nile.

The global flood hazard model FATHOM currently represents the best option available for country-scale flood hazard mapping. It uses an improved terrain model and hydrography data (Merit-DEM and Merit-Hydro 2019) and performs hydraulic simulations at 90 meters resolution. The output dataset consists of layers representing maximum water depth for different scenarios, expressed as 'return periods' (RP) which describe the hazard intensity in relation to the probability of occurrence (that is, once in 5, 20, 100, and 250 years).

Figure 4 shows the incremental change in the extent of the flooded area according to the increase of the event intensity, which is inversely proportional to its probability. The largest increase is found for RPs below 1 in 100 years probability. Predictably, the states located in the White Nile floodplain have the largest share of flood-prone area: Unity (67 percent), Warrap (55 percent), and Jonglei (52 percent). The large map below shows the extent of modelled hazard scenario RP 100 and observed flood extents of October 2019. Flooded settlements according to the site survey are shown as red points.

Figure 4. Flood-prone area



Note: SS01 = Central Equatoria; SS02 = Eastern Equatoria; SS03 = Jonglei; SS04 = Lakes; SS05 = Northern Bahr el Ghazal; SS06 = Unity; SS07 = Upper Nile; SS08 = Warrap; SS09 = Western Bahr el Ghazal; SS10 = Western Equatoria.

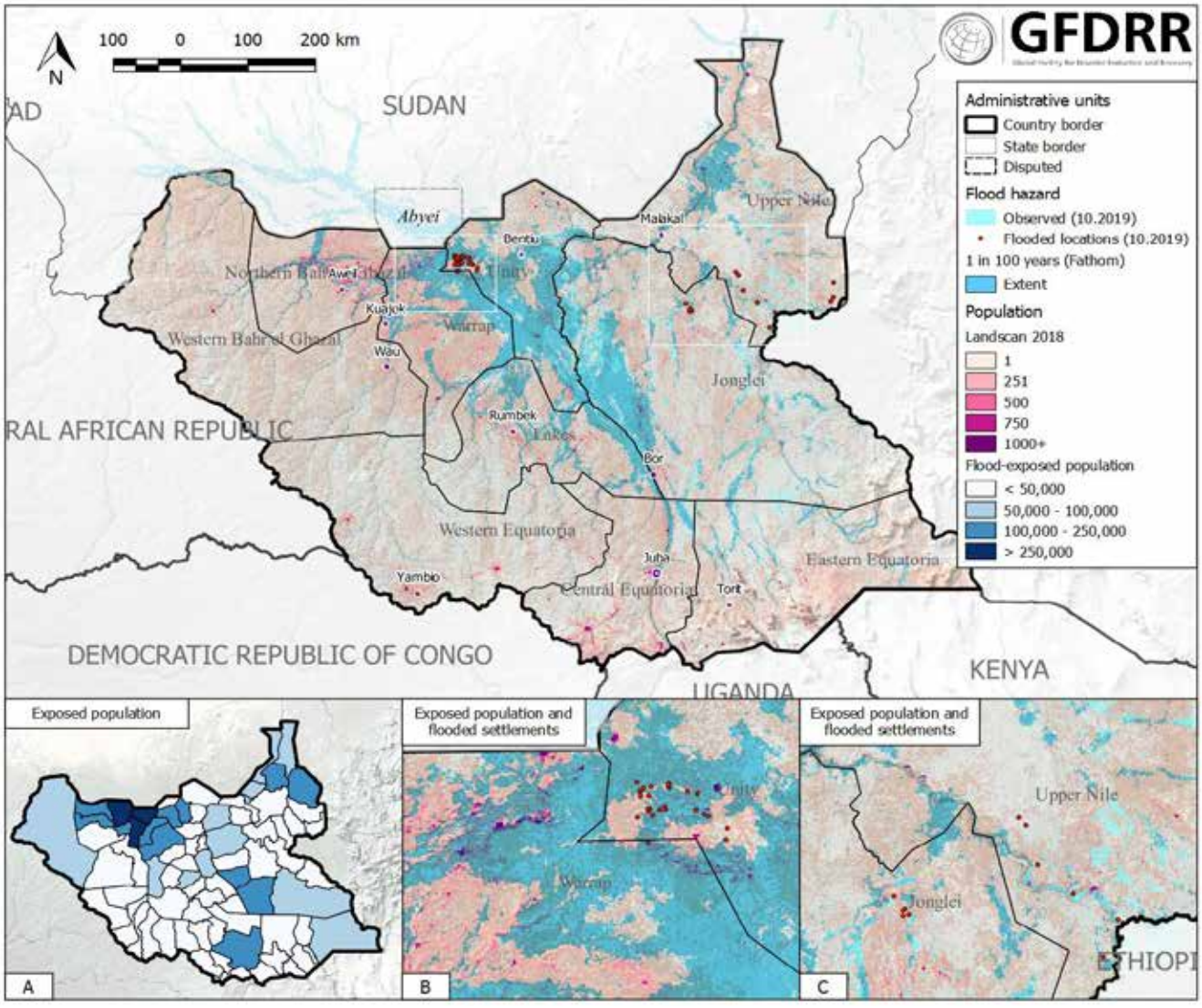


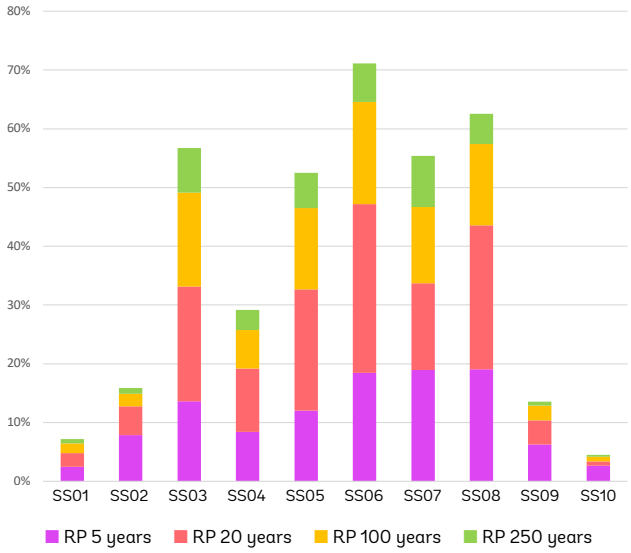
Figure 5 shows the incremental change in the population potentially prone to flooding according to the increase in the event intensity. Unity, Warrap, Jonglei, Upper Nile, and Northern Bahr el Ghazal are the most exposed to flood hazard, with more than 50 percent living within the RP 250 flood perimeter. A large uncertainty is related to the location of nomadic herders at the time of the flood. Differently, the number of flood-exposed elements for each asset layer is measured by overlay of the hazard dataset with the extents defined by the selected RPs, aggregated into one map showing incremental zones of flood hazard probability. A 0.5 meter threshold is applied to flag flood-prone areas; that is, only areas where water depth is deeper than 0.5 are considered to be flood prone.

The FATHOM flood maps emphasize the hazard along the main catchment of White Nile River but appear to underestimate secondary flood routes in the eastern sector, which also experienced floods in areas not expected to be flooded by the model.

Other indicators of flood hazard are represented by the number of exposed settlements, roads, and health facilities according to simulated flood scenario RP100, as presented in the next map. Panels A and B display the percentage of settlements and health facilities falling within the RP 100 flood extent at the county level. Overall, 26 percent of settlements, 16 percent of health facilities, and 20 percent of buildings in urban areas are exposed to a flood probability of 1 in 100 years. The highest exposure is found in Unity, where 1,870 settlements, 81 health facilities, and 97,945 buildings fall within the hazard perimeter. Upper Nile and Jonglei are also highly exposed, with 706 and 517 settlements falling in the flood-prone area.

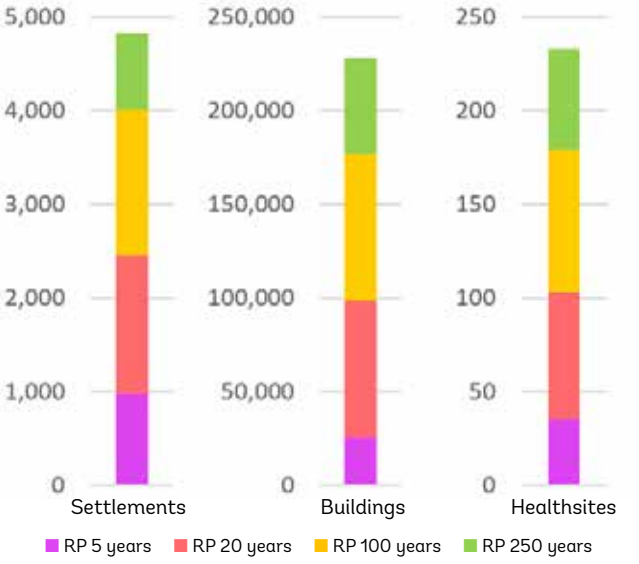
Figure 6 shows the incremental change in the number of settlements, buildings, and health facilities exposed to floods according to the modelled hazard scenarios. Like in previous charts, the largest increase in exposure is found for events with a probability between 1 in 20 and 1 in 250 years. According to this general assessment, it is estimated that enhancing hazard protection levels to 1 in 50 design floods could reduce flood hazard exposure by up to 50 percent.

Figure 5. Exposed population

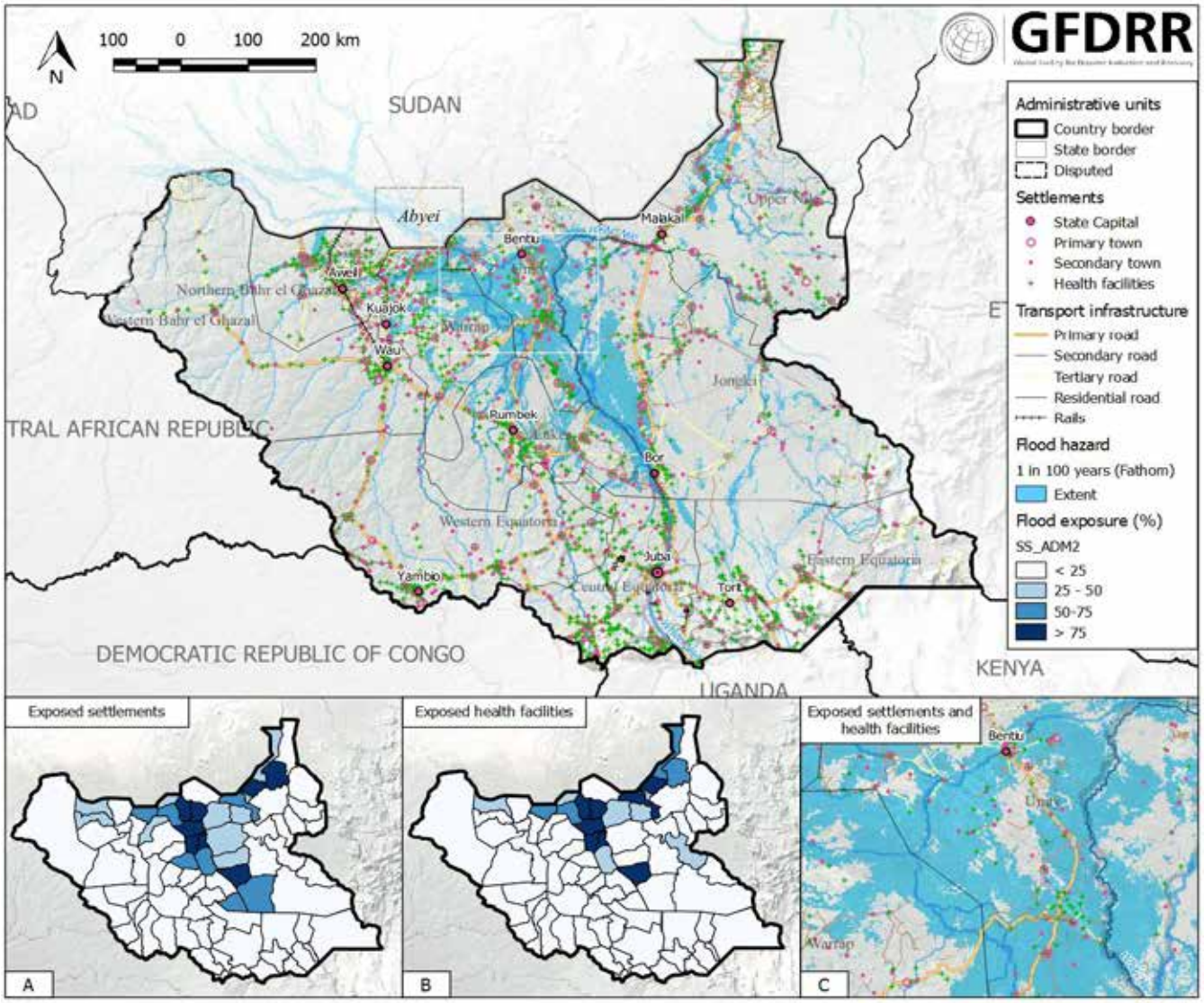


Note: SS01 = Central Equatoria; SS02 = Eastern Equatoria; SS03 = Jonglei; SS04 = Lakes; SS05 = Northern Bahr el Ghazal; SS06 = Unity; SS07 = Upper Nile; SS08 = Warrap; SS09 = Western Bahr el Ghazal; SS10 = Western Equatoria.

Figure 6. Elements at risk in flood-prone areas



Note: SS01 = Central Equatoria; SS02 = Eastern Equatoria; SS03 = Jonglei; SS04 = Lakes; SS05 = Northern Bahr el Ghazal; SS06 = Unity; SS07 = Upper Nile; SS08 = Warrap; SS09 = Western Bahr el Ghazal; SS10 = Western Equatoria.

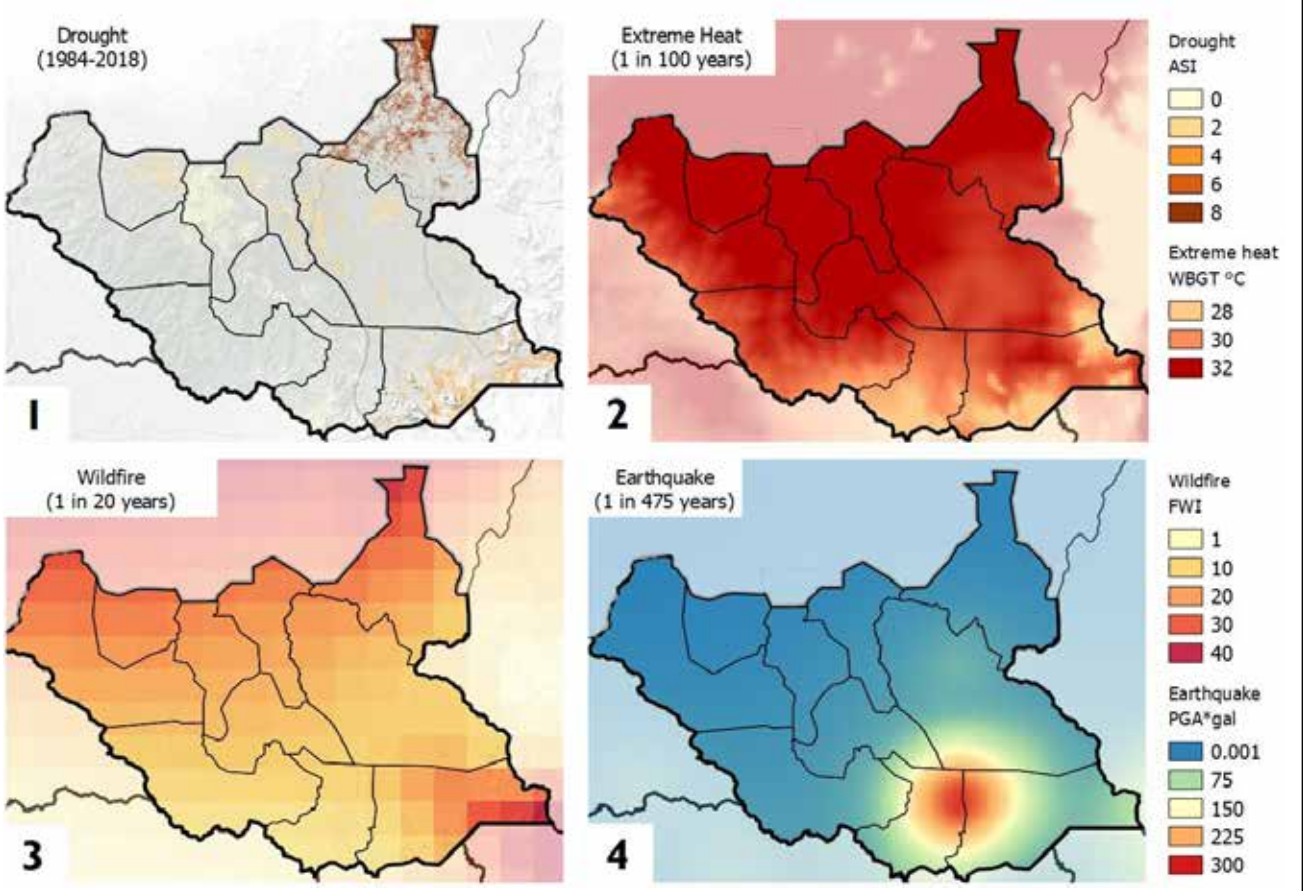


To rank states in terms of flood exposure, a synthetic index is produced combining the indicators obtained from elements at risk (table 1). The indicators are measured in relation to modelled hazard scenario 1 in 100 years (severe flood). The relative flood-prone area extent and number of affected settlements and buildings are first normalized and then averaged to define a relative indicator of flood hazard intensity. This is multiplied by the number of affected people in each state to produce an aggregated indicator of exposure. More details on the aggregation procedure is provided in chapter 5.

Table 1. Flood hazard ranking based on the normalized averaging of exposure indicators.

State	Name	Population (%)	Area extent (%)	Settlements (%)	Buildings (%)	Flood exposure index
SS01	Central Equatoria	6	12	7	6	0.07
SS02	Eastern Equatoria	15	30	5	2	0.15
SS03	Jonglei	49	52	31	32	0.51
SS04	Lakes	26	39	21	9	0.28
SS05	North Bahr el Ghazal	47	26	21	17	0.37
SS06	Unity	65	67	78	67	0.82
SS07	Upper Nile	47	43	39	22	0.47
SS08	Warrap	57	55	28	30	0.55
SS09	West Bahr el Ghazal	13	7	7	2	0.08
SS10	Western Equatoria	4	4	4	8	0.04

3.2. Secondary Natural Hazards



Secondary natural hazards maps

3.2.1. Drought

According to EM-DAT, in 2009 and 2010, a drought associated with food shortage is estimated to have affected approximately 4,300,000 people in South Sudan, particularly in the provinces of Unity, Northern Bahr Ghazal, Jonglei, Upper Nile and Eastern Equatoria. From February 2016 to November 2016, a drought associated with the 2017 South Sudan famine is estimated to have affected 3,600,000 people. According to the Integrated Country Approach and GIEWS estimates produced by the FAO, drought hazard and associated food scarcity mostly affect the eastern states, especially Upper Nile, Eastern Equatoria, and Jonglei. The drought map (panel 1 in the figure) shows the annual ASI from GIEWS over cultivated areas, averaged over 1984–2018. The ASI is based on the integration through space and time of the Vegetation Health Index (VHI) and depicts at the state level the percentage of arable land that has been affected by drought conditions over the entire cropping season. These results are in agreement with the results provided by ICA (2016) ranks at the county scale.

3.2.2. Extreme Heat

Extreme heat and related health impacts are a common hazard at these latitudes, but there is no reliable source to properly estimate local extremes. Extreme heat hazard is classified using the daily maximum Wet Bulb Globe Temperature (WBGT, in °C) from VITO dataset (2017). Heat stress studies apply thresholds of 28–32°C to categorize heat stress risk, as indicated in the extreme heat map (panel **2** in the figure). The damaging intensity thresholds are applied following this definition of slight/low (<28°C), moderate/high (28–32°C), and severe/very high (>32°C) heat stress. Evidence from Sub-Saharan Africa suggests increased mortality with temperature over 31°C for children under 5 years and adults over 65 years. Juba's average temperature ranges between 26°C and 32°C and it is warming at 0.4°C per decade, a rate faster than almost anywhere else on earth (Lamanna 2019). Developing towns and informal settlements (for example, emergency camps) are especially vulnerable to heat-related illness as people are ill-equipped to adapt to increasing temperatures.

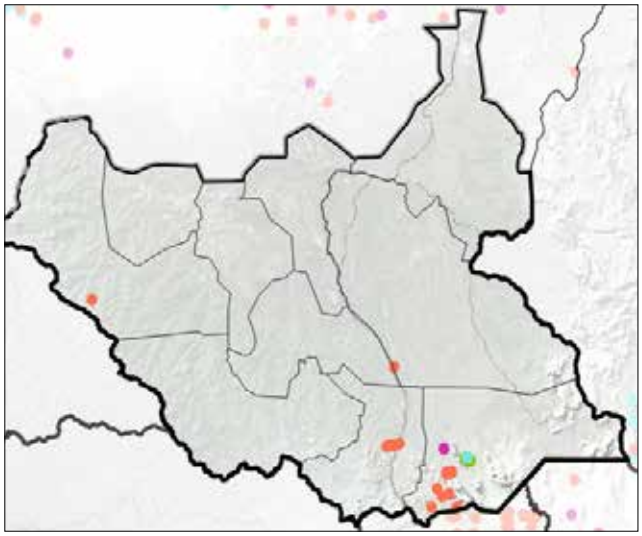
3.2.3. Wildfires

Wildfires are not among the most critical hazards in South Sudan; they can happen often, mainly due to human action (for example, burning of wastes and land clearing), but rarely evolve into life-threatening events. Feature layers from the Global Fire Atlas provide a description of the most important fire events in the past ranked as fastest, longest, and largest fires. Two of the fastest spreading fires in 2006 and 2016 were located in the South Sudan savanna. In 2007, one of the largest wildfires spread from the Central African Republic, affecting the region of Western Bahr el Ghazal. The wildfire map (panel 3 in the figure) shows the FWI map from Vitolo et al. (2019), which measures the weather conditions (temperature, humidity) associated with a wildfire. Vegetation layer is used to mask the hazard areas, but no fuel model is applied. Coherently with the drought hazard map, weather conditions are more likely to cause or propagate fires in Upper Nile and Eastern Equatoria.

3.2.4. Earthquake

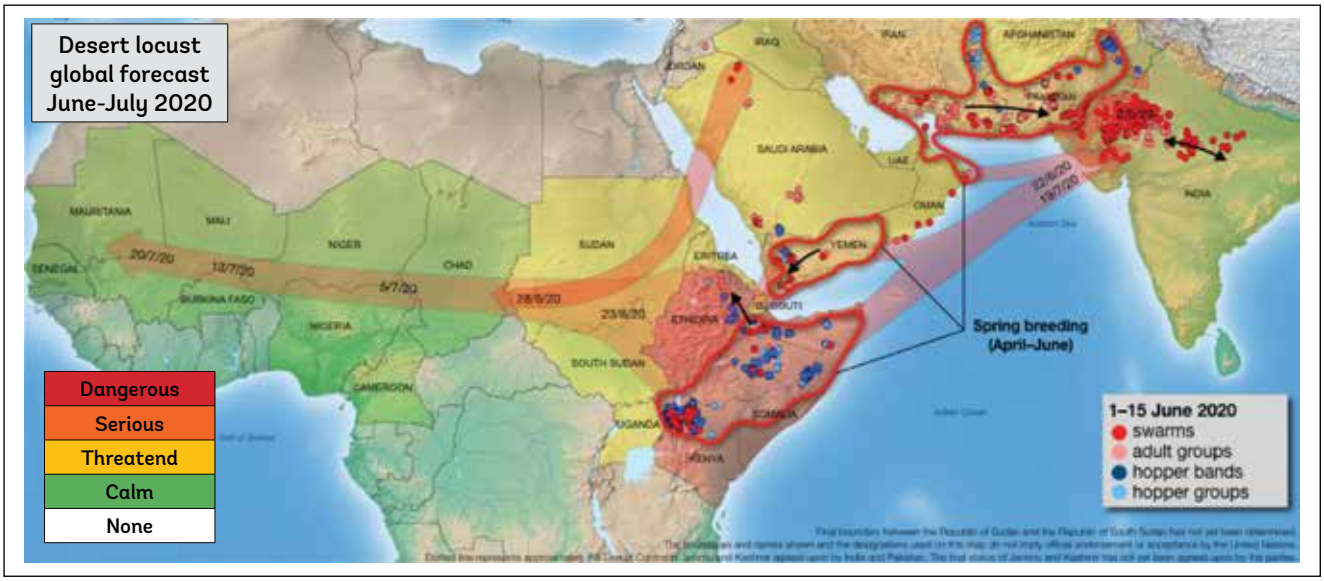
South Sudan shows seismic activity in the southernmost part of the country due to the presence of several systems, such as the Aswa Fault, the East African Rift System, Afro-Arabian fault, and Afar depression. One of the largest earthquakes ever recorded in Africa (magnitude M_s 7.2) occurred about 100 km northeast of Juba on May 19, 1990. Four days later, two more large earthquakes (M_s 6.4 and M_s 7.0) occurred about 75 km northwest of Juba, in the Nile Valley. These earthquakes were associated with two fault systems: one east of the Nile with azimuth southeast and one along the Nile Valley with azimuth north-northeast. The hazard classification is based on GAR 2017 seismic hazard map for an RP of 1 in 475 years (panel 4 in the figure). The unit is Peak Ground Acceleration (PGA) × gals (1 gal = 1 cm/sec/sec). The hazard area covers Central and Eastern Equatoria and the southern part of Jonglei. Juba is located within the high-category hazard area.

Locust invasion



3.2.5. Locust Invasion

In addition to hydrometeorological and geophysical hazards, desert locust invasion poses another serious threat to the region. The desert locust is one of the most devastating pests, feeding on enormous quantities of green vegetation, including crops, pasture, and fodder. A typical swarm can be made up of 150 million locusts per km^2 and is carried on the wind, up to 150 km in one day. Swarms arrive from Asia and the Arabian Peninsula to Western Africa, crossing Ethiopia and



Kenya to reach South Sudan. Locusts follow heavy rainfall, which provides them the optimal breeding conditions. They have two behavioral phases: (a) the solitary phase (low numbers and densities), when they behave as individuals (hoppers), and (b) the gregarious phase, when they form dense and highly mobile bands of hoppers and flying swarms of adults (winged locusts), which behave as an entity. Swarms in South Sudan appear to have increased in frequency during the last decades. Since January 2020, according to the FAO's Locust Watch (map below), a large population of desert locusts gathered in Kenya, covering more than 10,000 km^2 of land, reaching the southern states of South Sudan (principally Eastern Equatoria and Central Equatoria), although the country was less severely affected than others in Africa and South Asia.

3.2.6. Secondary Hazards Index

To classify different intensity units into comparable hazard categories, we use the thresholds 'High', 'Medium', and 'Low' for hazard intensity from the Global Facility for Disaster Risk Reduction (GFDRR) tool ThinkHazard, shown in table 2. Locust invasion is excluded from ranking due to the extreme variability of this natural hazard and lack of thresholds.

Table 2. Thresholds applied for secondary hazard ranking

Thresholds	ASI	°C	FWI	PGA×gal
High (H)	8	32	30	200
Medium (M)	7	28	20	100
Low (L)	3	25	15	25

Hazard classification is shown in the maps below for droughts, extreme temperature, wildfires, and earthquakes. These hazards are less dependent on local features compared to floods, meaning that their effects are felt on a much wider extent. Therefore, it is more appropriate to estimate exposure to these hazards at the state level. Hazard classes are combined with population numbers in table 3 to provide a general account of the exposure for each state. In general, Upper Nile is potentially the most exposed to combined hazards (drought, extreme heat, and wildfire), followed by Unity, Warrap, and Northern Bahr El Ghazal. These are also the most populated states in South Sudan, accounting for 43 percent of the total population.

