Northern Bahr el Ghazal Climate Impact & Displacement Profile

Northern Bahr el Ghazal State, South Sudan, December 2020

Context & Methodology

The October-November 2020 Integrated Food Security Phase Classification (IPC) analysis determined that an estimated 50% of the population in Northern Bahr el Ghazal (NBeG) state were classified in Crisis (IPC Phase 3) or worse acute food insecurity (AFI), with over 46% of children facing global acute malnutrition (GAM).[1] Field reports and satellite data indicated that the high level of food insecurity and malnutrition encountered in NBeG was likely caused by a **series of climate shocks**, namely a combination of drought-like conditions in July followed by flooding in August/September 2020, both of which affected the harvest. Field reports also indicated atypical movement into Sudan in response to deteriorating food security conditions.

To support understanding of food insecurity and the status of distress migration in the area, REACH conducted a qualitative assessment in NBeG state to better understand the intricacies and impacts of the climate shocks as well as investigate reports of atypical displacement. From 2nd to 5th December 2020, REACH conducted **5 focus group discussions (FGDs)** on climate impacts and **11 FGDs on** climate displacement, which included participatory mapping exercises, covering **Aweil Centre, Aweil South, Aweil West, Aweil East, and Aweil North counties**. FGDs were divided into male and female groups for each respective county. For Aweil Centre, Aweil West, Aweil East, and Aweil South, FGDs were conducted with residents of settlements in these counties, yet in close proximity to Aweil Town. For Aweil North, FGDs were conducted with residents of settlements near Gok Machar. This assessment used a qualitative methodology that did not assess all potentially relevant locations, and as such, findings are **indicative only.**

Key findings

- **Findings suggest that in 2020, a combination of climate shocks together had a severe impact on food production.** Delayed rains and drought-like conditions between May-July, followed by flooding from July-September interrupted the typical cultivation calendar. Atypically dry conditions meant households had to delay land preparation and seed planting, which led to reduced crop health and growth. Subsequent flooding meant that a large amount of crops were destroyed, with many that could be salvaged uncultivable due to delayed planting.
- **Access to food appears to be of existing and impending humanitarian concern.** It was reported in all FGDs that households were frequently using food-based coping strategies such as skipping meals, with foodstocks reportedly almost exhausted. This level of food insecurity is uncommon for this time of year, with the lean season usually between May - June before the harvest in July, suggesting food security conditions may deteriorate further before the next harvest.
- **Current humanitarian conditions cannot be viewed in isolation from extreme flooding in 2019.** Flooding in 2019 reduced food availability, which was then exacerbated by a second year of climate shocks. This has meant many households have **faced protracted food insecurity**.
- Although movement of individuals seeking seasonal livelihood opportunities in Sudan is normal for parts of NBeG, **atypical movement intentions of entire households to Sudan or areas on the border were commonly reported for the three months following data collection, and many households were already moving.** Such atypical movements were reportedly due to food insecurity, which was compounded by high market prices, driving movements to access livelihoods such as fishing or casual labour, or humanitarian assistance. Movements of entire households were reported to likely take longer than typical seasonal movements.
- **Most of the households engaging in movement to Sudan or the Sudanese border were reported to be vulnerable in some way,** primarily in having less wealth/ fewer assets that would enable them to cope with food insecurity in NBeG. Those travelling as whole households also seemed more likely to be female-headed households.
- **Households that are not moving appeared to be divided among the relatively well-off and the most vulnerable**. Households with wealth or assets (including cattle) are reportedly not engaging in movement as their resources allow them to mitigate shocks. On the other hand, some of the households remaining are those that cannot make the journey, especially those with household members who are elderly or Persons with Disabilities and those who do not have the financial means to afford transportation by vehicle.
- While beliefs about changes in climate as a long-term trend were unclear, **most participants felt that rainfall had become more irregular in recent years.** Many said that, if they were to experience climate shocks driving food insecurity similar to those in 2020 several years in a row, **they would pursue longer-term relocation from their area.**

Traditional livelihoods and cultivation calendar

As identified by the Famine Early Warning Systems Network (FEWSNET), NBeG is divided into two livelihood zones: the Western Floodplain Sorghum and Cattle zone, and the Western Plains Groundnuts, Sesame, and Sorghum zone.[2] All assessed locations were in the former livelihood zone, so the methodology and analysis were informed by the livelihood practices and the seasonal calendar associated with this classification. This assumption was corroborated through FGDs in all assessed locations.

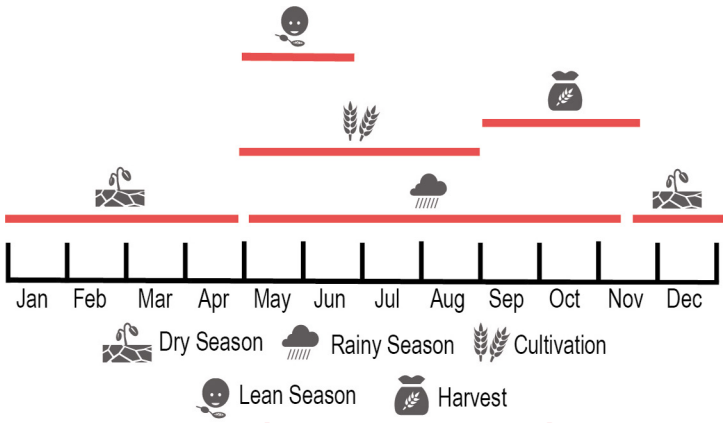
Households in the Western Floodplain Sorghum and Cattle zone of NBeG practice a mixed agro-pastoral production system. Sorghum is the main staple food, with cropped sesame and groundnuts also playing fundamental roles in households meeting cash and food requirements. Maize, pearl millet, legumes and vegetables are also grown, and wild foods and fishing are additional important food sources. Cattle rearing is commonly practiced, with an estimated 80% of households owning cattle as of August 2018.[2]

Agro-pastoralist practices are heavily influenced by climatic factors. The area has a single rainy season, starting in May and typically ending in October. This is preceded by a dry period that begins in January and lasts to the end of April. Land preparation is typically done in March and April, followed by planting from May to July, with the main harvests occurring in October and November as shown in Figure 1. Changes in weather patterns can have a significant impact on the yield of critical food supplies.[2]

After the harvest period, households usually have enough produce to last them for six months, with the lean season being identified as May-July.[2] This period coincides with peak milk consumption between June and October, and consumption of wild foods also increases.[2] As household food stocks decrease between April and September, households purchase more food from markets and staple food prices subsequently increase.

More affluent households typically rely on the sale of crops and livestock, with the sale of the former peaking during the lean season.[2] Less affluent households tend to pursue casual livelihood opportunities such as carpentry, farm labour, or selling produce at the market. The poorest households, typically identified as those without cattle, rely on support from kinship networks.

Figure 1: Seasonal Calendar, Northern Bahr el Ghazal



Context: Cumulative and Compounding Shocks

NBeG has been affected by a series of cumulative climatic shocks since August 2019. These shocks cannot be viewed in isolation, and it is critical to understand the implications of each shock to understand the compounding implications of these events on humanitarian needs.

