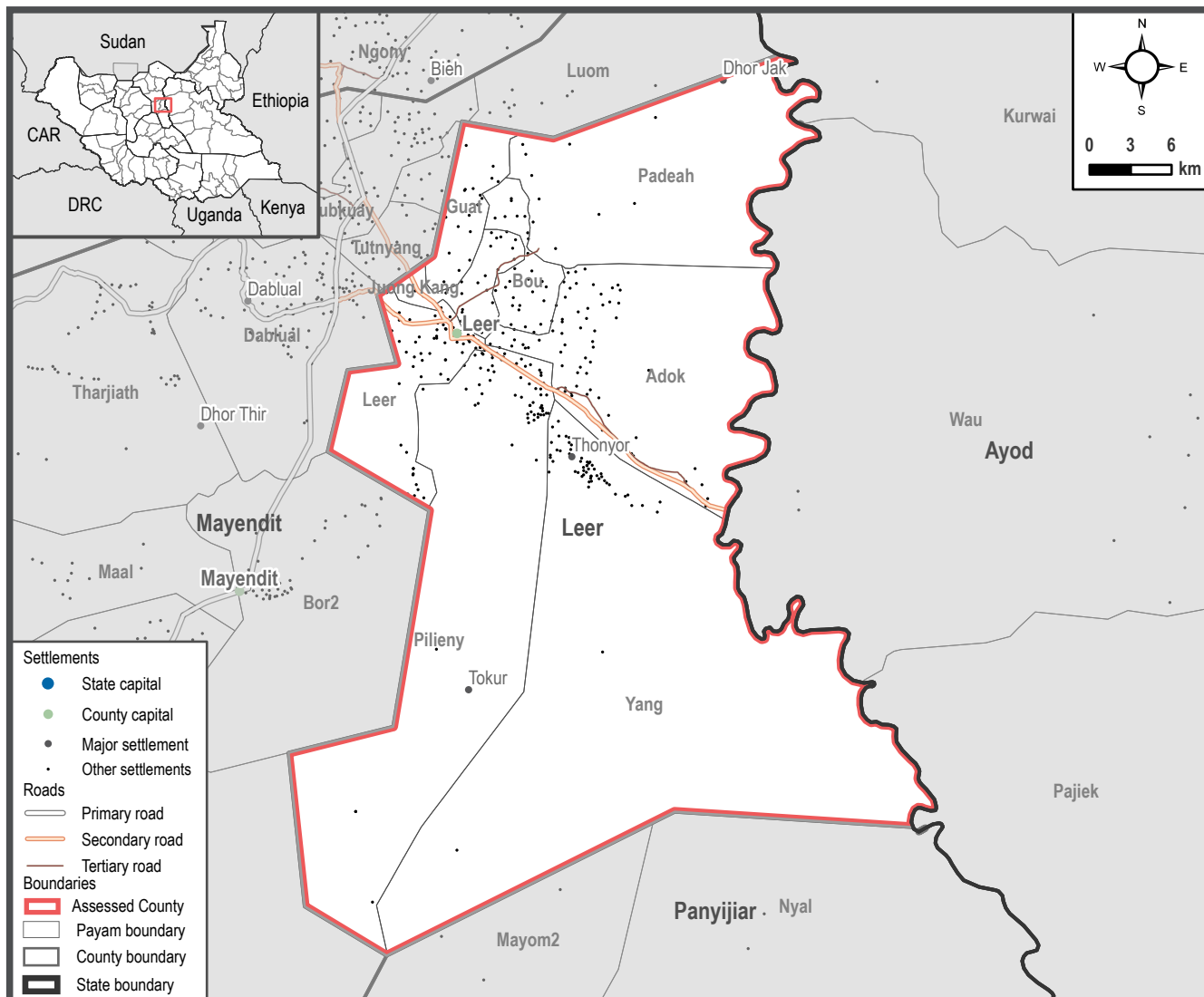




### LEER COUNTY - UNITY STATE

Map 0.1: Location of Leer county within South Sudan indicating payam boundaries and key settlements



#### LEER COUNTY - KEY FACTS

- **Estimated population:** 77,663<sup>1</sup> (2022 OCHA estimates); 92,227<sup>2</sup> (2023 NBS and UNFPA estimates)

*Note: Calculations using population figures in this county profile use the 2022 estimates*

- **Area:** 1,611 km<sup>2</sup>
- **Population density:** 48 persons per km<sup>2</sup>
- **County capital:** Leer town
- **Payams:** Juong Kang, Adok, Bou, Guat, Padeah, Leer, Pilieny and Yang

Leer county, situated in the southeastern region of Unity State, is approximately 135 kilometers from the state capital, Bentiu. It shares its borders with Mayendit county to the west and north, Panyijiar county to the south, and Ayod county in Jonglei State to the east. This county comprises 8 payams, with an estimated population of 77,663<sup>3</sup> residing in an area covering 1,611 square kilometers.<sup>4</sup>

Leer county has had a turbulent history, having been significantly affected by conflicts during the civil war. Since 2013, it has faced multiple conflict-related challenges, leading to increased vulnerability within communities.<sup>5</sup> The period from late 2021 to April 2023 witnessed further conflicts, resulting in the displacement of approximately 40,000 people within the county.<sup>6</sup>

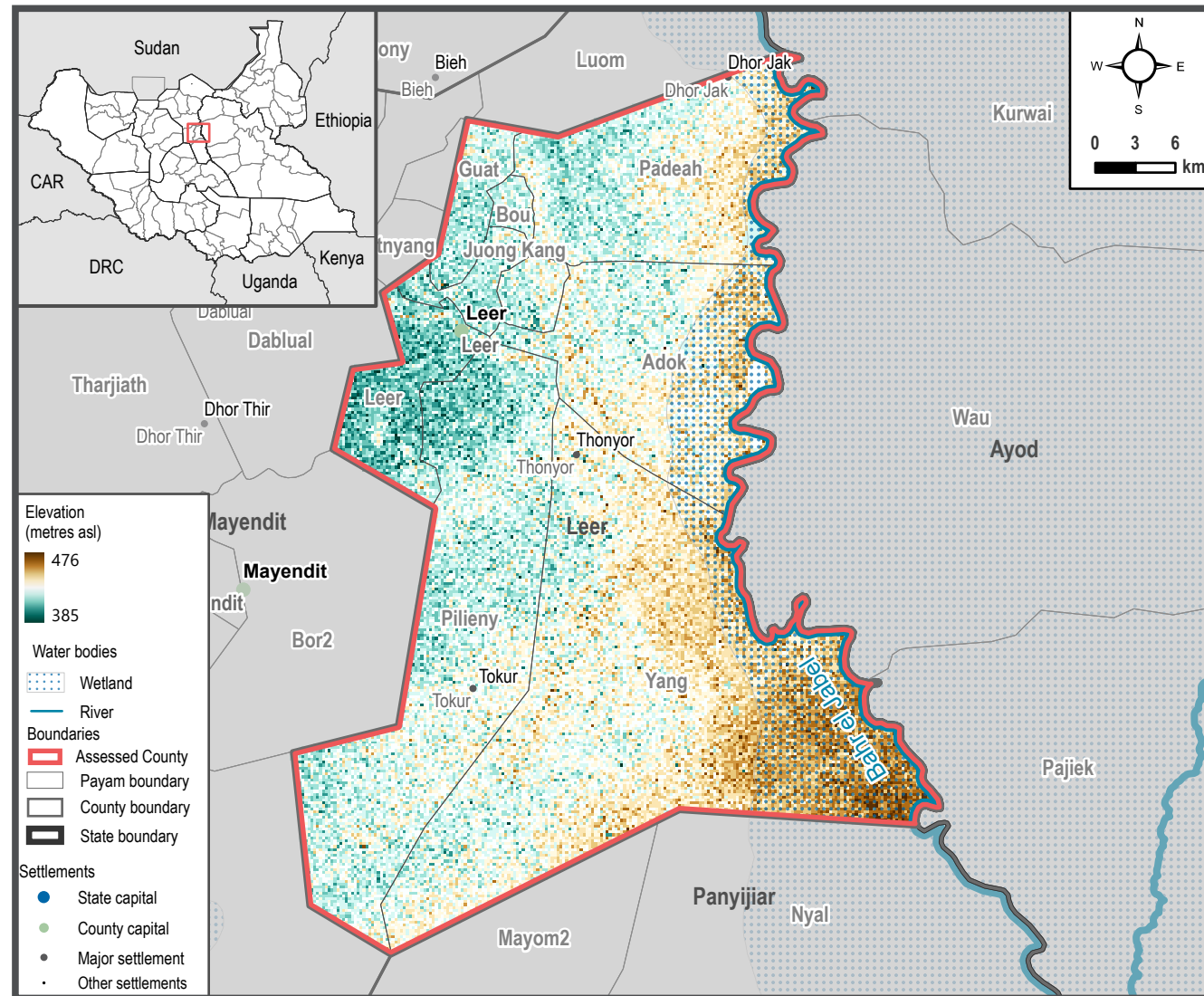
Additionally, the county has experienced and continues to grapple with severe flooding, primarily due to poorly drained flat terrain. Unusual flooding patterns have been observed since 2019, with the situation exacerbating in 2021 and 2022, with local authorities in assessed areas (Juong, Payak, Thonyor and Muom/Din-din/Adok) reporting that 90% of the area was submerged.<sup>7</sup>

#### About REACH

REACH is a leading humanitarian initiative that collects primary data and produces in-depth analysis to help aid actors make evidence-based decisions in support of crisis-affected people. With this in mind, our flagship research programmes aim to inform the prioritisation of aid according to levels of need - both crisis-level planning and targeted rapid response - as well as decisions around appropriate modalities of aid. Through our team of assessment, data, geospatial, and thematic specialists, we promote the design of people-centred research and set standards for collecting and analysing rigorous, high quality data in complex environments.

