THE JUNE-JULY-AUGUST-SEPTEMBER (JJAS) SEASONAL WEATHER FORECAST AND ITS IMPLICATIONS ON WFP WAREHOUSES.

FLOOD VULNERABILITY RISK ANALYSIS.

JULY 2025

HYDROLOGY REPORT

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1.0. Introduction

1.1. Project description

The World Food Programme (WFP) has strategically placed food storage warehouses and distribution sites across South Sudan to reach the most vulnerable communities facing acute food insecurity. South Sudan's volatile climate, conflict zones, and under-developed infrastructure make WFP's logistics network absolutely vital.

Flooding has had a profound and recurring impact on WFP's warehouse operations in South Sudan, especially over the past four years as climate extremes have become more severe and intensified. Locations such Bentiu and Rubkona, floodwaters have permanently submerged entire communities, including WFP storage sites. However, community made and humanitarian structural measures such construction of levees (dikes) have helped to protect the Rubkona airstrip, warehouses, POCs and humanitarian hubs.

Furthermore, access by road to warehouse locations has equally been limited by flood occurrences in Jonglei, Upper Nile, and Unity States have become impassable during rainy seasons, forcing WFP to rely on airlifts, river transport, and amphibious vehicles. As a result of prolonged periods of flooding in South Sudan, there has been damages to warehouses some of which have been rendered unusable which has shrink WFP's ability to stockpile emergency food, cut off roads have contributed to delayed food distribution especially in famine stricken states such as Jonglei and Unity. To continue with food prepositioning, WFP has adopted some anticipatory actions to ensure food, non-food and nutrition related items reach the most vulnerable communities through;

1. Rehabilitation of flood control dikes along the White Nile, community dikes to protect assets and livelihoods
2. Worked on the logistics Prepositioning Strategy: To stay ahead of seasonal floods, WFP prepositions food stocks in satellite depots before roads become inaccessible.
3. Road Infrastructure Upgrades: Roads and warehouse foundations have been reinforced to withstand flooding, though funding constraints limit the scale of these improvements to all warehouses across the Country.
4. Utilization of Flexible transport modalities: WFP shifts between road, river, and air transport depending on seasonal accessibility.

5. Utilization of the regional forecast (ICPAC) climate outlooks to understand flooding scenarios on infrastructure developments (roads, warehouses, airstrips and accommodation facilities)
6. Mapping WFP and CP locations and assessing their vulnerability against flooding.

1.2. Site assessment

In South Sudan, topographical analysis and proximity to streams are foundational elements in flood risk assessment especially for humanitarian actors. Topographical analysis identifies elevation and slope in low-lying areas and flat terrain which are more prone to water accumulation, inundations and prolonged flooding. This assessment of topography further gives details on how water will flow on the land surface and pond during heavy rains which requires protective infrastructure placement and emergency planning. In South Sudan where the land terrain is relatively flat terrain analysis informs site selection for warehouses, road embankment heights and community settlements can be strategically located on elevated ground to reduce flood exposure. Infrastructure developments close to streams and or rivers are more vulnerable to pluvial flooding whereas those located in low lying areas would be affected by surface runoff.