Flooding August - October 2019

Participants in all FGDs reported having been affected by extensive flooding between August and October 2019. Participants consistently stated that the flooding in 2019 was more severe than in 2020, with the 2019 floods commonly reported as the worst in living memory. As can be seen in Map 1, although flooding in 2020 covered a greater surface area, flooding in 2019 had a notably higher impact on densely populated areas. In 2019, cropland and subsequent crop outputs were significantly affected, causing notable reductions in food availability. Barriers to mobility caused by flooding further impeded the harvest and transfer of produce to markets, with NBeG having an estimated cereal deficit of approximately 60,000 tonnes in 2020, and the cereal balance for the state being 15% below the previous five year average in 2019.[3] In the same report, flooding was reported to be the main factor behind this significant shortcoming in cereal supply.[3]

Participants in all FGDs reported differences in flood patterns between 2019 and 2020. In 2019 early rains commencing in April and May were higher than regular weather cycles, enabling some early cultivation before peak excessive flooding began in September. Participants also reported that the length of inundation (standing water) after the rainy season was shorter than 2020, thus reducing the impact of flooding on shelter, as well as movement related constraints to accessing services.

Figure 2: Northern Bahr el Ghazal Shock Calendar

August - Octber 2019
Extensive flooding between July and September caused major impediments to movement and significantly reduced agricultural yield.

April - May 2020
In response to the **global COVID-19 pandemic** restrictions to national and cross-border movement impact market prices.

May - July 2020
Drought-like conditions between May and July in much of the state meant that the planting season was delayed and crop and livestock health were both impacted.

July - September 2020
Extensive flooding for a second year in a row caused major impediments to movement and significantly reduced agricultural yield.

Drought May - July 2020

The state of NBeG was affected by atypically low rainfall and subsequent drought-like conditions between May and July 2020 as shown in Map 2. As shown in Figure 1, precipitation between April and the third dekad (period of ten days) of July was below the longterm average (shown in Figure 3). Subsequently, as identified by the Food and Agricultural Organisation (FAO) Global Information and Early Warning System (GIEWS), this led to significantly reduced vegetation health in cropland areas.[4]

Delayed rains and subsequent drought-like conditions are not uncommon in NBeG, with FGD participants frequently reporting 1998 to be a year particularly severely affected by drought. Drought-like conditions reportedly usually lead to planting and harvesting being shifted to later in the calendar year to align with delayed rains.

Flooding July - September 2020

Flooding in 2020 was reported to have come in two stages. After rains were initially delayed, heavy rains at the end of July (as shown in Figure 3) caused flooding at the end of the month. This was followed by atypically high levels of flooding in August, caused by higher than usual downstream water levels combined with typical seasonal precipitation locally. This instance of flooding caused widespread inundation, which still persisted in water bodies having atypically high levels at the time of data collection.

Atypically dry conditions October to December 2020

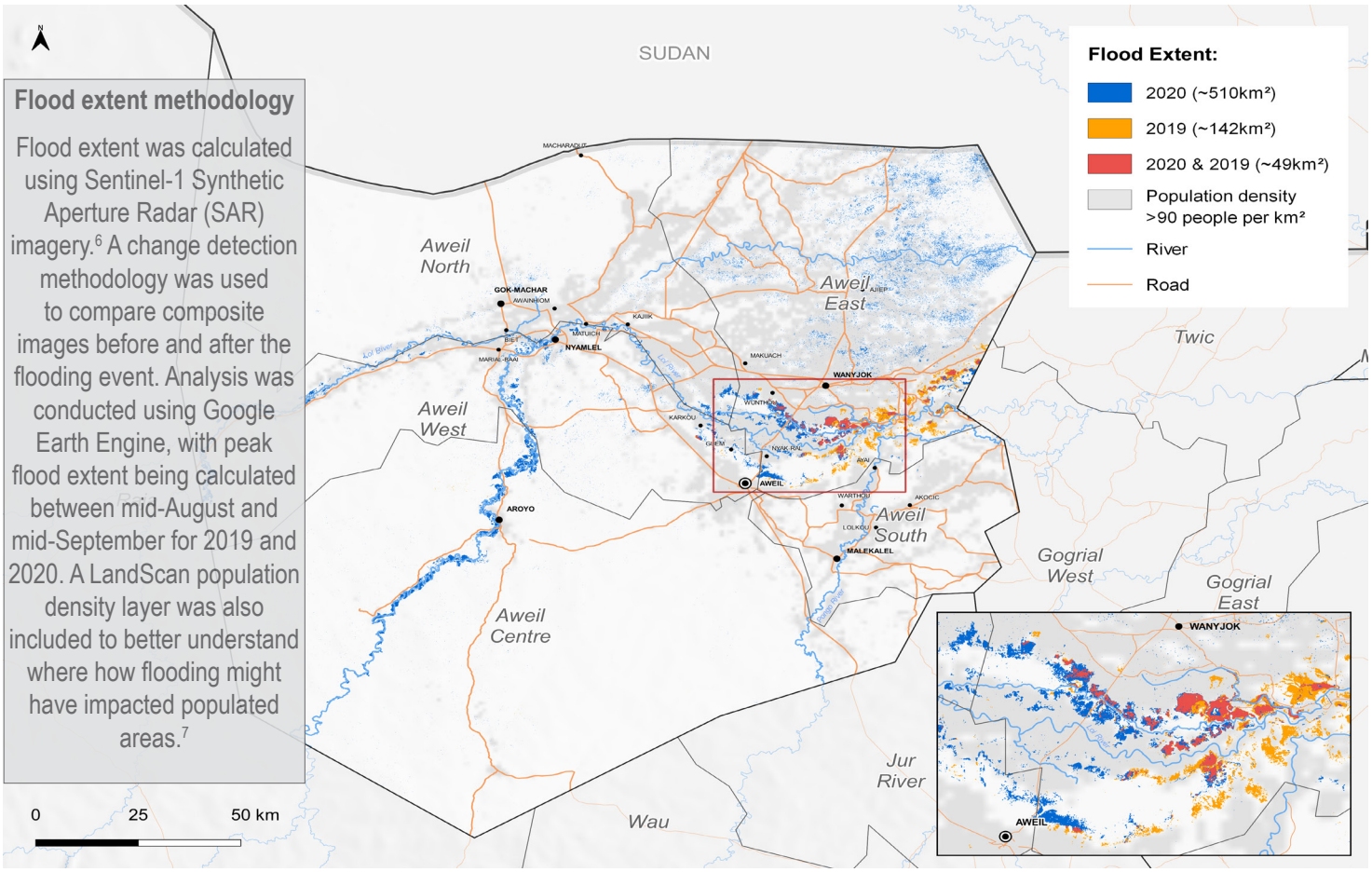
Although the rain and flooding brought relief to water sources and vegetation, and some areas remained inundated, participants reported that conditions in assessed areas were atypically arid at the time of data collection. Combined with continued flood inundation around water bodies, this has hampered efforts to cultivate quick-growing legumes and other vegetables for sale, which is a common activity after the main harvest. In addition, participants reported that a continued lack of soil moisture could lead to a more severe drought in 2021, which would have wide-ranging ramifications.