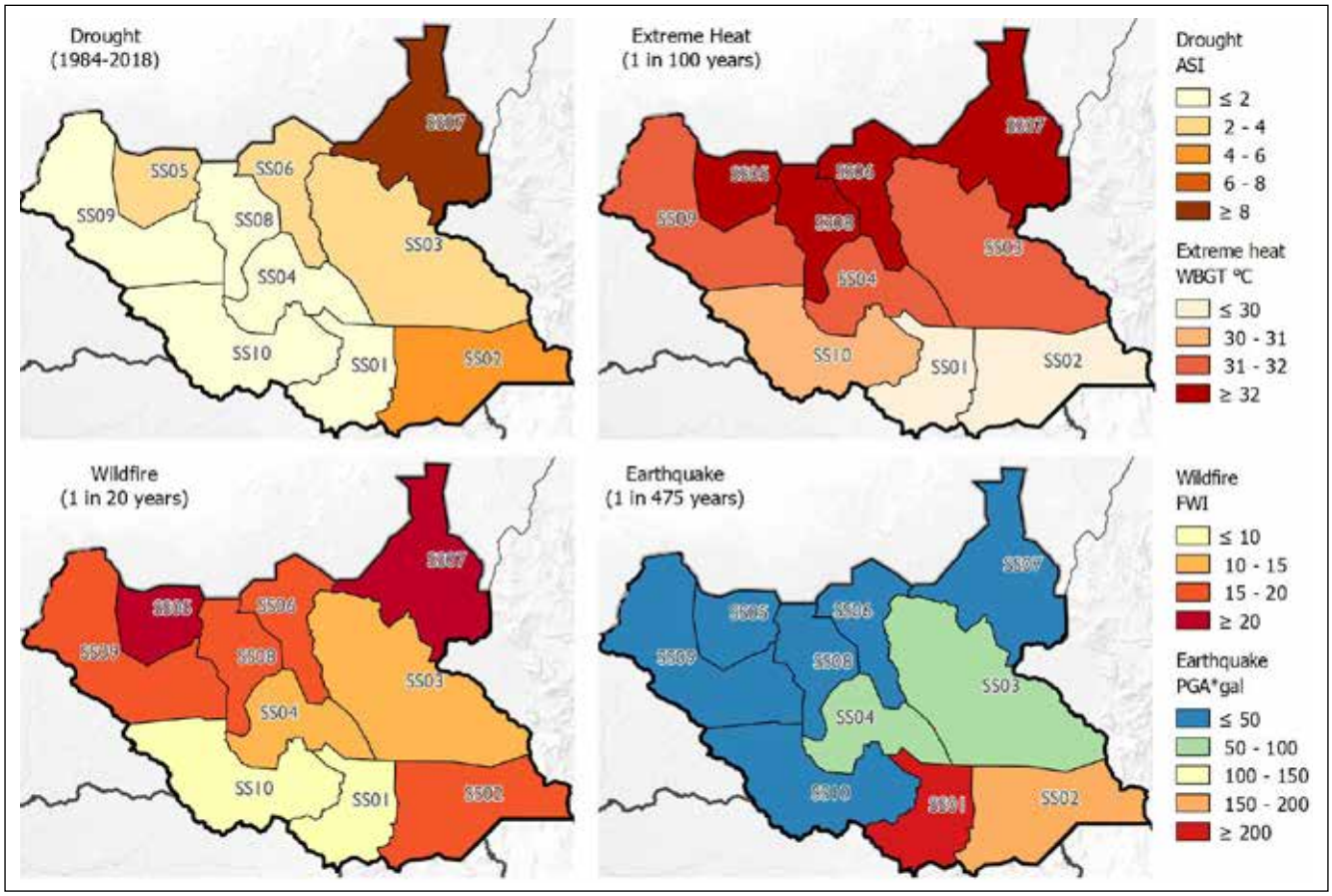
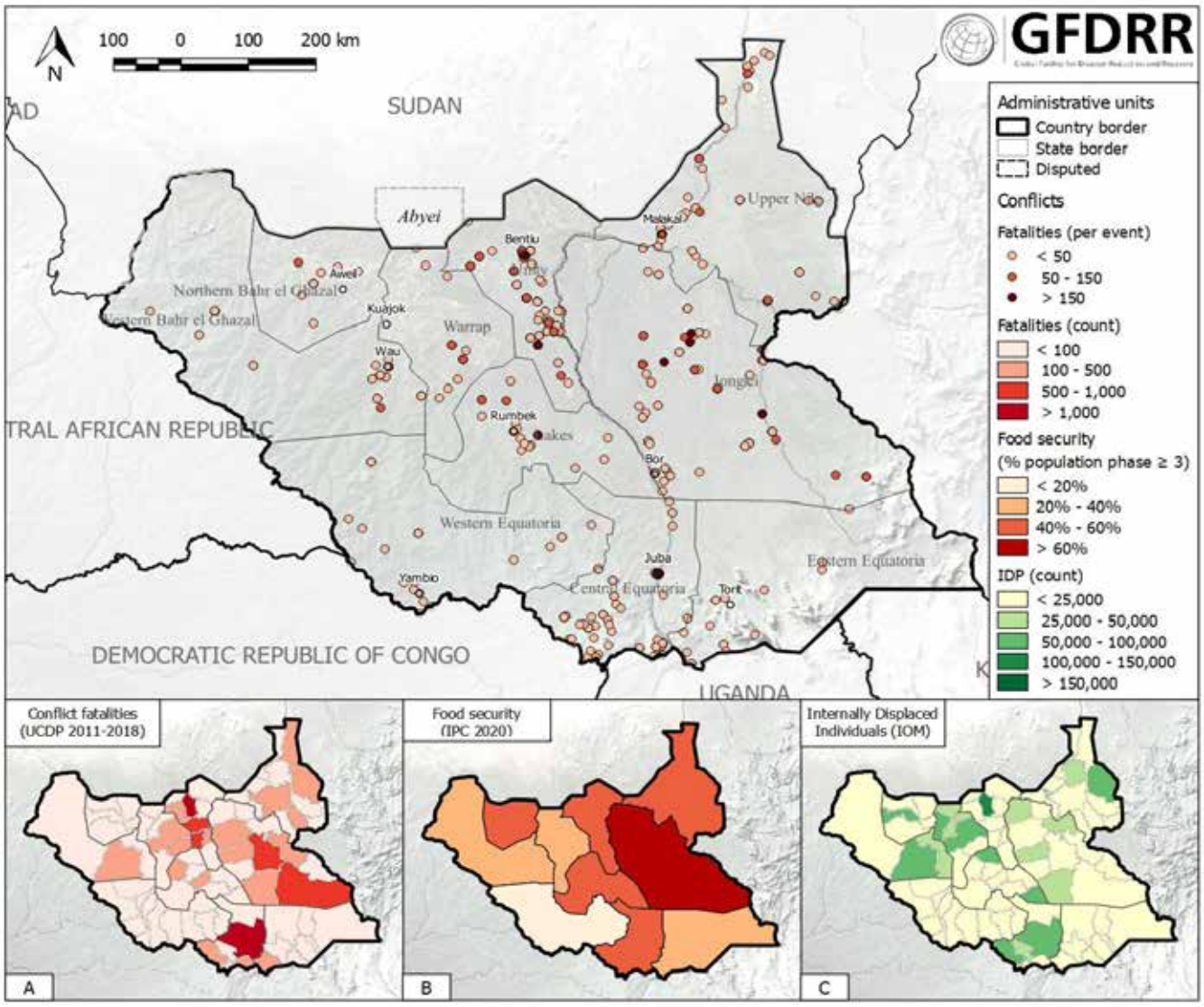


Table 3. Secondary hazard ranking based on thresholds.

State	People (Million)	Drought	Extreme heat	Wildfire	Earthquake
SS01	2.8	L	H	L	H
SS02	1.1	M	H	M	H
SS03	1.2	L	H	L	M
SS04	0.8	L	H	L	M
SS05	1.8	L	H	H	L
SS06	0.8	M	H	M	L
SS07	1.4	H	H	H	L
SS08	1.9	L	H	M	L
SS09	0.9	L	H	M	L
SS10	0.9	L	H	L	M

Note: SS01 = Central Equatoria; SS02 = Eastern Equatoria; SS03 = Jonglei; SS04 = Lakes; SS05 = Northern Bahr el Ghazal; SS06 = Unity; SS07 = Upper Nile; SS08 = Warrap; SS09 = Western Bahr el Ghazal; SS10 = Western Equatoria. L = Low; M = Medium; H = High.

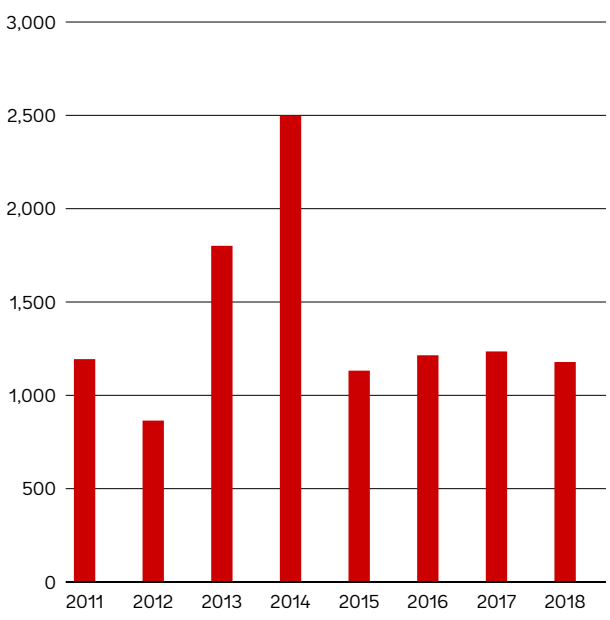
4. Fragility, Conflict, and Violence



4.1. Conflict-related Violence

South Sudan is one of the most fragile states in the world (Fragile State Index 2019). Having achieved independence in 2011 after decades of armed conflict, the country itself descended into civil war in December 2013, which reflected and exacerbated long-standing tensions along ethnic groups. The impacts of violent conflict on South Sudan has been calamitous. An estimated 380,000 people died between December 2013 and April 2018 (Checchi et al. 2018). Approximately half of these deaths were due to violence, while the other half were attributed to indirect factors (for example, disruptions in health services and increased food insecurity). As shown in figure 7, the highest number of fatalities (2,500 people) was recorded in 2014 but has remained over 1,000 deaths per year since then. UCDP data in the large map display individual events of organized violence (phenomena of lethal violence occurring at a given time and place) from 2011 to 2018. Panel A shows the total number of conflict fatalities at the county level.

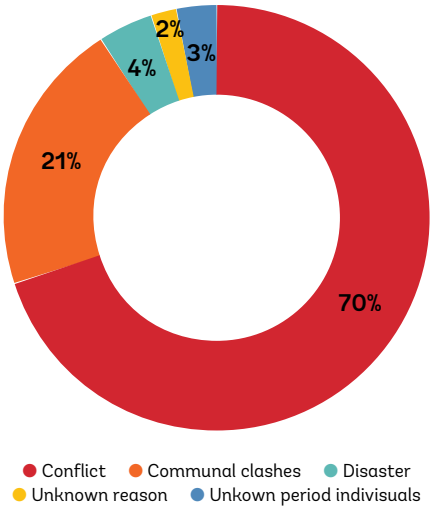
Figure 7. Conflict-related fatalities



4.2. Forced Displacement

Since December 2013, conflict and instability in South Sudan resulted in large-scale internal and cross-border displacement of over 4 million individuals. In September 2018, after the Revitalized Agreement for the Resolution of the Conflict in South Sudan (R-ARCSS), there have been overall improvements in security with people returning to their homes, but fighting and communal clashes (frequently linked to cattle raiding) continue to trigger new displacements and the situation remains volatile (IOM 2019).

Figure 8. Reason for displacement (total IDPs)

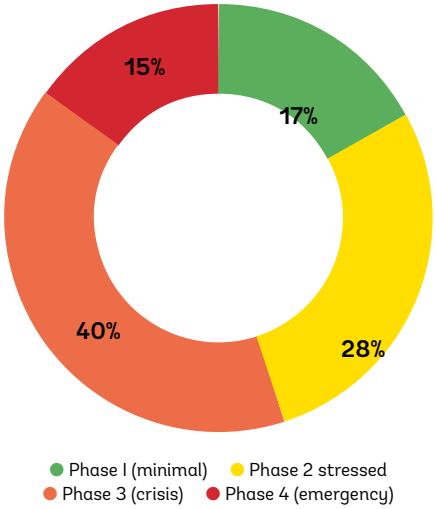


Statistics of internally displaced persons (IDPs) are obtained from the IOM DTM database, which includes the number of IDPs, number of returnees, origin and destinations, the reason for displacement, and type of accommodation from 2013 to 2019 at the payam scale. Panel C shows the total number of IDPs per county of origin (2013–2020). The most affected states in terms of population shares are Unity (21 percent), Warrap (20 percent), Upper Nile (17 percent), Lakes (16 percent), and Central Equatoria (15 percent).

The highest number of IDPs was in 2014–2015, when the most incidences of violence and fatalities also occurred. The cause of displacement is conflict in 70 percent of cases; other main causes are communal clashes (21 percent) and natural disasters (4 percent). Additional information and further analysis about displacement in South Sudan are provided in Part II of the report.

4.3. Food Security

Figure 9. Population in Crisis, Emergency, and Humanitarian Catastrophe



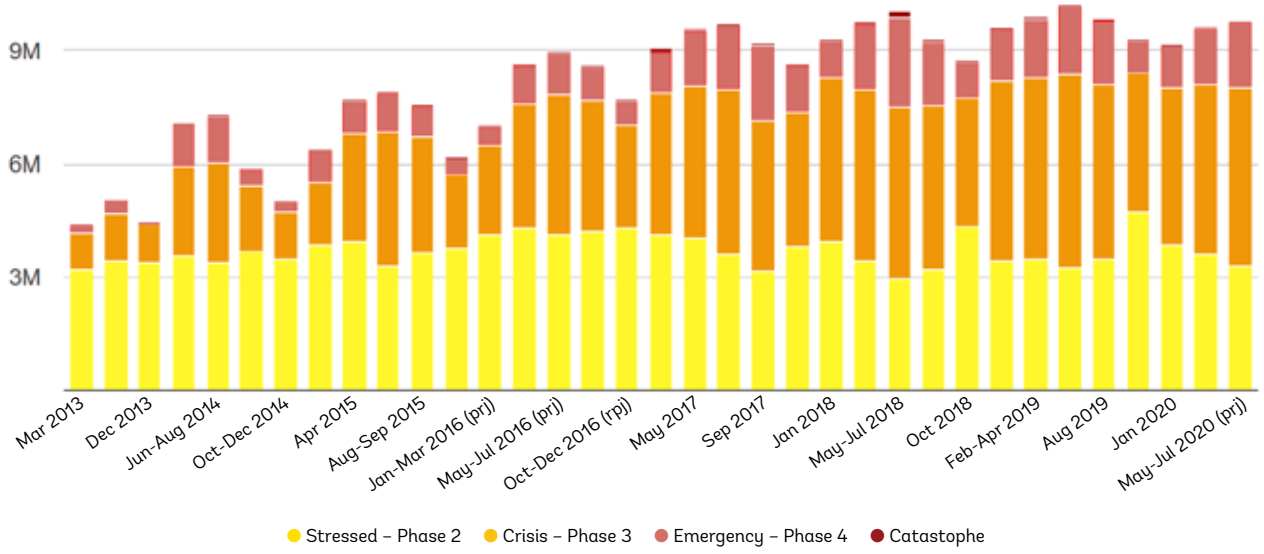
Source: FAO IPC report May/July 2020.

The cumulative effects of natural hazards, population displacement, conflicts, economic crisis, and prolonged years of asset depletion contributed to high levels of acute food insecurity in the country, with crop production in 2019 meeting only 63 percent of the national needs. Panel B ranks current food security status according to the FAO IPC as the share of population affected by food insecurity: 15 percent of the population (about 1.75 million people) is in Emergency (IPC Phase 4), and 40.5 percent (about 4.74 million people) is in Crisis (IPC Phase 3), as shown in figure 9. According to the March 2020 data, the acutely food insecure population is estimated at 6 million people, growing to 6.5 million in June even in the presence of humanitarian food assistance. Acute malnutrition remains a significant problem: around 2 million people require nutrition assistance, including 1.3 million children facing severe or moderate acute malnutrition and 470,000 malnourished pregnant and lactating women, according to South Sudan's 2020 Humanitarian Needs Overview. The most acute food insecurity conditions are in the flood-affected counties of Akobo, Duk, and Ayod (in the Northeast of the country).

Figure 10 from the IOM displays the evolution of the food security crisis since 2013. In July 2020, 33 counties are classified in Emergency (IPC Phase 4), 37 are classified in Crisis (IPC Phase 3), and 8 are classified in Stress (IPC Phase 2) conditions[21].

[21] FAO (Food and Agriculture Organization of the United Nations). 2020. *IPC Maps 2014–2019 of South Sudan.* (Online: http://www.fao.org/emergencies/resources/maps/detail/en/c/1141779)

Figure 10. Number of people under challenged food security conditions in South Sudan, 2013-2020



4.4. Cattle Raiding

Agropastoralism is the main livelihood system in rural areas. Although agropastoralism involves both livestock rearing and crop production, a household's financial capital is held in the form of livestock. Livestock supply milk and other foods, which are sold to purchase cereals for food and meet other domestic needs. Due to the seasonality of food production, milk is a critical food at specific times of the year, when other foods (for example, cereals) are not readily available. In addition, for both the Dinka and Nuer people, cattle are fundamental to relationships and social structures; they are a profound measure of wealth, status, and personal influence. Cattle are used to pay debts, fines, and bride prices and are also central to religious and artistic culture. Information on trends in livestock points to a decline in livestock among wealthier and middle-wealth households as a result of targeted raiding during the recent conflict. Consequently, affected households have shifted into a category of poor households; that is, there are now higher numbers of poor households in South Sudan, with relatively few animals. Average livestock ownership in South Sudan was estimated at only 0.87 tropical livestock units per capita. This low level of livestock ownership is broadly consistent with the recent categorization of 5.4 million people in South Sudan as severely food insecure (IPC Phases 3, 4, and 5). At the same time, South Sudan's oil wealth up to 2015 and conflict since 2013 seem to have a created a class of 'super-rich' elites with large herds of livestock (Catley 2018). In addition to problems such as conflict and market access, the critical livelihood issue for many households is the extent to which they can rebuild their herds.

Maps, trend analysis, and updated information are available from the United Nations High Commissioner for Refugees (UNHCR) and Community Empowerment for Progress Organization (CEPO), although the map data are not open-source and thus could not be included in our index.

5. Intersectional Risk Assessment: The Disaster-Fragility Index

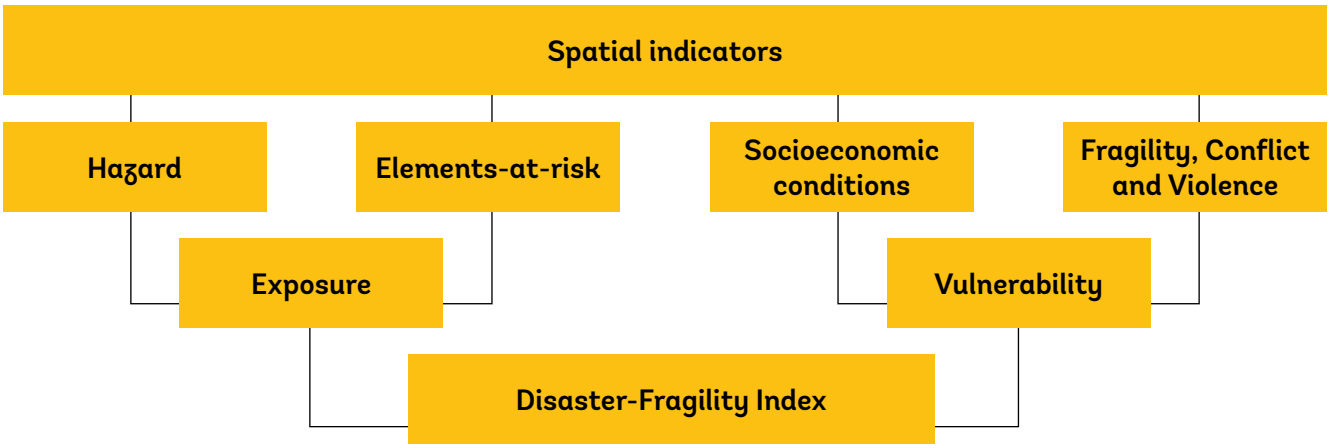
Taken together, the above disaster- and FCV-related risks can be represented in the form of an index-based intersectional risk assessment. This 'Disaster-FCV Index' combines the different components into a synthetic index score, to provide a ranking of administrative units according to their disaster-fragility. Due to the limited quantitative information for many of these components in South Sudan, guided by the frameworks provided by van Westen (2018), Fekete (2009), and Fuchs and Thaler (2018), an indicator-based approach is used to build the index, whereby heterogeneous indicators are combined in a quantitative way to enable the comparison of different geographic areas. Selected indicators were produced by aggregating individual datasets at the state level and then combined as shown in figure 11. Arithmetic and geometric aggregations are applied to control the trade-offs between indicators. No specific weight is assigned to individual indicators or index.

First, the Exposure Index estimates the total amount of elements at risk at the state level, which are susceptible to suffer losses due to natural hazards, capturing both the social (population) and physical assets (settlements and buildings). For each hazard type (that is, flooding, drought, extreme heat, wildfires, and earthquakes), the exposure score is calculated by multiplying the hazard intensity with the total elements at risk at the state level. The exposure score is normalized between 0 and 1 (see section 3.1), and the normalized scores are then averaged across all hazard types to obtain one multihazard exposure index at the state level (see Panel A).

Second, the Vulnerability Index is generated by combining socioeconomic and FCV data. FCV data include indicators related to conflict fatalities, food security (IPC), and displacement (IDP), as presented in chapter 4 (see Panel C). Two more indicators have been added to represent the socioeconomic conditions (see Panel B): (a) HDI, a statistic composite of life expectancy, education, and per capita income indicators, which are used to rank countries and regions into four tiers of human development, and (b) age dependency ratio (ADR), a measure of the age structure of the population, which relates the number of individuals who are likely to be 'dependent' on the support of others for their daily living—the young and the elderly—to the number of those individuals who are capable of providing this support. Both socioeconomic and FCV indicators are first normalized and then averaged (that is, no weights).

Finally, the Exposure and Vulnerability Indexes are normalized and combined into the Disaster-FCV Index using the geometric mean (see the large map). Table 4 summarizes the Exposure, Vulnerability, and Disaster-FCV Index scores at the state level. This is just one example of how the indicators can be combined to obtain a synthetic index. The approach (selected indicators and aggregation procedure) may vary depending on the specific scope of the assessment. This index, or similar ones produced from these data, provide a cumulative overview of the most critical risk factors in the country and may thus be applied to identify or prioritize areas for disaster risk reduction or to plan and allocate humanitarian relief and prevention efforts. This index is however not intended to inform the design of specific measures at the local scale, as this would require more granular data and a more detailed assessment.

Figure 11. Composition of Disaster-Fragility Index



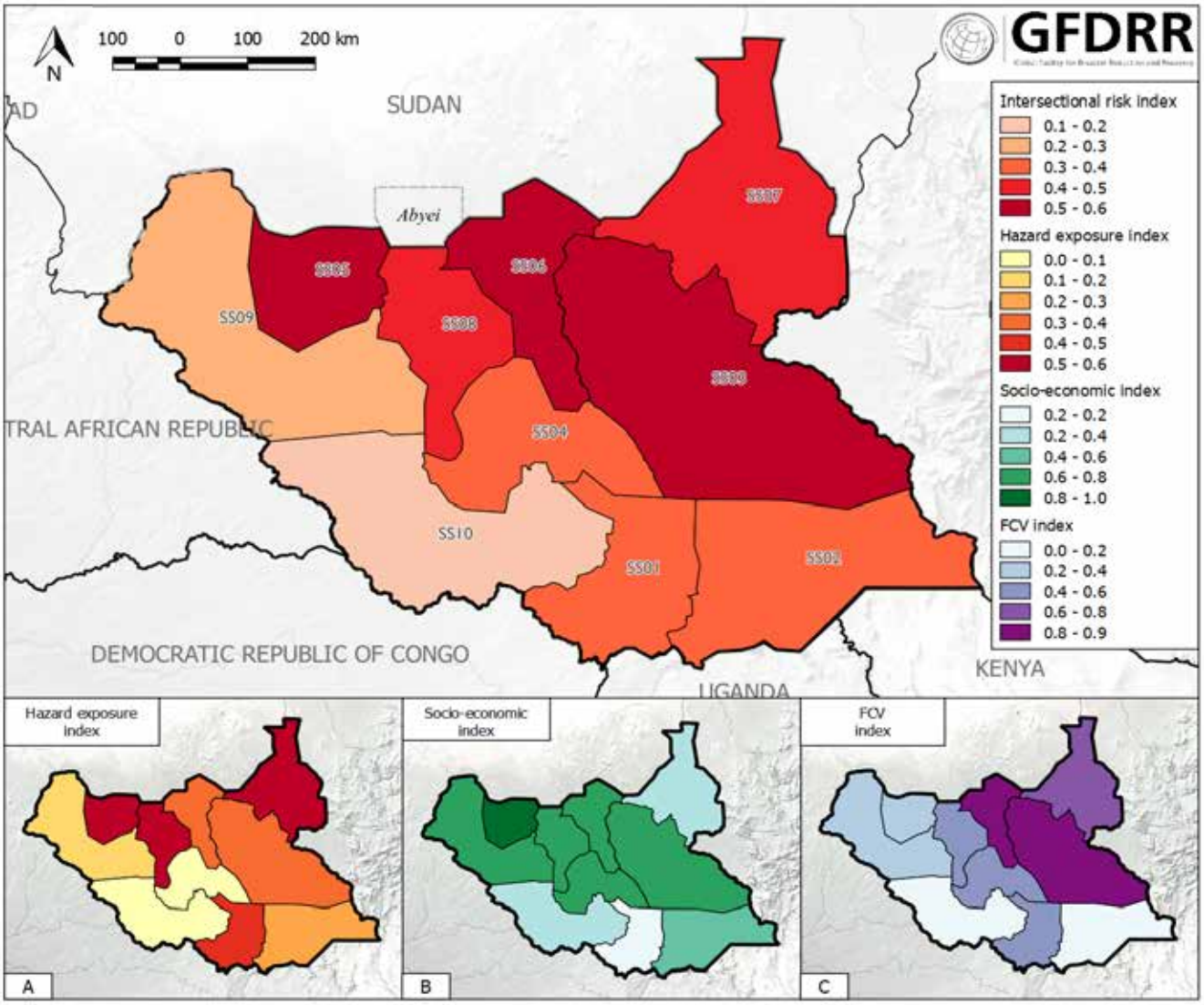


Table 4. Components of the intersectional risk assessment and related indicators

State		Population (million)	Exposure Index	Vulnerability Index	Disaster-FCV Index
SS01	Central Equatoria	2.8	0.37	0.32	0.34
SS02	Eastern Equatoria	1.1	0.34	0.41	0.37
SS03	Jonglei	1.2	0.38	0.81	0.56
SS04	Lakes	0.8	0.16	0.68	0.32
SS05	Northern Bahr el Ghazal	1.8	0.48	0.70	0.58
SS06	Unity	0.8	0.40	0.91	0.60
SS07	Upper Nile	1.4	0.52	0.56	0.54
SS08	Warrap	1.9	0.34	0.74	0.51
SS09	Western Bahr el Ghazal	0.9	0.14	0.39	0.23
SS10	Western Equatoria	0.9	0.07	0.13	0.10

6. Output Data in Detail

The results of the project are provided in a folder containing the following:

- **Maps and technical report** (this document): Synthetic document with hazard and exposure maps includes a description of input, processing, and output; statistics of error; insights on hazard ranking; and discussion on usage limitations.
- **SS_summary.xlsx** (datasheet): Summary table of hazard, exposure, losses, and risk.
- **SS_index.xlsx** (datasheet): Hazard, exposure, and vulnerability indicators and aggregation into intersectional risk index.
- **SS_pop-stats.xlsx** (datasheet): Catalogue of population datasets, statistics details, comparison, and error estimate.
- **SS_DTM-IOM_summary.xlsx** (datasheet): Catalogue of population datasets, statistics details, comparison, and error estimate.
- **SS_GDB** (geodatabase folder): Collection of spatial data split as input and output and organized by type of content (base, hazard, and FCV) and two boundary layers providing synthetic information:
  - **SS_ADM2.shp** (shapefile): County boundaries and associated flood hazard and flood exposure information
  - **SS_ADM1.shp** (shapefile): State boundaries and associated indicators for population, secondary natural hazards, socioeconomic conditions, and FCV.