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**Map 1.1. Elevation and natural features including wetland areas, rivers and water bodies in Leer county**

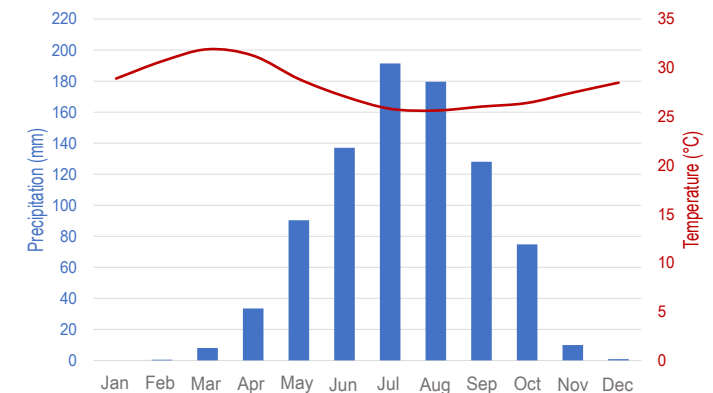


Leer county features a predominantly flat topography, characterized by an average elevation of 404 meters above sea level, and it exhibits a limited range of elevation. The highest elevations are located in the south eastern part of the county, gradually diminishing as one moves westward toward Leer, the capital of the county. Additionally, there is a slight increase in elevation to the north along the wetlands. The county borders the River Nile to the East, cutting along three Payams within the county.

The county is split into two livelihood zones: the “Northwestern flood plain sorghum and cattle” livelihood zone and the “Nile basin fishing and agro-pastoral” livelihood zone. The latter covers over three quarters of the county and natural vegetation such as tall reeds and grasses, including papyrus, as well as bush scrub dominate the landscape. Grasslands, bush scrub and occasional forested areas are also integral components of the natural landscape.<sup>8</sup> The soils in close proximity to the river are predominantly clay-rich, transitioning into sandy loam further away from the river.<sup>9</sup>

The county receives a large amount of rainfall, totaling 854 mm/year on average (Graph 1.1), with the wettest month being July and the driest month being January. Temperatures are usually highest in the driest months of December to February and lowest in the wettest months of July and August.

**Graph 1.1. Average monthly precipitation and temperature, Leer county (1981 - 2022)<sup>1011</sup>**



**Highest point**  
**424 m**

**Average elevation**  
404 m

**Annual precipitation**  
854 mm/yr

**Wettest month**  
**July**

**Elevation range**  
57 m

**Average temperature**  
**27.5°C**

**Driest months**  
Dec - Feb

## 2. LAND USE AND LAND COVER

## LEER COUNTY

Map 2.1. Land use and land cover map, Leer county<sup>12</sup>

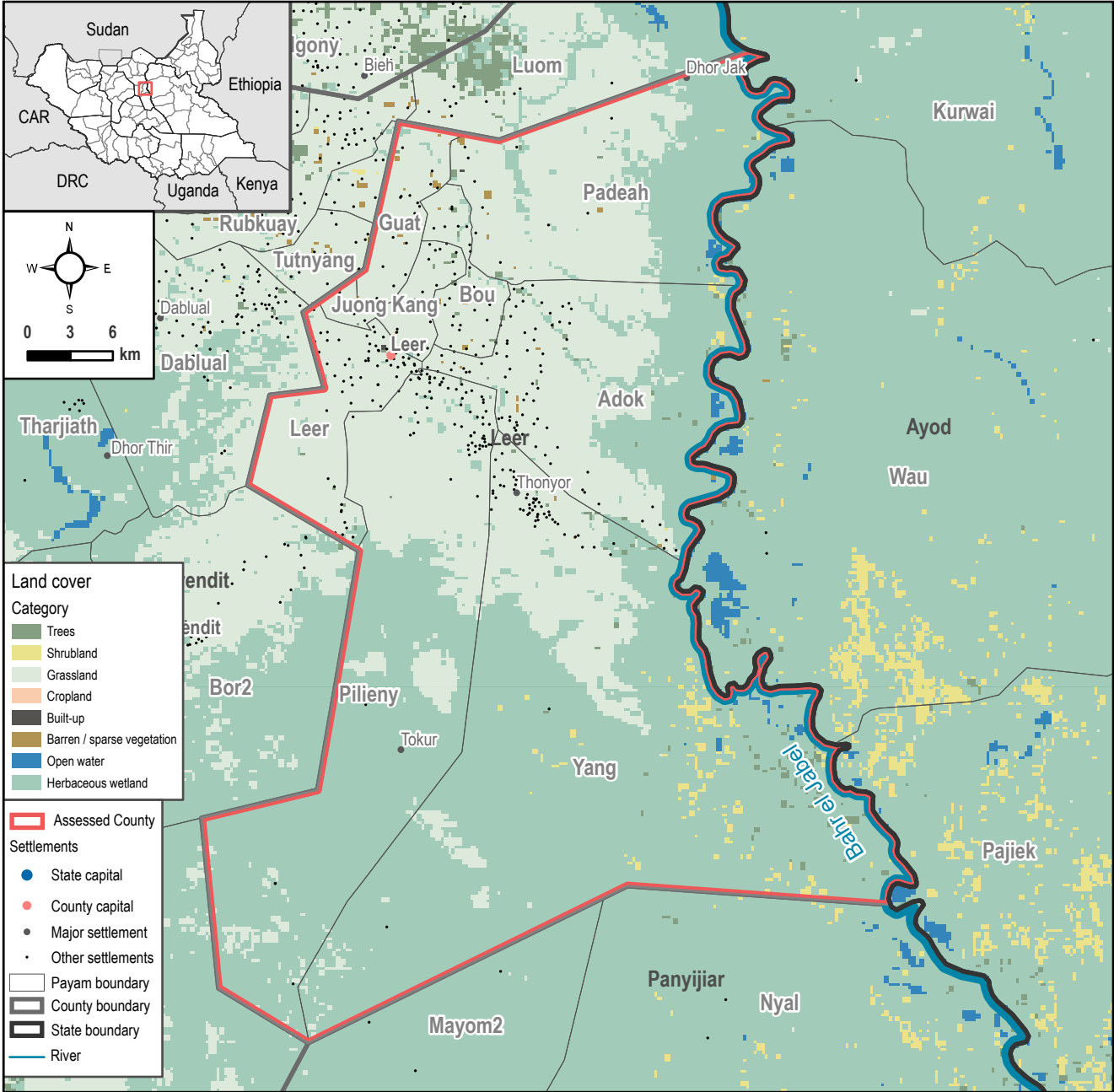


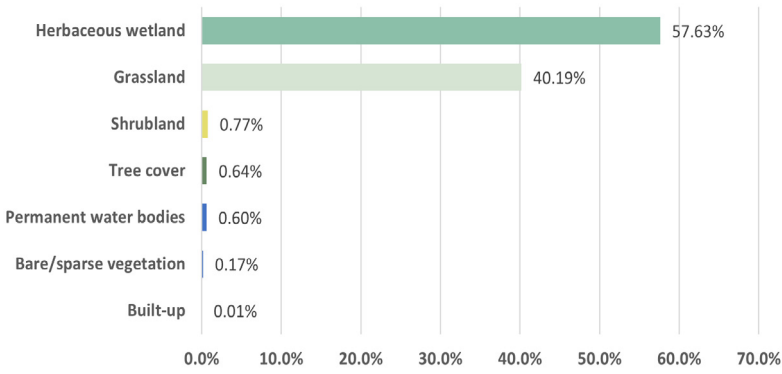
Chart 2.1 and map 2.1 describe the predominant land cover types in Leer county, emphasizing the prevalence of herbaceous wetland and grassland, which together account for a substantial portion of the county's landscape. Specifically, herbaceous wetland covers 58% of the county, highlighting the prevalence of areas characterized by non-woody vegetation, often associated with marshes or swamps. Grassland, comprising 40% of the county, signifies expanses dominated by grasses rather than shrubs or trees.

In addition to these dominant land cover types, there is presence of minority land cover features. Shrubland, trees, barren sparse vegetation, and water bodies collectively constitute less than 3% of Leer county. This suggests that while these features are present, they are relatively limited in extent compared to the expansive herbaceous wetlands and grasslands.

The herbaceous wetlands within the county primarily serve as areas for rainfed crop cultivation. The grasslands are considered valuable for both livestock raising and crop farming. Additionally, fishing is a prevalent activity in these wetlands, which partly form the riparian lands adjacent to the River Nile.