Markets and other shocks

In all assessed locations, an increase in market prices of key goods was reported as a shock that had occurred in 2020. According to to the Joint Marketing Monitoring Initiative, conducted by the Cash Working Group and REACH, the average price of sorghum, the area's key staple cereal, has increased monthly between September 2019 and 2020.[5] FGD participants attributed this to cross-border Sudan-South Sudan trade restrictions imposed in response to the global COVID-19 pandemic, flood-related barriers to the transport of produce, poor harvests in both 2019 and 2020, and the decreasing value of the South Sudanese Pound.

Exposure to COVID-19 was not reported as a shock during the FGDs, yet cross-border movement restrictions were mentioned by some participants to be a barrier to residents who would normally pursue casual labour in Sudan.

Map 1: Flooding 2019 & 2020 Northern Bahr el Ghazal



Food Security & Livelihoods (FSL) Implications

The impact of flooding in 2019 cannot be viewed in isolation to those of the climate shocks in 2020. It was consistently reported that flooding in 2019 had led to reduced food supplies, and thus a lean season that began atypically early, as food stocks were exhausted earlier than usual. FGD participants reported that the lean season began between February and May. Protracted exposure to limited food has exacerbated humanitarian conditions and made the impact of subsequent shocks even more severe.

Participants reported in all assessed locations that drought in 2020 had significant implications on the cultivation calendar. The land preparation and planting periods were reportedly delayed due to the soil being too arid to allow the tilling of land and planting of seeds. As a result, cultivation and the subsequent harvest were shifted to later in the season. Highland areas were particularly adversely affected, with participants in all assessed areas where residents would typically cultivate in highland areas, reporting challenges persisted even after initial rains.

Participants consistently reported that the crops they planted were less healthy than in years not affected by drought, with leaves appearing wilted and growth reduced. Furthermore, participants in four assessed locations reported that there was an increase in crops being affected by disease compared to non-drought years. In addition, wild foods were also less plentiful.

Participants consistently reported increased livestock morbidity as a result of drought-like conditions. This was attributed to reduced access to water and grazing pasture leading to increased livestock malnutrition and subsequently to increased susceptibility to disease. Concerns around access to water and pasture meant that cattle were kept away from households longer than typical, with most cattle only returning to the homestead between May and June. This resulted in reduced access to milk for those in the homestead, at a time when milk provides critical nutritional support in the lean season.

The two incidences of flooding reportedly had different implications. Although floodwaters from the first period of flooding receded quickly, the heavy rains reportedly destroyed crops such as sesame and groundnuts that are shorter in height than cereal crops such as sorghum. Reports of the impact on the yield varied, but there appeared to be a consensus that this had a significant impact on crop harvest, with groundnuts often being harvested earlier than other produce, and thus affecting access to a key early harvest crop.

Subsequent flash flooding caused a significant amount of cropland to be flooded. It is difficult to quantify the extent of the damage, with FGD participants reporting between 60-80% of lowland cropland being affected. All crops, including the staple sorghum were adversely affected by flooding and this is widely attributed to a drastic reduction in food availability post-harvest.

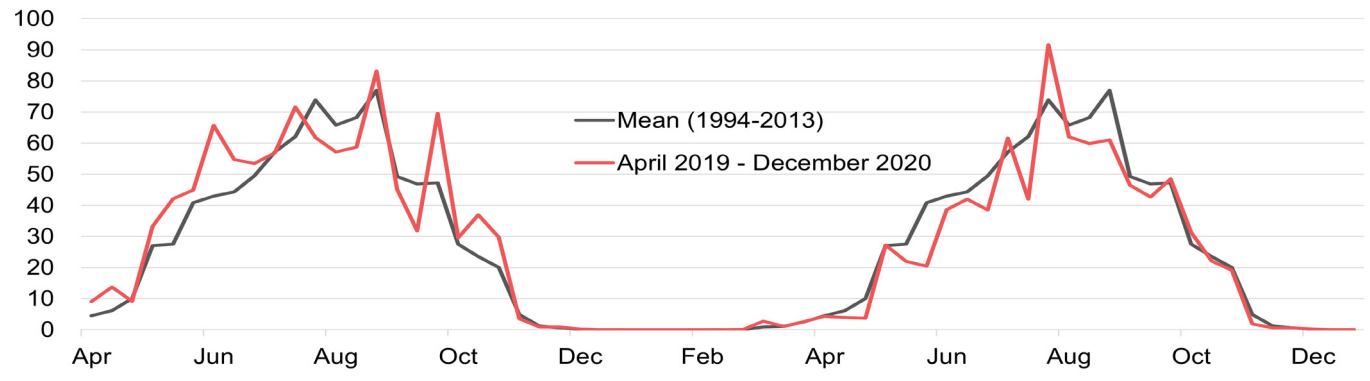
Although flooding had occurred at roughly the same time in 2019, far less land was cultivated in 2020 by the time flooding commenced. This was reportedly due to the highland being uncultivable as a result of drought-like conditions, which in turn delayed the planting period. This meant that when the floods arrived, it was too early to cultivate produce leading to far less being cultivated. Participants also reported that continued inundation has impeded access to wild foods, with many trees unable to bear fruit after inundation and foods being inaccessible due to continued inundation.

In addition, participants stated that flooding had led to an increase in livestock morbidity and mortality, with cattle fertility and milk production reportedly affected in two of the assessed locations. This may be due to prolonged experience of stress after the drought period. In general, cattle migration patterns appear to have not been affected greatly, as cattle were typically at the homestead during this time of year.

Impact of cumulative and compounding shocks on FSL:

Repeated climate shocks appear to have had a compounding impact on access to food and livelihoods. A poor harvest in 2019 led to an earlier lean season in 2020. This was then followed by a period of drought and further flooding, which again negatively affected food production. Participants reported that many households had already exhausted food stocks as early as December 2019, with the lean season reportedly beginning five months early for the more vulnerable households. Accordingly, access to food remained low throughout much of 2020, and was projected to deteriorate further into 2021 from the October-November 2020 IPC, which projects both AFI and GAM will deteriorate further between December 2020 and July 2021.

Figure 3: Rainfall (mm) NBeG April 2019 - December 2020[8]



The combination of climate shocks has had a particularly adverse impact on agricultural practices. Typically, if communities experience a drier-than-average dry season, they are more likely to prepare the low land closer to the river. As this year saw atypically dry conditions, communities reportedly responded by focusing planting in lower land, only for it to be directly affected by flooding. As such, this relatively unique dual combination of shocks was particularly detrimental to food production.