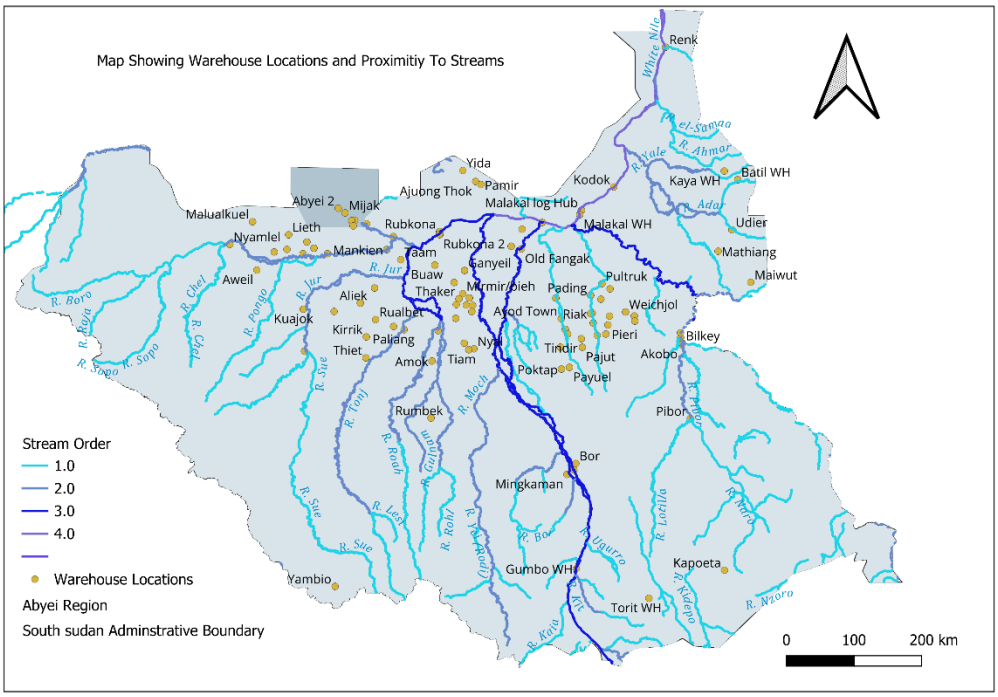


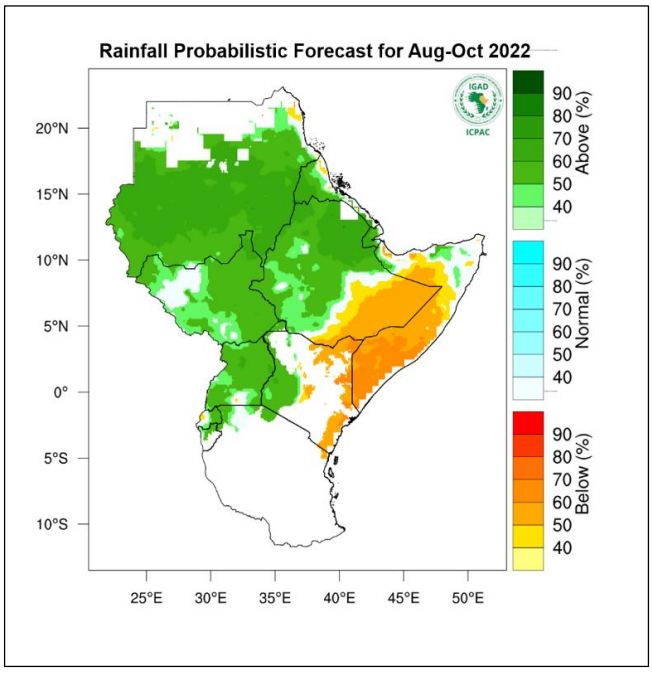
Figure 1: Map of warehouses proximity to stream channels

1.3. Use of climate outlook forums

The climate dynamics over East Africa during June, July, August and September (JJAS) 2025 are primarily governed by the dual influence of a projected 69% positive La Niña and a positive IOD. This coupling may yield heterogeneous rainfall outcomes spanning below-average, average, and above-average rainfall-across the IGAD region and associated territories under ICPAC.

The above mentioned estimate reflects current climate model outlooks that suggest moderate confidence in La Niña conditions developing and influencing regional rainfall patterns across the East Africa region. However, seasonal forecasts can be updated as new oceanic and atmospheric data become available.

The released climate outlook forecast indicates a high likelihood of above-normal rainfall across much of the northern parts of the IGAD region. It is important to note that the JJAS is a critical rainy season for countries in the northern and western parts of the GHA in which South Sudan forms part. This season contributes to over 50% of annual rainfall over the northern parts of GHA region, and more than 80% in most parts of South Sudan and Sudan, making the seasonal forecast particularly significant for WFP early planning and action for prepositioning of food items as well as securing warehouses which are likely to be affected by extreme weather events within the region.



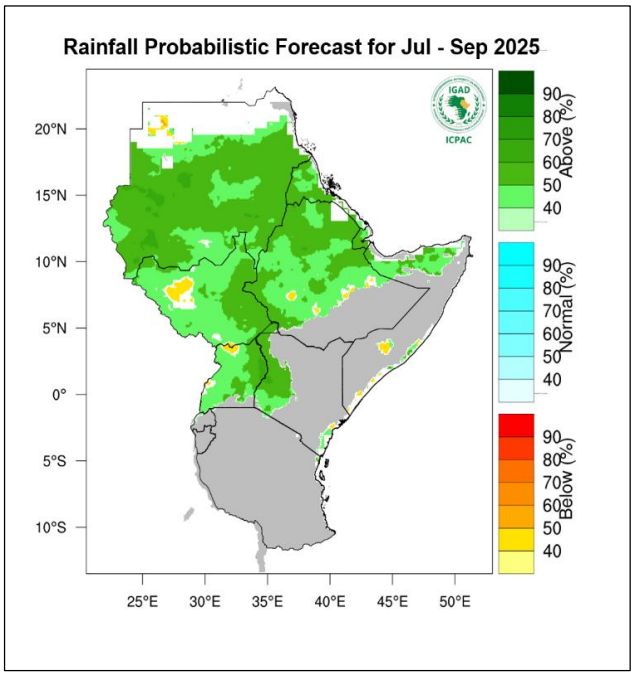


Fig. 1. GHACOF Seasonal rainfall forecast for August-October, 2022.

Fig 2. GHACOF Seasonal rainfall forecast for July-September, 2025.

The released forecast indicates a 55% probability of above-normal rainfall over central Sudan, eastern South Sudan, northern and southwestern Ethiopia, western Kenya, and eastern Uganda. Additionally, western Uganda, South Sudan, southern Sudan, Djibouti, and western Eritrea are expected to experience wetter-than-average conditions. The Forecast clearly indicates that the **Singata river system, Pibor river system, Yabus river system and Sobat river system** will be affected more than other river systems in the Country, considering inputs from Eastern South Sudan and South Western Ethiopia.

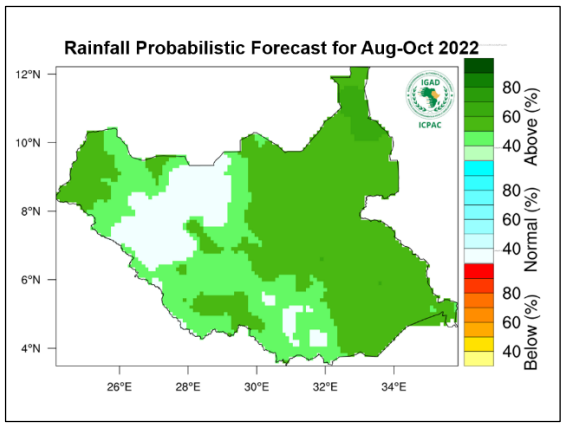
It is equally expected that the climate patterns will closely resemble those of the 2022 rainfall events in the region, which experienced wetter-than-normal conditions with the onset of rains likely to be normal over most parts of the region, with a few regions that are expected to have an early onset.