The information from individual datasets is combined with the boundary layers as field attributes. Detailed RP exposure information about elements at risk (populated places, buildings, and health facilities) is stored in separate thematic shapefiles located within the SS_GDB, in the folder Hazard\Flood\FATHOM\Exposure. All layers are mapped using Coordinate Reference System EPSG 4326 (WGS84). The global hazard layers shown in the report can also be accessed by the GFDRR GeoNode available at www.geonode-gfdrrlab.org. Flood extent observations for October 2019 are obtained from ESA and NASA observations. Table 5 lists the indicators combined to produce the intersectional risk index.

Table 5. Components of the intersectional risk assessment and related indicators

Component	Indicator	Type
Hazard	Floods	Extent and severity
Hazard	Drought	Severity
Hazard	Extreme heat	Severity
Hazard	Wildfires	Severity
Hazard	Earthquakes	Severity
Elements at risk	Population	Count
Elements at risk	Settlements	Count
Elements at risk	Buildings	Count
Vulnerability	HDI	Index (max = best)
Vulnerability	ADR	Ratio (max = worst)
FCV	Conflict fatalities	Count (max = worst)
FCV	Food security	Index (max = worst)
FCV	Displacement	Count (max = worst)

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Annex A: Data Validation and Gaps

Land Cover and Built Environment

Boundaries for three administrative levels (country [ADM0], 10 states [ADM1], 78 counties [ADM2]) updated for 2018 are provided by OCHA through the Humanitarian Data Exchange (HDX). Abyei State is currently a disputed area and is excluded from this assessment. Additional divisions are *payams* (540 subcounties) and *bomas* (2,500 towns), only listed as tables. Boundary files are suitable for database or GIS linkage with the population estimate tables at county scale (2019). OCHA also provides the location and size ranking of populated places as point features, updated in 2017, which is similar to what is available from ICA (2016). The location and typology of health facilities is available from OCHA (2009), while the 2016 update adds 414 new facilities which are not coupled with lat-lon reference). Water points and main rivers are provided by FAO (2012). The most updated and detailed land cover product is the map from ESA (2016), a 20 m resolution grid (figure A.1), while the OSM dataset includes several feature types that describe natural and artificial elements such as buildings, transport infrastructures (road network), and land cover areas. The quality is good when validated against satellite imagery (Google) by means of aerial inspection (figure A.2).

Figure A.1. Example of land cover definitions from ESA 2016 (left) and buildings footprints from OSM (right)

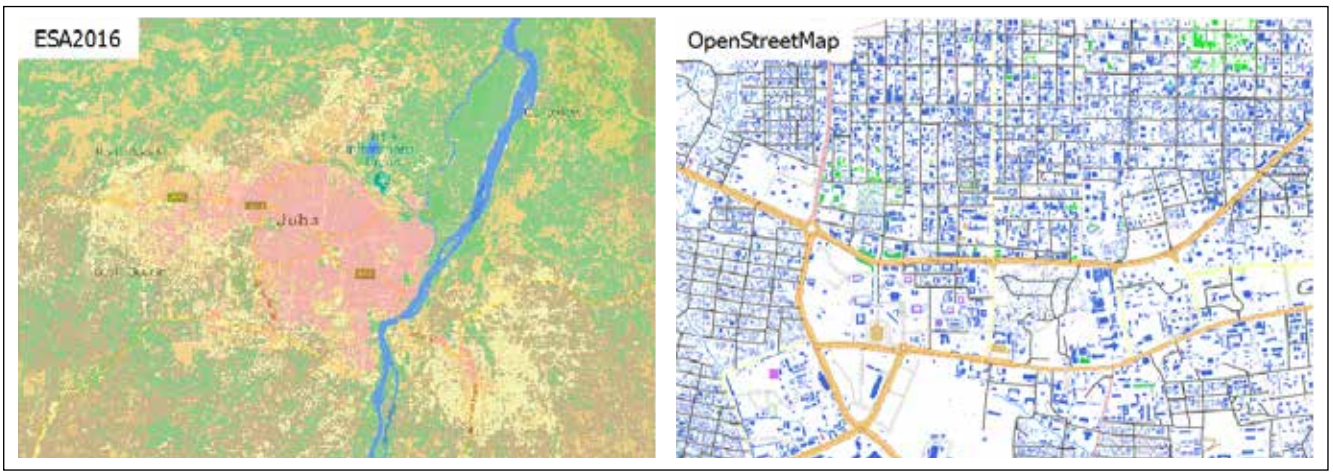
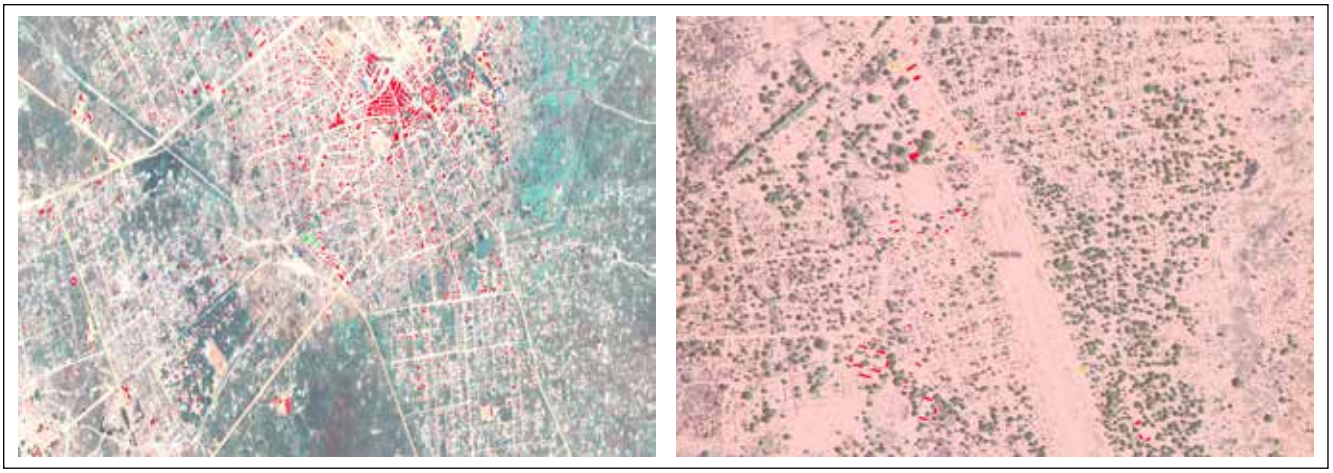


Figure A.2. Example of OSM buildings and land cover data



Note: Individual buildings are well identified in major towns, while smaller villages show partial coverage (20–50 percent). Light red is identified as 'residential areas'.

The most important urban areas (that is, state capitals) have a good coverage of building footprints, while in many smaller villages the lack of high-resolution imagery causes a partial identification of buildings[22].

[22] The full details of OSM coverage in South Sudan are found at url: https://wiki.openstreetmap.org/wiki/South_Sudan/HOT_Activation_tasks.

Population Data

Population data are collected from a variety of sources: ICIWG-OCHA, NBS, WorldPop, LandScan and Global Human Settlement Layer (GHSL). ICIWG and NBS (figure A.3) are the most updated (2019) and reliable, reporting also population statistics and people in need per sector, but they only offer an aggregated view at the county level. Worldpop, LandScan, and GHSL, on the other hand, are based on a raster grid with a different reference year and resolution. Table A.1 displays the total population error and the root mean squared error (RMSE) at the county scale compared to ICIWG estimates.

Figure A.3. Population in 2019 according to ICIWG-OCHA (left) and the NBS (right)

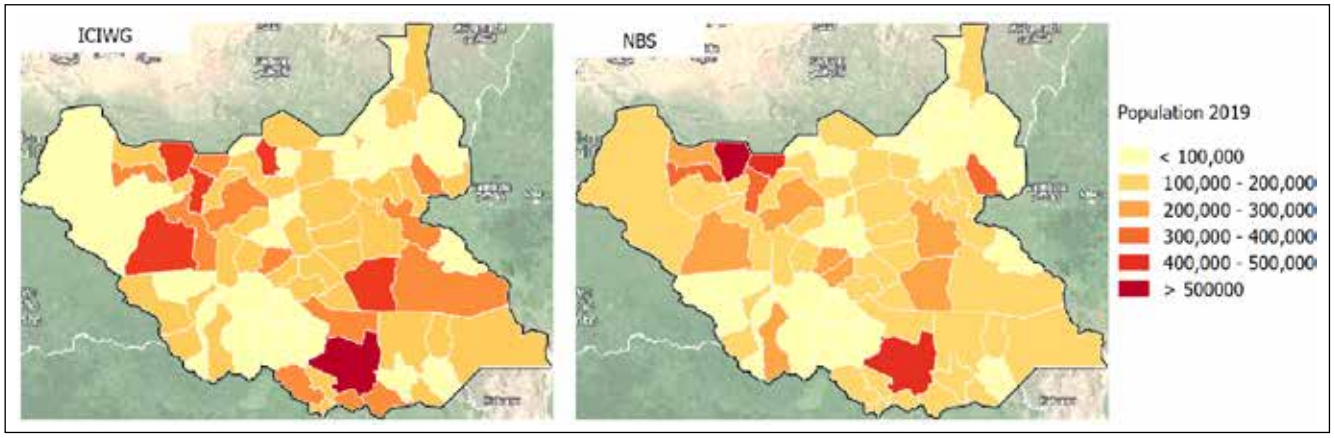


Table A.1. Error comparison for three population grid datasets

Source	Total Population	Total error	RMSE
ICIWG 2019	11,703,111	—	—
WorldPop 2018	14,369,036	2,665,925	148,619
LandScan 2018	13,540,327	1,837,216	155,056
GHSL 2015	12,114,078	410,967	8,3306

GHSL (figure A.4 left) offers the most precise grid representation (distribution over built-up area), although with consistent uncertainty in some areas. Population is projected on a 250 meter grid, but since it is distributed only over built-up areas, the set fails to identify any population in most rural areas; for example, in Rumbek North and Maiwut Counties no built-up land cover is identified, and therefore no population is projected. Also, the last update was in 2015. The WorldPop dataset uses a 100 meter grid resolution; population density was first assessed in 2013 and then adjusted in 2018 to match UN population estimates. The total error is the largest, and the RMSE is the second largest. Among grid datasets, the LandScan 2018 dataset (figure A.4 right) is selected as the best representative, although it has the largest RMSE. Some counties show significant errors when compared to most recent county estimates. It has a relatively coarse resolution of 1 km and the best coverage of populated places, accounting for sparse population in rural areas. A comparison between presented dataset is shown in figure A.5. The color classes represent the difference between ICIWG estimates (which are selected as the most reliable) and the other datasets.

Figure A.4. Two global population datasets: GHSL 2015, 250 m resolution (left) and LandScan 2018, 1 km resolution (right)

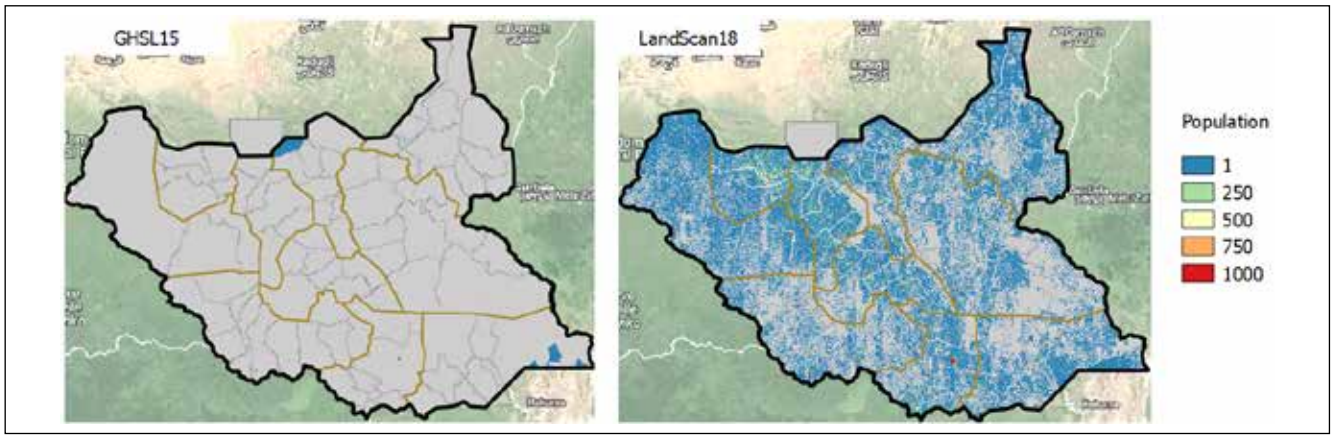


Figure A.5. Population dataset error at the county level in comparison to ICIWG-OCHA 2019 estimates

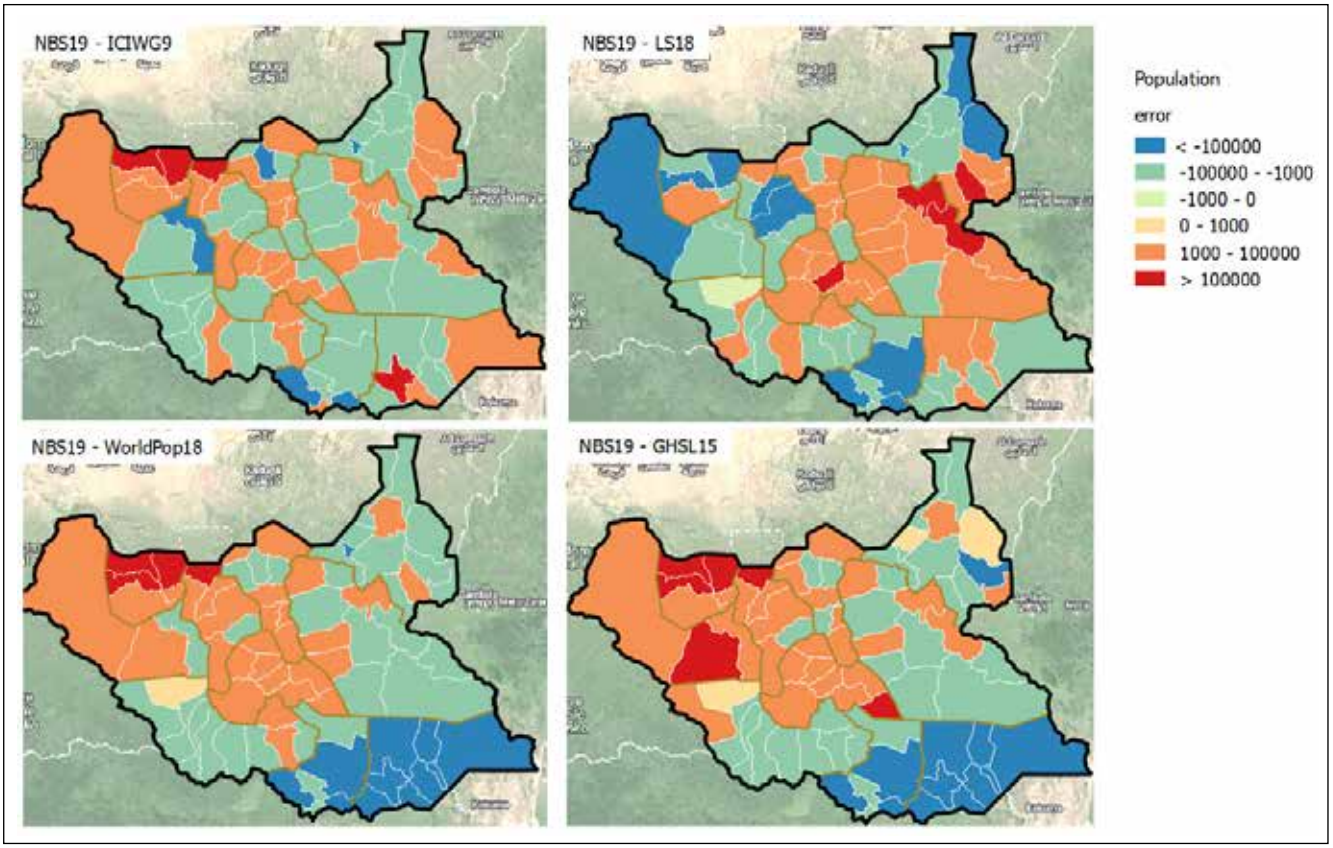
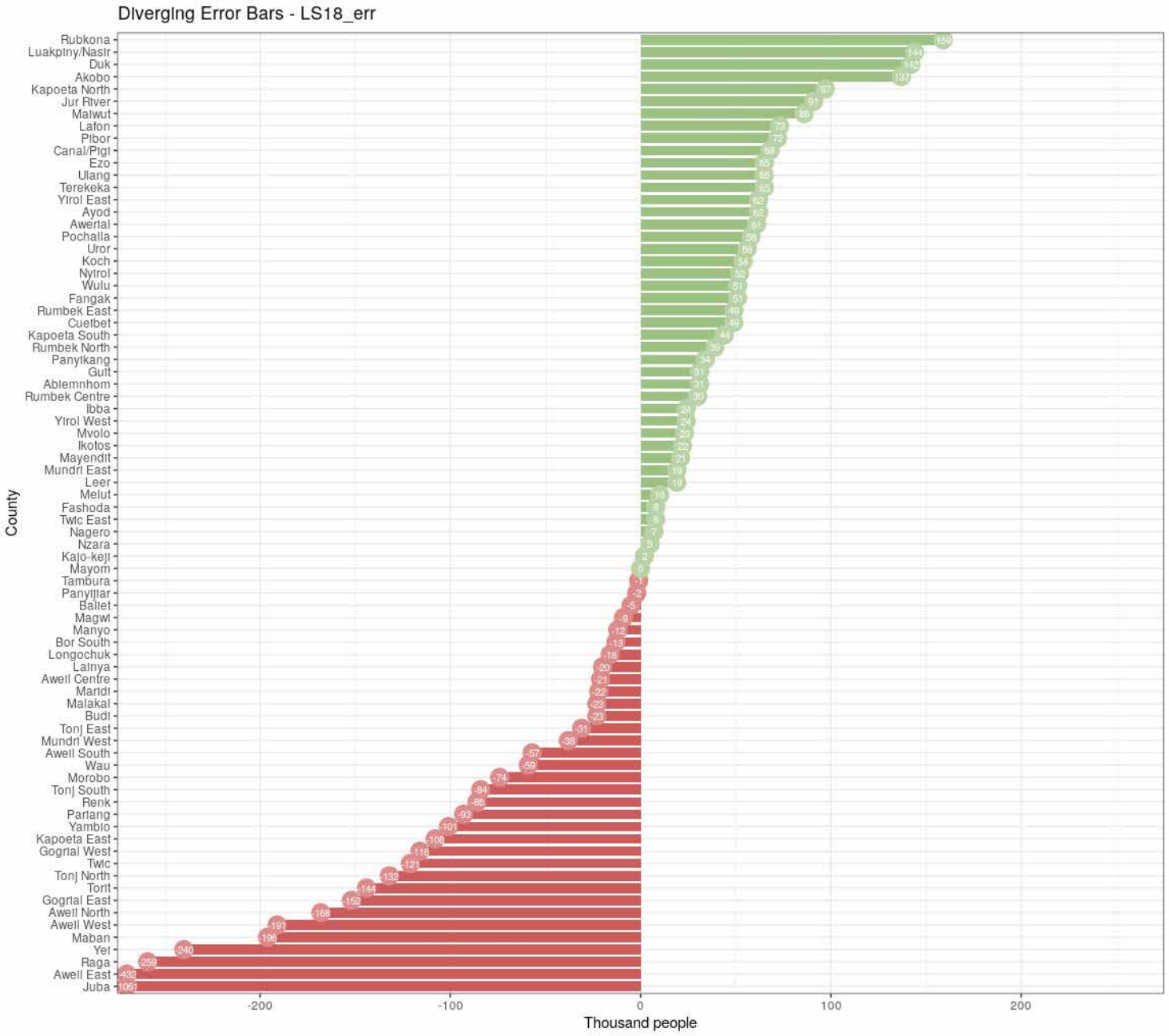


Figure A.6 displays the same information in detail as LandScan2018, to better compare the relative error size. Green bars indicate underestimation compared to ICIWG value while red bars are overestimation. Please note that the x-axis limit figure A.6 is -250,000, but the actual value is much larger in two cases; for example, in Juba, LandScan 2018 has an overestimation error of more than 1.5 million people.

Figure A.6: LandScan2018 population error at county level



PART II

South Sudan: Natural Disasters, Conflict, and Displacement

RESEARCH REPORT

Summary

This study conducts an inter-sectoral disaster risk assessment in South Sudan, within a context characterized by fragility, conflict and violence linked to internally displaced persons (IDPs), since the country became independent in July 2011. Primary data was collected from nine counties that were selected based on the number of IDPs and disasters experienced linked to fragility, conflict and violence. As the time of independence, when many refugees were returning to the country, natural disasters and pockets of inter-communal violence across South Sudan were the key hazards faced by the population. The outbreaks of civil war in 2013 and 2016 led to significant and sustained displacement of populations, both internally and across international borders. Combined with floods, droughts and inter-communal violence, the civil war had a devastating impact on South Sudan.

The study adopts the World Bank DRM-FCV and Sendai Framework to guide both data collection and analysis, with the aim to consider key characteristics of South Sudan's unique context in charting a path forward for disaster risk management. Additionally, South Sudan's draft national policy for disaster risk management is considered, as well as regional policies and tools facilitated by IGAD. The research questions guiding the study explore the main hazards impacting communities in South Sudan, the segments of the population that are most vulnerable, risk perceptions and knowledge of safety systems, preparedness and coping strategies, the response of humanitarian partners, as well as interventions that could be implemented in the future.

This report includes results from primary research (key informant interviews and focus group discussions) conducted with community members and local leaders in nine counties, as well as interviews key stakeholders located in Juba (national and international NGOs, ministry officials and UN agencies). This is supplemented with a review of findings from secondary data collected and published by stakeholders in disaster risk management, including datasets on displacement figures and conflict events, research reports, and rapid needs assessments conducted in locations that have faced significant disasters.

The key findings of this study indicate that in terms of natural disasters, floods and droughts are the key hazards that communities in South Sudan face. Disease outbreaks continue to be a threat; however, they are not perceived to be as devastating to communities compared to floods and droughts. Human-induced disasters were primarily identified as the civil war (with outbreaks of conflict in 2013 and 2016), as well as inter-communal violence (resulting from ethnic tensions, clashes over natural resources such as land and water, as well as cycles of revenge attacks). Women and children were identified as the most vulnerable segments of the population, particularly widows and orphans that have limited access to communal mechanisms to meet their basic needs. Additionally, IDPs were also seen as having heightened vulnerabilities in this context, due to their lack of assets and income-generating activities.

The research report shows that many communities have faced multiple hazards simultaneously, which has heightened vulnerabilities among populations at the local level, and reduced the ability of communities to build resilience in the face of hazards. It has also been indicated that the frequency and severity of floods and droughts have increased in recent years, and subsequently increased the number of community conflicts and number of casualties, which further enhanced community crises in the studied areas. The destruction of key infrastructures when disasters occur, including schools, healthcare facilities and means of livelihoods, has also inhibited the development of resilience mechanisms, particularly since communities are reliant on humanitarian actors to provide assistance in meeting basic needs. Community members also highlighted that they have minimal leverage in predicting hazards or preparing for disasters, regardless of whether it results from natural or human-induced hazards. Local initiatives, such as adapting agricultural practices and building dykes, have not been sufficient to address the devastation to local resources, and thus food insecurity continues to be prevalent across the country and communities experience challenges in-rebuilding infrastructure in the aftermath of hazards such as floods. Hazards also have a strong linkage to livelihoods in South Sudan, and thereby food insecurity, consequently leading to communal clashes over natural resources. Both natural and human-induced hazards lead to the loss of livestock and crops, as well as natural resources, which constitute the primary subsistence livelihoods in South Sudan.

The recommendations provided target both stakeholders involved in policy making, as well as program practitioners, and are primarily drawn from interviews with community members and key stakeholders. Participants in the study identified the need for sustainable models that encourage disaster preparedness and resilience building, which adopts a "build back better" approach. Additionally, while some data collection mechanisms exist, there is a need to develop national mechanisms to ensure programming is data driven. Consideration of vulnerable populations is imperative given the FCV context, requiring an approach to disaster risk management that is both gender and conflict sensitive. Lastly, capacity development and greater resources are needed, from the local to the national level, to support communities in identifying the hazards, instituting an early warning system, preparing for disasters and responding to threats of future disasters.

1. Introduction

Photo: Vlad Karavaev / Shutterstock.com

In 2011, when South Sudan became independent from Sudan following two lengthy civil wars, the country began charting its path toward the development of a new country and government. Just two and a half years later, in December 2013, civil war broke out, with clashes initially beginning in Juba and subsequently spreading to other parts of the country. This caused immense displacement, which led to the establishment of the first protection of civilians (PoC) sites in the world. Additionally, a number of ad hoc displacement sites emerged across the country as well. The conflict led to a shift from institutions building and development programming that was initiated in 2005, when the Comprehensive Peace Agreement (CPA) was signed, to humanitarian programming that sought to meet the basic needs of the population. A peace agreement to the 2013 conflict was ultimately reached, and the Transitional Government of National Unity (TGoNU) was formed on April 28, 2016.[23] However, on July 9, 2016, conflict broke out again, leading to conflict that embroiled more parts of the country, particularly in the Equatoria Region and Western Bahr el-Ghazal State, leading to increased displacement rates in these areas. By 2018, it was estimated that there were over 400,000 "excess deaths" since the beginning of the conflict in 2013.[24] The Revitalized Agreement on the Resolution of the Conflict in South Sudan (R-ARCSS)[25] was reached in 2018, and the formation of the new TGoNU of South Sudan was declared on February 22, 2020.

The impact of sustained conflict has been compounded by additional hazards to the South Sudanese population. In the last nine years, the country has experienced a variety of hazard risks, including, but not limited to,

[23] http://embassy-southsudan.de/transitional-government-of-national-unity-tgonu-of-the-republic-of-south-sudan/
[24] https://www.lshtm.ac.uk/research/centres/health-humanitarian-crises-centre/south-sudan-report-
[25] https://igad.int/programs/115-south-sudan-office/1950-signed-revitalized-agreement-on-the-resolution-of-the-conflict-in-south-sudan

droughts, floods, disease outbreaks, and fires. Droughts and extended dry spells have affected livelihoods, particularly subsistence agriculture, and subsequently food security levels. Flooding, especially in 2013, 2019, and 2020, has been observed at unprecedented levels, which has led to the destruction of crops, shelters, and local infrastructure. Furthermore, since the cessation of the civil war in South Sudan, intercommunal violence has spiked, leading to displacement, deaths, and destruction of shelters. These clashes are often rooted in tension over access to resources such as land and water and revenge attacks rooted in histories of cattle raiding. The Internal Displacement Monitoring Centre (IDMC) estimated that by the end of 2019 there were 1,352,000 internally displaced persons (IDPs) resulting from conflict and violence in South Sudan and a further 246,000 IDPs resulting from disasters. As of June 2020, the United Nations High Commissioner for Refugees (UNHCR) estimates that there were 2,255,697 refugees and asylum seekers in neighboring countries originating from South Sudan.