Wider humanitarian impact of climate shocks

In all assessed locations, FGD participants commonly attributed morbidity and reduced access to water to drought. Open water sources that were typically used for bathing, defecation, and occasionally for consumption, had dwindled and become increasingly congested and stagnant. This had led to a deterioration in water quality, reportedly leading to an increase in gastric illnesses and diarrhoea.[9]

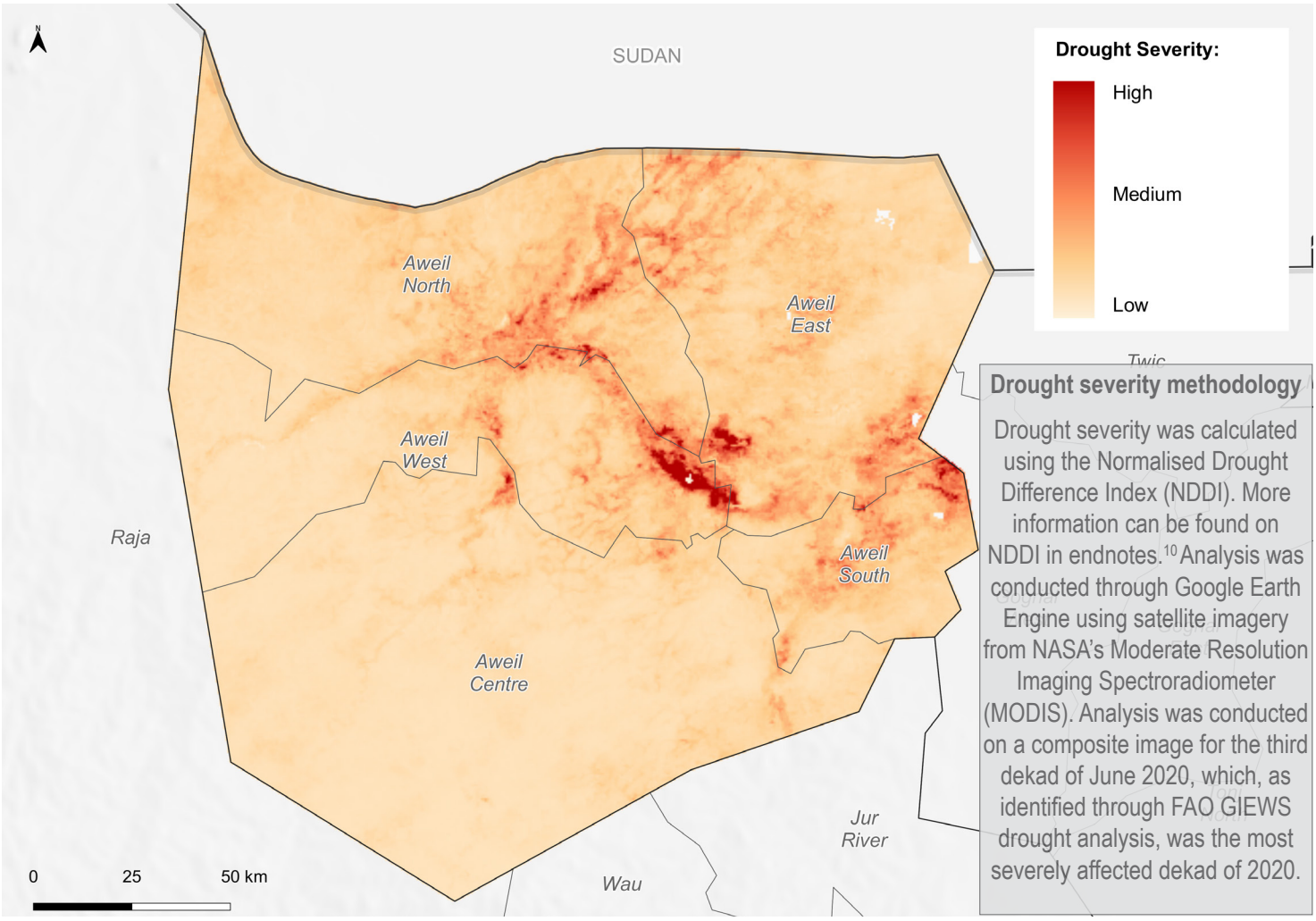
Flooding reportedly caused localised displacement and shelter damage in all assessed locations, although those closer to water bodies appeared to be more severely affected.

In general, flooding-induced damage to shelter and non-food items (NFIs) was reportedly less severe in 2020 than in 2019. In heavily affected areas, participants stated that many of the shelters damaged by previous flooding in 2019 had not yet been repaired, with reports of multiple households residing under one roof. Concerns over future flooding were cited as a reason why households had not rehabilitated damaged shelters, as well as a lack of access to resources and capital.

Flooding and continued inundation were reported barriers to movement across NBeG. According to participants, flooding had impeded access to health facilities, markets, and the transfer of supplies to nutrition and health services. As a result, FGD participants attributed perceived increases in malnutrition, morbidity, and mortality to flooding. Furthermore, water-borne diseases such as malaria, as well as fatal snake bites, were both attributed to flooding and continued inundation.[9]

At the time of data collection, a combination of a protracted lack of access to food, recent increased exposure to water-borne diseases, and reduced access to healthcare and nutritional programming was reportedly leading to perceived increased levels of malnutrition and mortality.[9] Specifically, FGD participants reported increased mortality of elderly and vulnerable groups, increased infant morbidity, and increased post-natal sicknesses.[9] This was supported by the October-November 2020 IPC, which identified 47% of children were facing GAM, with this proportion projected to increase over the next six months.[1]

Map 2: Drought Severity NBeG: 3rd Dekad June 2020



Food Security & Livelihoods (FSL) coping strategies and barriers

In all assessed areas, participants reported that residents were consuming smaller meals, having fewer meals per day, and often going full days without eating. Further, it was also reportedly common for households to activate kinship support networks and ask to borrow food. This coping strategy was reportedly starting to become exhausted and less accessible as wider food shortages meant even those more affluent were starting to deplete their food stocks. It should be noted that it is typical for a lot of these coping strategies to be deployed in the lean season, but that they now appear to be deployed atypically early to compensate for already dwindling food supplies. Further, participants reported that many households had been practicing these coping strategies for much of 2020, even outside the lean season, due to protracted limited food access, highlighting the severity of the current food needs among communities in NBeG.

With the dry season approaching, residents had reportedly already started adopting seasonal livelihoods such as selling livestock, wild foods, charcoal, or firewood, or brewing tea and alcohol. Participants reported being concerned that there will be less access to such coping strategies due to the drier than usual conditions. For example, access to wild foods and firewood was reportedly diminished by flood inundation and drier-than-average conditions.

In addition, FGD participants commonly cited fatigue as a reason they could not pursue manual or physical labour and thus access cash, in a concerning negative feedback loop. Other reported barriers to accessing food and livelihoods included reduced access to wildfoods and natural resources due to climatic conditions, dry conditions limiting crop production, cross-border barriers to seasonal labour migration, and a lack of wider liquidity as more affluent households sold less crops to market resulting in reduced local casual labour opportunities.

Climate change mitigation strategies

In addition to the need to cope with limited food availability, communities in NBeG also have to simultaneously engage in strategies to mitigate climate shocks. Yet, as mentioned previously, the traditional mitigation strategy based on rotating soil used between lowland and highland areas was ineffectual this year because weather patterns could not be predicted accurately. Participants reported that, in response to recent climate shocks, communities were increasingly looking to cultivate higher land to mitigate flood impact. Although communities have long engaged in soil rotation practices, participants reported that there is an increased interest in farming untilled pastures to increase food security. However, access permission, distance, and land clearing were reported as barriers to cultivating high land, and as seen in 2020, future drought may offset the benefits of such a labour intensive practice. In general, the combination of climate shocks in 2020 has left communities unsure of the best practice regarding future soil rotation. Further, participants reported changing cattle migration patterns to higher land due to flood based movement barriers, which may lead to longer term shift in the locations of cattle camps.