 **10,620 identified buildings in Leer county<sup>13</sup>**

Chart 2.1. Land cover as proportion of Leer county area

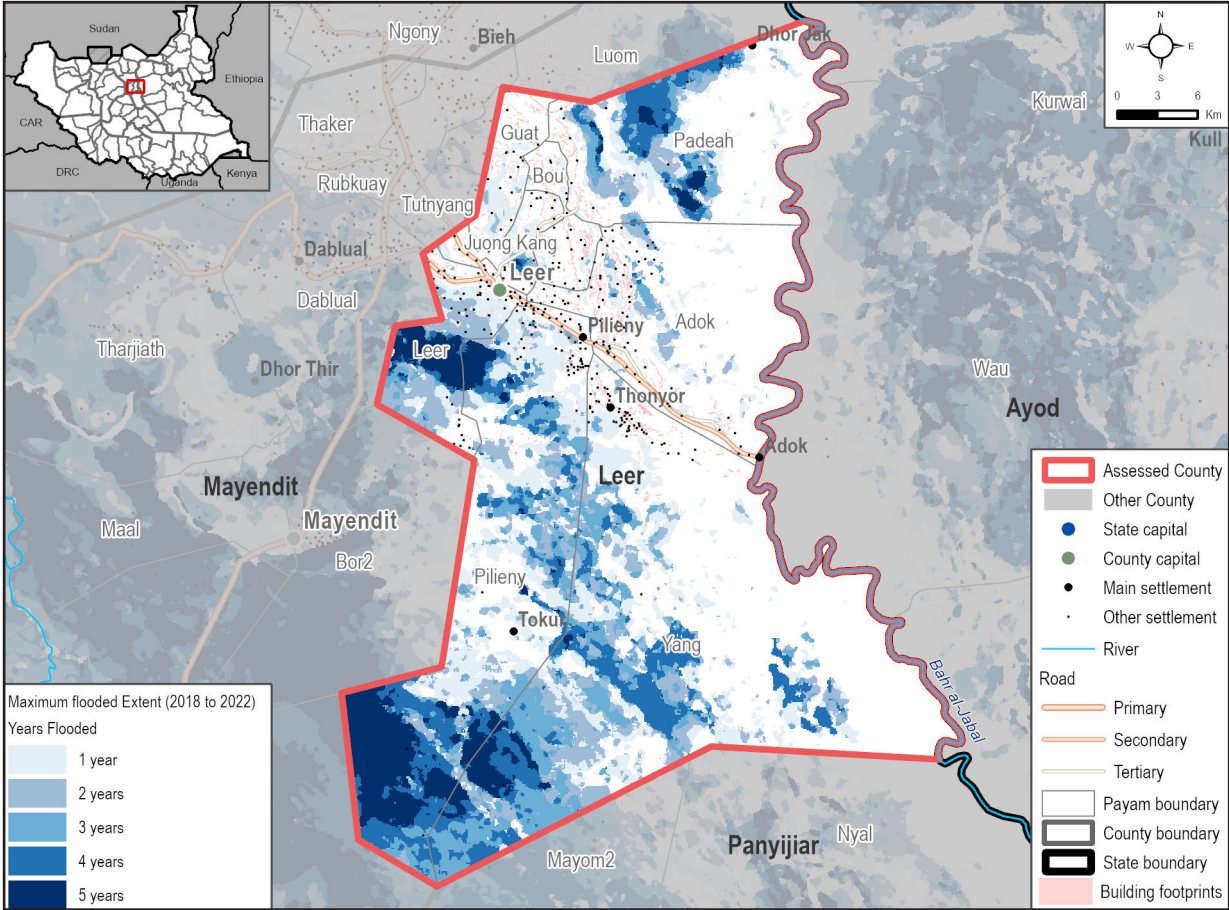




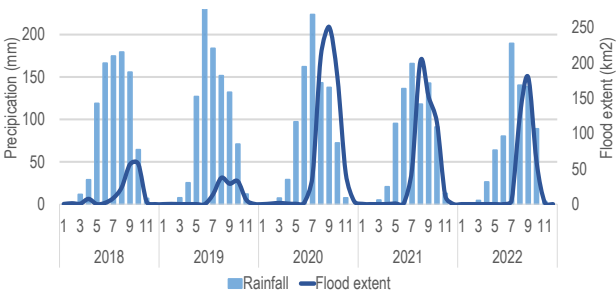
3A. HYDROMETEOROLOGICAL HAZARDS - FLOODING

LEER COUNTY

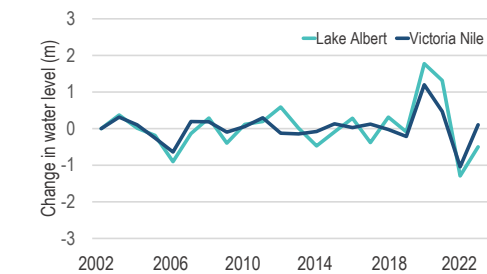
Map 3.1. Estimated maximum annual flood extent (2018-2022), affected settlements and key infrastructure<sup>i</sup>



Graph 3.1. Area of flood extent vs rainfall (2018-22)<sup>14</sup>



Graph 3.2. Changes in water levels<sup>ii</sup> upstream, Nile Basin<sup>15</sup>



<sup>i</sup> Estimated flood extent calculated based on analysis of Sentinel 1 data in Google Earth Engine. Data is indicative only and has not been validated in the field.  
<sup>ii</sup> Water level change calculated from DAHITI altimetry data for Lake Albert (ref. 85) and Victoria Nile (ref. 2264). Shows change in water level in metres from first year of data availability.

FLOODING

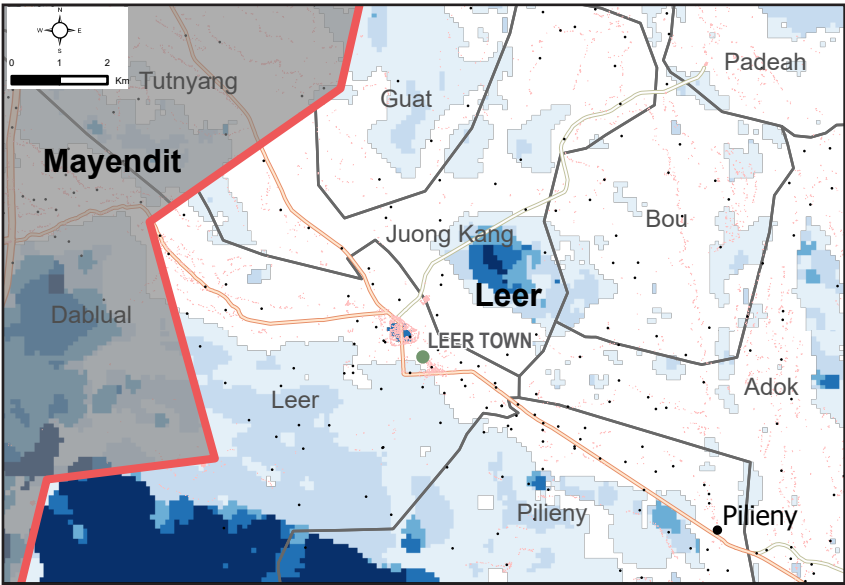
Over the course of a five-year period (2018-2022), Leer county underwent significant flooding, with several areas consistently affected, as illustrated in map 3.1. Particularly, the southern regions of Leer, Pilieny, and Yang payams, along with the northern parts of Padeah payam, experienced the most pronounced impacts throughout this period.

These specific areas, identified in maps 3.1 and 1.1, exhibit lower elevations compared to other parts of the county, rendering them more susceptible to flooding. The county's overall vulnerability to flooding is primarily attributed to its low-lying and poorly drained terrain, further compounded by the lingering effects of preceding years' floodwaters that seldom fully recede.

Graph 3.1 indicates that since 2018, the most significant flooding in Leer county occurred in 2020. Notably, flooding consistently aligned with the rainy seasons, reaching its peak each year during the rainy season. Despite the intermittent nature of rainfall seasons, there were instances where floodwaters did not recede, leading to prolonged periods of continuous flooding. As depicted in graph 3.1, from July 2019 to January 2021, there was only one month during which the flood extent in the county was non-existent.

In addition to heavy rainfall, the water levels upstream along the Nile surged notably in 2020 and persisted into 2021 (Graph 3.2), causing a substantial increase in water flow into the riparian areas of the county along the Nile. Furthermore, the decrease in water levels in 2022 coincided with a reduction in the extent of flooding compared to the preceding two years.

Map 3.2. Estimated maximum annual flood extent (2018-22), Leer Town and its environs





### 3B. HYDROMETEOROLOGICAL HAZARDS - FLOODING IN 2022

### LEER COUNTY

Map 3.3. Estimated maximum annual flood extent in 2022, affected settlements and key infrastructure

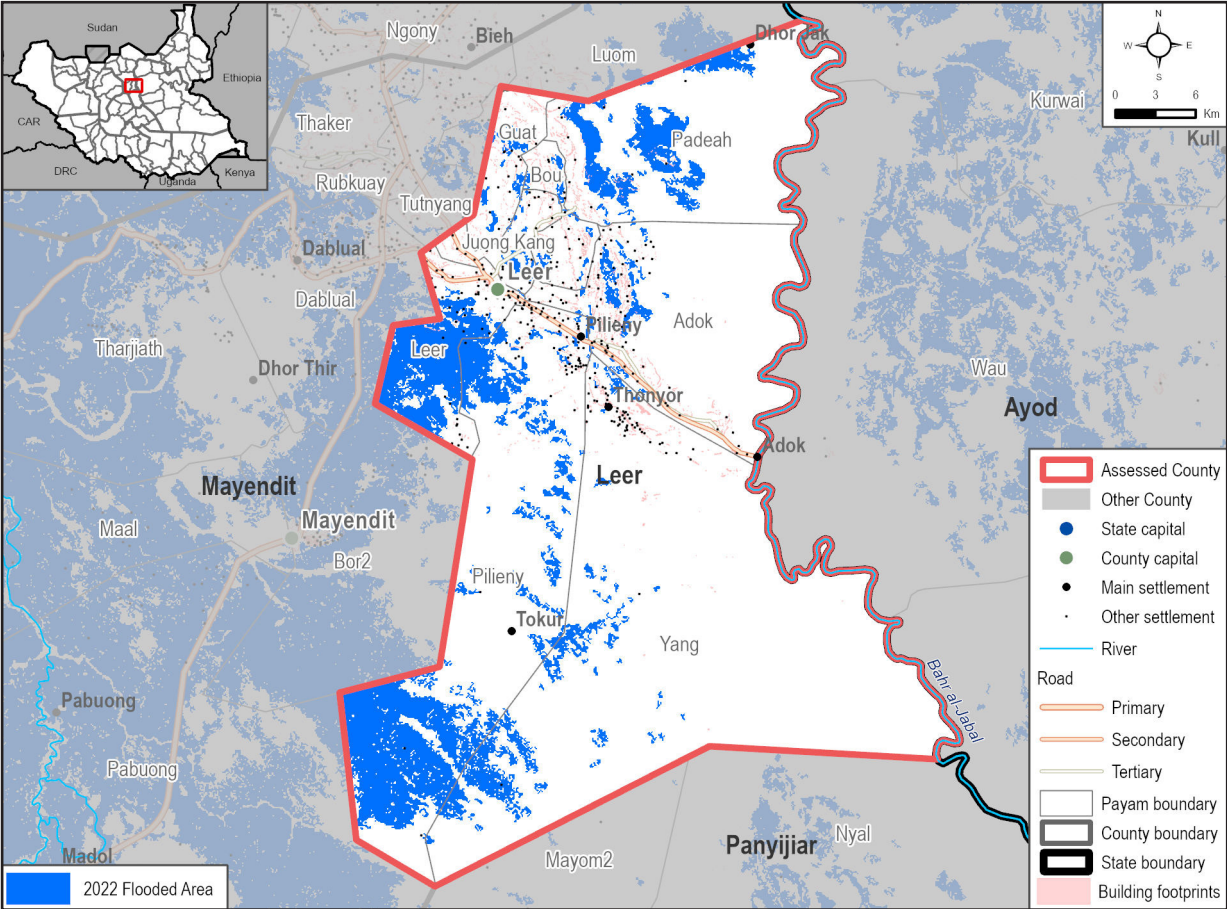


Figure 3.1. Satellite imagery snapshot. Destruction of built up area at the South of Leer Town



#### FLOODING 2022

In 2022, flooding had a significant impact on Leer county, with Leer payam, the southern section of Pilieny payam, and parts of Padeah payam, being the most severely affected areas, as indicated in Map 3.3. A five-year comparison reveals that these regions consistently face protracted flooding issues, as shown in map 3.1.