A comparative analysis of the JJAS Climate Outlook Comparison: 2022 vs 2025 (Source: www.icpac.net)

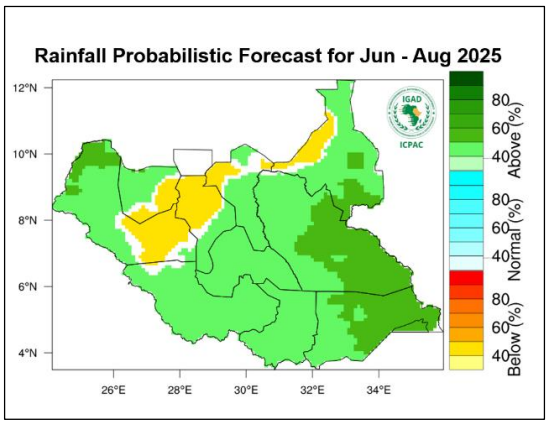
Feature	JJAS 2022	JJAS 2025
Rainfall Outlook	Above-normal rainfall across northern GHA: Djibouti, Eritrea, northern/central Ethiopia, South Sudan, Sudan, western Kenya, Uganda	Above-normal rainfall likely in central Sudan, eastern South Sudan, northern/southwestern Ethiopia, western Kenya, eastern Uganda
Dry Zones	Drier-than-normal in eastern Ethiopia, coastal Kenya, southern Somalia	Below-normal rainfall expected in coastal Somalia/Kenya, NW South Sudan, SE Ethiopia
ENSO Phase	Neutral, with La Niña developing later in the year	69% probability of La Niña conditions during JJAS
IOD Phase	Positive IOD	Positive IOD

Temperature Outlook	Warmer in northern Sudan, eastern Kenya/Tanzania; cooler in southern Sudan, eastern South Sudan	Warmer in southern Ethiopia, Somalia, eastern Kenya; cooler in central Sudan, Djibouti, NE Ethiopia
Onset of Rains	Average to early onset in most areas	Mostly normal onset; early in some areas, delayed in western Ethiopia

Both years show a strong signal for above-average rainfall in the northern GHA, However, 2025 has a stronger La Niña influence, which could increase rainfall variability.



Seasonal forecast for JJAS 2022



Seasonal forecast for JJAS 2025

In the year 2022 we had more widespread wet conditions due to a neutral ENSO and strong IOD, while 2025 shows a more mixed pattern with localized dry zones.

1.4. Hydrological implications of the forecasted JJAS rainfall

There are numerous hydrological implications on the forecasted rainfall with the basins and sub-basin within South Sudan and outside South Sudan catchment areas. Above-normal rainfall within catchment areas can have wide-ranging hydrological implications some of which are beneficial, while others are likely to be potentially hazardous as outline below,

1. Increased Surface Runoff

When the excess rainfall exceeds the soil's infiltration capacity, it leads to higher runoff volumes causing saturation excess overland flow conditions. This conditions are likely to cause flash floods, especially in urban or steep catchments with poor drainage.

2. Elevated River and Stream Flows

Rivers and tributaries may experience sustained high flows, increasing the risk of bank overflow and floodplain inundation affecting the communities in the respective catchment areas and compromise the durability of the infrastructure. Prolonged high flows can lead to channel erosion and sediment transport downstream.

3. Enhanced Groundwater Recharge

Infiltration increases where soils are permeable, which boosts aquifer recharge. This can improve dry-season water availability, especially in semi-arid regions within the Country.

4. Wetland and Reservoir Impacts

Wetlands may expand, improving biodiversity and ecosystem services. Likewise, reservoirs may fill rapidly, which is good for hydropower and irrigation, but may also require controlled releases to prevent overtopping. Measures should be put in place to ensure downstream population is not adversely affected by the release excess water. Transboundary water management policies should be formulated.

5. Water Quality Concerns

Increased runoff can carry pollutants, sediments, and pathogens into water bodies. This may degrade drinking water sources and compromise aquatic habitats affecting the aquatic animals.

6. Infrastructure Stress

Roads, bridges, and drainage systems may be overwhelmed, leading to damage or disruption. Whereas urban catchments are particularly vulnerable due to increased impervious surfaces.

2.0. Flood risk Analysis

Flood vulnerability risk analysis is absolutely critical for the World Food Programme (WFP) in South Sudan, where seasonal and climate-driven flooding regularly disrupts humanitarian operations. WFP and CP Warehouses play a fundamental role of storing essential food and nutrition supplies for millions of vulnerable people. Severe flooding can destroy these food stocks, leading to hunger and malnutrition. Flood risk analysis helps identify high-risk locations which allows WFP to reinforce or relocate warehouses before floods hit vulnerable warehouse locations, preposition supplies in safer areas ahead of the rainy season, ensuring uninterrupted aid delivery

and supports route planning for supply chains, helping avoid washed-out roads and inaccessible regions.