Participants reported that mitigation strategies should focus on close adherence to the cultivation calendar in order to mitigate the effects of atypical weather patterns and ensure food availability is consistent with seasonal expectations. Farmers reported that they were unable to till land during the period of drought-like conditions, citing a lack of irrigation and mechanised infrastructure, and thus leading to a delay in land preparation and planting. Improved mechanisation, through for instance the provision of tractors, would also reportedly support cultivation of crops in early drought-like conditions, allowing for an increased proportion of cultivated crop to be salvaged.

In order to be better prepared for climate shocks, participants commonly reported that they were considering changing the crop varieties that they plant. Typically, medium maturity sorghum is grown and cultivated in October/November, with respondents suggesting short maturity sorghum would be a better alternative as this can be typically harvested green in August and thus cultivated before potential flooding. Furthermore, rainfall irregularities allow for increased opportunities in the cultivation of legumes and other quick growing crops in receding floodplains, which may serve as a useful crop to support nutrition and cash access. In both cases, participants reported that access to a more diverse set of seeds would be beneficial, with crop diversification increasing households' resilience to climate shocks.

With increased exposure to flooding, households were reportedly keen to explore the possibility of constructing dykes, canals, and other flood barriers to both better manage surface water and protect infrastructure and farmland. However, in all assessed locations, a lack of machinery and technical knowledge were reported as barriers to constructing such a project. Again, in all assessed locations, increased livelihoods assistance was reportedly required to make farming more resilient and protect households from the worst implications of climate shocks. Other proposed community level mitigation practices included building additional boreholes so residents are less reliant on potentially unclean surface water, protecting boreholes from being submerged by flooding, and elevating connecting roads to improve access to key services and markets during flooding.

Reported barriers to communities being able to deploy these suggested mitigation practices mainly circulated around a lack of access to cash, but also protracted low calorific intake and the subsequent lack of energy were reported as barriers. This lack of calorific intake was reported to create a negative feedback loop where limited energy exacerbates vulnerability and leaves households more susceptible to future climate shocks.

Flooding displacement and mobility restriction

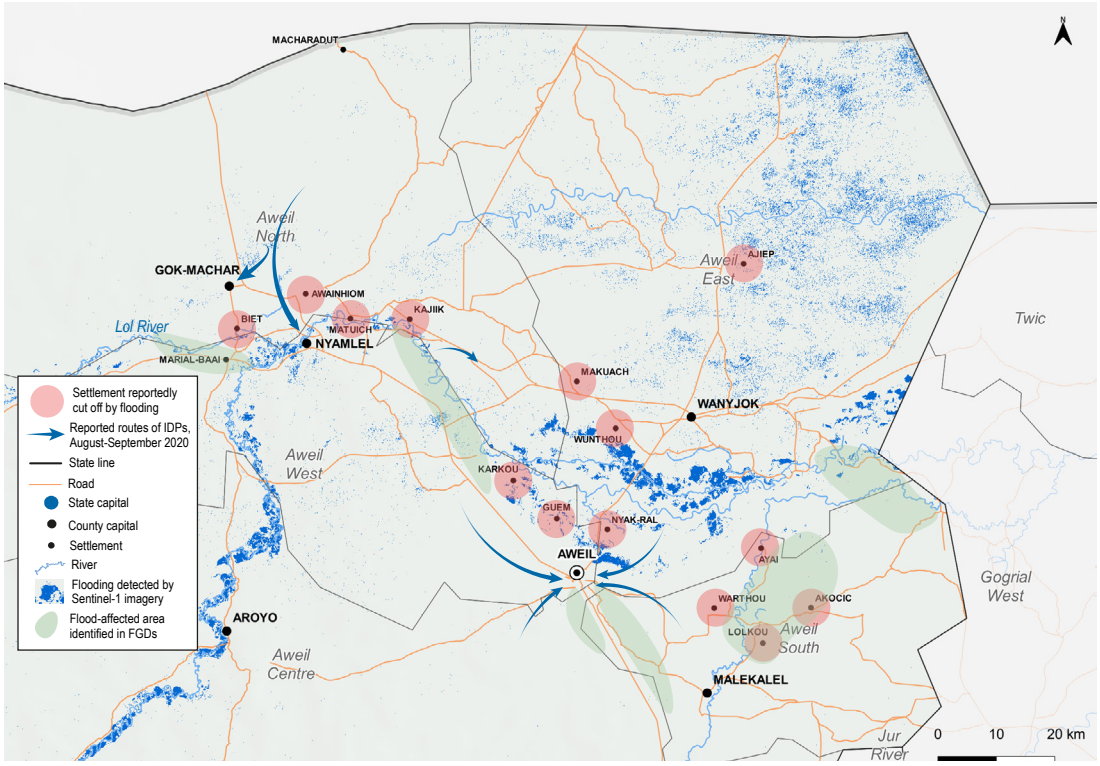
FGD participants across the assessed areas reported that 2020 flooding had greatly affected all five counties in NBeG state; people living in the lowland areas and along the Lol River and its tributaries were reportedly the most affected. FGD participants reported that, depending on the severity of the flooding, people were displaced to different locations across all five assessed counties in NBeG state. The majority of people were reportedly displaced within their counties of residence, where most settled along main roads, railway lines, and community buildings on higher ground, while others resorted to movement to areas of Aweil Town, Nyamlel, Gok Machar, and other highland main towns where they could get assistance from relatives or friends. Livestock disease outbreak, loss of property, and snakebites were widely reported as challenges encountered during the flooding period. Mobility restrictions were reported across all FGDs conducted on climate displacement, in which it was reported that people living in settlements on higher ground were not able to access the lowland settlements and vice versa, with many lowland settlements completely cut off from movement elsewhere by the August-September flooding (see Map 3 below). Some participants reported that people from the lowlands could not carry basic assets when moving to the highlands, and access to markets, health care, and livelihood activities were reportedly restricted during this time. However, as of early December 2020, participants reported that flood water was receding in most parts of the state, although some settlements remained cut off.

Current and anticipated displacement

Across all climate displacement FGDs, high levels of displacement amongst vulnerable households with the capacity to move were reported as ongoing or intended in the near future (as of December 2020), with some FGD participants reporting that *most* households planned to move in the coming months at the time of data collection, as a result of 2020's unique combination of climate shocks and its impact on food security. During the first and second waves of flooding in August and September 2020, many households were reportedly displaced to higher-ground settlements. However, as flood water was receding in October and November and roads became more passable, many households and individuals reportedly started engaging in cross-border movements to Sudan or the Sudanese border where livelihood activities such as fishing and casual labor were perceived to be more accessible. FGD participants also reported the perception that humanitarian assistance in IDP or refugee camps in Sudan was more readily available, driving some movement to those locations. Anticipated displacement from all NBeG counties to Sudan or areas on the border with Sudan was reportedly planned in the next 1-2 months as of December, though some FGD participants reported that sufficient humanitarian assistance could mitigate the need to move.

When asked when individuals and households would return to their areas of origin, many FGD participants said that, in cases where a single working-age youth was being sent to Sudan for livelihood opportunities, they planned to go and come back within a relatively short timeframe. However, a few FGD participants across the assessed areas reported that households that were moving or planning to move with all household members were likely to stay longer before returning to their areas of origin, as it was considered more difficult to move and then come back with a whole household within a short period. Those with family members in Sudan were also reportedly likely to stay longer.