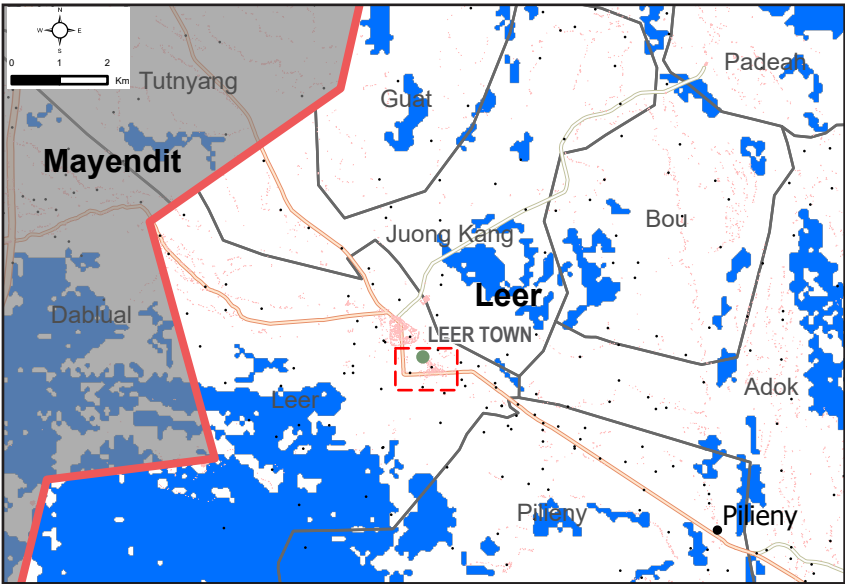
An Inter-Agency Rapid Needs Assessment (IRNA)<sup>16</sup>, conducted in October 2022, reported that out of Leer county's 112 villages, 75 were submerged by floodwaters. Notably, by the end of November 2022, more than 48,295,<sup>17</sup> individuals, accounting for 62% of the population at that time, had been impacted by the floods.

From the beginning of August 2022, communities and humanitarian partners in Leer county have been confronted with a significant and ongoing flood crisis, underlining the cumulative, persistent and severe nature of flooding in the area.

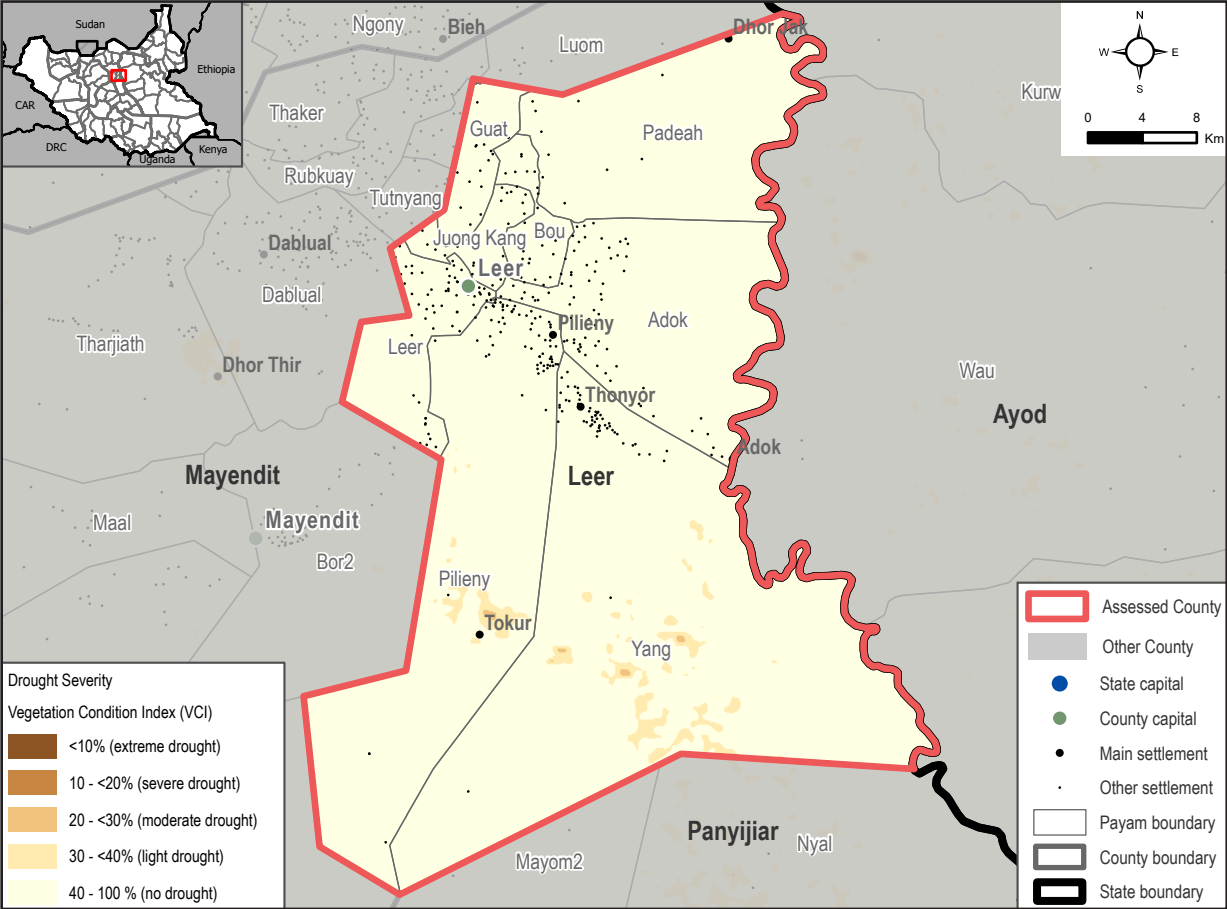
Regarding infrastructure, in August 2022, the Leer-Adok-Mirmir-Koch Road had become impassable due to exceptionally high water levels caused by flooding, particularly between Pilieny and Leer, as well as from Leer to Rubkyuay/Mirmir.<sup>18</sup>



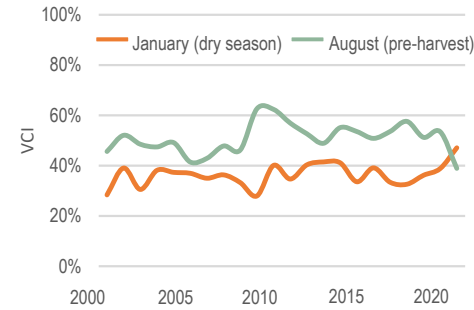
Map 3.4. Estimated maximum flood extent in 2022, Leer Town and its environs



Map 4.1. Vegetation condition index (VCI), indicator of drought severity, in July to September 2022, minimal drought<sup>i</sup>

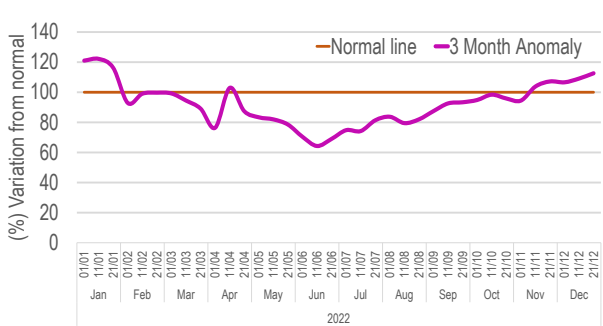


Graph 4.1. VCI (2000-2022) - drought index



i. Vegetation condition index calculated in Google Earth Engine based on MODIS EVI data

Graph 4.2. Percentage rainfall anomaly in 2022<sup>ii</sup>



ii. 100% is defined as the average value for the same month between 1981 and 2023

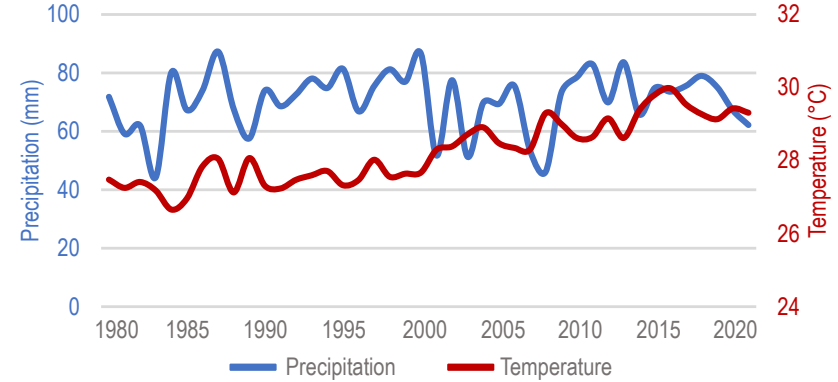
DROUGHT

Drought seldom affects the county, with its primary hydrometeorological hazard being flooding. As illustrated in map 4.1, some southern areas of the county encounter light drought. A comparison of the wet season and dry season indicate lowest vegetation condition index (VCI) in January and highest in August. Low VCI indicates poor vegetation health while high VCI indicates good vegetation health. As shown in Graph 4.1, since 2000, the vegetation health conditions have been higher in the wet season and lower during the dry season. However, in 2022, the vegetation health was better in January (dry season), compared to August (wet season). Among other factors, flooding extent within the months preceding the peculiar incidences could be a contributing factor.

The presence of floodwaters, albeit limited in the months leading up to January 2022, might have positively influenced vegetation. However, in the seven months before August 2022, flooding only occurred in July. This could potentially have been detrimental to vegetation, as the usual steady onset of floods typically occurred at least five months prior to August in the preceding two years. Rainfall anomalies, as depicted in graph 4.2, could also be a contributing factor as rainfall level in January were above the normal levels while the opposite was true for August. Given that Leer is in two livelihood zones that rely on a mixed agropastoral system, low VCI during the wet season can adversely affect livelihoods, potentially leading to reduced harvests or poorer pasture conditions.