Flood risk assessment for South Sudan was performed on Landsat satellite images downloaded from the earth explorer, google Earth Engine a cloud based large scale geospatial analysis tool was used to classify flood inundation on three different years, 2022, 2023, and 2024 to compute the LSWI index as shown in the figure 2 in the appendices section. The results showed that in 2022, 61% of the WFP warehouses were at a medium to high risk of flooding, in 2023, we had 33% of the warehouses at a medium to high risk of flooding whereas 2024 had 45.80% flood vulnerability to WFP South Sudan warehouses.

In 2025, from the issued climate outlook forecast, there is a likelihood of 46% of the warehouses at a medium to high risk of flooding, Table 1 in the appendices has the details.

3.0. Conclusions and recommendation

Under extreme weather events with a more widespread wet conditions due to a neutral ENSO and strong IOD like those experienced in the year 2022, More than 61% of the population and infrastructure development is exposed to a medium to high risk of flooding. Utilization of Impact based forecast (IBF) and early warning (EW) can play a fundamental role in reducing anticipated damages on infrastructure as well as save lives. Likewise, when the weather events are mixed with localized dry spells then the flooding effects are more reduced.

The assessment shows warehouses managed by Bor field office and partners, Bentiu field office and CP, Malakal field office and Kuajok are exposed to medium to high risk of flooding during both wide spread wet conditions and localized events.

It is recommended that WFP works closely with regional bodies to get weather related information for all the seasonal forecast but of great importance to South Sudan is the JJAS season.

4.0. References

1. Du, J., Kimball, J. S., Sheffield, J., et al. (2021). Satellite Flood Inundation Assessment and Forecast Using SMAP and Landsat. IEEE Journal. https://doi.org/10.1109/JSTARS.2021.3081234
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4. June to September 2025 Seasonal Forecast: Above-Normal Rainfall Expected Across Most Parts of the Greater Horn of Africa20 May, 2025, Press Release, https://www.icpac.net/news/june-to-september-2025-seasonal-forecast-above-normal-rainfall-expected-across-most-parts-of-the-greater-horn-of-africa/
5. Mehmood, H., Conway, C., & Perera, D. (2021). Mapping of Flood Areas Using Landsat with Google Earth Engine Cloud Platform. Atmosphere, *12(7), 866. https://doi.org/10.3390/atmos12070866*