The ability to mitigate impacts and increase resilience in the face of hazards has been compounded by the context of sustained insecurity and the fact that many communities face multiple hazards simultaneously. South Sudan's ability to respond to hazards at both national and local levels is inhibited by a number of factors, including ongoing humanitarian crises in different sectors, a lack of development and adequate resources to respond, ongoing intercommunal violence, and the lack of a fully formed government. As such, preventative measures and resilience capacities are minimal, and communities rely almost entirely on humanitarian organizations to meet their basic needs when hazards occur. Humanitarian organizations and the Government of South Sudan have initiated mechanisms and interventions to promote community resilience and preparedness for disasters in key locations in the country, but the extent of resources provided has not matched the pace, frequency, and impact of hazards in the country.

As South Sudan charts a path to development and peace, yet again, it is imperative to understand the key hazards that are affecting the population. At the time that this report was written, many counties are grappling with the impact of intercommunal violence, extensive flooding, food insecurity, and the outbreak of COVID-19. Additionally, since the peace agreement was signed in 2018, returnees to different counties have placed additional stress on local infrastructure and resources, as development has not kept pace with the growing populations.

To inform the work of stakeholders such as humanitarian actors and government officials, this report examines the impact of natural hazards on community vulnerabilities, conflict and displacement, as well as resilience capacities at the county level. Datasets and reports published by different actors are examined and are supplemented by qualitative data collected in nine counties that were selected because they have been affected by a diverse range of natural hazards in South Sudan, have a significant number of IDPs, and have experienced conflict. A particular emphasis is placed on understanding how vulnerable populations, particularly IDPs, have been affected by natural hazards that have turned into disasters. Additionally, the report also examined resilience capacities that already exist in communities or how they can be better developed to mitigate the impact of hazards. The report ends with key program and policy recommendations to guide stakeholders in supporting local populations to prevent and respond to hazards as they occur.

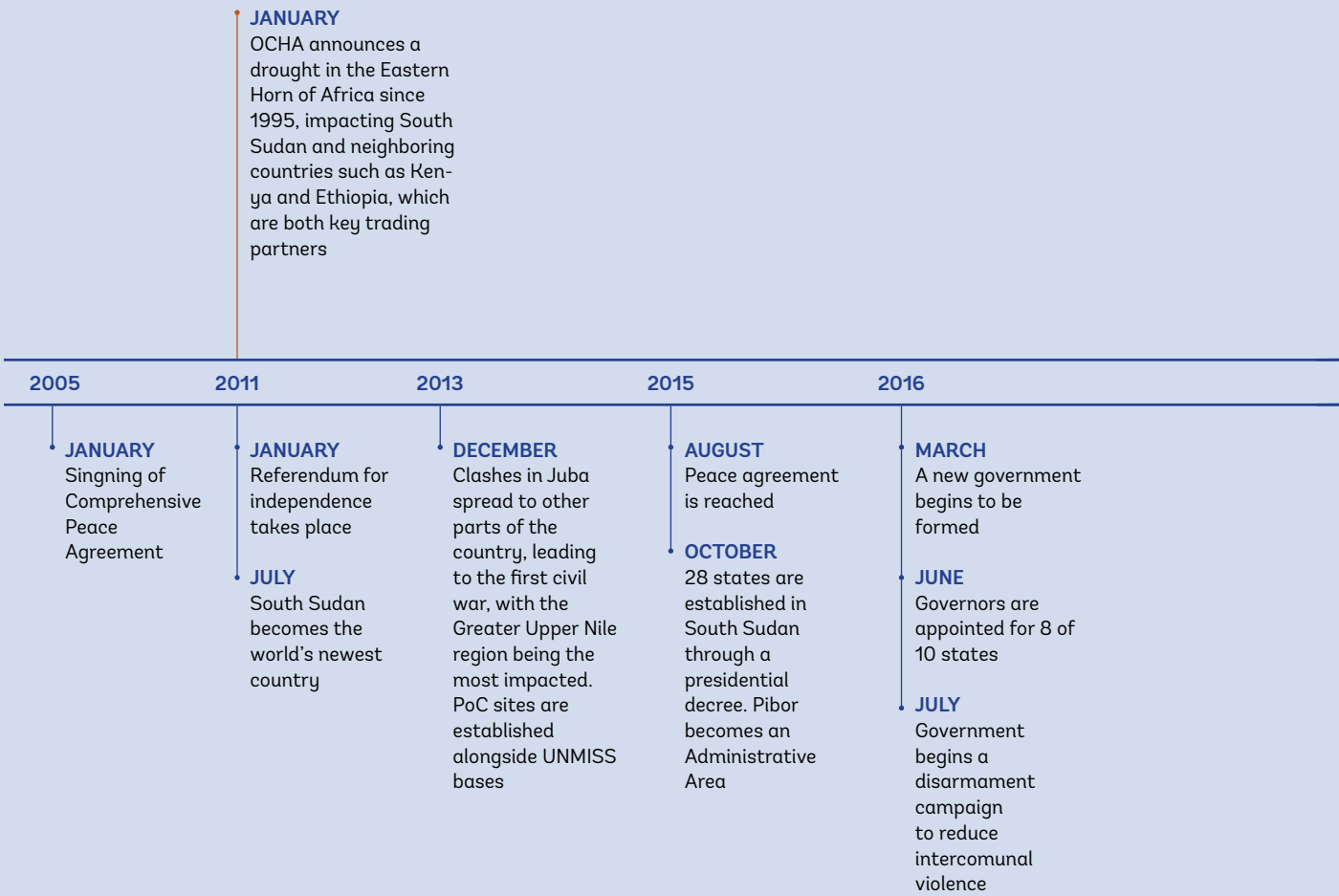
Specifically, the following research questions guide the framing, methodology, and analysis provided in this project:

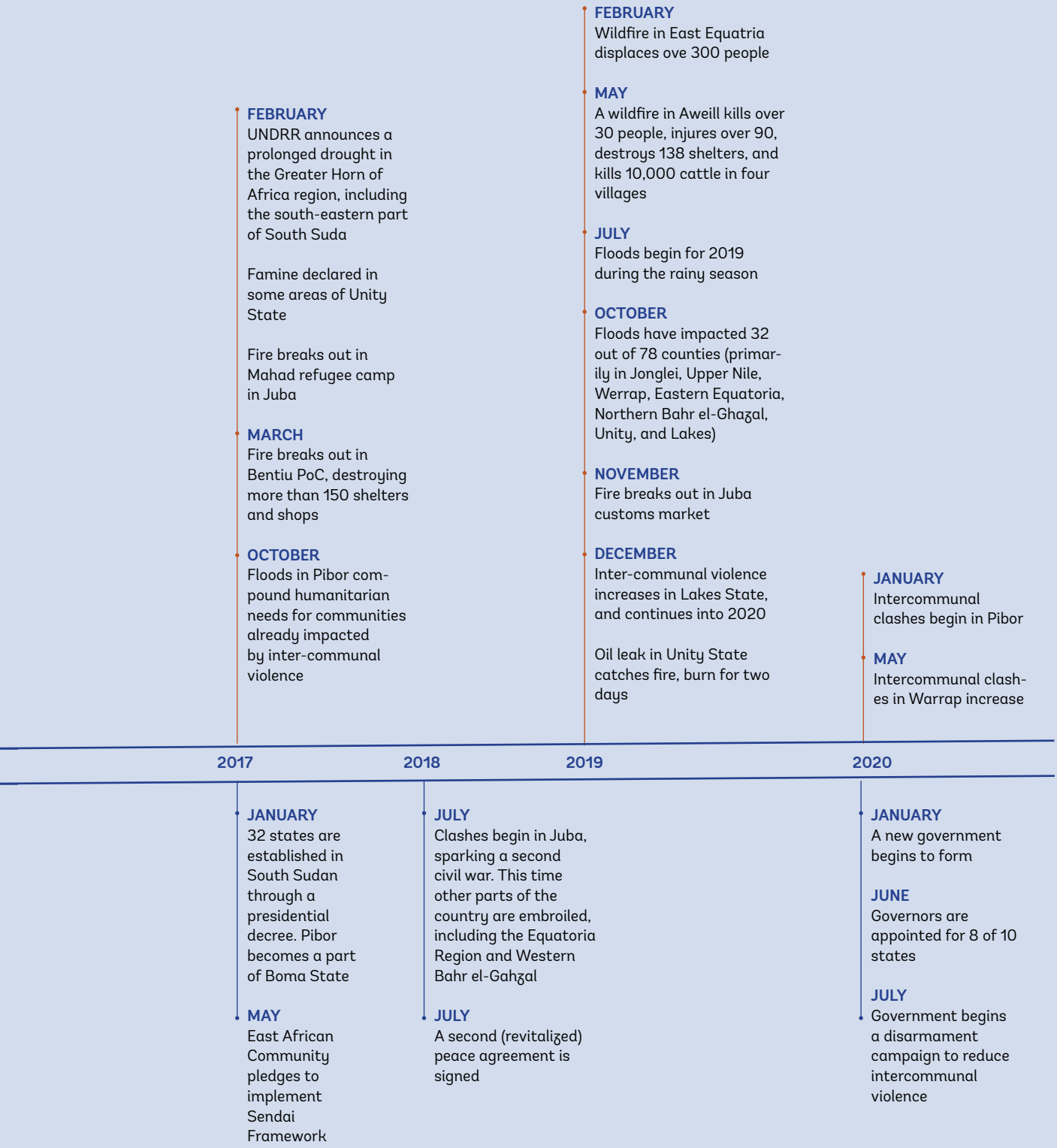
1. What are the major natural hazards that have had grave impacts on people's welfare? Which areas have been hit the hardest historically and how? Which population groups have been hit hardest, how, and why?
2. What were the spatial (regional) impacts of the 2019 floods on internal displacement and other FCV-related risks, such as food insecurity or intercommunal and land-related conflicts?
3. Which population groups (for example, ethnic groups, IDPs, and returnees) are most susceptible to disaster impacts?
4. What are the risk perceptions and knowledge of safety systems amongst communities in the event of a disaster?
5. Do IDPs have specific vulnerabilities to climate shocks?
6. What preparedness and coping strategies and disaster adaptation processes exist at the community level?
7. What measures have been taken by humanitarian partners in response to the floods?
8. What are some key strategies and interventions that could be implemented in flood-affected areas as part of disaster risk management?

Timeline of Eventes In South Sudan

Disaster/hazard events

Governance/political events




2017
FEBRUARY
UNDRR announces a prolonged drought in the Greater Horn of Africa region, including the south-eastern part of South Suda
Famine declared in some areas of Unity State
Fire breaks out in Mahad refugee camp in Juba
MARCH
Fire breaks out in Bentiu PoC, destroying more than 150 shelters and shops
OCTOBER
Floods in Pibor compound humanitarian needs for communities already impacted by inter-communal violence
JANUARY
32 states are established in South Sudan through a presidential decree. Pibor becomes a part of Boma State
MAY
East African Community pledges to implement Sendai Framework
2018
JULY
Clashes begin in Juba, sparking a second civil war. This time other parts of the country are embroiled, including the Equatoria Region and Western Bahr el-Gahzal
JULY
A second (revitalized) peace agreement is signed
2019
FEBRUARY
Wildfire in East Equatria displaces ove 300 people
MAY
A wildfire in Aweill kills over 30 people, injures over 90, destroys 138 shelters, and kills 10,000 cattle in four villages
JULY
Floods begin for 2019 during the rainy season
OCTOBER
Floods have impacted 32 out of 78 counties (primarily in Jonglei, Upper Nile, Werrap, Eastern Equatoria, Northern Bahr el-Ghazal, Unity, and Lakes)
NOVEMBER
Fire breaks out in Juba customs market
DECEMBER
Inter-communal violence increases in Lakes State, and continues into 2020
Oil leak in Unity State catches fire, burn for two days
2020
JANUARY
Intercommunal clashes begin in Pibor
MAY
Intercommunal clashes in Warrap increase
JANUARY
A new government begins to form
JUNE
Governors are appointed for 8 of 10 states
JULY
Government begins a disarmament campaign to reduce intercommunal violence

2. Frameworks and Policies

Two frameworks guide the analysis of disaster resilience and response in South Sudan: a framework developed by the World Bank and the Sendai Framework developed at the global level. Disaster risk management (DRM) in the country is also informed by the country's drafting of a policy and regional resources that seek to support South Sudan in developing its own infrastructure and approach. The combination of these frameworks, policies, and tools provide a lens that acknowledges both global priorities and the need for locally responsive approaches to DRM and community resilience building in South Sudan.

2.1. Sendai Framework

The development of the Sendai Framework for Disaster Risk Reduction 2015–2030 was coordinated by UNDRR, on behalf of the United Nations General Assembly. To promote sustainable development and reduce poverty globally, the framework sought to encourage countries to emphasize the development of resilience and disaster risk reduction within country-based programs and policies. It also incorporated consideration of climate change as a lead driving factor in disasters and included both natural and man-made hazards. The framework encourages the inclusion of all stakeholders, at all levels (national and sub national) and with an emphasis on consideration of those who are most vulnerable to disasters. The priorities listed include (a) understanding risk, (b) strengthening risk management, (c) investing in disaster risk resolution (DRR) for resilience, and (d) promoting preparedness and recovery mechanisms that protect from future hazards.

2.2. World Bank Disaster Risk Reduction-Fragility, Conflict, and Violence

The World Bank's Initiative for Disaster Risk Management in Countries Affected by Fragility, Conflict, and Violence (FCV) acknowledges the nexus between natural hazards and FCV and seeks to incorporate this relationship into DRM approaches. It also seeks to address a gap in the Sendai Framework, which does not make special considerations for fragile contexts experiencing conflict. Three key objectives are identified in the framework: (a) support development of DRM approaches that are appropriate for contexts affected by FCV, (b) support links between FCV, disaster, and climate risks, and (c) produce and share knowledge of DRM in FCV contexts. In the context of South Sudan, the FCV framework allows for consideration of the wide range of hazards observed on a frequent basis and for any interventions to consider the localized contexts of displacement, insecurity, and conflict to better serve vulnerable populations, particularly IDPs.

2.3. South Sudan's National Disaster Risk Management Policy

South Sudan's National Disaster Risk Management Policy26 is currently in its draft stage and is being facilitated through the Ministry of Humanitarian Affairs and Disaster Management. The policy aims to streamline efforts targeting disaster preparedness and response, while also strengthening coordination among government institutions at the national level to better support communities affected at the local level. The policy makes specific provisions to address vulnerability, that is, the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. It moreover emphasizes gender equality, social inclusion, and women's empowerment (GESIaWE), which refer to the equal rights, responsibilities, and opportunities for women and men and girls and boys. These are seen as not only a fundamental aspect of human rights and social justice but also as a precondition to improve the development process by putting social concerns at the forefront of policies and interventions related to DRM.

Consideration of vulnerable populations, as well as gender dynamics, is particularly important in the South Sudanese context where multiple groups face additional barriers in being resilient to hazards. In particular, IDPs and women have been identified in this study to be especially vulnerable, given their preexisting socioeconomic challenges and difficulty in accumulating assets.

The national policy also considers climate change, which adheres to global frameworks, while also acknowledging the changing weather patterns in recent years in South Sudan, which have increased

[26] This policy is in its draft stage. Please contact the Ministry of Humanitarian Affairs - Office of Disaster Management directly to obtain the latest copy of the policy and for any further inquiries.

Photo: Punhi/Shutterstock.com

the hazards affecting vulnerable populations across the country. Ideally, the policy will streamline into legislation, providing the government with a mechanism to enforce implementation and coordination of DRM measures.

2.4. IGAD-ICPAC

The Intergovernmental Authority on Development (IGAD) in East Africa hosts a Disaster Risk Management Programme and the Climate Prediction and Applications Centre (ICPAC). Originally founded to support member states when dealing with the impact of hazards, these resources seek to build resilience and preparedness measures through the development of national policies, risk assessment and mapping, capacity building, and the development of tools such as early warning systems. In South Sudan, the majority of disaster-related programming and services are currently being attributed to the response side of interventions. By increasing resilience in the country and providing the government with comprehensive tools to anticipate hazards and their impacts, vulnerable populations across

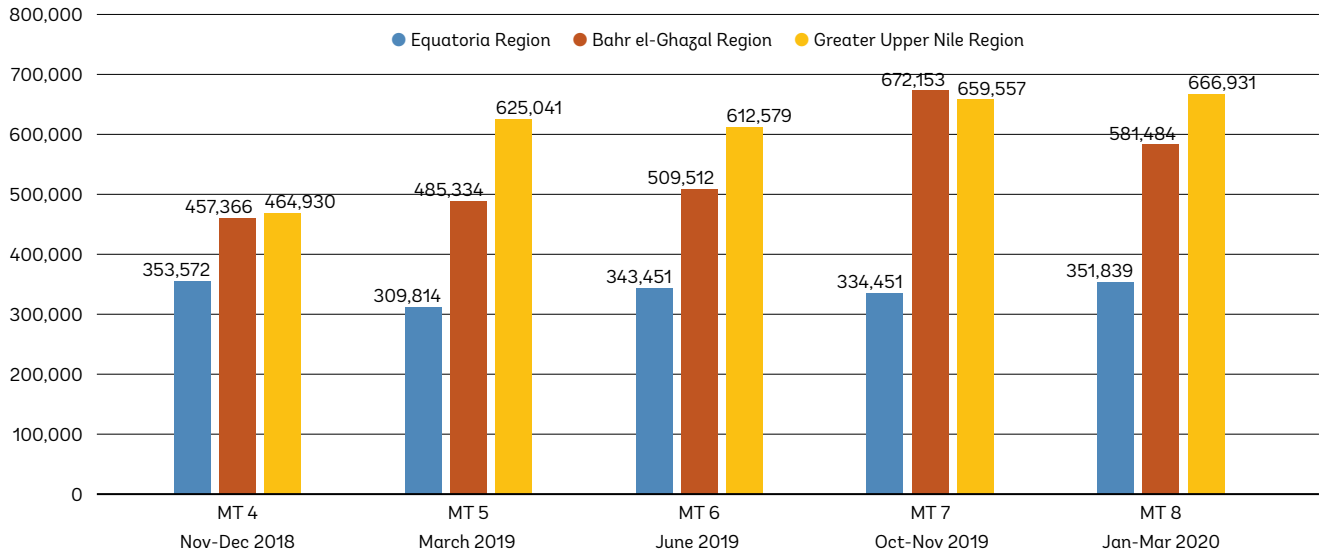
3. Background and Context

When the CPA was signed in January 2005, the country began shifting from humanitarian relief to development initiatives. Ahead of the referendum for independence in 2011, many refugees from neighboring countries began to return to South Sudan. It was estimated that by 2009, over 1.4 million returnees had arrived in the country (FAO 2009), many of whom had few assets. The capacities to absorb returnees and assessing the additional strain they may place on local livelihoods were crucial for the huge number of returnees in a transitional country. Thus, the returnees have had numerous challenges of food and shelter, also leading to increased food insecurity in southern Sudan. As they reentered the country, they were already subject to cycles of floods and droughts, which led to further internal displacement and increased humanitarian needs. It was estimated that floods in 2007 affected over 250,000 people, particularly in Jonglei and Upper Nile, and the following year over 30,000 households experienced moderate to severe impacts from the same hazard (FAO 2009). A 2011 FEWSNET report indicated that South Sudan had observed a 10–20 percent decrease in rainfall during the rainy season since the 1970s and "warming of more than 1 degree Celsius" (FEWSNET 2011a).

Livelihoods in South Sudan are inextricably linked to both a relatively rich and abundant natural resource base. Traditional livelihood systems in South Sudan rely on cattle rearing, crop production, fishing, wild food collection, and trade, with various combinations of these elements making up specific household economies depending upon their geographic location. The success or failure of all livelihood systems in South Sudan rests on the ability of people to move and to trade. Mobility allows people to take advantage of seasonal food opportunities in different areas, such as fish and wild foods; it is also crucial for the survival of livestock, which depend on regular migrations between dry and wet season grazing areas (FEWSNET 2007). At independence, it was estimated that over 80 percent of South Sudan's population lived in rural areas (NBS 2012), limiting access to key infrastructure and services that are centralized in state capitals and other major towns. An almost equal proportion of the population relied on subsistence agriculture as their major food source, making households susceptible to hazards that affected crop yields, including drought, floods, and conflict. A FEWSNET (2011b) report from the year of independence projected that the majority of the country was at Integrated Food Security Phase Classification (IPC) Phase 2, indicating stressed levels of food insecurity. For many households in South Sudan, animal husbandry, particularly raising cattle, goats, chickens, and so on, is also a major component of livelihoods. Displacement resulting from conflict, floods, and food insecurity often limits access to land needed for both types of livelihoods, which subsequently inhibits the ability of vulnerable population from meeting their own basic needs and increases reliance on humanitarian aid. As a result, being able to return to land and shelters that have been damaged by hazards, and acquiring the necessary resources to rebuild in the aftermath of conflict and natural hazards, are key components of resilience building in South Sudan for IDPs and refugee returnees.

A primary characteristic of South Sudan's unique context is the presence of displacement sites across the country—both ad hoc and PoC sites annexed to UNMISS bases. When they were initially founded, PoC sites in South Sudan were established with the outbreak of conflict, with no ability to plan for hosting long-term IDPs, many of whom have now been in PoCs for almost seven years. It is estimated that over 35,000 IDPs sought protection at PoC sites in just the first week following the outbreak of conflict in December 2013, primarily in Juba. By mid-2015, the number of IDPs in PoC sites had increased to over 200,000 (Briggs 2017). As a result of the lack of adequate time for planning, many challenges arose in the first year relating to infrastructure and services, particularly when hazards occur (Stern 2015). One key example was the flooding of Malakal PoC in July 2014, which led to some families having to hold their children above the flood waters throughout the nights. The flood waters also led to an outbreak of cholera, and as a result IDPs and small businesses in the site had to be relocated, and the stagnant water that remained had to be drained (UNMISS 2014a). By July 15, 2014, 30 cases and two deaths were attributed to a cholera outbreak in the PoC. In August of the same year, an estimated 40,000 IDPs in Bentiu PoC were also affected by floods, and 1,000 shelters were filled with contaminated water (UNMISS 2014b). While the community attempted to build dams out of mud to mitigate the damage, they were not successful. Doctors without Borders (*Médecins Sans Frontières*, MSF) reported on August 14, 2014, that that there had been over 200 deaths in the site since May, many of whom were children, due to spikes in waterborne diseases. This was exacerbated by the fact that many of these children were already suffering from malnutrition, which made them more susceptible to diseases. IDPs have since been relocated within the PoCs in Malakal and Juba to less flood-prone areas, and other mitigation measures have been implemented in Bentiu.

Figure 2. Number of IDPs by Historical Region



Note: The chart includes data from multiple rounds of IOM DTM's MT exercise.

Climate change has also been identified as a key factor in changing weather patterns, which ultimately lead to an increase in the frequency and severity of floods or droughts and subsequently forced migration or conflict over limited natural resources. According to the Climate Change Vulnerability Index, South Sudan was ranked among the five most affected countries in the world in 2017. It is estimated that 90 percent of agriculture and livestock livelihoods depend on adequate rainfall (FAO 2015). In 2012 and 2017, UNDRR issued warnings that the Greater Horn of Africa Region would experience lower than normal rainfall. In particular, the southern regions of South Sudan were affected as a result, particularly near the Kenyan border. This was predicted to affect both agriculture (and therefore food security levels) and access to water. The existing institutional capacity within South Sudan to document the impact of climate change is limited. The Department for Meteorology guides data collection in the country, but not all of the weather stations in the country are currently functioning (Toby 2018). There are also a limited number of historical weather stations established, which means that many parts of South Sudan where populations are vulnerable are not tracked, particularly those living in rural areas. Gender dynamics also factor into the impact of hazards resulting from climate change, as women in South Sudan have less access to resources and skills needed to be adaptable and resilient (Oxfam et al. 2019) and are also reliant on the informal economy for income generation (BRACED 2017). Women also maintain much of the responsibility for managing households and raising children (Ministry of Foreign Affairs - Netherlands 2018), which is compounded by the large number of female-headed households in the country. However, gender-disaggregated data on the impact of climate change in South Sudan are quite limited. In relation to conflict dynamics, climate change is seen as a driving factor in intercommunal violence over natural resources, particularly access to grazing land and water, as floods and droughts lead to changes in seasonal cattle migration patterns. South Sudan's Parliament has passed the South Sudan National Environmental Act in 2015 which calls for a climate change policy to be developed for the country; however, resources to implement and enforce the measures listed are minimal. Additionally, there is a National Adaptations Programme of Actions (NAPA) to climate change (Ministry of Environment 2016), which provides a framework for approaching the identification of priorities and designing activities to mitigate climate change. According to a U.S. Agency for International Development (USAID) study from 2019, temperatures are predicted to further increase in South Sudan, which will affect the availability of water resources for agriculture and lead to increased pest risks for both crops and livestock, longer dry spells, lower yields, and increased desertification. In turn, these risks threaten the future of food security in South Sudan.

Displacement trends are captured for the country by the International Organization for Migration's Displacement Tracking Matrix (IOM DTM). In South Sudan, mobility tracking (MT) was introduced in 2018, to document the presence of IDPs and returnees in each *payam*,[27] particularly as the dynamics of conflict and other hazards meant that the population composition in each community was constantly changing.

[27] A payam is an administrative governance unit in South Sudan, which falls between the county and the village level.

The figures indicate that displacement rates have increased since 2018, with the Greater Upper Nile Region being particularly affected. The region also hosts two of the largest displacement sites in the country. The cessation of hostilities in Wau County has led to a decrease in displacement rates in some areas and allowed IDPs to slowly return home; however, other parts of the Greater Bahr el-Ghazal Region have seen increased rates of displacement due to flooding.

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) annually produces a Humanitarian Needs Overview for South Sudan, which includes figures of the estimated number of people with significant humanitarian needs in each county. The projections for 2020, at the state level, were as follows:

Table 1. Proportion of people in need by state

County	People in need (PiN)	Projected population	PiN as a % of projected population
Central Equatoria	870,200	1,453,508	60
Eastern Equatoria	606,600	1,067,162	57
Western Equatoria	326000	861,331	38
Jonglei	1340100	1,931,051	69
Unity	815900	1,059,682	77
Upper Nile	1082500	1,377,076	79
Lakes	666000	1,137,753	59
Northern Bahr el-Ghazal	576700	946,905	61
Western Bahr el-Ghazal	436600	646,245	68
Warrap	735600	1,222,396	60

Source: OCHA's (2019a) Humanitarian Needs Overview for 2020.

Projections for 2020 indicate that more than half of states' populations are considered to have significant humanitarian needs, particularly in the Greater Upper Nile Region. The figures presented for the population estimates are based on anticipated birth and death rates and do not include the impact of displacement or conflict, as a national census has not been conducted since 2008. Additionally, the number of people in need includes those who have been forcibly displaced, which incorporates refugees. As a result, in many of these counties, the number of people in need is far greater than the projected population. Hosting IDPs and refugees, in addition to returnees to the area, places significant strain on existing local infrastructure and resources and subsequently raises the need for humanitarian interventions to meet basic needs. The heightened pressure on local resources also creates the potential for intercommunal violence, particularly over resources such as land and water.

The impact of hazards, including sustained displacement since 2013, has also been observed through engagement with livelihoods and food insecurity. An annual joint Crop/Food Security Assessment Mission to South Sudan by the Food and Agriculture Organization (FAO) and the World Food Programme (WFP) includes the estimated percentage of households engaging in agriculture. Since 2013, the following trends have been observed in the nine counties highlighted in this report:

Table 2. Agriculture and Food Insecurity

County	2013 % farmers	2016 % farmers	2018 % farmers	IPC January–April 2020
Pibor	24	45	40	Phase 4 - Emergency
Uror	74	50	45	Phase 3 - Crisis
Aweil East	91	85	80	Phase 3 - Crisis
Mayom	80	40	40	Phase 3 - Crisis
Maban	80	55	50	Phase 3 - Crisis
Nasir	70	55	50	Phase 3 - Crisis
Tonj North	93	70	70	Phase 3 - Crisis
Twic East	38	38	40	Phase 3 - Crisis
Wau	90	60	50	Phase 3 - Crisis

Note: Data on proportion of households that are farmers was obtained from FAO and WFP annual reports.

Figure 3. IDPs in Pibor have been displaced to a local school building (2020)

Source: IOM.