Future climate projections<sup>19</sup> suggest that precipitation in the wettest month across Unity State will increase by 5.7% by 2060. Moreover, the projected change in maximum temperatures in the warmest month by 2060 from the 1995-2014 baseline is +1.8°C. These increases in hydro-meteorological conditions could lead to more intense and frequent climatic shocks, including droughts and floods, in the future.

Graph 4.3. Long-term climatic trends (1981-2022), Leer county<sup>20</sup>



Projected climatic trends by 2060 based on SSP3-7.0 scenario,<sup>ii</sup> Unity State



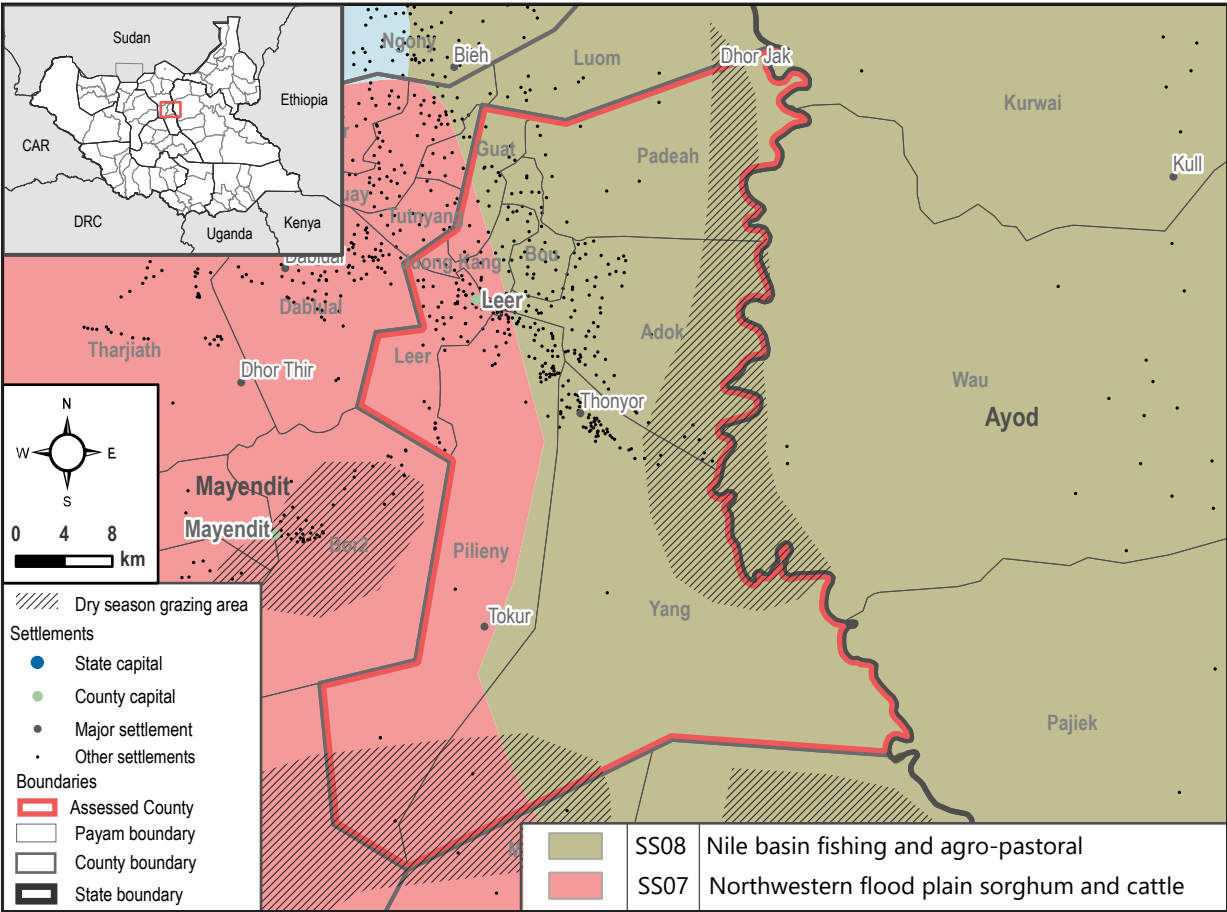
ii. 2060 projected climatic trends from 1995 - 2014 baseline with high green house gas emissions scenario based on Share Socio-economic Pathways (SSP) 3-7.0



5. LIVELIHOODS AND SOCIOECONOMIC CONDITIONS

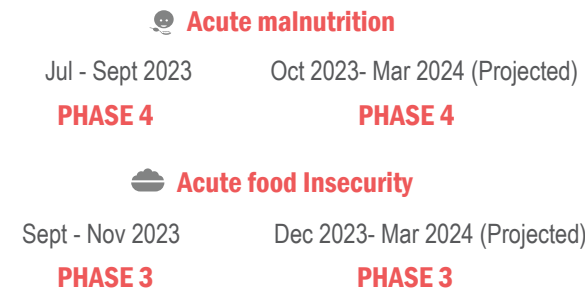
LEER COUNTY

Map 5.1. Livelihood zones in Leer county



Graph 5.1. Year on year change relative to previous year in net cereal production (CFSAM) <sup>24</sup>

IPC Scores - 2023/24<sup>26</sup>



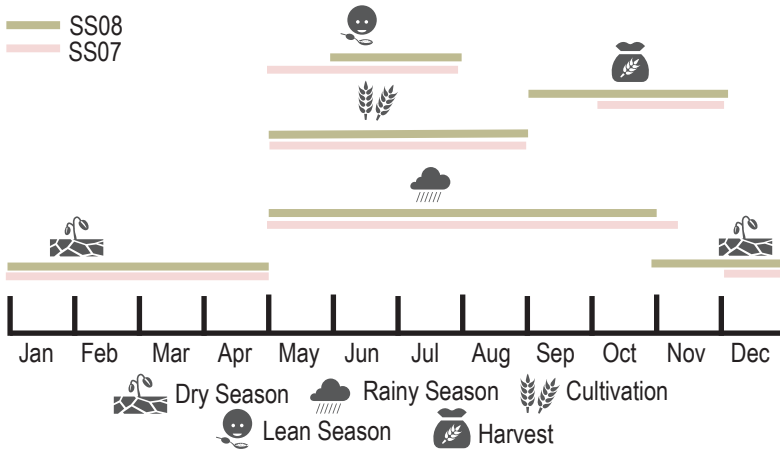
Leer county is split between two livelihood zones (map 5.1), the “Nile basin fishing and agro-pastoral” livelihood zone, which covers over three-quarters of the county, and the “Northwestern flood plain sorghum and cattle” livelihood zone.

The “Nile basin fishing and agro-pastoral” livelihood zone is characterized by its clay-rich soil, which transitions into sandy loam further away from the river Nile. Rain-fed farming of sorghum, along with maize, cowpeas, groundnuts, and vegetables is practiced. Possessing cattle, goats, and sheep is common among households. However, being situated along the Nile River, fishing and river-based activities are also prominent.<sup>22</sup>

The minority part of the county - located within the “Northwestern flood plain sorghum and cattle” livelihood zone - is characterized by flood plains and a mixed agro-pastoral production system. Households engage in both rain-fed crop cultivation and livestock rearing to meet their food and financial needs. Fishing, hunting, and gathering of native products and plants significantly complement these practices. Sorghum is the primary crop in this zone, complemented by groundnuts and sesame, which serve as the primary cash crops. Other crops grown include maize, pearl millet, legumes, and vegetables. Livestock are highly valued assets in the area, with cattle, goats, sheep, and poultry being the predominant types.<sup>23</sup>

Graph 5.1 depicts fluctuations in net cereal production, showing a peak in 2019, followed by a decline from 2020 to 2022. The 2019 surge aligns with favorable rainfall and low flood levels, as shown in graph 3.1. Conversely, the production decline may be attributed to prolonged and intense flooding observed between 2020 and 2023.

Figure 5.1. Cultivation calendar for livelihood zone SS08 and SS07<sup>25</sup>

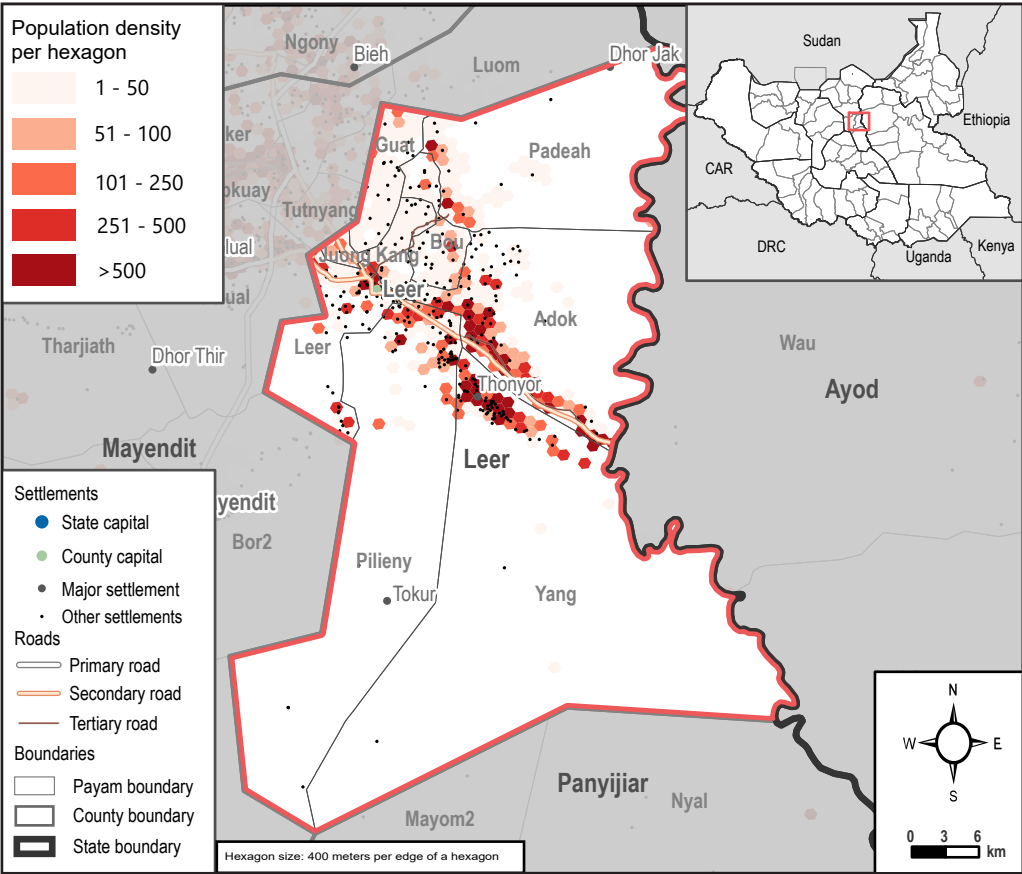




6. POPULATION AND DISPLACEMENT

LEER COUNTY

Map 6.1. Population density across Leer county (2023)<sup>29</sup>



Map 6.2. Significant population movements in Leer county over a five year period (2018-22)<sup>30 31</sup>