Map 3: Flooding-driven movement restrictions and displacement in NBeG state, August-September 2020



Movement and vulnerability

In NBeG state, FGD participants indicated that movement towards the livelihood and humanitarian assistance opportunities that the northward route presented was influenced by differing layers of vulnerability. Figure 4 illustrates this decision-making process for different types of households, showing how certain household traits, such as financial capacity and household composition, impacted and households' mobility options and likelihood of engaging in distress migration. FGD participants stressed that the households that were forced to move were those that were comparatively more vulnerable; these were households that had less wealth or fewer assets to sell than others. This was in contrast with better-off households, who reportedly did not have to move because they had the wealth or assets to stave off levels of food insecurity that would prompt them to move from their communities. Cattle ownership emerged as the most commonly reported mitigating factor allowing households to cope with the high market prices throughout the state, while household members holding government or non-governmental organisation (NGO) positions, as well as receipt of remittances, were also commonly reported as mitigating the need to move. Past research on displacement decision-making has also shown that asset ownership and the desire to safeguard such assets can heighten a household's reluctance to move, although this dynamic was not explicitly reported in FGDs as a factor behind better-off households' lack of movement in NBeG.[11]

The movement of partial versus entire households was also reportedly associated with differing vulnerability levels (see Figure 4). More vulnerable households, particularly female-headed households, were reported by some to be more likely to have to move with their entire household. Across most climate displacement FGDs, movement of an entire household, whether to Sudan and the Sudanese border area, or to other locations in NBeG state, was reported as an unusual and more disruptive movement option associated with higher levels of vulnerability and broadly indicative of greater-than-usual levels of food insecurity being encountered in 2020.

In contrast, short-term movement of a single working-age youth to Sudan or the Kiir River area for casual labour or fishing opportunities while the rest of the household remained behind waiting for remittances or the family member's return was not considered to be unusual movement compared to past years without severe climate shocks or food insecurity. In general, perceptions indicated that households that had a working-age male who could be sent away for casual labour opportunities were more vulnerable than households who had enough assets or wealth to withstand the combination of crop loss and high prices without having to move at all, but still better off than households who were moving in their entirety.

Participants reported that there were also households who did not move because their household composition constituted an innate barrier to any type of movement. These households form the bottom layer of vulnerability, lacking working-age household members who could be sent individually to earn an income, while simultaneously having household members who are sick, old, or otherwise experiencing difficulties moving, making it challenging to move as a unit. Additionally, although being able to send a working-age household member to Sudan or the border was reportedly an advantage if they returned with much-needed income, this approach was also seen as a gamble that would leave remaining family members highly vulnerable if that person was not able to secure a work opportunity or if they chose not to come back. FGD participants often indicated that the most vulnerable households remaining behind would have few options to sufficiently meet food needs aside from humanitarian assistance, though in particular areas with accessible fishing, wild foods, or other natural products that could be sold, these households could reportedly still manage at a basic level.

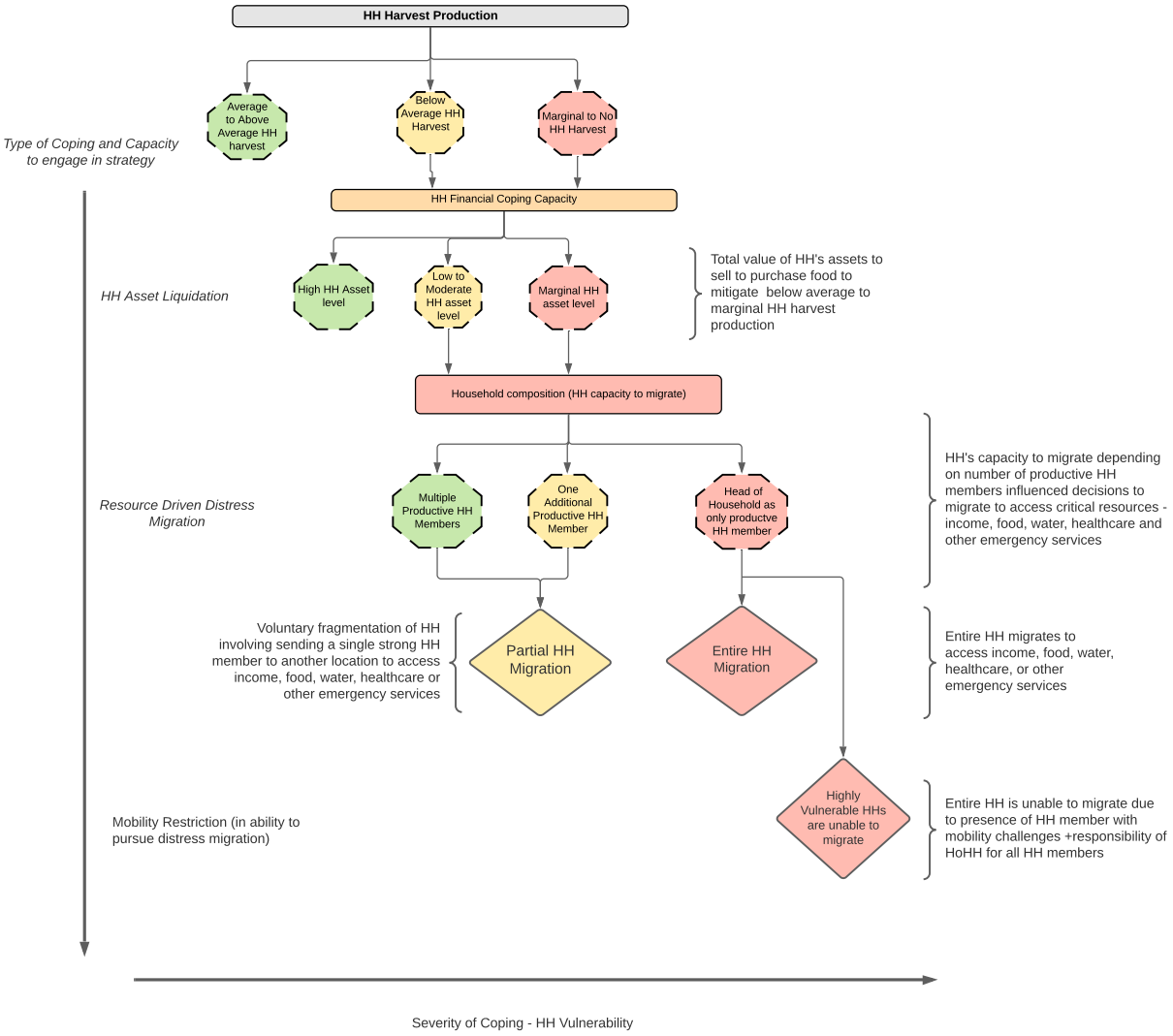
Table 1: Reported household vulnerability by movement

Vulnerability level	*Household and movement type*
Not vulnerable	Households that are **not moving** because they have wealth/assets to afford high prices and mitigate food insecurity
Low vulnerability	Households that are **sending one working-age member** to Sudan or elsewhere for income-generating activities
Medium vulnerability	**Entire households moving to Sudan or elsewhere** to seek livelihood opportunities, subsistence activities, or food assistance in camps (often female-headed households)
High vulnerability	Households that are **not moving** because they have no person to send for IGAs and **cannot move long distances** otherwise (household member with mobility challenges i.e. elderly or PWD, lack of money for transport)