The trends indicate that the percentage of households engaging in agriculture in each of the highlighted counties has either remained relatively stagnant or has decreased, despite the stabilization of the security context at the national level. This parallels increasing food insecurity in the country, reflected in ongoing IPC projections.

Cycles of multiple vulnerabilities feed into the significant impact that hazards have historically had on the population in South Sudan (REACH 2018). In 2020 alone, areas such as Pibor and Twic East have encountered multiple hazards which turned into disasters simultaneously, primarily flooding and intercommunal violence, inhibiting disaster preparedness and resilience in the face of such challenges. Additionally, these communities were subjected to the same types of hazards in previous years. Heavy rainfalls, which would typically lead to increased crop yields and strengthen resilience against food insecurity, are not leading to the predicted outcomes as farmers displaced due to conflict or other factors are not able to maintain their crops during key planting and harvest periods (Oxfam 2018). This has been particularly evident in Central Equatoria, where counties such as Yei and Kajo-Keji fall within the greenbelt of South Sudan and have historically been high-yield areas. However, significant displacement since 2018, combined with the destruction of farmland, has led to significant changes in crop yields and subsequently increased food insecurity. Furthermore, Oxfam (2018) emphasizes the gender and age dynamics observed in food insecurity trends, in which women and children are often the last to eat in households. Tasked with collecting food for households, women and girls are often exposed to security risks when traveling long distances to collect firewood or forage for wild foods. Other coping mechanisms include turning to markets for food sources, but conflict and floods may affect trade routes, and the 2015 financial crisis has led to exponential inflation which makes this option unaffordable for many. Multiple reports indicate that many households in South Sudan also restrict the number of meals they have in a day or resort to selling livestock to obtain a short-term cash flow to purchase food goods in the market (Ministry of Foreign Affairs - Netherlands 2018). Increased rates of malnutrition, particularly among children, also increase vulnerability to disease outbreaks when hazards occur, such as cholera. While these coping mechanisms are helping households survive during periods of food shortage, they are not sustainable, thus increasing reliance on

food aid. In areas where food insecurity has increased as a result of inter-communal violence, whether through destruction of crops and food supplies or lack of access to farming land, cycles of revenge attacks between communities may be incited. To mitigate the impact of multiple hazards, sustained stability in the security situation is key.

The lack of established institutional mechanism and disaster preparedness is also noted in South Sudan's newest hazard, notably the global pandemic of COVID-19. A recent report by Deep Knowledge Group (2020) listed South Sudan as the most dangerous country in the world in the context of COVID-19, due to the minimal health care infrastructure available. Additionally, the introduction of the pandemic has heightened humanitarian needs in the country, to the point that OCHA has published an addendum to its Humanitarian Needs Overview for the year. For 2020, the World Bank has classified South Sudan as a country with 'high-intensity conflict' on its list of fragile and conflict-affected situations, alongside six other countries. In anticipation of the pandemic in March 2020 (World Bank 2020), REACH[28] identified 18 counties that were the most vulnerable in South Sudan, identified by a vulnerability matrix. Among them were three key counties included in this study, such as Wau, Aweil East, and Mayom. The heightened vulnerabilities among the population in South Sudan, particularly IDPs, combined with a fragile security context, make disaster preparedness an urgent issue to be addressed by all stakeholders.

The analysis in this study also takes into consideration the context of fragility, conflict and violence in which hazards occur in South Sudan. In doing so, gender dynamics, conflict sensitivity and the experiences of vulnerable populations such as IDPs are also considered. Conflicts in South Sudan are dynamic and vary according to the local context, and as a result displacement trends are not homogenous. This is true for all types of conflict, including the civil war, intercommunal violence, and conflict over access to resources. Subsequently, a rigid and standardized approach to disaster preparedness and response may not accommodate local variations. The significant number of IDPs in the country, combined with returnees, has placed additional pressure on local infrastructure and resources used to meet basic needs. These forced migration dynamics, as well as return movement, are closely linked to the conflict histories in South Sudan.

Previous research has shown that women tend to take on the bulk share of responsibility for management of households as well as childcare, particularly due to the increased number of female-headed households arising from conflict and displacement. This includes financial responsibility for purchasing food, health care costs, and school fees and often occurs through the informal economy. Due to the financial crisis in the country and the impact of hazards on livelihoods, cultural mechanisms that would historically support widows, orphans, and other vulnerable members of a family are no longer able to adequately support the needs of all family members. Additionally, hazards may force women to travel long distances away from the safety of their home to seek firewood, food, and water, which exposes them to conflict-related hazards. Therefore, it is imperative that any programs designed, whether for preparedness or response, consider how women and girls in particular have unique needs and require special considerations, so that their vulnerability does not hinder their access to disaster preparedness and response interventions.

The vulnerabilities of women, IDPs and other demographic groups should also be considered when disasters occur has already been noted above, but other demographic factors. The elderly are often left behind when displacement occurs and do not have the means to engage in resilience mechanisms compared to other segments of the population. Reports have also noted the targeting of the elderly during attacks, particularly during the second phase of the civil war. Additionally, children may be targeted during attacks and either killed or abducted as witnessed during both the civil war and intercommunal violence. Food insecurity levels have led to increased malnutrition rates for children under the age of five, which in turn increase their susceptibility to disease outbreaks during displacement and hazards. This has been observed in South Sudan through cholera and measles outbreaks that occurred in the aftermath of conflict or floods.

[28] REACH, 2020. South Sudan – Identifying the Most Vulnerable Counties to Inform a Targeted and Efficient Response to Covid-19.

4. Methodology

This study used qualitative methods to collect data regarding the experience of South Sudanese communities in relation to hazards that have occurred over the last 10 years. In doing so, the findings of this study will seek to inform future policy and program design that will aim to increase the resilience of communities in the face of such hazards. This includes examining both natural hazards (floods and drought) and other threats including the spread of diseases (epidemics for humans and livestock) as well as the impact of conflict (including conflict over local resources), with a particular emphasis on understanding the experiences of vulnerable populations.

To be locally responsive, this study investigates examples of hazards that have affected South Sudan over the last 10 years. This includes the following:

- **Floods.** They are the primary natural hazard that has been observed in 2019 and 2020. The key areas affected include the Bahr el-Ghazal Region as well as Jonglei State, where floods are increasingly observed on an annual basis. Floods are connected to other hazards, such as disease outbreaks, and result in the destruction of field crops, local infrastructure, and displacement, which reduces resilience capacities in communities while also heightening vulnerabilities. Additionally, floods have led to changes in the migration of cattle, which may in turn lead to intercommunal violence over access to grazing land and water points.
- **Drought (including shorter dry spells).** Food insecurity in South Sudan, which has been a key outcome of the protracted humanitarian crises in the country, is significantly affected by droughts and dry spells which limit the production of local food sources and supplies. They also increase reliance on both food aid and the importing of food from neighboring countries. The latter is a limited option for many South Sudanese due to the ongoing financial crisis and inflation which increased exponentially in 2015.
- **Fires.** While fires are not a prevalent hazard in South Sudan, they have been observed since independence. In some cases, fires used to clear land for agriculture or other purposes have spread to local shelters and infrastructure. Given the lack of fire-fighting services in South Sudan, there is little that can be done to mitigate this hazard once it begins. Fires have also been documented in large market areas, the PoCs, and other population dense areas where they are able to spread quickly with minimal resources to respond.
- **Spread of diseases such as COVID-19, malaria, cholera, and measles.** In 2018, the outbreak of Ebola in neighboring Democratic Republic of Congo sparked fears that the porous borders of South Sudan could lead to the spread of the disease. The Ministry of Health, with the assistance of humanitarian organizations, began monitoring both official and unofficial border crossing points, to screen travelers entering the country. Particular emphasis was placed on Western Equatoria and Central Equatoria, due to their proximity to the Democratic Republic of Congo. Monitoring points included both airports and land routes. As the Democratic Republic of Congo marks the end of its Ebola outbreak, no case was confirmed in South Sudan. In early 2020, the declaration of COVID-19 as a global pandemic also led to mitigation measures in South Sudan. Ebola screening points were also used to screen for the new virus. Additional screening and testing points have been set up in key transit areas such as Nimule. Self-isolation measures have been implemented for travelers entering the country, and the Ministry of Health has been implementing testing and contact tracing measures. In addition to such disease outbreak threats, South Sudan has also faced ongoing diseases since independence. They include cholera, measles, malaria, and diseases that spread from livestock to humans. Conflict and floods, which lead to displacement and hazardous living conditions, have exacerbated the spread of such diseases and inhibited response due to restrictions in access as well as the destruction of local infrastructure.
- **Conflict (intercommunal violence, civil war, and resource-based conflict).** When South Sudan became independent in 2011, the country was still receiving returning refugees from neighboring countries and coping with the impact of two lengthy civil wars that began in 1955. Since 2011, the country has witnessed two additional outbreaks of civil war, in 2013 and 2016, which have led to significant displacement, inhibited development, and created massive humanitarian needs across the country. Since the signing of the latest peace agreement in 2018, the security situation has stabilized in most parts of the country. However, intercommunal violence has spiked, rooted in multiple factors. Hazards such as flooding have led to changes in the migration patterns of nomadic pastoralists, inciting new tensions over grazing land and water sources. Additionally, ethnic tensions have led to cycles of revenge attacks that have spiraled due to the

lack of state- and local-level leadership as the new government is still being formed.

To provide empirical and field-based insights on the disaster and FCV-related risks in South Sudan, key informant interviews (KIIs) and focus group discussions (FGDs) were conducted in nine locations across the country, targeting areas that host vulnerable populations such as IDPs and have experienced recent natural hazards and conflict (either civil war or intercommunal violence). Additionally, data collection took place in Juba, the capital of South Sudan, to document the perspectives of key stakeholders that support communities when faced with hazards. Lastly, enumerators were also asked to conduct observations through taking photographs and short videos to document the experience and impact of hazards in their respective locations.

Staff of partner organizations were recruited to assist in data collection, given current restrictions on travel within South Sudan due to COVID-19. This included recruiting participants, conducting KIIs and FGDs, and assisting with processing the data collected for the team leaders.

Participants for each tool were recruited from the local community, with an emphasis on engaging with those who can speak on the local history of hazards and have knowledge of both the community's resilience approaches and vulnerable populations. This includes participants such as the chief and elders, women and youth leaders, local government officials, nongovernmental organizations (NGOs) and other organizations operating in the area, and members of vulnerable groups such as IDPs. Both the FGDs and KIIs were audio recorded, to ensure that the richness and nuances of the data are captured and adequately inform the final report. Participants were asked for their permission before beginning the recording, and if they declined the interviewer took notes instead.

The data collected were coded and analyzed by the Team Lead and Co-lead in Juba. The data were then supplemented by secondary sources (Initial Rapid Needs Assessments [IRNAs], research reports, DTM data, and so on).

Figure 4. Map of data collection sites in South Sudan

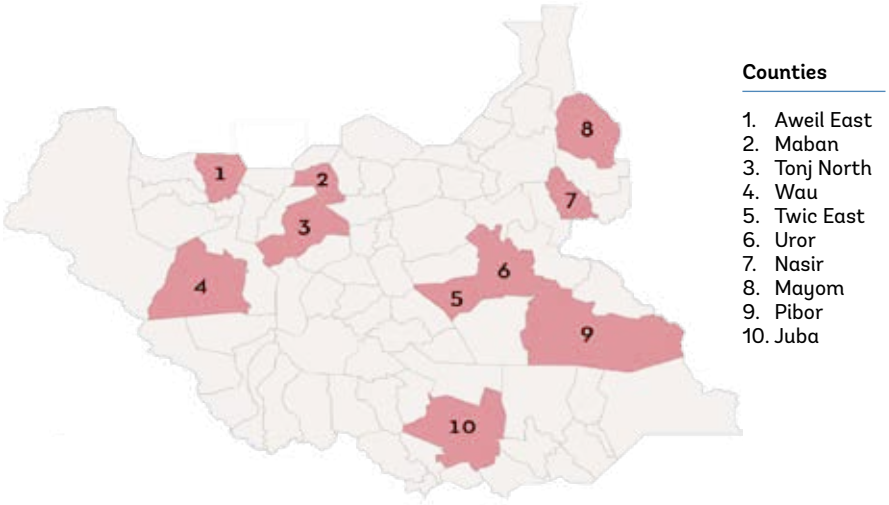


Table 3. Displacement in counties targeted in data collection

State	County	IDPs (MT Round 8)[a]	Reasons for displacement
Jonglei	Pibor	30,166	Conflict, intercommunal violence, returns, disaster
Jonglei	Uror	13,993	Conflict, intercommunal violence, disaster
NBeG	Aweil East	5,491	Conflict
Unity	Mayom	15,351	Conflict
Upper Nile	Maban	50,049	Conflict, intercommunal violence, disaster
Upper Nile	Nasir	13,909	Conflict, intercommunal violence, disaster
Warrap	Tonj North	81,614	Conflict, intercommunal violence, disaster
Jonglei	Twic East	1,508	Conflict, returns, disaster
Western Bahr el-Ghazal	Wau	46,555	Conflict, intercommunal violence

Note: a. Data obtained from IOM DTM's Round 8 of MT. https://displacement.iom.int/.

5. Discussion: Natural and Human-induced Hazards in South Sudan

The research findings for this study are drawn from both primary and secondary data relating to DRM across South Sudan. Although nine counties were targeted for primary data collection through qualitative methods, other counties are also included by drawing from datasets, research publications, and organizational reports.

As noted in chapter 4, the counties targeted for primary data collection included locations that have experienced multiple hazards since 2011, including both natural and human-induced hazards. As a result, the populations residing in each county also maintain significant humanitarian needs, as illustrated in table 4.

Table 4. Proportion of people in need by county

County	People in needa	Projected population[b]	PiN as a % of projected population
Pibor	173,400	119,000	146
Uror	89,300	173,700	51
Aweil East	201,100	54,200	371
Mayom	76,400	73,500	104
Maban	199,500	188,600	106
Nasir	182,500	64,900	281
Tonj North	131,200	62,900	209
Twic East	83,300	132,900	63
Wau	204,700	81,100	252

Note: a. Obtained from OCHA's Humanitarian Needs Overview for 2020; b. Projected population figures are obtained from OCHA/NBS estimates for 2020.

Because many counties in South Sudan also host refugees, IDPs, and other groups, at times the number of people with significant humanitarian needs may be larger than the projected population itself. As a result, as table 4 indicates, the number of people in need in several counties in South Sudan is over 100 percent of the estimated population. For locations such as Aweil East, Nasir, and Wau, hosting populations displaced by sustained hazards places additional pressure on local infrastructure and resources which are already limited to begin with. Such contexts increase the vulnerability of the host community, IDPs, returnees, and refugees who may be residing in a county and make them less resilient in the face of additional future hazards that may occur.

While the primary hazards identified by study participants were conflict, flooding, and drought, this study also seeks to explore other hazards that affect the diverse range of communities in South Sudan.

5.1. Natural Hazards

5.1.1. Droughts and Dry Spells

Climate change in South Sudan has led to temperature variations and unpredictable droughts and dry spells. This has significant impact on livelihoods in South Sudan, where rainfall is critical to maintain livelihoods, both agricultural and pastoral. It is estimated that 500 mm of rainfall is needed to maintain these types of livelihoods across the country (Ministry of Foreign Affairs - Netherlands, 2018).

Droughts and dry spells affect soil quality and thus reduce crop yields, which subsequently increases food insecurity levels in an area. This was particularly evident in 2017, when areas of the country near the northern border such as Northern Bahr el-Ghazal State reached famine levels of food insecurity as a result of drought. Many of the counties included in this study observed that they were experiencing cycles of floods and droughts, both of which were unpredictable for them. While some communities are attempting to increase food storages to last them through droughts, this has not been sufficient to address rising levels of food insecurity. Droughts also lead to households having to purchase food items in the market. However, given the financial crisis in South Sudan and high inflation rates, this has become an unaffordable option for many families. Selling cattle to raise cash for food is another coping mechanism, but it is a short-term solution that also affects the livelihoods and assets of

CASE STUDY

Strengthening the Livelihoods Resilience of Pastoral and Agropastoral Communities in South Sudan's Cross-border Areas with Sudan, Ethiopia, Kenya and Uganda – FAO (2019)

- Targeted the local, national and regional level
- Acknowledged the nexus between climate change, droughts, livelihoods and conflict over natural resources
- Approach:
  - Community-managed disaster risk reduction (CMDRR)
  - Participatory natural resource management
  - Community animal health workers (CAHWs)
  - Livestock and pastoral field school (PFS)

Figure 5. Damaged latrines at a local school

Source: IOM.

pastoral communities. Additionally, cattle themselves are affected by droughts, and combined with the prevalence of livestock disease, they may not draw prices that reflect their original value in the market during lean times.

Food insecurity resulting from droughts and dry spells are increasingly a critical factor within the context of fragility, conflict and violence in South Sudan, in regard to both the civil war and inter-communal violence. The national civil war led to significant levels of displacement, which prevented many farming households from accessing their land during key planting and harvest periods. Additionally, crops were often destroyed during attacks on communities, which lowered access to local food sources. IDPs that have re-settled in displacement sites have not had access to their land for extended periods of time and may not be able to obtain new land from host communities to use for subsistence agriculture. For those residing in PoC sites, this is even more challenging. Inter-communal clashes, which have spiked since the signing of the peace agreement in 2018, are not just centered on cattle raiding – homes and other infrastructure destroyed, crops are burned, and food stores are looted. Communities that are displaced following inter-communal clashes have also lost their assets which are key in rebuilding after such attacks, making it difficult to rebuild food supplies that would support households during the dry season. As a result, this also incites revenge attacks on other communities to replenish lost assets.

Droughts that are affecting the East Africa region have also led to atypical cattle migration patterns that have led to cross-border inter-communal clashes. To mitigate this, FAO has implemented a cross-border project that accommodates for the overlap between climate change, drought, livelihoods and inter-communal violence (FAO 2019).

5.1.2. Floods

In recent years, floods have occurred at unprecedented levels in South Sudan. In October 2019, the Government of South Sudan declared a state of emergency in multiple areas due to the resulting devastation, and it was estimated that floods that year had affected over 900,000 people in the country (OCHA 2020). Approximately US$25 million was allocated to partners to provide a response to communities across the country, primarily in the areas of food security and livelihoods; health, shelter, and nonfood items; and water, sanitation, and hygiene (WASH). While the 2019 floods were particularly severe, numerous counties in South Sudan have experienced similar disasters in previous years.

In 2015, an IRNA conducted in Mankien, Mayom County, indicated that seasonal floods were exacerbating humanitarian needs already emerging from the impact of the civil war on the area. Returning to their original homes was becoming increasingly difficult for those who had been displaced by the floods due to the destruction of crops, cattle, shelters, and other infrastructure. As a result, ad hoc IDP settlements were emerging at the time. As coping mechanisms, many families had resorted to small income-generating activities such as selling charcoal,

foraging for wild foods, and even sending their children to work. Similar findings were observed during an IRNA (2019a) conducted in 2019 in Nasir County, following flooding in the area. The displacement, destruction of shelter, and damage to livelihoods were additional hazards that the communities faced on top of the severe impact of the civil war that began in 2013. It was estimated that almost half of the individuals in assessed areas were impacted by the flooding, including both IDPs and returnees.

In Aweil East, community members reported annual floods from 2017 to 2019. In Maluaal Bai *Payam*, floods were also asserted to have occurred in 2012. In contrast, in 2020, extended dry spells were reported, heightening food insecurity. An FGD with local NGOs in the county revealed that cultivation had greatly reduced following the floods and with the advent of the dry spell. The floods had also destroyed crops in the county, which had made women and children particularly vulnerable to food insecurity.

As the PoC sites adjacent to UNMISS bases were initially ad hoc sites that were created as conflict spread to different parts of the country, the initial infrastructure and planning of these locations were unable to support the IDPs. According to its initial mandate, UNMISS was only designated to provide temporary protection, at the maximum for a few days, for those fleeing conflict. However, the nature of the conflict dynamics during the civil war has meant that hundreds of thousands of IDPs are still residing in PoC sites in six locations. The immense pressure on the ad hoc infrastructure was particularly prevalent in 2014, when flooding in Bentiu, Malakal, and Juba, the largest PoCs, destroyed the shelters and other infrastructure of the sites. Eventually, both the Juba and Malakal PoCs were relocated to areas not as prone to flooding. With the creation of new sites, planning for infrastructure and services could consider the more long-term needs of the populations residing there.

Additionally, in Maban County which hosts a number of refugee settlements, flooding has affected the local infrastructure. This was observed in 2019, when approximately 200,000 refugees and members of the host community were affected (Floodlist 2019). The floods damaged roads leading to the refugee camps,subsequently limiting access for humanitarian actors that were providing key services and implementing programs within the sites. Lutheran World Foundation (2019) reported at the time that three of the four refugee camps in the county were not accessible. Roads were eventually repaired and improved with the assistance of humanitarian organizations operating in the area, and services were able to resume. According to UNHCR (2019), the floods in 2019 also led to 43 percent of household latrines and 53 percent of school latrines being destroyed within the four refugee camps in the county. Additionally, 55,000 children in the area lost access to education due to the damage to school sites (LWF 2019). KIIs and FGDs in Maban with the host community indicated that this was the worst floods experienced in memory for many residents. Many people were no longer able to

Figure 6. Flooding in Pakeer, Twic East, 2020

Source: IOM.

engage in their livelihoods, as roads, markets, and local infrastructure such as health facilities and schools were damaged. Additionally, drinking water was contaminated, and many households lost their food supplies. The Director of Bunj Hospital also indicated that the floods were particularly challenging because local staff had difficulty traveling to the facility, and many residents of the area were suffering from health care complications resulting from the incident, that is, severe malaria symptoms, pneumonia, animal bites, and obstetrics emergencies. Some health facilities were shut down completely following the flood and supplies in pharmacies were lacking.

5.1.3. Fires

Both the primary and secondary data examined in this study did not reveal fires to be a main hazard in South Sudan. Furthermore, fire incidents are not well tracked in South Sudan, so it is difficult to gauge the extent to which they affect populations at the local level. In South Sudan, fires tend to happen on a smaller scale, given the low population density across the country. Four types of fires have been observed since independence in 2011: (a) wildfires, (b) fires used to clear land, (c) fires for burning rubbish, and (d) fires in population dense areas, particularly market places. The advent of electricity supply to the public has also posed a new hazard.

Wildfires may occur in South Sudan and, if not contained, may spread to residential areas. For example, in 2019, a wildfire that spread due to winds burned down four villages overnight. The hazard led to the deaths of over 33 people, left over 60 people injured in critical condition, killed 10,000 cattle, and destroyed over 130 shelters (AlJazeera 2019). In such instances, not only are firefighting services lacking but so are the high-level health care facilities needed to adequately treat the injured.

Due to the cramped conditions of markets in large towns in South Sudan, combined with the lack of precautionary measures, fires are a potential hazard to infrastructure and livelihoods. Fires in major markets have been documented in recent years. As early as March 2013, a fire in Aweil Town's market destroyed several shops and goods of traders. A fire broke out in the same market a year earlier as well (Hou 2013). In February 2019, a fire in Yei Town's market destroyed the shops and goods of local traders (Radio Tamazuj 2019). In November 2019, a fire destroyed several shops in Customs Market, one of the key markets serving Juba. In July 2020, a fire broke out in the Guedele Two market, destroying several shops in the area (Richard 2020). Because shops and supplies of traders are often not insured, rebuilding after a fire can be financially challenging, making it difficult to recover from this type of hazard.

PoC sites hosted by UNMISS bases have also experienced fires due to the high population density, the use of unsafe cooking equipment, flammable materials used to construct shelters, and unauthorized building of shelters and shops. In 2017, Bentiu PoC experienced two fires, which did not result in any deaths or injuries but did lead to the destruction of 117 shelters. As a result, 1,700 IDPs in the site required additional humanitarian assistance (UNMISS 2017). Just one year later, another fire broke out in the PoC's marketplace, destroying over 100 shops (UNMISS 2018). In each case, UNMISS peacekeepers provided the firefighting response to prevent the fires from spreading further.

Lastly, in 2020, South Sudan began rolling out electrical infrastructure and supply to different neighborhoods in Juba, the country's capital. This sought to increase access to electricity to many of the city's residents who were not able to purchase generators and fuel for their homes and to serve government institutions. Local media reports that some of the powerlines have caught fire, affecting the quality of the service available. The fires are attributed to illegal connections to the grid by residents which may be overloading the infrastructure.

Firefighting services in South Sudan are quite minimal, and where possible, UNMISS has supported response to fires. However, in June 2020, UNMISS in Juba donated a water truck, a fire engine, and protective equipment to Central Equatoria's Fire Service (UNMISS 2020a).

5.1.4. Pests (crops) and Diseases (livestock)

Pests that damage crops and diseases that are acquired by livestock have a strong impact on livelihoods in South Sudan, for both agricultural and pastoral communities alike.

Fall Armyworm (FAW), which entered the African continent in 2016, was observed in South Sudan in 2017 in Eastern and Central Equatoria. Shortly after its arrival, it quickly spread to other states in the country (FAO 2018), where it targets key crops such as maize and sorghum. FAO estimates indicated that crop yields for maize could have been affected by up to 50 percent in some parts of the Equatoria and Bahr el Ghazal Regions, whereas sorghum yields may have been reduced by up to 30 percent. The South Sudan Fall Armyworm (FAW) Program Country Report published in 2019 indicated that counties across the southern border in South Sudan, that is, the Equatoria Region, reported severe levels of FAW incidence (Kedi and Morris 2019). The mid-region of the country, primarily in Wau County, Tonj North, Tonj East, and parts of Lakes reported moderate levels, whereas counties located closer to the

Figure 7. Crop pests in Jakmir, Nasir

Source: IOM.

northern border had a low incidence rate of FAW. Local NGO representatives in Aweil East recounted during an FGD that FAW destroyed many crops in the county and completely eradicated maize crops, which are more susceptible to the pest.

In October 2019, OCHA (2019b) announced that a desert locust infestation arrived in East Africa and was destroying both crops and grazing lands, threatening local food supplies. By February 2020, locusts had crossed into South Sudan, specifically Eastern Equatoria, through the shared borders with Uganda and Kenya. In particular, locusts were observed in Magwi and Lobone areas of the state (Danis 2020). Future swarms from neighboring countries could invade states in South Sudan by the country's eastern border, particularly Jonglei, Upper Nile, and Unity, before crossing into Sudan (USAID 2020). This also poses a threat to crop yields in South Sudan, during a time when the country's food security levels are already precarious. The FAO in South Sudan estimates that 20 percent of the country's crops could be damaged by locusts, an amount which USAID notes is "sufficient to feed approximately 278,000 people for one year."

One mitigation measure for locusts is aerial spraying, which was due to begin in South Sudan by midyear. However, COVID-19 restrictions paused humanitarian programs in the country, including the locust response.

Livestock diseases are also common in South Sudan, where many households rely on cattle for their livelihoods. Cattle are viewed as considerable assets in many communities in the country, where they provide milk to be consumed by the household, can be sold for food in lean times, and are also used as dowry payments. In 2017, the government announced that an estimated 4 million cattle in the country had foot-and-mouth disease, out of a population of 12 million cattle (ISID 2017). Other livestock diseases that have been documented in South Sudan include East Coast fever, trypanosomiasis, contagious bovine pleuropneumonia, hemorrhagic septicemia, and contagious caprine pleuropneumonia (Mekonnen 2015). Hazards that threaten cattle migration patterns, such as floods and conflict, can limit access to veterinary services for cattle herders, increasing risks of illnesses and death among cattle (Catley 2018). The FAO and UNMISS, among other organizations, have implemented vaccination campaigns for livestock in communities across South Sudan to limit the spread of such diseases, while also protecting livelihoods. Local NGOs in Aweil East revealed that livestock diseases from 2017 to 2018 in the county led to many cattle deaths and affected the quality of milk produced by cattle.

5.2. Disease Outbreaks

While disease outbreaks are a very present hazard in South Sudan, they were not among the primary hazards listed by communities. Rather, the immediate dry spells, floods, and intercommunal violence that were affecting them during the data collection period were the primary concerns. Regardless, disease

outbreaks are critical to consider as a population's vulnerability is increased following natural hazards and conflict. This has been observed in PoCs and ad hoc displacement sites as well as in communities that have been significantly affected by flooding, as discussed in this section.