Appendices

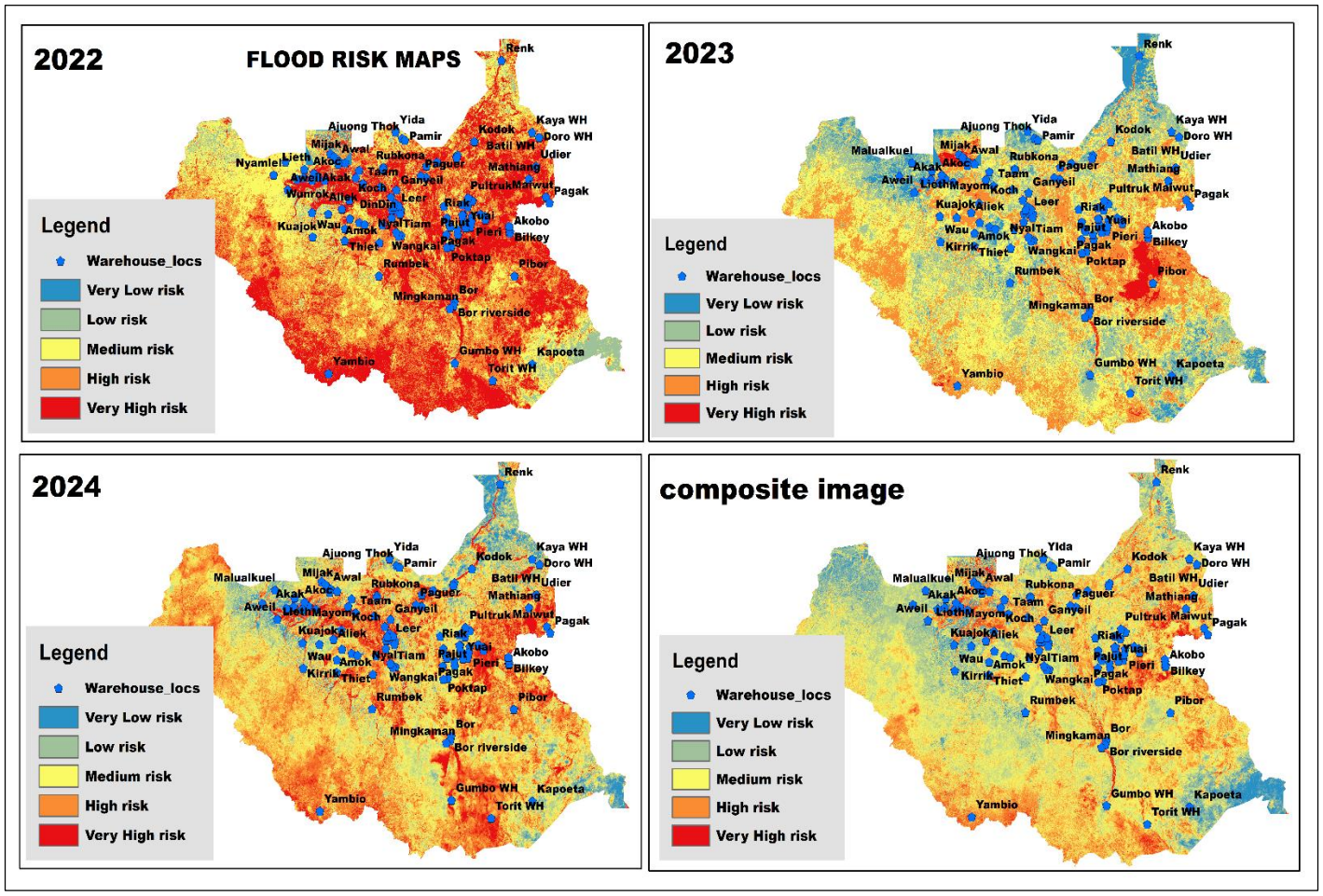

Figure 2: Flood maps for different years

Table 1: Ware house flood risk table

NAME OF WAREHOUSE	LONGITUDE	LATITUDE	FLOOD RISK LEVELS FOR DIFFERENT YEARS		
			2022	2023	2024
Abathok_WH	28.66120924	9.438210456	Medium risk	Medium risk	Medium risk
Abhiemnom_WH	28.82109262	9.392474367	Low Risk	very low risk	Low risk
Abyei 2	28.44244291	9.598991185	Low Risk	Medium risk	Low risk
Ajuong Thok	30.27093512	9.954828108	Low Risk	very low risk	Very low risk
Akak	28.11921581	9.067438759	Low Risk	Low risk	Low risk
Akobo	33.0060712	7.786648746	very low risk	High risk	High risk
Akoc	28.02504714	9.150790105	Low Risk	very low risk	Low risk
Aliek	28.73652643	8.336904782	Low Risk	High risk	Medium risk
Amok	29.69020783	7.565333461	Medium risk	Low risk	Low risk
Awal	28.62113809	9.434117943	very low risk	High risk	Medium risk
Aweil	27.35945662	8.776438686	Low Risk	very low risk	Low risk
Ayod Town	31.40906643	8.128812058	Medium risk	very low risk	Low risk
Batil WH	33.75805083	9.977837557	Low Risk	Low risk	Medium risk
Bentiu	29.79567055	9.24983248	Low Risk	very low risk	Very low risk
Bilkey	33.02138889	7.802777778	very high risk	High risk	Medium risk
Bor	31.60416667	6.202222222	Medium risk	Medium risk	Low risk
Bor riverside	31.57861111	6.115833333	Medium risk	Medium risk	Low risk
Buaw	29.72836003	8.84349496	very low risk	Medium risk	Medium risk
Buong	32.38236505	8.164960687	Medium risk	Low risk	High risk
Dablual	30.01326797	8.318071064	High risk	Medium risk	Medium risk
Dengjok	32.99951892	7.878130954	very low risk	High risk	Medium risk
DinDin	30.23143373	8.305697933	High risk	Low risk	Medium risk
Doro WH	33.7586059	9.977824118	Low Risk	very low risk	Medium risk
Gakdong	32.99679857	7.942033435	High risk	High risk	Medium risk

Ganyeil	30.12353439	8.77112935	Medium risk	Low risk	Low risk
Gendrassa WH	33.75864245	9.978218945	Low Risk	very low risk	Low risk
Gumbo WH	31.6113	4.8055	High risk	Low risk	High risk
Kaikuny	32.38989675	8.097259699	Medium risk	Low risk	Medium risk
Kapoeta	33.58374958	4.782137856	High risk	Low risk	Medium risk
Karam	31.82351292	8.204815998	Medium risk	Low risk	Low risk
Katdalok	31.46423577	7.988572423	Medium risk	Medium risk	Medium risk
Kaya WH	33.57999748	10.09430124	Low Risk	Low risk	Low risk
Kirrik	28.8166442	7.885989136	Medium risk	Medium risk	Medium risk
Koch	29.9851622	8.610922708	Medium risk	very low risk	Low risk
Kodok	32.10985716	9.882377816	Medium risk	Low risk	Very low risk
Kuajok	27.97766859	8.255577346	Low Risk	very low risk	Very low risk
Kuernyang	30.88872886	9.321289078	Low Risk	very low risk	Low risk
Kuriak	31.88795783	7.906970781	Medium risk	Low risk	Medium risk
Langkap	28.9265217	8.537603715	Low Risk	Low risk	Low risk
Lankien	32.05951426	8.526255887	Medium risk	Low risk	Low risk
Leer	30.14596725	8.310535949	High risk	Low risk	Low risk
Lieth	27.78225111	9.246352408	Low Risk	very low risk	Low risk
Lunyaker	28.38719349	8.225063895	Low Risk	Low Risk	Low Risk
Maiwut	33.93233154	8.613780841	very high risk	High risk	High risk
Malakal log Hub	31.6803045	9.572344223	Medium risk	Medium risk	Low risk
Malakal Riverside WH	31.6561324	9.514052446	very high risk	High risk	High risk
Malakal WH	31.65734951	9.515287003	High risk	Low risk	Low risk
Malualbai	27.75979526	9.05170624	Low Risk	Low risk	Low risk
Malual kuel	27.30234121	9.419504942	Medium risk	very low risk	Very low risk
Mankien	29.08881837	9.049997973	Medium risk	Low risk	Medium risk
Marial Lou	29.17864233	8.026320702	Medium risk	very low risk	Low risk