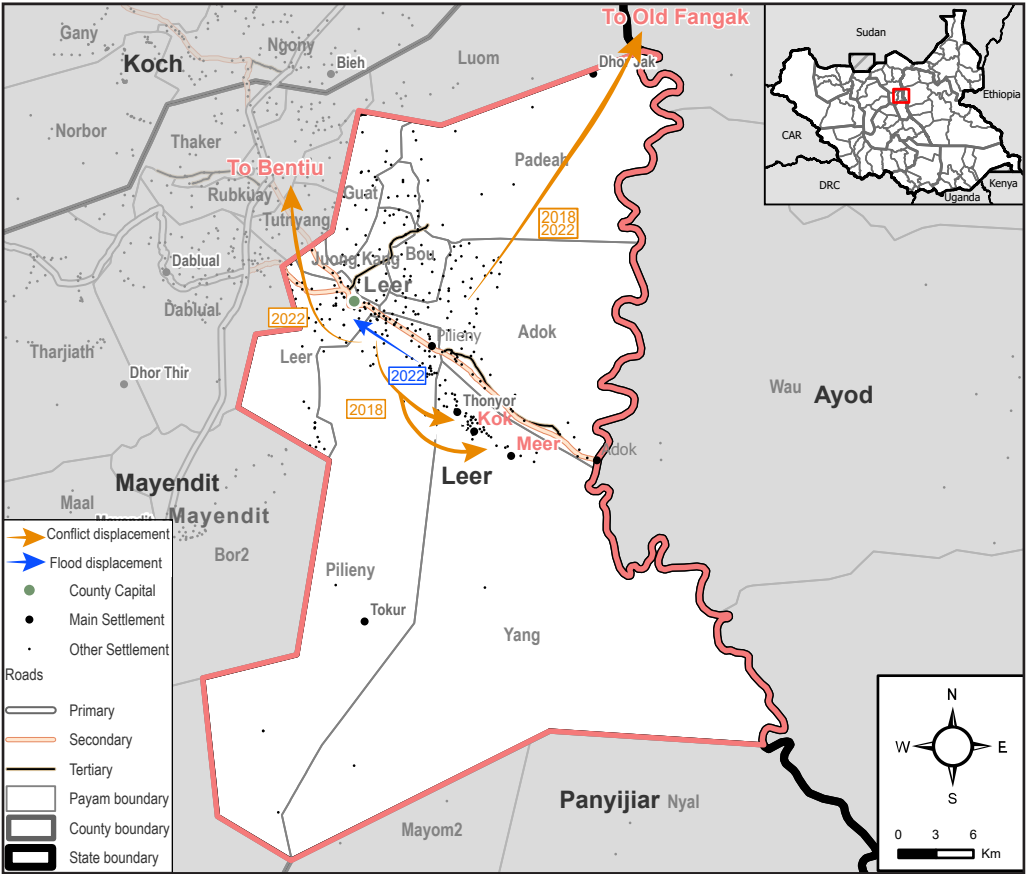


Table 6.1. Est. number of displaced persons by payam (2023)<sup>28</sup>

Payam	IDPs	Returnees	Relocated	Total
Adok	14,924	6,492	636	22,052
Bou	126	3,864	623	4,613
Guat	172	165	97	434
Juong Kang	1,154	1,143	32	2,329
Leer	14,496	2,418	90	17,004
Padeah	-	5,346	1,008	6,354
Payak	2,298	1,248	102	3,648
County total	33,170	20,676	2,588	56,434

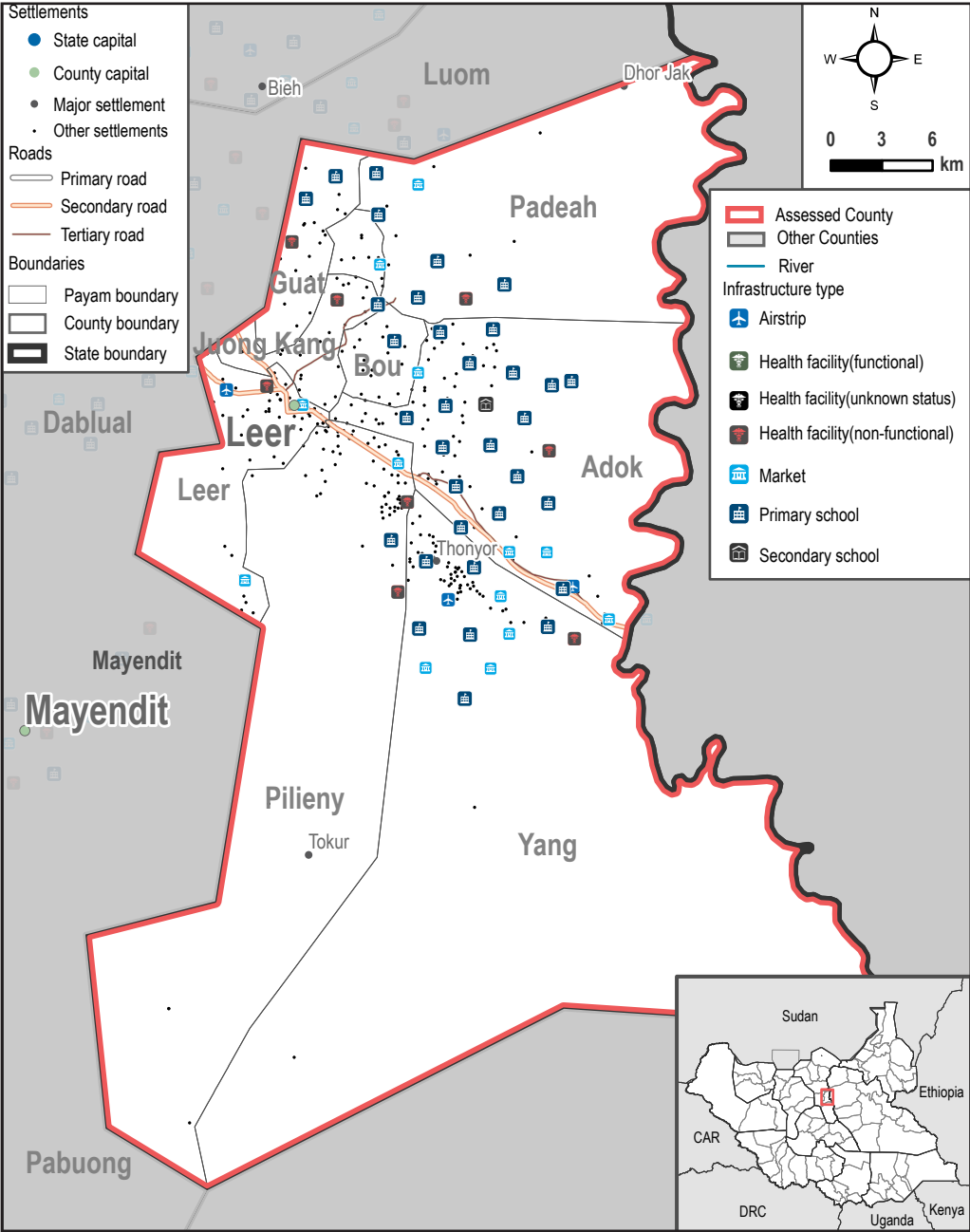
Populations in Leer are concentrated in the centre of the county, predominantly around Leer and Adok towns as well as along Adok-Leer road (Map 6.1). The total population of Leer is 77,663 and, as of September 2023, the county had 40,760 internally displaced persons (IDPs), 23,508 returnees and 2,984 people having relocated, as depicted in table 6.1. Among the total population of 77,663, 73% are either IDPs, returnees, or had relocated, signifying that a vast majority had faced displacement at some stage in their lives. Furthermore, almost half of the county's population (43%) were IDPs in 2023.