5.2.1. COVID-19

On March 11, 2020, the World Health Organization (WHO) declared COVID-19 to be a pandemic. The rapid increase in confirmed cases in other countries elicited preventative measures in South Sudan, including the closure of international borders and the cessation of interstate travel. By April, South Sudan had confirmed its first case in Juba. While the initial cases were clustered in the country's capital city, cases have now been confirmed in other states. As of July 11, 2020, the country had a total of 2,145 confirmed cases. However, due to the limited availability of testing facilities and supplies, mass screening is currently not available, and subsequently the total number of cases may be greatly underestimated.

Humanitarian actors have begun interventions such as awareness-raising campaigns; distribution of masks; and enhancement of WASH infrastructure and facilities. To assist states in preparing for a potential influx of patients with COVID-19, UNMISS and humanitarian organizations have assisted the government in establishing isolation centers in major towns, by either rehabilitating existing buildings or constructing new ones.

Despite border closures, South Sudan shares porous borders with six countries, and individuals often cross through unofficial points that are not regulated by the government. As a result, screening points previously used for Ebola screening have been equipped to assist in supporting the COVID-19. Key transit hubs at the southern border with Uganda, namely Nimule in Eastern Equatoria and Yei in Central Equatoria, have also been equipped with testing machines.

The primary impact currently being felt in counties where data collection occurred was the closure of schools and other institutions, to minimize transmission. Prevention of transmission is particularly key in South Sudan as the country does not have an adequate health care infrastructure to support an outbreak of COVID-19, particularly in rural areas where health facilities lack specialized care and are often located far from communities. In some areas, infrastructure has been destroyed or damaged as a result of conflict. Additionally, access to healthcare is restricted when inter-communal violence takes place or flooding occurs. Primary data collection in this study also revealed that in some counties primary healthcare units have been damaged due to flooding. Limited access to healthcare also has the liability to impact other areas of humanitarian services, as schools are often used as key locations for the dissemination of services to children, including nutrition, cash distributions for female students, and the distribution of dignity kits. Now that schools are closed, female students in particular may not be able to access essential support services.

The likelihood of gender-based violence increasing as a result of COVID-19 is a key concern on the part of both the government and humanitarian actors, particularly in areas where communities have already been displaced due to conflict. A rapid assessment conducted in 2020 by University of Juba in partnership with UNDP (2020) on the gender and socio-economic impact of the pandemic revealed that women are particularly vulnerable in this context. The number of households that were relying on one meal a day almost doubled as result of the movement restrictions implemented by the government. Additionally, women who rely primarily on the informal economy to generate income were experiencing increased financial instability in their households, raising the risk of being exposed to gender-based violence. These findings were supported by a different study conducted by UN Women (2020) and other humanitarian partners, which also revealed that despite restrictions on movement, many women were continuing to sell their goods in the market and engage in other livelihoods, despite the risks, due to financial pressures. For women in IDP sites, who are already experiencing extraordinary financial hardship due to loss of assets and being displaced, this vulnerability is heightened (Mednick 2020).

While many national organizations have joined the effort to mitigate the impact of COVID-19 in South Sudan, a survey by Impact Cap Initiative (D'Arcy 2020) reported that 68% had lost funding or support as a result of the pandemic. This is particularly worrisome given that national organizations are often at the frontline of responding to hazards, both natural and human-induced, at the community level.

5.2.3. Ebola

In 2018, the outbreak of Ebola in neighboring Democratic of Congo led to preventative measures being instituted in South Sudan. The porous borders shared between the two countries, combined with South Sudan's limited health care infrastructure, meant that preventative measures had to be taken urgently. Screening points were set up along the country's southern border, primarily in Western Equatoria and Central Equatoria States. Humanitarian organizations provided much of the equipment, training, and capacity-building support for the prevention measures. As of July 2020, no Ebola

cases had been confirmed in South Sudan. However, cross-border movement between the two countries continues – according to UNHCR, over 89,000 South Sudanese refugees reside in DRC, and in May 2020, 250 refugees from DRC were reported to have entered Western Equatoria State due to conflict. Border markets between the two countries also continue to operate, presenting an on-going risk for transmission.

5.2.4. Cholera and Other Waterborne Diseases

Floods heighten the risk of waterborne diseases, as the local population often relies on contaminated water for bathing, cooking, drinking, and so on. An epidemiological study conducted by UNICEF in 2018 showed that historical trends of cholera cases from 2007 to 2017 indicated that Eastern Equatoria and Juba were key hotpots for outbreaks, leading to outbreaks in other parts of the country. Areas such as Malakal and Bor were also identified as being vulnerable to cholera outbreaks due to the conflict dynamics of these towns. Other vulnerable sites include IDP settings, cattle camps, and camps for armed forces (UNICEF 2018). When one of the biggest outbreaks in South Sudan's history began in 2017, other counties began to report high caseloads of cholera as well, particularly in areas where the Sudd swamp is located. This could potentially be related to the change in conflict dynamics in 2016 and 2017, where violence against civilians in the area pushed IDPs to flee through the swamps to seek safety, while also exposing them to waterborne diseases.

Vaccine campaigns, as well as development of WASH infrastructure and facilities, are key prevention tools for cholera outbreaks, particularly in areas with high population densities such as IDP settings. In Aweil East, residents reported that a cholera outbreak occurred in the county in February 2018, following floods in the area. The IOM responded with a cholera vaccination campaign that had reached over 83,700 children by April of the same year (IOM 2018). In counties such as Kapoeta East which experienced a spike in cases in 2017, UNICEF has also implemented awareness raising campaigns and provided necessary equipment to treatment centers (UNICEF 2017). As such diseases are also closely tied to malnutrition rates, it becomes imperative to provide interventions to vulnerable communities following hazard incidents, to ensure that children are not further susceptible to contracting and transmitting diseases.

5.2.5. Measles

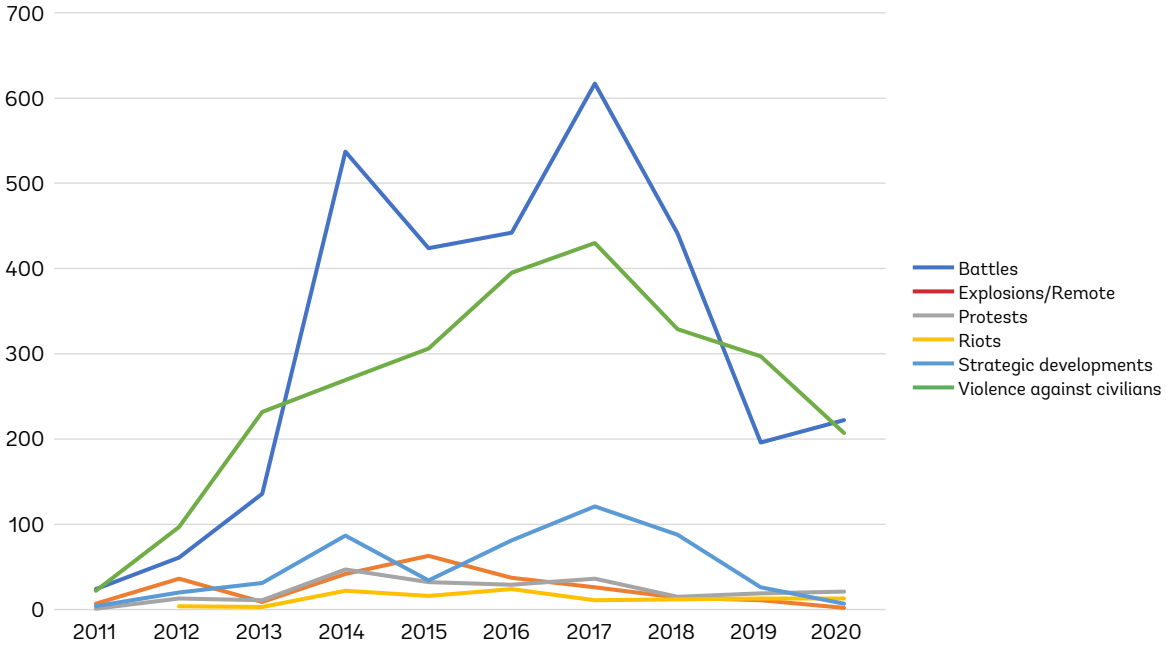
The cessation of movement and services in South Sudan due to COVID-19 has hindered access to health care programs and facilities that are vital in preventing the spread of other diseases that the country is working to eradicate. For example, UNICEF (2020) estimated in April that 787,000 children may miss out on their measles vaccines due to interruptions of the vaccination campaign as a result of COVID-19. However, the campaign was resumed in June in Aweil East County, where partner organizations supported the WHO in vaccination of over 94,000 children. As measles is a contagious but preventable disease, vaccines are critical in ensuring that it does not spread, leading to massive outbreak. In a country where many are still displaced, locating children who are not vaccinated and tracking their vaccination records can be a particular challenge. This is particularly true of ad hoc displacement settings that do not have the same coordination mechanisms as PoC sites.

5.3. Conflict

After two lengthy wars with Sudan, beginning in 1955, South Sudan faced internal threats of conflict since its independence in 2011. At the time that it became the world's newest country, internal conflict dynamics were already present. Tensions with Sudan continued, including bombings by the Sudan Armed Forces (SAF) in Raja County. This also included rebel movements in Jonglei that had not been resolved by the time the country's new government was formed. Additionally, sustained tensions in the Greater Upper Nile Region continued due to the presence of oil fields at the northern border, which were a valuable resource given that oil revenues constituted the majority of funding for the national budget at the time. The governance of Pibor, in Jonglei State, remained a disputed issue at independence, resulting in it becoming an administrative area in 2015, in an attempt to stabilize the area.

Since 2011, there have been two major outbreaks of conflict at the national level, in 2013 and 2016. This sustained violence led to immense displacement and significantly increased humanitarian needs. While the security situation has been remained relatively stable since the signing of the Revitalized Peace Agreement in 2018, counties across South Sudan have struggled to recover from the impact of war due to other hazards that occur frequently, as well as minimal resources and infrastructure.

Figure 8. ACLED data (conflict event type), 2011 to present[29]



Note: ACLED = Armed Conflict Location and Event Data Project.

ACLED data, as illustrated in figure 8, show spikes in conflict events following the 2013 and 2016 outbreaks of conflict in South Sudan. While both 'battle' and 'violence against civilians' types of incidents have shown a marked decrease since peace negotiations began and ceasefire protocols were implemented, civilians in South Sudan continue to be displaced as a result of conflict and other hazards. In 2020 alone, the IDMC reported 259,000 new displacement resulting from conflict and violence alone, with a further 246,000 new displacements resulting from natural disasters. This has sustained the high level of humanitarian needs in the country while also inhibiting the development of resilience mechanisms at the local level.

5.3.1. Civil War

In 2013, just two-and-a-half years after independence, clashes broke out in Juba between forces aligned with President Salva Kiir and Vice President Riek Machar. These clashes soon spread to other parts of the country, particularly the Greater Upper Nile Region, where they lasted until the signing of the peace agreement in 2014. Despite the peace agreement, numerous violations of the ceasefire were observed. When Riek Machar returned as a part of the formation of the Government of National Unity in April of 2018, it was meant to lead to the resolution of the conflict and set South Sudan back on a path for peace and development. However, just a few short months later in July 2018, clashes between the two sides broke out again, leading to a second phase of the civil war. This time, more regions of the country were drawn into the conflict—notably, Central Equatoria, particularly by the southern border, as well as Western Equatoria and Western Bahr el-Ghazal.

The complexity of the conflict dynamics meant that counties have different displacement trajectories and inequity in the impact of the devastation of conflict. While the Greater Upper Nile Region, counties near the southern border in Central Equatoria, and the forests of Western Equatoria and Western Bahr el-Ghazal have served as bases for armed forces throughout the conflict, making civilians more vulnerable, other counties have been relatively unscathed from conflict dynamics. Variations in forced migration patterns are also observed in terms of borders that refugees cross to seek safety—historically, Sudan, Ethiopia, and Kenya were key countries that hosted South Sudanese refugee populations. The more recent conflict, however, which affected areas such as Yei and Kajo-Keji Counties significantly, had led to increased displacement patterns across the Ugandan border. This is also compounded by the closure of the borders with Sudan for much of this time, as well as growing communal tensions in Ethiopia near the border.

[29] ACLED data, 2011-2020, retrieved from: https://acleddata.com/data-export-tool/

5.3.2. Intercommunal Violence

Intercommunal violence and localized conflict dynamics have evolved over time due to hazards, ethnic tensions, and access to resources. As each of the counties in South Sudan has its own history and trends relating to intercommunal violence, key examples will be discussed in this section. Intercommunal tensions may occur over limited natural resources needed to sustain livelihoods such as land for grazing cattle and water sources. Additionally, South Sudan's administrative borders between counties and *payams* are disputed in some areas by different communities, which leads to contestations over land ownership. Cycles of revenge attacks, particularly involving cattle raids, also often involve the destruction of local infrastructure, and abduction of women and girls.

Due to its proximity to the northern border, the county was affected by the civil war with Khartoum from the 1950s to 2005. Presently, in Maban County, which hosts four refugee camps, the host community has experienced periodic intercommunal violence with different actors from 2013 to 2017, namely refugees displaced to the area due to pressure on limited local resources and neighboring communities. A *payam* chief in Maban recounted that in 2017 and 2018, tensions with Dinka communities from Khar Adar and Melut led to intercommunal clashes, which resulted in livelihoods being impacted, cattle stolen, deaths, and displacement.

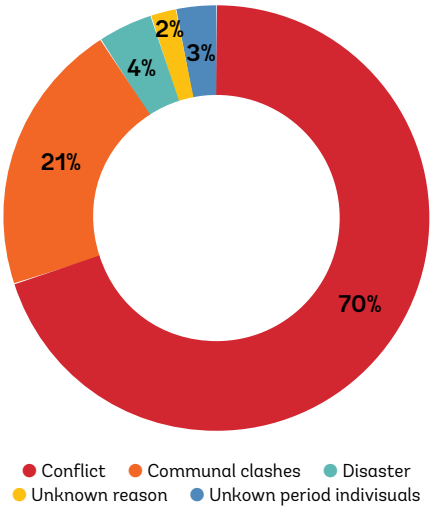
Aweil East County, which is also located close to the northern border, has also experienced intercommunal violence resulting from cross border attacks. An FGD with female returnees recounted that in 2018 "there was an attack of civilians by Arabs at the border of Majok-Yinh-Thious that killed many people."

Intercommunal violence in Jonglei State in recent years has been particularly devastating, especially in the Pibor area. Recently in 2020, tensions between Murle and Nuer communities have led to the displacement of thousands of individuals (Malaak 2020), at a time when communities are also grappling with floods. Clashes with the Murle can extend to counties outside of Pibor, as observed in June 2020 in Uror County, where communal clashes led to the displacement of over 3,000 households (IOM DTM 2020). Cycles of revenge attacks indicate that the hazards communities in Jonglei face are sustained and often lead to killings, abductions, destruction of infrastructure, and the loss of assets such as food, shelters, and cattle, which impedes the ability of a household to recover from an incident. In addition to conflict with other communities, the Murle are also experiencing intracommunal clashes between different age groups of male youth and historical tensions with Dinka subgroups. In 2019, former Governor Yau Yau established a program to return abducted youth residing in Pibor to their families, to reduce ethnic tensions in the area.

5.4. Linking Displacement to Disasters

The connection between displacement and disasters is evident in South Sudan and an imperative one to consider when designing programs and policies relating to both disaster preparedness and response.

Figure 9. Primary reason for displacement in South Sudan 2014–2020



In examining national-level data trends in the figures below, it is evident that when ceasefires were implemented in preparation for the signing of the Revitalized Peace Agreement in 2018, the types of hazards leading to displacement began to change.

Overall displacement trends from 2014 to early 2020 indicate that the national conflict accounted for 70 percent of displacement that has been documented through IOM DTM's MT exercises. Communal clashes accounted for a further 21 percent of displacements, whereas natural disasters accounted for 4 percent of displacements recorded during this period.

From 2014 to 2015, a period which covered the aftermath of the 2013 outbreak of conflict, as well as attempts to reach a peace agreement, the civil war accounted for 94 percent of displacements that occurred. Communal clashes constituted 4 percent and disasters 2 percent of displacements that occurred during this period.

Subsequently, from 2016 to 2017, when the first peace agreement was signed and implemented, and the

Figure 10. Reason for displacement 2014–2015

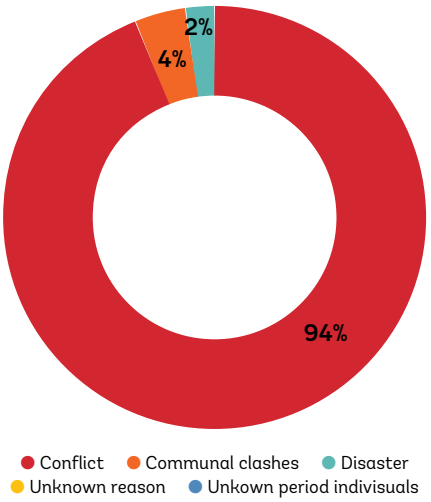
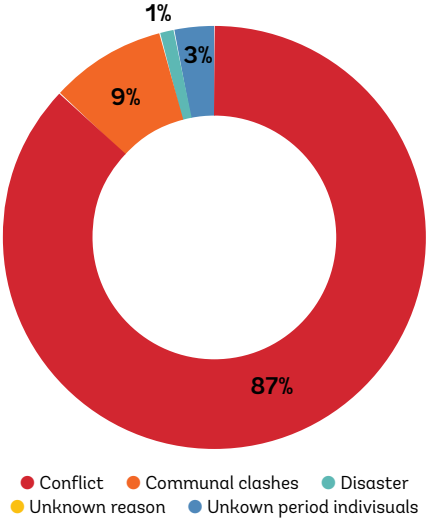


Figure 11. Reason for displacement 2016–2017



second outbreak of conflict began, the composition of reasons for displacement began to change. The civil war accounted for 87 percent of displacements and intercommunal violence for 9 percent.

In 2018, ceasefires were instituted for a second time, and the Revitalized Peace Agreement was being negotiated. The changing security context in South Sudan during this period was also reflected in the reasons for displacement, where the proportion of displacements attributed to the civil war reduced to 52 percent, intercommunal violence accounted for 43 percent of displacement documented, and disasters accounted for 2 percent.

Following the signing of the Revitalized Peace Agreement in 2018, further changes are observed in reasons for displacement. While the proportions of displacement attributed to conflict (50 percent) and intercommunal violence (36 percent) decreased from the previous period, displacement from natural disasters increased to 9 percent.

Subsequently, in 2019, when many counties experienced extensive flooding, displacement attributed to natural disasters continued to increase to 19 percent, whereas displacement resulting from conflict (43 percent) and intercommunal violence (32 percent) continued to decrease.

Lastly, in the first half of 2020, spikes in intercommunal violence in multiple counties were observed. This led to intercommunal violence accounting for almost two-thirds of displacement, whereas conflict led to 27 percent and natural disasters led to 6 percent of displacements in the country.

Figure 12. Reason for displacement 2018 pre R-ARCSS

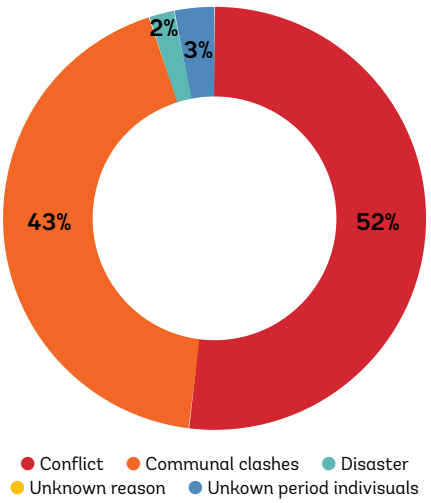


Figure 13. Reason for displacement 2018 post R-ARCSS

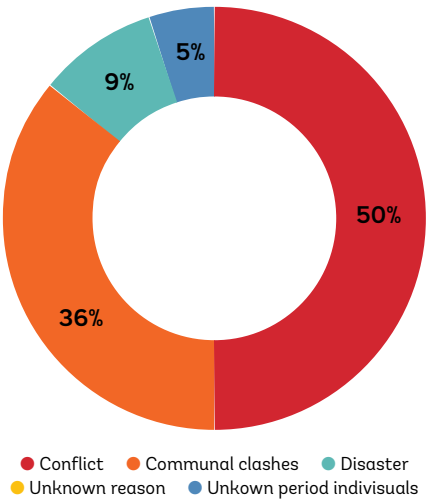


Figure 14. Reason for displacement 2019

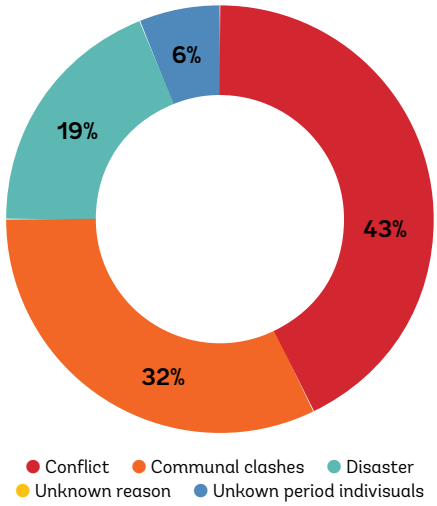


Figure 15. Reason for displacement 2020

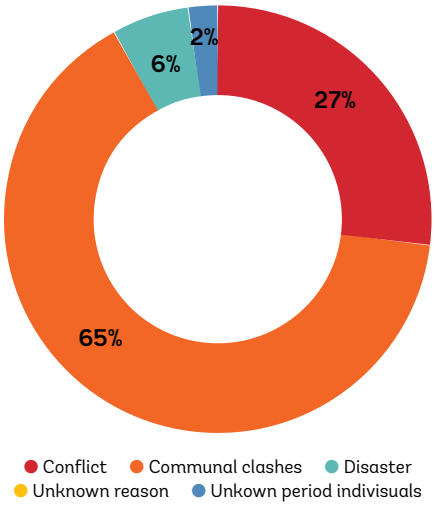


Table 5. Number of IDPs by county, 2018–2020

County	IDPs MT Round 1	IDPs MT Round 2	IDPs MT Round 4	IDPs MT Round 5	IDPs MT Round 6	IDPs MT Round 7	IDPs MT Round 8	Reason for displacement
Pibor	—	5,926	6,992	6,877	6,382	6,382	30,166	Conflict, returns, disaster
Uror	—	—	—	9,401	9,608	12,895	13,993	Conflict, intercommunal violence, disaster
Aweil East	—	6,845	5,281	5,522	5,723	9,570	5,491	Conflict, intercommunal violence, disaster
Mayom	—	—	15,529	14,054	19,234	21,196	15,351	Conflict, intercommunal violence, disaster
Maban	16896	17674	15,438	12,136	18,541	51,923	50,049	Conflict, intercommunal violence, disaster
Nasir	—	—	—	61,459	3,199	4,636	13,909	Conflict, intercommunal violence, disaster
Tonj North	—	—	54,897	59,082	46,107	95,236	81,614	Conflict, intercommunal violence, disaster
Twic East	—	—	3,773	3,764	2,975	2,834	1,508	Conflict, returns, disaster
Wau	17616	85,334	90,894	64,461	114,615	65,394	46,555	Conflict, intercommunal violence

5.5 Livelihoods and Food Security

In terms of livelihoods, many of the communities examined in this project are agropastoralists. The findings revealed that a number of community members, particularly women, also engage in small income-generating activities within the informal economy. These activities often require access to natural resources found within their surrounding environments. For example, selling charcoal, making furniture or crafts for household use, brick laying, foraging for wild foods, selling groundnuts and peanut butter, tea making, operating public transport (boda boda), and selling grass.

When floods occur, however, they often lead to the deterioration of roads used to travel to markets where goods are sold, which can hinder even these options for rebuilding after a hazard.

In areas where communities are located near rivers, fishing is also a common livelihood. It is also one of the very few income-generating activities that remains viable even during floods.

Hazards in South Sudan are closely linked to food security and the extent to which local populations will rely on food aid to survive in the aftermath of disasters. Due to the lengthy history of conflict, multiple areas in South Sudan were struggling with food insecurity at independence. IPC projections for

Figure 16. Dead livestock following floods in Jikmir, Nasir

Source: IOM.

July–September 2011, after independence, predicted that most counties in South Sudan would be at IPC Phase 2 (Stressed) or IPC Phase 3 (Crisis) levels of food insecurity. This was in part due to the high number of returnees still entering the country, as well the closure of trade routes with Sudan, which particularly affected the northern counties in the country.

Subsequent projections were optimistic that by October of the same year, most counties in South Sudan would be at IPC Phase 1 (None or minimal food insecurity), as a result of improving security conditions, harvests in October, and communal coping mechanisms to support returning populations.

In recent years, however, hazards have disrupted the primary livelihoods in South Sudan and subsequently increased levels of food insecurity across the country. However, communities struggle to adapt their livelihoods in sustainable ways that are responsive to the changing context and environment. For example, an elderly male FGD participant in Mankien, Mayom, recounted that livelihoods had not changed: "all the cultivation areas were flooded and the animals die but the community did not change to other type of livelihoods." Displacement means that households practicing agriculture, even at subsistence levels, do not have access to their land, particularly during key planting and harvesting periods. In Pibor, a female FGD participant observed that, "During disaster, we are not able to carry out these activities. We seek for safety and run to safer locations. During this time, there is no way farming or fishing can be carried out." For those whose land was occupied while they were displaced, returning home and re-gaining access to their farms may be challenging. This inhibits local food production on South Sudan, making the population increasingly reliant on food aid, market goods, and selling assets such as cattle to raise cash to purchase food.

While the security context in South Sudan has become relatively stable since the Revitalized Peace Agreement was signed in 2018, localized insecurity in some areas of the country still hinder livelihoods and subsequently affect food security levels. An elderly woman in Mankien, Mayom, stated, "[a] long time ago the community cultivates freely, take[s] care of their livelihoods, but for now people fear to move freely because all the youth are carrying guns and raid cattle." Respondents also noted that when cattle raids occur, other assets are also stolen such as food supplies which would typically support households through the dry season. As a result, food insecurity has become one of many factors fueling cycles of inter-communal violence.

5.6 Disaster Preparedness and Resilience in South Sudan

Many of the participants in all nine counties emphasized that existing mechanisms to respond to hazards are minimal in their localities, and they are highly reliant on aid organizations to meet their basic needs when disasters occur. Building resilience is also critical for youth and future generations, as one female FGD participant in Mayom reflects, "the youth, they lost hope in their future plans due [to] stress caused by the hazards."

Access to information regarding hazards before they occur is a key challenge in South Sudan. Early warning systems are still being developed, and as a result many of the study's participants expressed that they do not feel they have much control in preparing for hazards that will occur in their area. Local NGOs operating in the area may have access to information networks and links to resources in Juba, but this is not consistent across the country.

Figure 17. Degraded dyke in Jikmir, Nasir.

Source: IOM.

Figure 18. Community volunteers build a new dyke in Jikmir, Nasir

Source: IOM.

South Sudan has numerous water sources, including rivers that may overflow during the rainy season, which leads to floods. In multiple counties dykes have been built to limit the impact of floods on local infrastructure and livelihoods. Locally built dykes require rehabilitation due to the deterioration resulting from hazards, wild animals, and erosion over time. In Twic East, Panyagor in Kongor *Payam* had a dyke that limited damage to the local infrastructure during the 2019 floods. An IRNA (2019b) conducted the same year in Twic East noted that the topography of the county, namely, rivers and swampy areas, leads to the deterioration of dykes. However, due to the significant level of floods, it required assistance from humanitarian partners to repair the dyke. Similarly, in Jikmir *Payam* in Nasir, they have rehabilitated a dyke that had deteriorated. In Aweil East, members of the host community recounted that dykes are built before flooding occurs, primarily to protect shelters and crops; however, the ability to do this also depends on having the necessary equipment, resources, and technical support.