Mathiang	33.49850339	9.026989259	High risk	Low risk	Medium risk
Mayen Pajok	27.97369019	8.99475964	Very high risk	High risk	High risk
Mayendit HQ	30.00637273	8.13379444	very low risk	Medium risk	Medium risk
Mayom	29.17468412	9.222181209	High risk	Medium risk	Medium risk
Mijak	28.53306571	9.537660318	very low risk	Low risk	Very low risk
Mingkaman	31.48614751	6.055595452	Low Risk	Low Risk	Low Risk
Mirmir/bieh	30.09813224	8.462139077	High risk	Medium risk	High risk
Miyom Ngok-Damaged	28.64185588	9.363787098	very low risk	High risk	Medium risk
Mogok	31.33789575	8.403400694	Medium risk	Medium risk	Medium risk
Mwotot	32.05233643	8.163173372	Medium risk	Medium risk	Medium risk
New Fangak	31.15629444	9.4096	Medium risk	very low risk	Very low risk
Nyal	30.24711158	7.728857389	High risk	Medium risk	Medium risk
Nyambor	31.93860953	8.387780244	High risk	High risk	Medium risk
Nyamlel	27.0003613	9.117383372	Medium risk	very low risk	Low risk
Old Fangak	30.87801714	9.057957578	very low risk	High risk	High risk
Padeah	30.18786686	8.405153432	Medium risk	Low risk	Medium risk
Padiat	31.39799225	7.749539267	Medium risk	Low risk	Low risk
Pading	31.80201649	8.439093051	High risk	Medium risk	Medium risk
Pagak	31.49631506	7.92548576	Medium risk	Low risk	Low risk
Paguer	30.74472213	9.0932831	High risk	very low risk	High risk
Pajut	31.69042352	7.748487585	Medium risk	very low risk	Low risk
Paliang	29.31839539	7.983021731	Medium risk	very low risk	Medium risk
Pamir	30.34327818	9.914454686	Low Risk	very low risk	Very low risk
Partet	32.00352301	7.924917089	Medium risk	Low risk	Medium risk
Pathai	31.83601821	8.071056314	Medium risk	Low risk	Low risk
Payuel	31.5186863	7.481720949	Medium risk	Low risk	Low risk
Pibor	33.1287926	6.799621311	Medium risk	High risk	Medium risk

Pieri	32.03142052	8.04581945	Medium risk	High risk	Low risk
Poktap	31.41329312	7.458364671	Medium risk	Low risk	Low risk
Pultruk	31.95114454	8.594739863	Medium risk	very low risk	Low risk
Renk	32.79774346	11.74253008	Medium risk	very low risk	Low risk
Riak	31.79999606	8.20000262	High risk	Low risk	Low risk
Rualbet	28.93987466	8.11665696	Low Risk	Medium risk	Low risk
Rubkona	29.79123844	9.28890449	Medium risk	very low risk	Low risk
Rubkona 2	29.78959844	9.24808948	Low Risk	very low risk	Low risk
Rubkuai	29.77174299	7.9707127	very low risk	Low risk	High risk
Rumbek	29.67694384	6.8066513	Low Risk	very low risk	Low risk
Taam	29.27499938	8.91499918	Low Risk	very low risk	Low risk
Thaker	30.04861504	8.39271694	very low risk	High risk	High risk
Thiet	28.80992444	7.60762562	Low Risk	very low risk	Low risk
Thonyor	30.220142	8.223214	Medium risk	Low risk	Medium risk
Tiam	30.178909	7.715998	High risk	High risk	Medium risk
Tindir	31.677697	7.862796	Medium risk	Low risk	Medium risk
Torit WH	32.57692397	4.40946332	Medium risk	Low risk	Medium risk
Udier	33.68099913	9.31216583	very high risk	High risk	Medium risk
Wangkai	30.12003216	7.80383195	High risk	Medium risk	High risk
Wanjok	27.59055556	9.0175	Low Risk	very low risk	Low risk
Wau	27.99349446	7.69834264	Low Risk	Low risk	Very low risk
Weichjol	32.265724	8.218141	Medium risk	Low risk	High risk
Wunrok	28.299289	8.994594	Low Risk	Low risk	Low risk
Yambio	28.400402	4.565699	Medium risk	Low risk	Low risk
Yida	30.10002064	10.1013393	Medium risk	very low risk	Medium risk
Yuai	31.887961	7.906953	Medium risk	very low risk	Medium risk