Context-specific movement strategies

Within NBeG State, communities in different counties took varied approaches, reportedly engaging in both localised and cross-border movements, and responding to a mixture of push and pull factors. Across all assessed areas, FGD participants in Aweil North county more consistently mentioned that large numbers of people in their settlement had moved or were planning to move to Sudan or border areas compared to participants from the other counties. Many participants mentioned Sudan or the border areas as having a comparative advantage over areas within NBeG state, but also emphasised high prices combined with the poor harvest as a push factor, reporting that many people were not able to manage in their home settlements. In Aweil Centre county, for example, participants reported that, in late 2020, wild food was less available than normal, as the flooding had rotted the tree roots in forested areas close by so that the trees did not produce fruit, whereas the trees that had not been affected were much further away in areas with no accessible drinking water. However, some localised movement to engage in coping strategies was reportedly possible for some and was taking place; in Aweil West County, for example, FGD participants mentioned that some people were going or intending

Figure 4: Household-level decision-making for distress migration in NBeG



to go to War Lac and Akuac settlements (Aweil West county), areas that were reportedly good for livelihood activities such as charcoal and firewood collection and had been used as locations in which to engage in tthese coping strategies in the past. Meanwhile in Aweil East county, many people from Ajaac settlement were reportedly migrating to Aweil Town to access casual labour, along the Lol River or tributaries for fishing, or to Nyalath Payam in Aweil Centre County, where wild food was reportedly more plentiful.

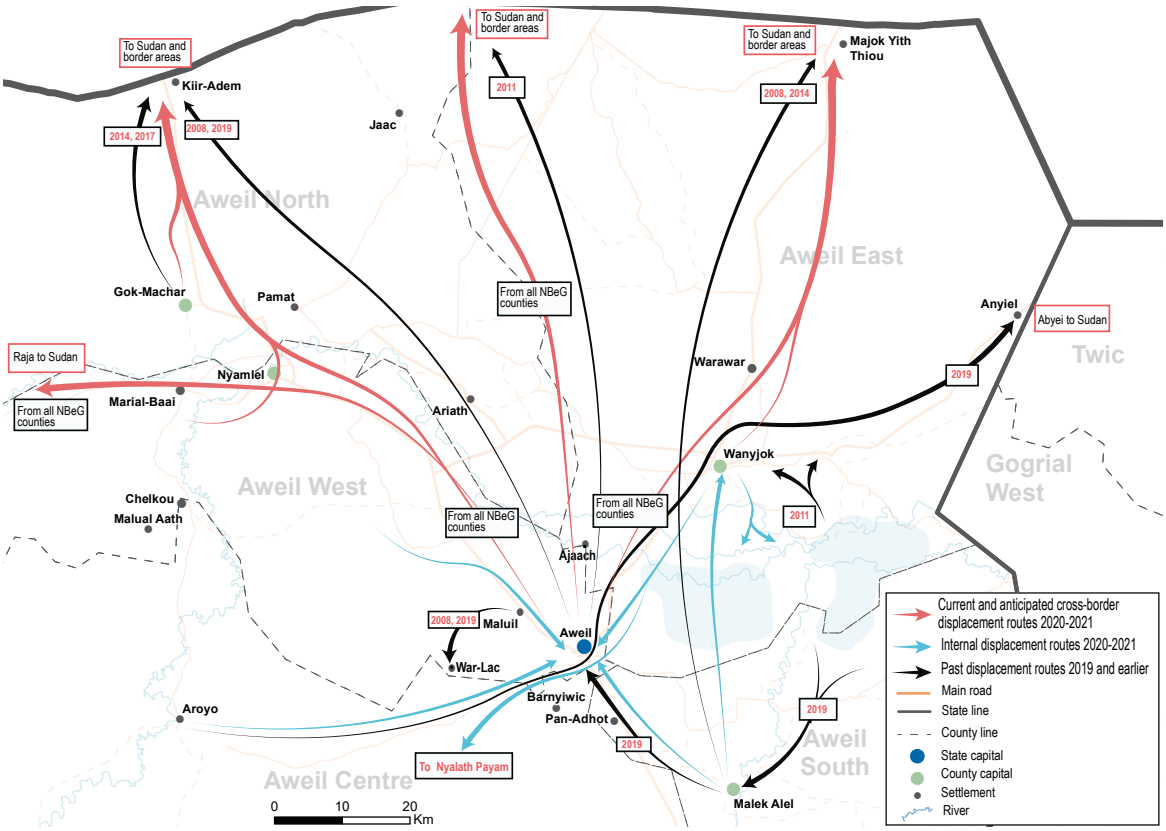
Climate-driven displacement in historical context

In almost all climate displacement FGDs, it was commonly reported that the 2020 climate shocks were worse than those of the past; participants commonly emphasized that particularly the impacts of the sequential, cumulative climate shocks on food security were worse in 2020. Meanwhile, only in a few FGDs was it mentioned that flood levels or property destruction was worse in 2020 compared to past flooding events.

Nonetheless, the unusually severe impacts on food insecurity resulting from the particular sequence and timing of climate shocks were the most commonly mentioned reason why movement in late 2020 was reportedly different than that of past years. In some FGDs, participants mentioned that, during past climate shocks, households only or mainly moved to nearby highlands or population centres within the state. Others noted that the route to Sudan and border areas had been used in response to past climate shocks, especially when those climate shocks triggered or exacerbated food insecurity, but also reported that the volume of movement and in particular the increase in movement of entire households in 2020 was different than what had occurred in response to past climate shocks.

Aweil East: Past climate shocks in 2011 and 2019 were noted as somewhat comparable to those of 2020; 2011 in particular reportedly saw a sequence of drought or delayed rains followed by flooding. However, participants explained that, in 2011, other locations across the state produced adequate harvests, so people did not need to travel as far and were only displaced to highlands in the vicinity. In addition, in 2011, NGOs reportedly responded with blanket distributions to the majority of households in Aweil East, while in 2019, the NGO response was less expansive but households were not simultaneously facing high prices in markets. Meanwhile, in 2020, assistance was reportedly also more limited, on top of high prices.

Map 4: Livelihood and distress migration displacement routes 2020-2021 and earlier



Aweil South: Men in one FGD reported that movement into Sudan to seek out income-generating activities had occurred previously, specifically in response to flooding that destroyed crops in 2008 and 2014, noting that people used the Majok Yin Thiou route in those years. Meanwhile, flooding in 2019 reportedly caused greater numbers of displaced households in comparison to 2020, but mainly to nearby high ground or to population centers such as Aweil Town and Malek Alel, while in 2020, the series of climate shocks and their effect on food insecurity prompted longer-distance movement to Sudan. According to FGD participants, such far-ranging movements were the only option in 2020, especially as NBeG state was perceived as being affected on a wider scale compared to 2019, which made distress migration to nearer areas or reliance on Aweil Town livelihood opportunities less tenable. Aweil town in particular was ruled out as a viable option despite its use in 2019, due to the perception that it did not have enough casual labour and that prices were very high relative to wages.