Communities also shared strategies used in agricultural practices to limit damage to local food supplies when hazards occur. For example, one strategy shared by an elderly man in Aweil East is planting crops such as groundnuts which can be stored easily to support food supplies if crops are destroyed. Other community members also shared that they can cultivate high or low lands, depending on the hazard they expect to encounter, but this is often difficult to predict—while they had experienced flooding in previous years, this year the community is enduring a dry spell. In terms of shelters, local NGOs in Maban encourage community members to build their structures on higher land and with stronger materials to withstand flooding. In Aweil East, community members shared that peace initiatives, both at the local and national levels, had helped improve the security situation and reduce the impact of conflict. Peace committees formed at the local level sought to address intercommunal violence, particularly tensions surrounding access to the natural resources that deplete during the dry season. These migration patterns have had to evolve

as droughts and floods increase in South Sudan and at times have also resulted in clashes and cattle raids. In Aweil East, the Misseriya (nomadic pastoral groups from Sudan) cross the border with their cattle during the dry season into South Sudan, to access water sources and grazing land. In 2019, UNMISS facilitated a migration dialogue in Aweilt East, to address the issue of cattle raiding and negotiate compensation for affected families (UNMISS 2019).

Aside from building of dykes and adapting agricultural practices, as well as localized peace processes, communities where data were collected reported no other coping mechanisms for building resilience in the face of hazards that occur. As a result, they continue to depend on humanitarian organizations to meet basic needs and rebuild in the aftermath of disasters. While natural hazards may not be preventable, their impact can be mitigated. Additionally, even for man-made hazards such as conflict, preventative measures are critical as an FGD participant in Mayom pointed out that for youth, "some are joining the military that they were not supposed to joint if they are in good situations." Conflict sensitivity is also essential, as different tools and interventions are needed in reducing this type of hazard at the community level. In Pibor, one FGD participant expressed her frustration with a context in which it is difficult to rebuild: "During conflict, the only safe location is that which the attacking community has not reached to. If they reach any location, they make sure anything is down. These are the situations we are undergoing in this community. You find a person can build Tukuls[30] more than three times in a year. You build, flood comes and destroy. You build another one, Nuer or Dinka come and destroy."

In addition to women (especially widows), the elderly, disabled, and orphans, IDPs are seen as particularly vulnerable at the local level as they have few assets, do not have land to cultivate, and are not able to access the same resources as the host community when hazards occur. Similarly, returnees often return to South Sudan with few assets to rebuild, and when combined with disasters, their resilience in such situations can be inhibited. As a returnee FGD participant in Tonj North shared, "the returnees suffer most especially when they get repatriated with hopes of rebuilding their lives again in their land of origin. However, they become discouraged when man-made hazards and/or natural hazards struck again, and since they have limited resources most of the time they face challenges."

CASE STUDY

Community Managed Disaster Risks Reduction (CMDRR) program – Cordaid

- Targeted communities that were facing multiple hazards and acknowledged that natural disasters could increase the risk of conflict and violence
- Adopted a bottom-up approach led by communities
- Phase 1: Participatory Disaster Risk Assessment
- Phase 2: Interventions:
  - 1: Capacity building for both the community and partners
  - 2: Community institution building
  - 3: Conflict transformation – "enhancing community capacity to facilitate dialogues among conflict parties"
  - 4: Livelihood security
  - 5: WASH infrastructure (human and livestock consumption)
  - 6: Community early warning system

5.7 Humanitarian Response to Disasters

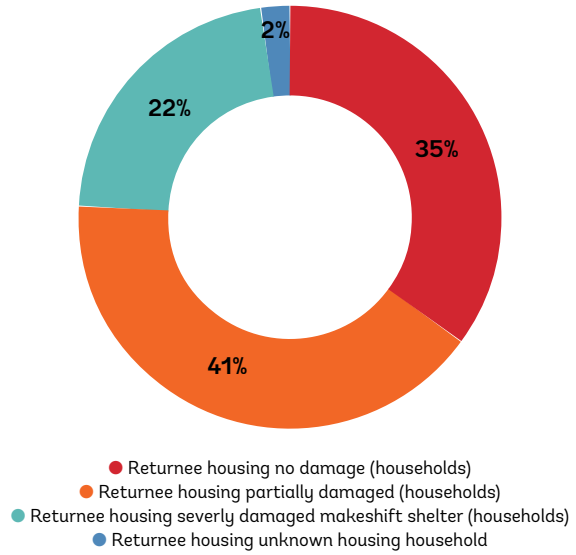
According to OCHA's Humanitarian Response Overview, US$1.9 billion is needed to support the significant humanitarian needs in South Sudan, much of which are rooted in both natural and man-made hazards in the country. In addition to the COVID-19 response, these funds are intended to cover the sector's camp coordination and camp management, education, shelter and nonfood items, food security and livelihoods programming, health, nutrition, protection, mine action, logistics and telecommunications, as well as WASH.

Humanitarian actors are also having to consider how returning IDPs and refugees to different counties are compounding humanitarian needs and stressing local infrastructure, particularly as such groups often arrive with few assets and require access to basic services. A recent assessment conducted by the WHO and IOM DTM in 2019 examined the accessibility of health care for IDPs and returnees. The findings concluded that 32 percent of IDPs and almost 37 percent of returnees resided more than 5 km away from a functioning health facility. Upper Nile faces the greatest challenge in access to functional health care facilities and hosts the highest number of IDPs and returnees combined.

[30] Tukuls refer to a particular type of architectural style of homes in South Sudan and other parts of East Africa that are made from locally available materials.

IOM DTM also captured the shelter status of returnees during Round 8 of MT, which indicated that almost two-thirds of returnee households had either severe or partially damaged shelters. In terms of absolute numbers, Upper Nile and Western Bahr el-Ghazal States had the highest numbers of households with severely damaged shelters. Addressing infrastructural needs can assist in reducing tensions between host communities and returnees but require a longer-term approach compared to humanitarian response.

Figure 19. Shelter status of returnees (2020)



The emergence of COVID-19 in the country in April 2020 has reoriented resources from previous programs to mitigate the risks posed by the pandemic. However, humanitarian actors continue to implement programs at the local level and support capacity development across the country, to develop disaster preparedness mechanisms and implement disaster response services.

Some of the examples of humanitarian response highlighted in this report include building local capacities through participatory methods; distributing livelihoods materials; addressing basic needs such as food, WASH, and shelter; and building local infrastructure, that is, dykes, roads, and health care facilities.

In addition to localized programming, humanitarian stakeholders noted that there are multiple initiatives to support the development of coordination and policy initiatives at the national level. This includes support for the development of a DRM policy as well as a resilience strategy.

Despite almost a decade of humanitarian support in South Sudan, longitudinal trends are evident in the types of hazards and vulnerabilities observed in South Sudan, that is, floods, droughts, conflict, and

CASE STUDY

Shelter-NFI Recovery Project – IOM S-NFI (2019)

- Targeted returnees and host community in Wau Town
- Adopted a people-centered mult-sectoral approach
- Approach:
  - Establishment of Village Development Committees to create recovery priorities and plans
  - Construction of new shelters and repair of damaged shelters
  - Capacity building of local technicians and artisans
  - Psycho-social interventions
  - Rehabilitation of key infrastructure
  - Community peace events and dialogue
  - Training and sensitization related to DRM, including HLP, early warning and response, peacebuilding and first aid

a large proportion of the population that is displaced, as evidenced in comparing the FAO's 2009 study with the key findings presented in this report. This places urgency on the need to further develop disaster preparedness and resilience capacities in South Sudan, to reduce vulnerabilities to multiple hazards, particularly for IDPs, women, the elderly, the disabled, and children.

5.8 The DRM-FCV Nexus in South Sudan: Community and Stakeholder Perspectives

The analysis of primary and secondary data in this study revealed clear linkages between disaster risk management needs in South Sudan, and the complex context of fragility, conflict and violence in the country. While thus far they have been approached as two separate areas of policy and programming within the governance structure of the country, the communities assessed in this study indicate that an integrated approach is critical in order to strengthen resilience and preparedness mechanisms at the local level, and to mitigate the compounded vulnerabilities that emerge from experiencing cycles of hazards, or even simultaneous hazards, on a regular basis.

Each of the key stakeholders interviewed for this

study identified a strong correlation between natural hazards they had observed through their work in South Sudan, and the conflict and gender-based violence trends that exist. They also emphasized the need to focus more resources and programming on disaster preparedness and building resilience, as resources for disaster response and mitigating disaster impacts are often insufficient. In addition to developing local facilities through building WASH infrastructure and services, building dykes and embankments, etc., preventing human-induced hazards is also critical. IOM supports IDPs and returnees in many parts of the country through its programs, particularly vulnerable communities where community infrastructure and services are overwhelmed from the significant increases in population, in order to prevent future inter-communal violence over scarce resources. However, on-going hazards, both natural and human-induced, can limit access to populations requiring emergency services. In 2019 alone, FAO's emergency response programming was stopped multiple times due to insecurity resulting from inter-communal violence, in areas such as Tonj North, Pibor, Pochalla and Duk. This operational context, characterized by fragility, conflict and violence, makes it challenging to adequately meet the needs of communities that are facing multiple hazards at the same time, particularly when community mechanisms for responding are minimal.

As a key stakeholder at a UN agency shared, hazards in South Sudan "trigger migration and resource competition, political destabilization and conflict [and] threaten customary management systems" that would typically be a localized resilience mechanism. The impact of multiple hazards over many years has compounded the vulnerabilities of communities at the local level, as the South Sudan Red Cross pointed out, "If you look at the capacities of the households, the capacities of communities were broken before the conflict came, the communities had other hazards that were impacting them again as they have not strengthened or built their capacities. When the communities were trying to strengthen their capacities, this conflict came again, to compound a situation which is already very vulnerable." The lack of local capacity was also noted by the Ministry of Humanitarian Affairs and Disaster Management, which stated, "The political instability in the country for a long time has created very few resources for the people to depend on".

While communities examined in this study are eager to develop disaster preparedness and resilience mechanisms, they often feel that they do not have adequate resources or assets, early warning information and livelihoods development skills to do so. While this may vary by type of hazard, overall the counties assessed were largely reliant on aid organizations to support their basic needs. This is hindered by the fact that communities experience the same hazards regularly, as noted by elders in Mayom: "For last ten years this community was displaced two times, by war in 2011 and 2013, and again displaced by [the] two floods of 2013 and 2019. These two types of hazards impacted the whole community." They also observed that these hazards were present even before independence, and have led to multiple cycles of displacement: "In 1962 massive displacement hit all [of the] Mayom community, in 2007 displacement of some areas, 2014 massive displacement and in 2019 another massive displacement." These cycles of displacement shared by the elders did not include those experienced as a result of conflict. With few tools and resources to rebuild in the aftermath of disasters, and to prepare for future ones, the impact of disasters is compounded each year.

Since 2011, the Ministry of Humanitarian Affairs and Disaster Management has established various coordination bodies/committees at national, state, county and payam level which are outlined in the draft National DRM policy. However, conflict resolutions and peace issues were not included as a major component of National DRM policy and strategies, and were not included under the DRM coordination bodies at national level. However, at the community levels, the payam and boma Chiefs are the entry point of the disaster mitigation. They lead emergency preparedness and response and they are also the responsible entity of the community led process for conflict resolution and peace processes at the community level. Hence opportunities exist to bring DRM and FCV together at the community level using the existing institutional mechanism, yet at National at State levels, the mandated ministries and institutions address the issue separately.

Inter-communal violence in South Sudan is rooted in different causes, depending on the location. In Maban, border disputes at the local level were identified as a key reason for clashes, particularly in 2017. In Aweil East, the County Commissioner reported that cross-border clashes with the Misseriya were fueling displacement at the county level. When faced with inter-communal violence, community leaders may organize reconciliation talks amongst themselves. For example, as a chief in Maban shared: If [there is] a conflict between people or any dispute, we stand for peace and reconciliation. Make sure [the] youth calm down and ask [the] government to intervene. If anyone violates, they must be arrested." However, similar mechanisms are not applicable in addressing natural hazards, as the Mabanese chief stated: "But

things like flood, this is natural. Nothing much we as chiefs can do. We may have meetings with NGOs and urge them to support [us]." Other local leaders shared similar sentiments, as the Women's Leader recounted: "We, [the] Women Association, Youth Associations and the government all…try to settle all situations of difficulties. But for the last year it was beyond our capacity. Because of flooding [the] crops grown were destroyed. Few goats and sheep and pigs available died of diseases. No medicine to treat them, others got drowned." Existing community-based mechanisms for preventing and responding to hazards are limited in their capacity and require further strengthening. In areas where conflict and natural hazards have depleted access to livelihoods for youth, some may turn to joining local militias to support themselves financially. In Nasir, the County Commissioner stated that "There has been [a] series of cattle raiding over the last few years. Idle youths of the same community make cattle raiding as a business."

This has been particularly challenging for IDP youths in Nasir who do not have access to land, equipment, livestock and other assets needed for livelihoods. In Tonj North, ongoing insecurity has also prevented youth from engaging in livelihoods, as a FGD with youth revealed, "Fishing and cattle keeping are practiced in fear because the swampy areas are insecure. They are [at] the border between Unity State and Warrap State, attacks are expected [at] any time. Cultivation is also affected [by] fear of attacks and floods; because the community is a low land." In Pibor, which has historically witnessed frequent cycles of inter-communal violence, the elders stated in an FGD that "From 2011 until now there is no rest. If it doesn't happen in one year, it happens in the other year."

Floods in South Sudan tend to unfold at a slower rate compared to other hazards such as conflict. As a result, local leaders may be able to warn households that are in danger of being flooded and begin to mobilize a response. In 2019, the County Commissioner of Maban recounted: "We as government we went out with microphones mobilizing people to take care of children and move to high land areas before water/flood reached them. We also talked to the NGOs around to respond to the emergency as food items inflated in the market."

A number of participants also recounted how experiencing multiple hazards in a row has impacted the ability of their communities to engage in sustainable livelihoods. As the Hospital Director in Maban observed, "All this time I [have] been here, only some people were able to cultivate, but many are dependent on NGO support because of insecurity, drought and sometimes flooding like for 2019. Livelihood is not good here. Farming was destroyed, goats and pigs were taken by water." This has led to both changes within the types of livelihoods engaged in, as well as increased reliance on humanitarian aid to supplement food supplies in the local area. Maban's County Commissioner also noted that "People of Maban originally were farmers and cattle keepers. But…many lost their livestock due to raiding, and insecurity is not allowing for farmers to [go to] deeper [places] where soil can produce well." Similar trends were observed in Aweil East, where the Director of Agriculture noted that "Those who ran away during cultivation run because of [clashes with the] Misseryia at the border to Sudan." Similarly, in Wau County, an elderly female shared that over time she had observed that "some time there is flooding in some of the areas and over some year the same areas can have drought", which has made agriculture a particularly challenging livelihood to engage in for many households.

Food insecurity in South Sudan is also tied to the state of local markets, for both formal traders and those that engage through the informal economy. However, markets are also vulnerable to different types of hazards, which impact the structures used for shops in the market, destroy natural resources used for livelihoods, and also impact trade routes. As the Market Union Leader in Aweil East recounted, "War has cancelled imports and [a] number of the traders brought down their business because other traders were robbed on the road. Flood cut off road connection from state to state and from county to county. Business has been affected due to shortage of food stuff especially in the year of flood and year of drought." Additionally, the restrictions of movements and closures of school during the initial stages of the COVID-19 pandemic in South Sudan led to some traders closing their businesses, which reduced the supply of goods in local markets across the country. In Maban, the impact of both natural and human-induced hazards were documented on markets and other key infrastructure, as one key informant described: "When there is a hazard like flood, market prices [of food and other necessary items] go up and [there is] no more supply from other places. If it is conflict, also the market will close. No work, no food, no sleeping place, no hospital because you cannot cross there." Trade routes may be inaccessible during the rainy season in areas such as Pibor, where the Market Union Leader shared these challenges: "In Pibor we only have [a] few months in each year for supplying goods mainly from Juba, it is usually during January up to April. After that when the rain season begins, the roads become muddy and vehicles immediately stop coming to Pibor. We also do register cases of lorries being ambush[ed] on the road to Pibor. Usually it is worsened when inter-communal fighting occurs. In rainy season we are

forced to supply goods from Juba by planes and that is why prices here are very high compared to other locations." In both 2019 and 2020, Pibor has faced both conflict and significant flooding, which has increased food insecurity in the area. Markets are critical as coping mechanisms when crops have been damaged, however inflation may prevent households from relying on food items available through local markets. These challenges were mirrored by the Market Union Leader in Tonj North when asked about the impact of hazards on markets, as he stated, "Flooding of 2019 has badly impacted on the business in Warrap, destroying most of our existing seasonal roads to Wau and many other local markets in villages. People got disconnected and businesses came to standstill. Most of the shops got flooded and collapsed." For communities that host a large number of IDPs or returnees, access to land to facilitate livelihoods in the market may also become a point of contention. As the Market Union Leader in Nasir County observed, "The IDPs do not have land in the local market here. They hired retail shops of host community members and this always brings conflict of interest."

IDPs, in places such as Maban, were seen as particularly vulnerable compared to other segments of the community, especially women and children that had been displaced. Those that had arrived in the area due to displacement from conflict, had now lost their assets for a second time due to floods. As one RRC representative observed, "Actually IDPs and returners grow crops of small scale that is not enough for seasonal food [needs]. This is due to lack of farming tools, lack of seeds, hunger, sheltering materials." Although the government has allocated land in Mayom for IDPs to live on, the RRC noted that "when they received the land, they didn't have the ability to [construct] their shelters by themselves, from there they just joined their relative members for living. It is not their choice but condition." A chief in Mayom also pointed out that because IDPs and returnees rely on materials such as plastic sheeting to build structures, they remain vulnerable to hazards such as floods which can easily destroy them. Similar findings were observed in Aweil East, where the RRC representative pointed out that "the IDPs and returnees are affected most because they don't have shelters already like host the [community]". The Youth Representative of the county shared similar sentiments when he stated that "IDPs and returnees should not be compared to the host community, because host community have coping strategies as they are living here for long period of time and they also have alternatives." As a result, IDPs may have higher rates of reliance on humanitarian aid compared to the host community. Similar findings were observed in Pibor, where IDPs shared that, "They suffer double. Now that problem is coming, they don't even know where to run. They don't know the roads here. They lack everything." As a result, the ability to be resilient and recover from hazards is different for IDPs compared to the host community in which they reside. In counties such as Wau, participants stated that IDPs were being encouraged to return to their homes of origin now that the security situation has stabilized, in hopes that they will be able to resume their livelihoods and rebuild their shelters.

In terms of gender dynamics, the significant number of responsibilities that women have in supporting households is seen as key factor that makes them more vulnerable when disaster occur. In Aweil East, the County Commissioner stated that, "When people are in crisis, women suffer too much because they have responsibility of services at home, school fee[s], and medication. Now you have seen children are in the market because there is lack of responsibility, food, clothing and school fees at home." As the Women's Representative in Maban also pointed out, women are also at risk during hazards as "During this time also your belongings get stolen, cases of sexual abuse or sexual exploitation may happen." A recent report by UNMISS (2020) on access to healthcare services for GBV survivors revealed that many survivors are not able to access the services needed, as facilities are often too far away, not equipped to provide specialized services, or not functioning due to natural and human-induced hazards. In Wau County, where many IDPs had fled to Wau Town, a female FGD participant observed that "During the war, some women were delivering [babies] alone, women and small girls were raped by the solders, some women were killed on the way to Wau while they were trying to get food, salt and others."

While some services are available in the town to support GBV survivors, long-term care is needed, and it is unclear if these services will be provided when they return to their original homes. All of the key stakeholders interviewed for this study observed a relationship between gender-based violence and hazards, particularly for IDPs; displaced women that lack assets and security are having to travel long distances to collect basic necessities for their households, such as water and firewood. When natural disasters occur, whether floods or droughts, these resources in the immediate surrounding area may be damaged, forcing women and young girls to travel even further. This has been observed during IOM's response to floods in South Sudan, where "there is an increased impact upon women…that could be because of stresses at home, and that leads to intimate partner violence. It could also be a result of women being displaced…without those social structures there can

be increases in gender-based violence. During floods and insecurity, if aid is being delivered in different areas because of lack of access for example, then if women are going to be picking up the aid or delivery of assistance, there can be issues, visibly S-GBV risks along the way." Multiple stakeholders also noted that women are particularly at risk for GBV incidents in the context of South Sudan's newest hazard, COVID-19. Increased isolation and loss of income leads to increased stress within households, as well as the use of coping mechanisms, and limits access that women and girls would typically turn to for support.

Other vulnerable segments of the population, such as children and the elderly, also continue to face heightened impacts by hazards. In Wau County, a local government official observed that "schools and some health facilities are occupied by people, e.g. soldiers and civilians, and some parts of the building are destroyed." Similarly, in Mayom County, where both the civil war and inter-communal violence has challenged the county, a chief shared that "Children are impacted by the hazards most because they do not have schools [and] sometimes they are recruited into [the] military forcefully, the second group is women because they sometimes experience rape cases when they go out to get water or fire woods in the bush for their children to survive". Access to basic services such as education and healthcare are key factors in the ability of IDPs to return home, particularly for households with children. Additionally, elderly people in a household are also vulnerable during hazards, as one healthcare worker in Wau shared, "Elderly people; most of them were left in the houses as their sons and grandsons ran and left them and most of them died due to lack of food, water and medicine."

Climate change impacts in South Sudan are observed in more frequent extreme weather events, which in turn has led to water scarcity and loss of land viable for agriculture and pastoral grazing, thus the relationship between the availability and access of natural resources to displacement or migration within country is evidenced. The politicization process of grievances between societal groups often turns to conflicts, thus vulnerabilities among the population are increased, as well as fragility and conflicts risks. In Wau County, a number of participants identified tensions between farmers and cattle keepers over access to grazing land as a key point of contention that has led to displacement. Participants in Wau cited the Marial Bai agreement between the communities which was meant to limit cattle migration patterns so that crops are not destroyed, however perceptions of the success of this agreement was varied during data collection. Similarly, in Tonj North County, the Director of the RRC shared during a key informant interview that, "The cattle raiding in the swampy areas from the Unity State occur on [a] yearly basis almost every dry season…Cattle keeping activity is badly affected because of the displacement from the grazing lands." In Cordaid's work in Eastern Equatoria, "a lot of communities have reported that there is a lack of water resources and vegetation, and [because of this] they have to migrate".

These communities, displaced by hazards resulting from climate change, migrate with their cattle areas near the border with Kenya. Because resources in their destination areas are also limited, this movement creates the potential for cross-border inter-communal violence. Interrupting these seasonal cycles of inter-communal violence, and which are being exacerbated by climate change, will be critical in approaching disaster risk management in a locally responsive manner. Similar observations were made by the Ministry of Humanitarian Affairs and Disaster Management in relation to changing cattle migration patterns resulting from dry spells and floods: "dry season, the question of water…when we don't have rain from December up to March and April, we have a lot of livestock that need water. There's usually a movement of livestock, which brings conflict. The water is not there, the pasture is not enough. Other communities are stigmatized for bringing diseases as their livestock is not vaccinated." Cattle raiding trends also indicate a propensity for gender-based violence, where women and girls may be abducted or targeted for attack. The research findings indicate that displacement has increased in areas where there were floods in 2019 as well as conflicts due to cattle raiding. This was reiterated by Israel Nyaburi Nyadera (2019), who stated in South Sudan the primary causes of ethnic conflicts and civil wars are natural resources; pastoralists require access to pastures of grazing and water, which are not abundant in all seasons, thus livestock herds are migrated to the areas where these resources are more readily available.

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6. Conclusion

This aim of this report was to explore intersectional risks that arise in South Sudan following hazards and how they intersect with disaster risk and reduction within an FCV context. To do this, the study investigated the current state of DRM in South Sudan, from the perspectives of both community members and stakeholders. Key data from quantitative datasets, policy reports, interagency rapid needs assessments, NGO reports, and other publications are also considered to provide a comprehensive perspective on the current state of the country in terms of DRM. South Sudan is currently building a comprehensive and coordinated approach to DRR for community resilience building. It is imperative that this mechanism is completed as quickly as possible, given that multiple counties in the country face a combination of risks.

This phenomenon of inter-sectional hazards, and cycles of hazards, was highlighted in the report in areas such as Northern Bahr el-Ghazal and Jonglei where the combination of food insecurity, intercommunal violence, and floods have occurred during a time when the humanitarian situation was already precarious. Combined with the recent outbreak of COVID-19 in South Sudan, a coordinated approach is required that integrates each level of governance and humanitarian intervention, from the local, subnational level to the national level. Food insecurity, whether induced by climate change or conflict, has also been fueling inter-communal violence at the local level. The nexus between DRM-FCV, within the context of South Sudan, highlights the importance of understanding these trends from an inter-sectional perspective; natural hazards in South Sudan are creating situations that fuel conflict, while also impacting those that are already vulnerable following displacement from conflict.

The cycles of natural and human-induced hazards have also inhibited the ability of communities in South Sudan to initiate resilience and preparedness mechanisms. Dykes built by communities often have to be re-built annually, and adaptations of agricultural practices have not led to adequate yields to address food insecurity in many counties. Both hazards and conflict heighten vulnerabilities in communities while also reducing resilience in the face of hazards that occur (primarily floods, drought, and disease outbreaks). The civil war that began in 2013 interrupted development initiatives that sought to build capacity and resilience, at both the local and national levels. Although the civil war has ended and the national security context has become relatively stabilized, pockets of insecurity, manifesting through intercommunal violence, continues to prevent communities from developing capacity and instituting resilience mechanisms that would mitigate the impact of droughts, floods, and disease outbreaks. Millions of South Sudanese continue to be displaced, which leaves them without access to basic infrastructure, assets, and services, such as shelter, clean water, reliable food source, health care, and government services. This has sustained high levels of reliance on humanitarian aid, particularly as many have been unable to return to their homes of origin and cannot

access the land or livelihoods necessary to sustain themselves. These vulnerabilities are compounded by climate change, which has increased the frequency of both dry spells and floods, resulting in displacement, destruction of local infrastructure, and destroying resources critical to maintaining self-sustaining livelihoods in the country, such as crops and farmland, as well as cattle. With little recourse to recover from these losses, attacks on neighboring countries to obtain food and cattle through forceful means have increased. This has been evident in both Aweil East and Pibor, which are highlighted in this report. Women and children (especially widows and orphans), who are already among the most vulnerable groups in South Sudan, are further affected when displaced following conflict or natural hazards. In some instances, the FCV context has exposed women to gender-based violence and made children susceptible to abduction by militias or forced recruitment by armed groups.

The findings revealed that a number of diseases are prevalent in South Sudan, however they are not among the most prevalent hazards that communities face. Displacement resulting from conflict, which pushes IDPs into sites with high population density and inadequate infrastructure increases the risk of disease transmission. This has been evident in cholera and measles outbreaks documented in PoC and ad hoc displacement sites and indicates a potential for COVID-19 to spread similarly. Livestock diseases are also present, which can be particularly damaging to households as cattle are a key asset that support food security in pastoral communities. Among natural hazards, floods and droughts are experiences most frequently, particularly in recent years. In addition to impacting food security levels and damaging local infrastructure such as schools and healthcare facilities, natural hazards also have the propensity to deplete assets of households. Floods often make major roads inaccessible, limiting access to markets and key trade routes, which can limit a community's ability to engage in coping mechanisms following disasters such as selling livestock or engaging in the informal economy to generate income. Additionally, the impact on roads can limit humanitarian access in the aftermath of floods, which increases the scope of humanitarian needs in a community. Human-induced hazards were also reported as a common factor by communities in this study, including the civil war, inter-communal violence, as well as conflict over natural resources. While the civil war ended after the signing of the peace agreement in 2018, the lack of infrastructure and preparedness mechanisms in many communities has made them increasingly vulnerable to contemporary hazards. High levels of poverty and food insecurity are also leading to changes in inter-communal clashes, as changes in cattle migration patterns have led to tensions over access to land for grazing and water sources. Additionally, looting of food sources and the destruction of crops during instances of inter-communal violence have also been documented.