Table 2: Flood risk disaggregated by field office

NAME OF WAREHOUSE	LONGITUDE	LATITUDE	2022 Flood risk	2023 flood risk	2024 Flood risk	2025-Likely	Field office
Abathok_WH	28.66120924	9.438210456	Medium risk	Medium risk	Medium risk	medium risk	Abyei
Abyei 2	28.44244291	9.598991185	Low Risk	Medium risk	Low risk	low risk	Abyei
Awal	28.62113809	9.434117943	very low risk	High risk	Medium risk	medium risk	Abyei
Mijak	28.53306571	9.537660318	very low risk	Low risk	Very low risk	Very low risk	Abyei
Aweil	27.35945662	8.776438686	Low Risk	very low risk	Low risk	low risk	Aweil
Lieth	27.78225111	9.246352408	Low Risk	very low risk	Low risk	low risk	Aweil
Malakal WH	31.65734951	9.515287003	High risk	Low risk	Low risk	medium risk	Aweil
Malualbai	27.75979526	9.05170624	Low Risk	Low risk	Low risk	low risk	Aweil
Nyamlel	27.0003613	9.117383372	Medium risk	very low risk	Low risk	low risk	Aweil
Wanjok	27.59055556	9.0175	Low Risk	very low risk	Low risk	low risk	Aweil
Bentiu	29.79567055	9.24983248	Low Risk	very low risk	Very low risk	Very low risk	Bentiu
Buaw	29.72836003	8.84349496	very low risk	Medium risk	Medium risk	low risk	Bentiu
Dablual	30.01326797	8.318071064	High risk	Medium risk	Medium risk	medium risk	Bentiu
DinDin	30.23143373	8.305697933	High risk	Low risk	Medium risk	medium risk	Bentiu
Ganyeil	30.12353439	8.77112935	Medium risk	Low risk	Low risk	low risk	Bentiu
Koch	29.9851622	8.610922708	Medium risk	very low risk	Low risk	low risk	Bentiu
Kuriak	31.88795783	7.906970781	Medium risk	Low risk	Medium risk	medium risk	Bentiu
Leer	30.14596725	8.310535949	High risk	Low risk	Low risk	medium risk	Bentiu
Malual kuel	27.30234121	9.419504942	Medium risk	very low risk	Very low risk	low risk	Bentiu
Mayendit HQ	30.00637273	8.13379444	very low risk	Medium risk	Medium risk	low risk	Bentiu
Mayom	29.17468412	9.222181209	High risk	Medium risk	Medium risk	medium risk	Bentiu
Mirmir/bieh	30.09813224	8.462139077	High risk	Medium risk	High risk	High risk	Bentiu
Nyal	30.24711158	7.728857389	High risk	Medium risk	Medium risk	medium risk	Bentiu
Padeah	30.18786686	8.405153432	Medium risk	Low risk	Medium risk	medium risk	Bentiu
Riak	31.79999606	8.20000262	High risk	Low risk	Low risk	medium risk	Bentiu

Rubkona	29.79123844	9.28890449	Medium risk	very low risk	Low risk	low risk	Bentiu
Rubkona 2	29.78959844	9.24808948	Low Risk	very low risk	Low risk	low risk	Bentiu
Rubkuai	29.77174299	7.9707127	very low risk	Low risk	High risk	low risk	Bentiu
Taam	29.27499938	8.91499918	Low Risk	very low risk	Low risk	low risk	Bentiu
Thaker	30.04861504	8.39271694	very low risk	High risk	High risk	medium risk	Bentiu
Thonyor	30.220142	8.223214	Medium risk	Low risk	Medium risk	medium risk	Bentiu
Wangkai	30.12003216	7.80383195	High risk	Medium risk	High risk	High risk	Bentiu
Akobo	33.0060712	7.786648746	very low risk	High risk	High risk	medium risk	Bor
Ayod Town	31.40906643	8.128812058	Medium risk	very low risk	Low risk	low risk	Bor
Kaikuny	32.38989675	8.097259699	Medium risk	Low risk	Medium risk	medium risk	Bor
Karam	31.82351292	8.204815998	Medium risk	Low risk	Low risk	low risk	Bor
Katdalok	31.46423577	7.988572423	Medium risk	Medium risk	Medium risk	medium risk	Bor
Pajut	31.69042352	7.748487585	Medium risk	very low risk	Low risk	low risk	Bor
Pamir	30.34327818	9.914454686	Low Risk	very low risk	Very low risk	Very low risk	Bor
Partet	32.00352301	7.924917089	Medium risk	Low risk	Medium risk	medium risk	Bor
Pathai	31.83601821	8.071056314	Medium risk	Low risk	Low risk	low risk	Bor
Payuel	31.5186863	7.481720949	Medium risk	Low risk	Low risk	low risk	Bor
Pibor	33.1287926	6.799621311	Medium risk	High risk	Medium risk	medium risk	Bor
Pieri	32.03142052	8.04581945	Medium risk	High risk	Low risk	medium risk	Bor
Poktap	31.41329312	7.458364671	Medium risk	Low risk	Low risk	low risk	Bor
Pultruk	31.95114454	8.594739863	Medium risk	very low risk	Low risk	low risk	Bor
Tiam	30.178909	7.715998	High risk	High risk	Medium risk	High risk	Bor
Tindir	31.677697	7.862796	Medium risk	Low risk	Medium risk	medium risk	Bor
Weichjol	32.265724	8.218141	Medium risk	Low risk	High risk	medium risk	Bor
Yida	30.10002064	10.1013393	Medium risk	very low risk	Medium risk	low risk	Bor
Yuai	31.887961	7.906953	Medium risk	very low risk	Medium risk	low risk	Bor
Bilkey	33.02138889	7.802777778	very high risk	High risk	Medium risk	High risk	Bor
Bor	31.60416667	6.202222222	Medium risk	Medium risk	Low risk	medium risk	Bor