Among the IDPs in the county, Adok and Leer emerged as the primary host payams, accommodating 45% and 44% of the total, respectively. While the rest were dispersed across various areas within the county, none were situated in Padeah. Interestingly, Padeah recorded the highest number of relocated individuals and the second-highest number of returnees. Conflicts and flooding are the key factors in displacement, with approximately 40,000 people displaced due to conflicts witnessed from late 2021 to April 2023 within the county.<sup>27</sup>

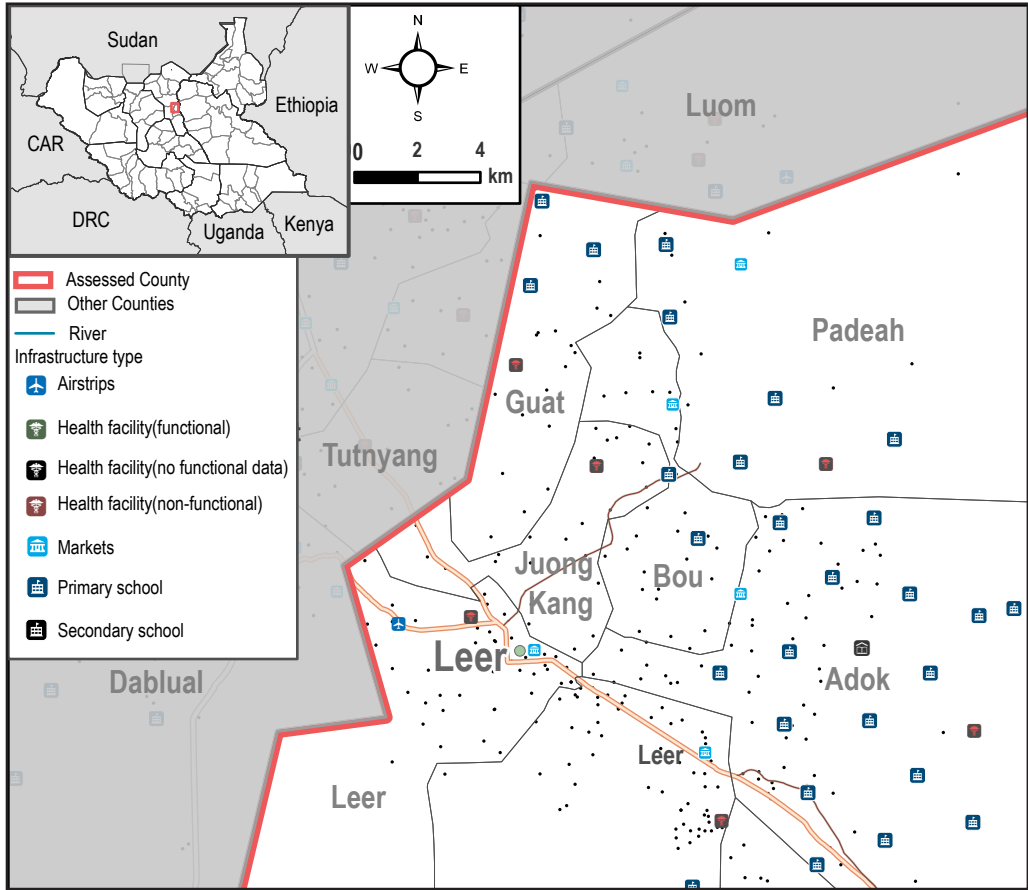
7. COMMUNITY INFRASTRUCTURE AND SERVICES

LEER COUNTY

Map 7.1. Key infrastructure in Leer county<sup>32 33</sup>



Map 7.2. Community infrastructure in Leer Town and its environs



EDUCATION AND HEALTH INFRASTRUCTURE

Overall, Leer county has forty-one primary schools and one secondary school, but lacks early childhood development centers. In the 2022-2023 school year, 25.3% of schoolaged children (5 to 17 years old) were not enrolled or registered in formal education. Poor infrastructure in schools, including inadequately adapted facilities and classrooms for children, emerged as a significant barrier accessing education in the county.<sup>34</sup>

Within the Health Sector, the county has fifteen operational health facilities as of 2022,<sup>35</sup> out of which nine are Primary Health Care Units and six are Primary Health Care Centers. However, 37% of households are still unable to access healthcare facilities, with distance reported as a primary barrier.<sup>36</sup>

WASH indicators<sup>37</sup>



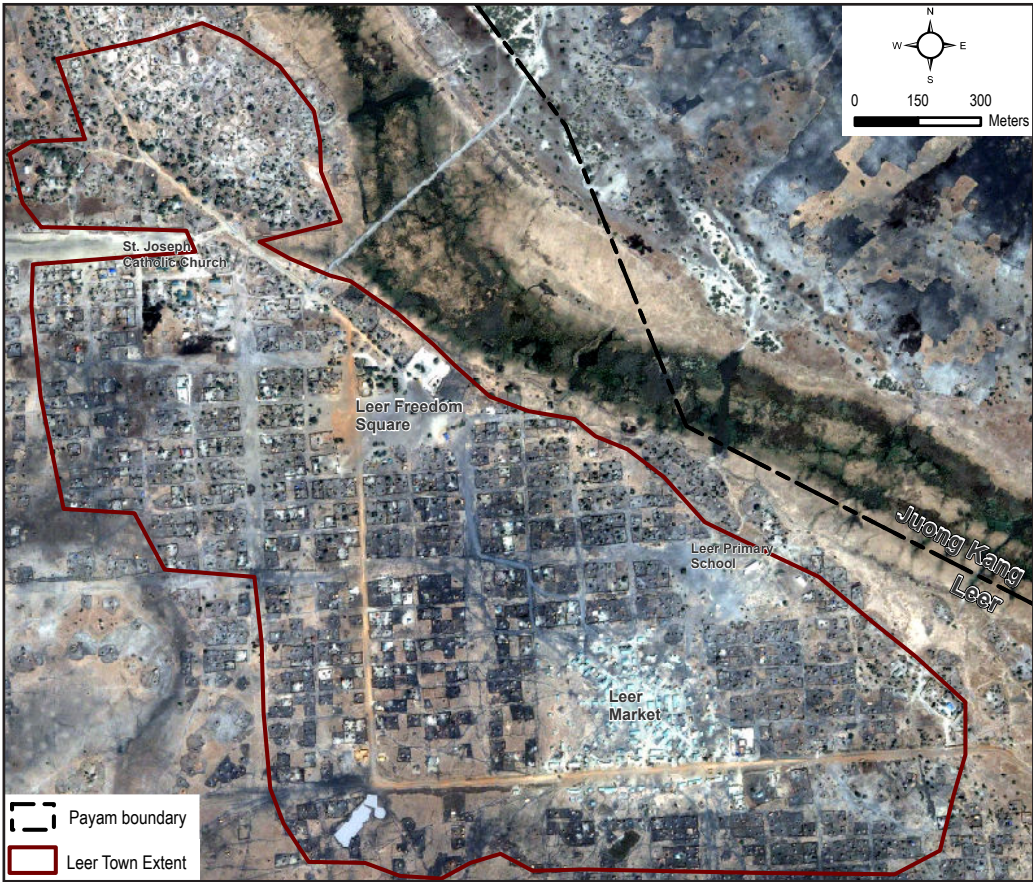
49% of households take <30 minutes to fetch drinking water

59% of households practice open defecation

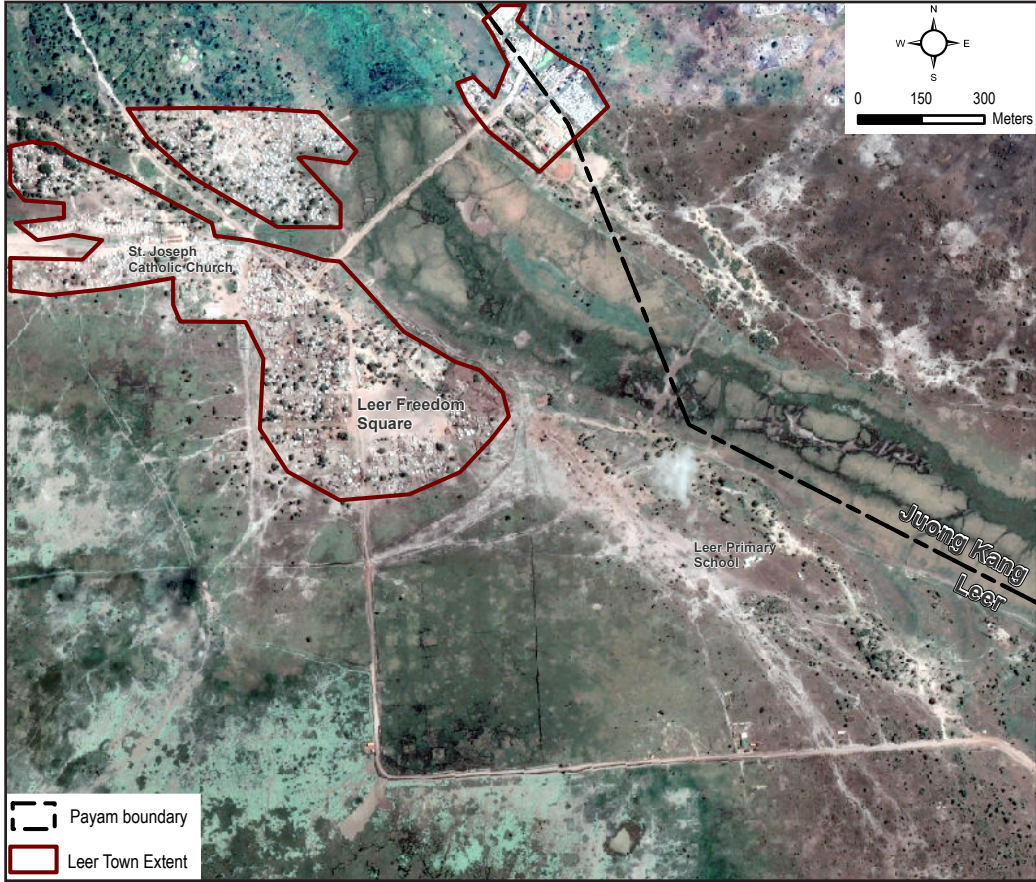


Figure 8.1. Satellite images showing change in built-up area in Leer town and its environs between 2011 and 2022.

Leer town, February 2011 (Google Earth Image)



Leer town, May 2022 (Google Earth Image)



SETTLEMENT STRUCTURE

The county capital and most populated area is Leer Town, with other key centers including Adok, Thonyor and Padeah, as depicted in map 6.1. According to 2023 ISNA data,<sup>38</sup> rakoobas are the primary shelter types, being utilized by 58% of the population. Other shelter types include improvised shelters made of plastic sheets and other materials and tukuls. Regarding shelter conditions, the majority of shelters (67%) are partially damaged, while 16% are completely damaged. The primary causes of damage to these shelters were attributed to rain (45%), conflicts (22%), and floods (14%).

SETTLEMENT CHANGE

As depicted in figure 8.1, a notable portion of Leer town towards the south, including residential areas, Leer market, and a primary school, that can be seen in satellite imagery in 2011, are no longer visible in imagery from 2022. Concurrently, there has been an increase in built-up area in the north of Leer town and around St. Joseph Catholic Church as shown in the two images. Conflict and continuous flooding seem to be the main causal factors that damaged a lot of the southern built-up areas, supported with findings from IRNA,<sup>39</sup> UNMISS,<sup>40</sup> and graphics in the “Flooding” section that illustrate the flood extent across Leer county.