Aweil West: Although in past years of climate shocks, such as 2008 and 2019, a few people crossed into Sudan, the majority reportedly moved to high ground nearby in response to flooding itself, and onward to the areas of War Lac and Akuac, which were fertile enough for subsistence via wild foods gathering, to address any contingent food insecurity issues. In 2020 however, War Lac and Akuac were reportedly less fertile and produced less wild food than expected, driving more households than usual to go to Sudan from Aweil West county, according to FGD participants.

Aweil North: Likely due to proximity, Aweil North appeared to have greater connectivity to Sudan and border area livelihoods in comparison to other NBeG counties, with people from Aweil North resorting to movement to Kiir Adem and onward to Sudan more frequently in response to climate shock-driven food insecurity. Dry spells that reportedly occurred in 2014 and 2017, and caused or worsened food insecurity reportedly drove some movement into Kiir Adem for fishing and onward for other casual labour opportunities, alongside movement to nearer areas. Although movement northward is seemingly less unusual for people living in Aweil North county, the level of movement to Kiir Adem, Kariireu camp, and other areas in Sudan in 2020 was reportedly fairly high in comparison to previous years, with more cases of entire households moving. In other FGDs, it was reported that those moving may also plan to stay longer than they usually do. Overall, while movement to Sudan and border areas from Aweil North in other years was generally associated with livelihood opportunities operating more positively as pull factors, ongoing and anticipated northward movement in 2020 and early 2021 was strongly characterized as being driven by negative push factors, namely destruction of harvest resulting from the dual drought and flooding in 2020.

Aweil Centre: Although the shift in displacement routes to include greater use of the route to Kiir Adem and on to Sudan was mainly attributed to poorer food security as a consequence of unique 2020 climate shocks, other conditions also reportedly played a role in driving this atypical movement, especially in Aweil Centre County. FGD participants in Aweil Centre County noted, that in 2019,

flooding also caused people to displace to Sudan, but that people used Amieth road in order to avoid ongoing insecurity—whereas one improvement reported in 2020/2021 was that Majok Yin Thiou and Kiir Adem crossing points were reportedly no longer blocked by conflict.

Perspectives on climate change and climate migration

When asked if they thought the weather was changing over time, most participants in both rounds of FGDs reported that weather patterns were becoming increasingly irregular in recent years.

When asked what communities would do if climate shocks similar to 2020 were to repeat themselves multiple years in a row, participants of many FGDs said that they would evacuate their settlements, i.e. that whole communities would move for a long-term basis, rather than engage in a household-by-household approach to displacement with a clear intent to return. Evacuations were not, however, framed in large-scale or cross-border terms—some participants reported that communities would move from their current settlement to other settlements fairly close by that had higher ground, while others did not specify where they would move. In a few cases, such evacuations to nearby settlements had already taken place this year or were being planned to take place: the people of Pukic settlement in Aweil West county reportedly had already relocated/evacuated on a long-term basis to split up among the settlements of Maluil Akong, War Lac, and Akuac. In Aweil East county, the settlements of Waknhom, Wunkec, Wun Amoth, Mabior, and Akoc were reportedly still experiencing standing water as of December and were planning to evacuate to Ajaac settlement (Aweil East county).

Still, other participants noted that, although they may continue to temporarily move elsewhere when climate shocks struck, they would still return to their home settlements and would not permanently relocate. Additionally, many residents of NBeG state did not necessarily seem to expect a scenario of continued shocks like those of 2020 in the coming years. Across climate impact and displacement FGDs, participants in three FGDs suggested that gaps between years of more severe climate shocks were more likely. As identified in the climate impact FGDs, there was limited awareness of climate change phenomena and the possibility that these climate shocks may be part of a continued change of weather irregularities.

Conclusion

Due to a series of climate shocks beginning with severe flooding in 2019, atypical drought followed by an additional year of flooding in 2020, crop production in NBeG was unusually impacted, resulting in a more limited harvest than usual. Findings suggest that the combination of drought and flooding shocks in 2020 have negatively impacted the availability of coping mechanisms such as lowland/highland crop rotation and gathering wild foods. The situation, compounded by high food market prices, has meant that many households have faced protracted food insecurity with the lean season beginning atypically early in 2020. Furthermore, at the time of data collection many households were reported to have already exhausted personal food stocks, and were deploying food based coping strategies such as skipping meals and having smaller meals far earlier than they typically would. With limited livelihood opportunities available as the dry season commences, there is the concerning possibility that food insecurity could deteriorate significantly before the next harvest.

Reduced coping options in their areas meant that many households had begun moving to Sudan and border areas to seek out livelihood opportunities or food assistance, both of which were perceived as more readily available across the border. Although northward movement is not entirely uncommon for NBeG residents, many FGD participants reported that more cases of entire households making this journey were occurring, which was unusual relative to years of more successful harvests. Households that were moving in their entirety, as well as households who were less able to move, such as those with Persons with Disabilities or elderly household members for whom long-distance movement was too difficult, appeared to be among the most vulnerable.

Endnotes

1. IPC Acute Food Insecurity & Acute Malnutrition Analysis October 2020 – July 2021. Issued 18 December 2020
2. Famine and Early Warning Systems Network (FEWSNET) Livelihoods Zone Map and Descriptions for the Republic of South Sudan August 2018. Issued August 2018
3. FAO / World Food Programme (WFP) Crop and Food Security Assessment Mission (CFSAM) to South Sudan 2019. Issued 27 May 2020
4. FAO Global Information and Early Warning System (GIEWS) website portal.
5. Market data was taken from the Joint Market Monitoring Initiative (JMMI). The JMMI was created by the South Sudan Cash Working Group (CWG) in August 2019, and has since collected monthly market data for NBeG as part of its nationwide coverage.
6. Synthetic Aperture Radar (SAR) is a form of radar spatial resolution analysis using the backskatter of radio waves to conduct spatial classification and imagery analysis.
7. Population density was overlayed using Oak Ridge National Laboratory LandScan 2018 dataset. Landscan is a community standard for global population distribution data and is developed using best availabel demographic and geographic data, remote sensing imagery analysis techniques within a multivariate dasymetric modeling framework.
8. Rainfall data was obtained through WFP's Dataviz Platform that hosts the Climate Hazards Group InfaRed Precipitation with Station (CHIRPS) data. This data is 35 year quasi-global rainfall data set.
9. Due to challenges around accessing public health data, it was not possible to verify these findings with official health data.

10. The NDDI index is the normalised difference of Normalised Differnce Vegetation Index (NDVI) and Normalised Difference Water Index (NDWI). NDVI is calculated as a ratio between red and near infared (NIR) light, which acts as a proxy to understand relative vegetation density and health. This is possible as chlorophyll (a plant health indicator) strongly absorbs visible light and reflects NIR light in healthy plants, yet when the plant becomes dehydrated or less healthy, it absorbs much more infared light - thus providing an indicator on vegetation health. NDWI is calculated as a ratio between NIR and short-wave infared (SWIR) light, whic acts as a proxy to understand water content of leaves. SWIR reflectance is well absorbed by water in plant cells and thus acts as a proxy to measure vegetation water content, whereas NIR is absorbed higher in dry plant matter.
11. REACH, Population Movement Baseline Report: Movement and Displacement in South Sudan, 1983-2019. Issued September 2020.