Bor riverside	31.57861111	6.115833333	Medium risk	Medium risk	Low risk	medium risk	Bor
Buong	32.38236505	8.164960687	Medium risk	Low risk	High risk	medium risk	Bor
Dengjok	32.99951892	7.878130954	very low risk	High risk	Medium risk	medium risk	Bor
Gakdong	32.99679857	7.942033435	High risk	High risk	Medium risk	High risk	Bor
Lankien	32.05951426	8.526255887	Medium risk	Low risk	Low risk	low risk	Bor
Mogok	31.33789575	8.403400694	Medium risk	Medium risk	Medium risk	medium risk	Bor
Mwotot	32.05233643	8.163173372	Medium risk	Medium risk	Medium risk	medium risk	Bor
Nyambor	31.93860953	8.387780244	High risk	High risk	Medium risk	High risk	Bor
Padiat	31.39799225	7.749539267	Medium risk	Low risk	Low risk	low risk	Bor
Pading	31.80201649	8.439093051	High risk	Medium risk	Medium risk	medium risk	Bor
Gumbo WH	31.6113	4.8055	High risk	Low risk	High risk	medium risk	Juba
Kapoeta	33.58374958	4.782137856	High risk	Low risk	Medium risk	medium risk	Kapoeta
Torit WH	32.57692397	4.40946332	Medium risk	Low risk	Medium risk	medium risk	Kapoeta
Aliek	28.73652643	8.336904782	Low Risk	High risk	Medium risk	medium risk	Kuajok
Kirrik	28.8166442	7.885989136	Medium risk	Medium risk	Medium risk	medium risk	Kuajok
Kuajok	27.97766859	8.255577346	Low Risk	very low risk	Very low risk	Very low risk	Kuajok
Langkap	28.9265217	8.537603715	Low Risk	Low risk	Low risk	low risk	Kuajok
Lunyaker	28.38719349	8.225063895	Low Risk	Low Risk	Low Risk	low risk	Kuajok
Mankien	29.08881837	9.049997973	Medium risk	Low risk	Medium risk	medium risk	Kuajok
Marial Lou	29.17864233	8.026320702	Medium risk	very low risk	Low risk	low risk	Kuajok
Mayen Pajok	27.97369019	8.99475964	Very high risk	High risk	High risk	High risk	Kuajok
Paliang	29.31839539	7.983021731	Medium risk	very low risk	Medium risk	low risk	Kuajok
Rualbet	28.93987466	8.11665696	Low Risk	Medium risk	Low risk	low risk	Kuajok
Thiet	28.80992444	7.60762562	Low Risk	very low risk	Low risk	low risk	Kuajok
Batil WH	33.75805083	9.977837557	Low Risk	Low risk	Medium risk	low risk	Maban
Doro WH	33.7586059	9.977824118	Low Risk	very low risk	Medium risk	low risk	Maban
Gendrassa WH	33.75864245	9.978218945	Low Risk	very low risk	Low risk	low risk	maban
Kaya WH	33.57999748	10.09430124	Low Risk	Low risk	Low risk	low risk	Maban

Kodok	32.10985716	9.882377816	Medium risk	Low risk	Very low risk	low risk	Malakal
Kuernyang	30.88872886	9.321289078	Low Risk	very low risk	Low risk	low risk	Malakal
Maiwut	33.93233154	8.613780841	very high risk	High risk	High risk	High risk	Malakal
Malakal log Hub	31.6803045	9.572344223	Medium risk	Medium risk	Low risk	medium risk	Malakal
Malakal Riverside WH	31.6561324	9.514052446	very high risk	High risk	High risk	High risk	Malakal
Mathiang	33.49850339	9.026989259	High risk	Low risk	Medium risk	medium risk	Malakal
New Fangak	31.15629444	9.4096	Medium risk	very low risk	Very low risk	low risk	Malakal
Old Fangak	30.87801714	9.057957578	very low risk	High risk	High risk	medium risk	Malakal
Pagak	31.49631506	7.92548576	Medium risk	Low risk	Low risk	low risk	Malakal
Paguer	30.74472213	9.0932831	High risk	very low risk	High risk	medium risk	Malakal
Udier	33.68099913	9.31216583	very high risk	High risk	Medium risk	High risk	Malakal
Mingkaman	31.48614751	6.055595452	Low Risk	Low Risk	Low Risk	low risk	Mingkaman
Renk	32.79774346	11.74253008	Medium risk	very low risk	Low risk	low risk	Renk
Amok	29.69020783	7.565333461	Medium risk	Low risk	Low risk	low risk	Rumbek
Rumbek	29.67694384	6.8066513	Low Risk	very low risk	Low risk	low risk	Rumbek
Wau	27.99349446	7.69834264	Low Risk	Low risk	Very low risk	low risk	Wau
Akak	28.11921581	9.067438759	Low Risk	Low risk	Low risk	low risk	Wunrok
Akoc	28.02504714	9.150790105	Low Risk	very low risk	Low risk	low risk	Wunrok
Wunrok	28.299289	8.994594	Low Risk	Low risk	Low risk	low risk	Wunrok
Yambio	28.400402	4.565699	Medium risk	Low risk	Low risk	low risk	Yambio
Abhiemnom_WH	28.82109262	9.392474367	Low Risk	very low risk	Low risk	low risk	Yida
Ajuong Thok	30.27093512	9.954828108	Low Risk	very low risk	Very low risk	Very low risk	Yida
Miyom Ngok-Damaged	28.64185588	9.363787098	very low risk	High risk	Medium risk	medium risk	Yida