## 9. MARKETS, TRANSPORT AND ACCESSIBILITY

Map 9.1 Markets in Leer county, indicating supply routes

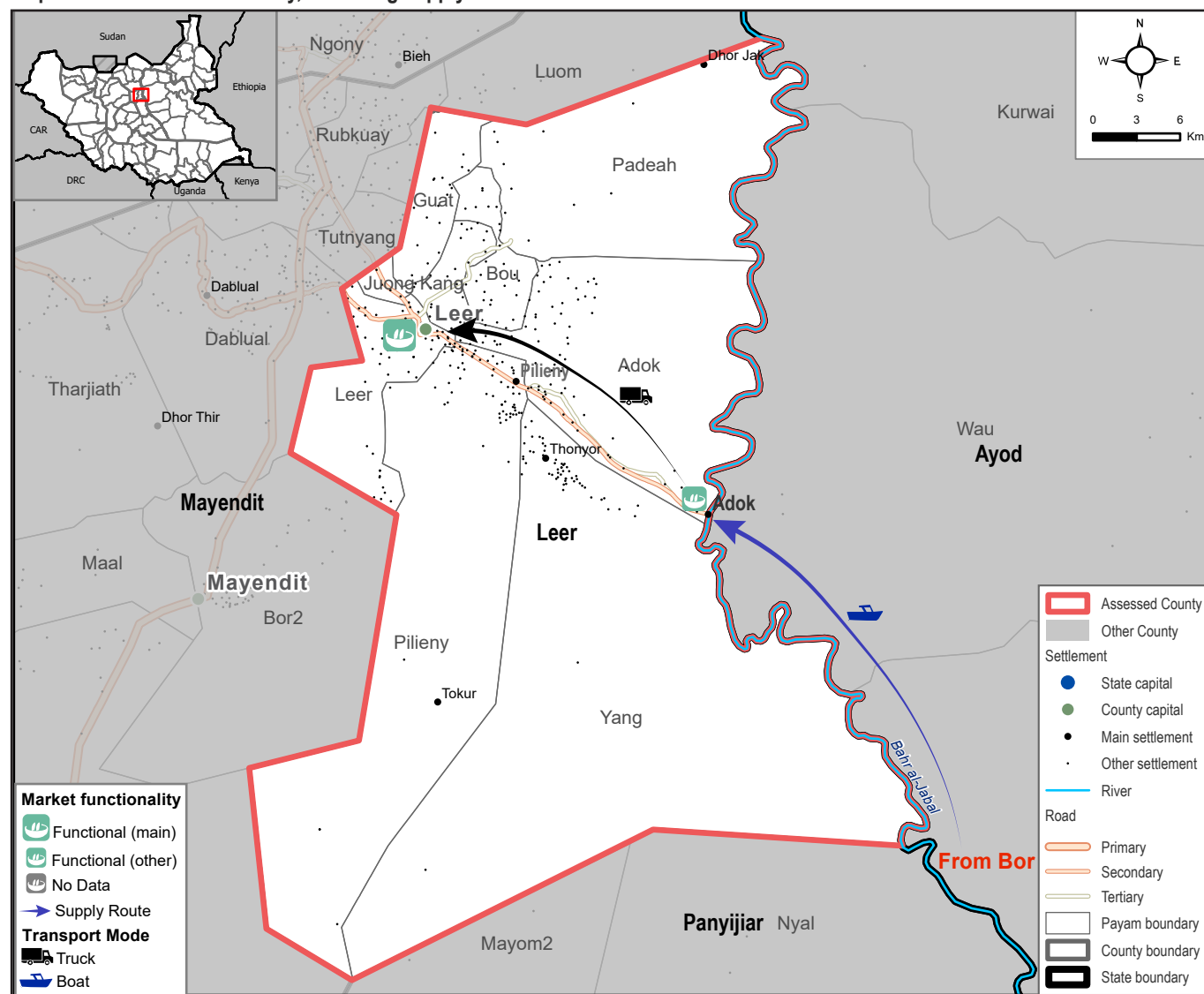


Table 9.1. Key market supply routes, Leer county (2023)

Market Name	Primary Supply route
Adok	From Bor (by Boat)
Leer	From Adok (by Road)



**Sorghum price (Sep 2023)**  
27% higher than South Sudan median



**MSSMEB price (Sep 2023)**  
32% higher than South Sudan median

## LEER COUNTY

### MARKETS

According to Joint Market Monitoring Initiative (JMIMI) data from REACH, the main market in the county is Leer market. Since JMIMI data collection began in Leer (May 2023), the market has been at reduced functionality. The market predominantly receives its supplies directly from Juba through river transport and, occasionally, shipments also come from Bentiu via road. However, since the roads to Leer are usually affected by flooding, road transport is unreliable. A secondary market exists at Adok port, which serves as the primary supply hub for the county (Map 9.1).

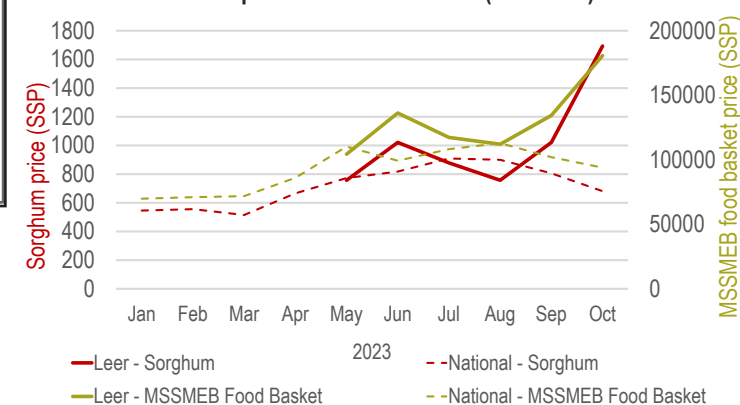
In terms of sorghum prices, the cost of 1 kilogram in Leer was 1,021 SSP in September 2023, which was relatively higher than the national median of 806 SSP. On the other hand, the Multi-Sector Survival Minimum Expenditure Basket (MSSMEB) was slightly lower than the national median within the months of May and July, while the opposite was true within the months of August and September. This means, during May and July, the prices for essential foods and nonfood items (NFIs) in Leer county were lower compared to national prices. However, in August and September, they exceeded national prices. This shift could be attributed, among other factors, to floods in the later months, which likely disrupted supply routes, affecting local pricing.

### TRANSPORT

Leer county has no primary roads, but has a single secondary road that runs from Mayendit county, through Leer town and to Adok port along the Nile. Overall, the road infrastructure is poor, often resulting in roads becoming impassable, especially during the rainy season.<sup>41</sup>

Adok port along the Nile is the main access point for Leer county, enabling access to goods and services from Juba and other parts of South Sudan, and thus making it the second-largest economic hub in Unity state.<sup>42</sup>

Graph 9.1. Market price trends for sorghum and Multi-Sector Survival Minimum Expenditure Food Basket (MSSMEB).<sup>43</sup>



- 1 HDX/UN OCHA. [2022 South Sudan admin level 2 population figure estimates based on the 2008 census and annual natural growth and attrition rates with displacement adjusted estimates](#). 2022.
- 2 HDX/UN OCHA. [2023 South Sudan Population Estimation Survey: admin level 2 population figure estimates by the National Bureau of Statistics \(NBS\) and UNFPA](#). 2023.
- 3 HDX/UN OCHA. [2022 South Sudan admin level 2 population figure estimates based on the 2008 census and annual natural growth and attrition rates with displacement adjusted estimates](#). 2022.
- 4 HDX/UN OCHA. [South Sudan administrative level 0-2 gazetteer](#). 2023.
- 5 Amnesty International. ["Anything that was breathing was killed."](#) pages 7-10. 2018
- 6 UNMISS. ["Leer county: Relative Calm Resumes After Waves of Brutal Violence, But Humanitarian Situation Dire."](#) 2022.
- 7 UN OCHA. [IRNA Report](#). 2022
- 8 Famine Early Warning Systems Network (FEWSNET). [Livelihood Zone Map and Descriptions for the Republic of South Sudan](#). Issued August 2018.
- 9 Ibid
- 10 Google Earth Engine. [CHIRPS Daily Rainfall Data](#). 1981-2022.
- 11 Google Earth Engine. ERA5-Land Monthly Average Dataset. February 2022.
- 12 Google Earth Engine. [ESA WorldCover v100](#). 2020.
- 13 Digitize Africa. Building footprints. 2017.
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- 16 UN OCHA. [IRNA Report](#). 2022.
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- 18 WFP. ["South Sudan Country Brief"](#). August 2022.
- 19 The World Bank Group. [Climate Change Knowledge Portal For Development Practitioners and Policy Makers](#). 2021.
- 20 Google Earth Engine. [CHIRPS Daily Rainfall Data](#). 1981-2022.
- 21 WFP VAM. [Climate Explorer](#). 2022.
- 22 Famine Early Warning Systems Network (FEWSNET). [Livelihood Zone Map and Descriptions for the Republic of South Sudan](#). Issued August 2018.
- 23 Ibid
- 24 FAO/WFP. [2021 Crop and Food Security Assessment Mission \(CFSAM\) to the Republic of South Sudan](#). June 2022.
- 25 Famine Early Warning Systems Network (FEWSNET). [Livelihood Zone Map and Descriptions for the Republic of South Sudan](#). Issued August 2018.
- 26 Integrated Food Security Phase Classification (IPC). [South Sudan Acute Food Insecurity and Acute Malnutrition Analysis](#). Nov 2022.
- 27 UNMISS. ["Leer County: Relative Calm Resumes After Waves of Brutal Violence, But Humanitarian Situation Dire."](#) 2022
- 28 IOM. [DTM Baseline dataset](#). 2023.
- 29 HDX. [South Sudan: Population Density for 400m H3 Hexagons](#). October 2023
- 30 OCHA. [South Sudan: Humanitarian Snapshot](#). May 2018
- 31 REACH. [Leer County Rapid Assessment: Unity State, South Sudan](#). August 2022
- 32 IOM. Education facilities in South Sudan. 2021.
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