The findings particularly seek to emphasize the impact of hazards on vulnerable populations in the country, specifically IDPs. Other vulnerable groups to consider include women (especially widows), children, the elderly, and the disabled. Additionally, the findings from the primary data on the impact and experience of hazards at the local level indicate that an intersectoral approach is also critical in considering livelihoods, health care access and infrastructure, conflict analysis, gender analysis, and forced migration patterns.

Given the limited capacity of the Government of South Sudan at this time, an integrated approach engaging multiple stakeholders is critical in establishing a way forward. Many counties in South Sudan are facing multiple hazards simultaneously, leading to increased displacement, exacerbated vulnerabilities, and lowered resilience. This includes enhancing the national government's capacity by providing sufficient resources, building technical capacity at the local level, supporting communities in developing preventative measures that mitigate the impact of hazards, and ensuring that humanitarian actors have the access and resources to fill in gaps in needs where necessary.

While response to hazards tends to adopt a short-term approach in meeting basic needs, a long-term perspective is also required in strengthening community resilience and disaster preparedness mechanisms across the country. This requires building technical capacities through higher education institutions, building community resilience through community-owned planning, and ensuring sufficient resources are available for different actors to respond to hazards and support a 'build back better' approach to increase resilience for future hazards.

In moving forward, stakeholders are committed to increasingly emphasizing disaster preparedness, capacity development, and resilience building, to mitigate the scale of response needed, particularly in the areas of livelihoods programming and minimizing the impact of hazards. Communities across the country have also participated in interventions that encourage local ownership of disaster preparedness, which is key to ensuring the success of such mechanisms. With increasingly resourced and coordinated support from governance institutions, South Sudan is establishing a locally responsive path to DRM.

7. Recommendations

South Sudan is currently developing an approach to DRM, and as a result it is important to reflect on lessons learned from cycles of hazards that were occurring even before independence in 2011. Developing policies and programs that are informed by the local history and context will ensure a proactive risk management approach that is suited for the country. This includes consideration of the conflict dynamics in different counties, gender sensitivity, particular emphasis on the experiences of vulnerable populations such as IDPs, and the inter-sectoral humanitarian needs that emerge in the aftermath of hazards. Adopting a DRM-FCV framework, as outlined by the World Bank, will facilitate a locally-responsive approach.

The recommendations presented here seek to guide both policies and programs in South Sudan, drawing from the primary data collected, secondary data that were analyzed, as well as relevant reports and frameworks from key stakeholders working in DRM in South Sudan. As new country, South Sudan has the benefit of learning from the experiences of other contexts that have sought to build resilience in the face of FCV. Program interventions target practitioners in South Sudan who are the key stakeholders responsible for program design and implementation. The policy recommendations seek to guide the work of policy makers, primarily at higher levels of government, as well as humanitarian actors that support policy development initiatives.

7.1. Policy Recommendations (Long-Term)–Target Audience: National Government and Supporting Aid Actors

- **Clear coordination between national budget established and DRM needs.** For FY2019/20, the National Budget for South Sudan allocates SSP 1.1 billion to the Office of Disaster Management within the Ministry of Humanitarian Affairs and Disaster Management. In the latest year for which expenditure figures are available, fiscal year 2017-2018, the Ministry of Humanitarian Affairs and Office of Disaster Management reported expenditures ranging from 85% to 130%, depending on the quarter (Ministry of Finance and Planning, 2018). However, OCHA anticipates that the humanitarian needs in South Sudan, resulting from a variety of hazards, require a response of US$1.9 billion (increased from US$1.5 billion due to COVID-19). The significant discrepancy between the need and national resources available necessitates the intervention of aid actors in supporting the population in South Sudan. In moving toward an approach that is both locally and nationally owned, greater resources have to be mobilized through the national budget to address the cycles of hazards that the country experiences. Increased transparency on both the allocation of revenues, as well as expenditure will be critical in assessing this, with analysis provided at the county level.

  Government ministries and offices that hold responsibility for responding to disasters when they occur often do not have the resources available to coordinate effectively with local governments. This includes the resources to access disaster sites to evaluate the situation and work closely with local government and aid actors. As a result, they face challenges in providing adequate support from Juba. Additionally, as the government offices themselves do not have the resources to implement response programs, their role is primarily limited to coordination at the national level.

- **Strengthening of local government capacities to assist in disaster preparedness and response**. Often the first line of response to hazards occurs at the local level, from community initiatives, local NGOs, and local government institutions. However, local governments may lack the technical expertise or resources to implement response programs in their counties. As they are able to navigate access issues more easily than stakeholders based in Juba and are also familiar with the local context and needs, strengthening capacity in terms of both human resources and institutional structural facilities at the local level will subsequently lead to improvements in DRM in South Sudan. A tangible approach to addressing this gap would include decentralizing resources and responsibilities to the state and county levels, as outlined in the Transitional Constitution of 2011. This would also necessitate the institution of accountability and enforcement mechanisms at the national and state levels that track the distribution and expenditure of resources, as well as how well aligned the allocation of resources are to needs at the county level.

- **Pipeline approach to capacity development, from the local level to the national level.** At the moment, as the bulk of the resources are going to disaster response, DRM is ad hoc, depending on where aid

actors have the capacity to implement programs, and humanitarian needs are the direst. As the focus shifts to resilience and preparedness, however, it also becomes imperative to adopt a more comprehensive approach that strengthens the connection between local communities and coordination that takes place at higher levels of government. This will allow for more equitable development to take place across communities while also providing for the local responsiveness needed in programming to adequately meet the needs of communities. South Sudan's new policy for DRM will help facilitate this, by outlining how different government institutions will coordinate to respond to different types of hazards and needs.

- **Integration of South Sudan's higher education system into capacity-building initiatives.** During the civil war with Sudan, South Sudan's higher education institutions were relocated to Khartoum. In preparation for independence, however, Juba University and other institutions were moved back to the country, to serve South Sudan's population. While funding initiatives to build capacity within higher education had begun after the signing of the CPA, the 2013 outbreak of conflict led to a loss of financial resources from the aid sector. Revenue from the national government is limited, and faculty struggle with salaries not being paid on time and payments do not reflect the current inflation rate. As a result, it has become difficult for students to complete their schooling, especially when the start of the school year is delayed, or as with the advent of COVID-19, educational institutions are closed altogether. While initiatives across the country have supported primary and secondary levels of schooling, the level of support for higher education institutions is not comparable. Training future generations to work in DRM is critical in ensuring there is a stable and well-trained workforce with expertise in this area to support the implementation of laws, policies, and programs across the country.

- **Comprehensive and public data coordination mechanisms.** For data-driven programming to be implemented, policies are required to guide what type of data is a priority, how and where it should be collected, and how it will be stored and shared. At present, because much of the data used in disaster response are collected by the aid sector, there are no national and public approaches to knowledge production. While the National Bureau of Statistics had begun to address this gap following independence in 2011, these efforts were interrupted by the outbreak of conflict in 2013. A comprehensive foundation of data to draw from is an essential tool for both policy makers and practitioners and allows for the consideration of localized dynamics, histories, and demographic stratification when approaching DRM.

- **Development of a multi-hazard early warning system (inclusive of conflict dynamics).** The IGAD is currently working with the Government of South Sudan to develop an early warning system, which would ideally mitigate the impact of hazards by allowing stakeholders and communities to prepare before they occur. Ideally, a national system that receives data from mechanisms at the local level would provide the country with a comprehensive multi-hazard early warning approach that enhances disaster preparedness and resilience.

7.2. Programming Recommendations (Short-Term)–Target Audience: Practitioners

- **Establish coordinating bodies/ committees at the national and state level centered on the DRM-FCV Nexus.** At present, disaster risk management and humanitarian affairs are handled by different government institutions than those responsible for conflict and inter-communal violence. As a result, policies and programs initiated by the government do not integrate conflicts, displacement and disaster contexts. Coordinating bodies that include nominees from the political, economic, professional, diaspora, religious and cultural spheres of South Sudan and the international community to bridge this gap, will be integral in strengthening disaster preparedness mechanisms.

- **Integrate peace and reconciliation processes with ongoing community-based management programs and initiatives.** Community-based programs managed by MHADM/RRC and development partners in South Sudan can integrate peace and reconciliation process, using the World and UN bodies developed tools and methodologies for recovery process in fragile context and resilience planning. This will be critical in addressing the rising number of inter-communal clashes observed since 2018.

- **Use of sustainable models that promote community participation and ownership.** The success of any program or intervention correlates highly with community buy-in, particularly as the impact of the program is meant to extend beyond the departure of humanitarian actors. Examples of such models that are already being implemented in South Sudan include natural resource management committees

through Cordaid, water management committees through the FAO, and shelter management by the IOM in a number of pilot counties. These types of programs allow for the impact of interventions to be sustained. They are also key to mitigating the impact of disasters that cannot be predicted or prevented and reducing South Sudan's rankings within the World Bank's index of contexts characterized by FCV. OCHA's Humanitarian Needs Overview also notes low resilience for humanitarian crises in many counties in South Sudan, which can be addressed through participatory models that encourage local ownership.

- **Increased focus on resilience and preparedness, that is, 'building back better'.** The Sendai Framework encourages approaches to DRM that 'build back better' to increase resilience and progressively reducing the impact that hazards have on vulnerable populations. The cycle of hazards has made it difficult to focus on resilience building and preparedness types of programming. With limited resources on the part of humanitarian actors, governance institutions, and local communities, funding is often prioritized for emergency response. As a result, communities in South Sudan remain susceptible to hazards, particularly floods and intercommunal violence over natural resources, which occur on a seasonal basis. Without a more focused shift to resilience programming, humanitarian needs may grow exponentially in South Sudan, because the impact of disasters are heightened with each new hazard that a community encounters.
- **Flexibility for localized preparedness and response.** Many factors at the local level necessitate localized approaches to disaster preparedness to mitigate the impact of hazards and disaster response following the occurrence of hazards. This includes variations in existing infrastructure, conflict dynamics, size of population, number of IDPs and returnees, type of hazard that occurs, and the scope of the impact, as well as the level and composition of the population in need. For example, Juba and Wau, which host major towns and have a strong presence of government institutions, more developed infrastructure, higher education institutions and a more skilled workforce, a greater number of humanitarian actors, and major transportation routes, will require a different approach to response compared to more rural areas that lack this infrastructure. Drawing from the World Bank's DRM-FCV framework, considering the unique dynamics of South Sudan's counties is essential to designing effective interventions.

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Annex A: Methodology

This study used qualitative methods to collect data regarding the experience of South Sudanese communities in relation to hazards that have occurred over the last 10 years. In doing so, the findings of this study seek to inform future policy and program design that will aim to increase the resilience of communities in the face of such hazards. This includes examining both natural hazards (floods and drought) and other threats including the spread of diseases and the impact of conflict (including conflict over local resources), with a particular emphasis on understanding the experiences of vulnerable populations.

KIIs and FGDs took place in 10 locations across the country, targeting areas that host vulnerable populations such as IDPs and have experienced recent hazards and conflict (either civil war or intercommunal violence). Additionally, data collection has taken place in Juba, the capital of South Sudan, to document the perspectives of key stakeholders that support communities when faced with hazards. Additionally, enumerators were asked to conduct observations through taking photographs to document the experience and impact of hazards in their respective locations.

Staff of partner organizations were recruited to assist in data collection, given current restrictions on travel within South Sudan due to COVID-19. This includes recruiting participants, conducting KIIs and FGDs, and assisting with processing the data collected for the team leaders.

Participants for each tool were recruited from the local community, with an emphasis on engaging with those who can speak on the local history of hazards, and have knowledge of both the community's resilience strategies and vulnerable populations. This includes participants such as the chief and elders, women and youth leaders, local government officials, NGOs, and other organizations operating in the area, as well as members of vulnerable groups such as IDPs. Both the FGDs and KIIs were audio recorded, to ensure that the richness and nuances of the data are captured, and adequately inform the final report. Participants were asked for their permission before beginning the recording, and if they decline the interviewer will take notes instead. Once this phase of data collection was completed, KIIs were conducted with stakeholders in Juba that represent UN agencies, NGOs (national and international), and the national government.

The data collected were coded and analyzed by the Team Lead and Co-lead in Juba. The data were supplemented by secondary sources (IRNAs, research reports, DTM data, and so on) and datasets relating to hazards that are currently being collated by the World Bank.

Table A.1. Participants Recruited

Tool	Participant(s)
KIIs	NGO staff, local Relief and Rehabilitation Commission, Director of local hospital/clinic, Chief of Payams/Boma, Director of Agriculture, Livestock, and Fisheries, County Commissioner
FGDs	Women, IDPs, youth, staff of local national NGOs (representing children, widows, the disabled, and so on), returnees, elders
Stakeholder KIIs	Ministry of Humanitarian Affairs, South Sudan Red Cross, IOM, Cordaid, FAO

List of Locations

Table A.2. Displacement in counties targeted in data collection

State	County	IDPS (MT Round 8)a	Reasons for Displacement
Jonglei	Pibor	30,166	Conflict, returns, disaster
Jonglei	Uror	13,993	Conflict, intercommunal violence, disaster
NBeG	Aweil East	5,491	Conflict
Unity	Mayom	15,351	Conflict
Upper Nile	Maban	50,049	Conflict
Upper Nile	Nasir	13,909	Conflict, intercommunal violence, disaster
Warrap	Tonj North	81,614	Conflict, intercommunal violence, disaster
Jonglei	Twic East	1,508	Conflict, returns
Western Bahr el-Ghazal	Wau	46,555	Conflict, intercommunal violence

Note: a. Data obtained from IOM DTM's Round 8 of MT. https://displacement.iom.int/.

The final report presents key findings organized according to the common hazards observed in South Sudan, as noted above. In addition to findings obtained from field locations across nine counties, this section is supplemented by information obtained from key stakeholders in Juba who have provided both preparedness and response programming in different parts of the country. Key data from quantitative datasets, policy reports, interagency rapid needs assessments, NGO reports, and other publications are also included. This also allows the report to include findings obtained from partner organizations in areas not covered by primary data collection for this study.

The findings particularly seek to emphasize the impact of hazards on vulnerable populations in the country, specifically IDPs. Other vulnerable groups to consider include women (especially widows), children, the elderly, and the disabled. Additionally, taking an intersectoral approach to analysis, the findings from the primary data on the impact and experience of hazards at the local level are tied to livelihoods, health care access and infrastructure, conflict analysis, gender analysis, migration patterns, and so on.

The report concludes with policy and program recommendations, informed by the data collected in this study, to propose a way forward for DRR stakeholders in South Sudan based on evidence available. The publication of the report is timely as the Government of South Sudan finalizes its policy on DRM and seeks to enact legislation in this area to allow for the implementation and enforcement of the terms laid out in the policy.

Annex B: Guidance for data collection

Guidelines

1. Your safety is a priority. If you ever feel unsafe conducting an FGD or KII, please remove yourself from the situation, and report the event to IOM. In addition to general security, this includes observing proper social distancing protocols due to COVID-19.
2. This project will involve three data collection tools: KIIs, FGDs, and observations through photos.
3. At the end of each day, each enumerator is required to send an update of 2 to 3 sentences to the IOM team. This should include what data collection was accomplished that day, any other relevant information regarding what was learned through the KIIs and FGDs, and any relevant contextual information (that is, hazards observed in the community, construction of new infrastructure to safeguard from hazards).
4. Please do not recruit any participants who are under the age of 18. Data collection with minors requires specialized training and protocols which have not been included in this project.
5. If a participant declines to participate in a KII/FGD, do not pressure them. It is their right to say no.
6. If you feel unsure of any of the details of this project, please feel free to raise questions during training or by contacting IOM directly during data collection.
7. If you encounter any challenges in recruiting participants or collecting data, please contact IOM so that we can support you in resolving the issue.
8. Any data collected for this study is owned by IOM and should not be shared with anyone else.
9. When interviewing someone with a specific role in their community, try to ask follow-up questions on how the groups that they represent have experienced hazards. For example, we want to find out about the unique experiences of women from the women's leader or the experiences of traders from the Trade Union leader.
10. Please take note of the translations agreed upon in training of technical words (that is, hazards, floods, drought, etc.). If you are unsure of how to translate a particular word, please check with your team or IOM before proceeding.

Annex C: KII Tool

Script

Hello, my name is _____and I work for _____.
We are assisting IOM with a study on the experience of communities when they are faced with hazards. Hazards include events like floods, droughts, dry spells, fires, conflict (including conflict over resources), and diseases such as malaria and COVID-19. By better understanding your experiences with hazards, we hope to use this information to help communities better prepare in the future.

Your participation in this study is voluntary, so please let me know if you don't want to answer a question, or if you would like to stop the interview at any time. If you have any questions about this study at any time, please let me know.

We would also like to record the interview to assist our colleagues in Juba with writing the report. Do I have your permission to record?

Standard KII Questions

State: _____ County: _____ *Payam:* _____

Title of interviewee: _____ Gender: _____ Age:_____

1. What is your role in this community?
2. What are the most common hazards that you have seen in your community in the last 10 years? Which types of hazards and when did they occur? Who was impacted and how?
3. Based on the role that you have in this community, how do you participate in responding to hazards?
4. What kind of resources, programs and practices currently exist in your community to respond to hazards that occur? (Interviewer should refer back to the examples given in Question 2)
5. What are the most common livelihoods practiced in this community, by men, women, and youth? How are livelihoods impacted by hazards? Are the livelihoods practiced in your community the same as 10 years ago? If not, what caused them to change?
6. Is your community informed of a hazard before it occurs? If so, how does this happen, and how does the community prepare? If not, what measures could be implemented to help?
7. What parts of the local infrastructure (roads, shelters, office buildings, etc.) are impacted by disasters? Can you identify specific examples?
8. What support is currently available to recover from hazards, from the government, UN, and or NGOs? What else could be done by these institutions to support the community in recovering?
9. Are they vulnerable groups in your community that are impacted more than others by hazards? Which groups are they and how are they impacted?

Specialized KII Questions

- **Market union leader**

1. How have trade routes and the supply of goods been impacted by different hazards that this community has experienced, and can you provide some examples?
2. Are there are programs, policies, or strategies that are used to help traders cope when hazards occur?
3. What would help traders be more resilient when hazards occur?
4. Are most of the traders here from the local community, or are these are also people from other areas?
5. Do the host community, returnees, and IDPs engage in the local market equally? If there are differences, what are the reasons?

- **Women's leader**

1. How are women and girls impacted when hazards occur?
2. Are they any programs, policies, or strategies that specifically target women for assistance after a hazard occurs in this community?
3. What can be done to help women and girls better cope with hazards?
4. For women and girls who are IDPs, are there any differences in how they experience and cope with hazards? If so, what can be done to better support them?

- **Youth leader**

1. Are the livelihoods that youth engage in this community different than those of other people here?
2. Have these livelihoods been impacted by hazards that this community has experienced?
3. For youth who are IDPs, are there any differences in how they experience and cope with hazards? If so, what can be done to better support them?

- **Local RRC**

1. Are there IDPs and returnees in this community? If so, approximately how many are there, and where do they live?
2. What types of livelihoods do the IDPs and returnees engage in?
3. Are there any differences in the way that the host community, IDPs, and returnees are impacted by hazards that occur here?

- **Health Director**

1. What has been the impact of hazards on health facilities?
2. What about the impact on access to services or the types of health issues that people seek treatment for?
3. What are the current coping strategies for health issues in the community when hazards occur? What can be done to improve the resilience of communities?
4. Are there differences in the way that the host community, returnees, and IDPs are able to cope with health issues when hazards occur? What can be done to support more vulnerable groups?

- **Chief**

1. What is the role of community leaders when hazards occur?
2. What can be done to better support community leaders when hazards occur?
3. Are there IDPs in your community? If so, what are the main reasons that caused them to become displaced?
4. How are IDPs in your community impacted by hazards that occur? How do they usually cope during hazards? What can be done to support them better?

- **Director of Agriculture, Wildlife and Fisheries**

1. What has the impact of hazards been on natural resources?
2. Is conflict over local natural resources an issue in this community and what are some examples? How can this issue be resolved?
3. How has the local government responded to hazards?
4. Does the local government work with any partners to respond? If so, which ones?
5. How can the local government be supported in better responding to hazards?

- **County Commissioner**

1. How has the local government responded to hazards, and who are the key actors?
2. Does the local government work with any partners to respond? If so, which ones?
3. How can the local government be supported in better responding to hazards?

Annex D: FGD Tool

Script

Hello, my name is _____ and I work for _____.
We are assisting IOM with a study on the experience of communities when they are faced with hazards. Hazards include events like floods, droughts, dry spells, fires, conflict (including conflict over resources), and diseases such as malaria and COVID-19. By better understanding your experiences with hazards, we hope to use this information to help communities better prepare in the future.

Your participation in this study is voluntary, so please let me know if you don't want to answer a question, or if you would like to stop the FGD at any time. If you have any questions about this study at any time, please let me know.

We would also like to record the FGD to assist our colleagues in Juba with writing the report. Do I have your permission to record?

Standard FGD Questions

State: _____ County: _____ *Payam*: _____

Group: _____ Number of participants: _____ Gender: _____ Age range :_____

1. What are the most common hazards that you have seen in this community in the last 10 years? Which types of hazards and when did they occur? Who was impacted and how?
2. What kind of resources, programs, and practices currently exist in your community to respond to hazards that occur? (Interviewer should refer back to the examples given in Question 1)
3. What are the most common livelihoods practiced in this community, by men, women, and youth? How are livelihoods impacted by hazards? Are the livelihoods practiced in your community the same as 10 years ago? If not, what caused them to change?
4. Is your community informed of a hazard before it occurs? If so, how does this happen, and how does the community prepare? If not, what measures could be implemented to help?
5. What parts of the local infrastructure (roads, shelters, office buildings, etc.) are impacted by disasters? Can you identify specific examples?
6. What support is currently available to recover from hazards, from the government, UN, or NGOs? What else could be done by these institutions to support the community in recovering?
7. Are they vulnerable groups in your community that are impacted more than others by hazards? Which groups are they and how are they impacted?

Specialized FGD Questions

- **Women**

1. How are women and girls impacted when hazards occur?
2. Are they any programs, policies, or strategies that specifically target women for assistance after a hazard occurs in this community?
3. What can be done to help women and girls better cope with hazards?
4. For women and girls who are IDPs, are there any differences in how they experience and cope with hazards? If so, what can be done to better support them?

- **IDPs**

1. How are the experiences that IDPs have with hazards in this community different?
2. What are the unique needs that IDPs have when hazards occur?
3. What are the coping mechanisms that IDPs usually rely on?
4. Within IDPs here, are there some groups of people that are more vulnerable than others? Please give some examples
5. How can IDPs be better supported to prepare for hazards and cope with them?

Youth

1. Are the livelihoods that youth engage in this community different than that of other people here?
2. Have these livelihoods been impacted by hazards that this community has experienced?
3. For youth that are IDPs, are there any differences in how they experience and cope with hazards? If so, what can be done to better support them?

Local NGOs

1. What are the different types of services and support that organizations such as yours provide when a hazard occurs?
2. How can these services and support be improved to help communities be more resilient when hazards occur?
3. Are there any coping mechanisms for hazards that you've observed in the communities that you work with here?
4. Are organizations able to access information beforehand about hazards before they occur, compared to the local community?

Elders

1. During the time you've lived in this community, have the hazards this community experiences changed over time? If so, which types and hazards and how have they changed?
2. Has the ability of the community to prepare or respond to hazards changed over time? If so, which types of hazards and how has this changed?

Returnees

1. How are the experiences that returnees have with hazards in this community different?
2. What are the unique needs that returnees have when hazards occur?
3. What are the coping mechanisms that returnees usually rely on?
4. Within returnees here, are there some groups of people that are more vulnerable than others? Please give some examples
5. How can returnees be better supported to prepare for hazards and cope with them?

Annex E: Observation Tool (Photographs)

As a part of the observation tool for this study, enumerators are requested to take photographs where possible to document the experiences and impact of hazards in the county. Please note that taking photos in public can be sensitive in South Sudan, so it is important to ensure that you have permission to do so first. If you do not feel safe, please do not take a picture. In addition to making sure that government officials at the county level are aware of your data collection activities and the request to take photographs, also notify any authorities in the location where you are taking photos. If the home/land belongs to a private individual, please get the owner's permission first. Do not take photos of people without their permission—if the individual in the photo is a child, you will need the parent's permission first. If the individual is not able to give permission, please do not take a photo of him or her.

In addition to being a part of the data collected for this project, IOM would like to use these photographs as a part of the final report. Please try to make sure that the photos are not blurry or taken at a slanted angle.

Photos should be submitted to IOM, along with a caption for each photo which includes information on the location, date, and description of what the photo contains.

Examples of events and locations that you can take photos of:

- Crops destroyed by floods or droughts
- Homes damaged by hazards (floods, fires, etc.)
- Dykes built to protect communities from overflowing rivers
- Health or WASH infrastructure built to respond to COVID-19
- Pollution
- Damage resulting from conflict over local resources (shelters, land, infrastructure, etc.).

Each county is different, so you may find other examples in your local area that are relevant. Please refer to the definition of hazards that is provided by IOM to determine other examples that could be relevant.

Annex F: KII Tool for Stakeholders

Hello, my name is _____ and I am assisting IOM with a study on the experience of communities when they are faced with hazards. Hazards include events like floods, droughts, dry spells, fires, conflict (including conflict over resources), and diseases such as malaria and COVID-19. As a part of this study, we are also interviewing different stakeholders that participate in hazard response.

Your participation in this study is voluntary, so please let me know if you don't want to answer a question, or if you would like to stop the interview at any time. If you have any questions about this study at any time, please let me know.

We would also like to record the interview to assist our colleagues in Juba with writing the report. Do I have your permission to record?

1. What is your role in your organization?
2. What are the main types of hazards that your organization has observed in South Sudan?
3. What is the role of your organization in responding to these hazards? Can you provide some examples of what type of hazard it was, when and where it occurred, and what the response was?
4. Do you see a connection between natural hazards and conflict in South Sudan?
5. Do you see a connection between hazards and gender-based violence in South Sudan?
6. What role does the government have at the national, state, and county levels in addressing the impact of hazards?
7. What are successful characteristics of hazard response that you've observed?
8. What are the challenges of hazard response that you've observed? What prevents organizations from providing timely and adequate responses to hazards?
9. What is the capacity of different stakeholders in South Sudan in preparing and responding to hazards?
10. Does your organizations work with local partners? If so, please provide examples.
11. How can other stakeholders better support community resilience when faced with hazards?
12. Does your organization have any reports or data relating to hazard response? If so, would it be possible to access them?

Annex G: Data Collected

Location	KII	FGDs
Maban	8 (RRC, County Commissioner, Health Director, Chief, Dir. of Agriculture, local NGO, Women's leader, Market Union leader)	6 (3 women, 3 men, 1 local NGO)
Uror	6 (RRC, County Commissioner, Health Director, Chief, Dir. of Agriculture, local NGO)	7 (3 women, 3 men, 1 local NGO)
Tonj North	6 (RRC, County Commissioner, Health Director, Chief, Dir. of Agriculture, Market Union)	7 (3 women, 3 men, 1 local NGO)
Twic East	6 (RRC, County Commissioner, Health Director, Chief, Dir. of Agriculture, local NGO)	3 (women, youth, local NGO)
Pibor	6 (RRC, Executive Director, Health Director, Chief, Midwife, Market Union)	5 (host community, women, elderly male, IDPs, local NGOs)
Wau	6 (RRC, Executive Director, Midwife, Chief, Dir. of Agriculture, Health Director)	7 (3 women, 3 men, 1 local NGO)
Nasir	8 (Chief, Trade Union, Women's leader, Youth leader, local NGO, County Commissioner, Sub-Chief, Clinical Officer, Director of Agriculture)	3 (local NGOs, youth, elders/leaders/ chief)
Aweil East	5 (RRC, County Commissioner, Chief, Health Director, Director of Agriculture)	5 (elderly men, elderly women, local NGOs, host community, female returnees)
Mayom	6 (RRC, Chief, County Commissioner, Director of Agriculture, Health Director, local NGO)	7 (elders, IDPs, returnees, women, male youth, female youth, local NGOs)
Juba	Ministry of Humanitarian Affairs, South Sudan Red Cross, Cordaid, IOM, FAO	n.a.

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