FLOOD & DROUGHT BULLETIN

JULY 2024

GHANA METEOROLOGICAL AGENCY

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INTRODUCTION

The Flood and Drought bulletin is a monthly analysis of rainfall in Ghana prepared and released by the Ghana Meteorological Agency (GMet). The bulletin provides an authoritative and scientific understanding of rainfall variability which is essential for accurate hydrological modeling, climate change assessments, and effective water resource planning to mitigate risks associated with extreme events like droughts and floods.

Among other services and products, the Flood and Drought bulletin complements the objectives of GMet in line with the National Framework for Climate Services (NFCS) to improve co-production, tailoring, delivery and use of science-based climate predictions and services focused on the five pillars of the Global Framework for Climate Services (GFCS) by the World Meteorological Organization (WMO): agriculture and food security, disaster risk reduction, energy, health and water.

The analysis in the Flood and Drought bulletin is based on the Standardized Precipitation Index (SPI) developed by McKee et al. (1993) for the purpose of *defining and monitoring drought*. Drought is an insidious natural hazard that results from lower levels of precipitation than what is considered normal. When this phenomenon extends over a season or a longer period of time, water becomes increasingly insufficient to meet the demands of human activities and the environment. Drought must be considered a relative, rather than absolute, condition. Drought means different things to different users such as water managers, agricultural producers, hydroelectric power plant operators and wildlife biologists. Even within sectors, there are many different perspectives of drought because impacts may differ markedly. Droughts are commonly classified by type as meteorological, agricultural and hydrological, and differ from one another in intensity, duration and spatial coverage (WMO, 2012).

THE STANDARDIZED PRECIPITATION INDEX (SPI)

SPI indicator, which was developed by McKee et al. (1993), and described in detail by Edwards and McKee (1997), measures precipitation anomalies at a given location, based on a comparison of observed total precipitation amounts for an accumulation period of interest (e.g. 1, 3, 12, 48 months), with the long-term historic rainfall record for that period. This indicator measures anomalies of accumulated precipitation during a given period. In calculating SPI, precipitation is the only required input parameter (McKee and others, 1993, 1995). The SPI calculation for any location is based on the long-term precipitation record for a desired period. This long-term record is fitted to a probability distribution, which is then transformed into a normal distribution so that the mean SPI for the location and desired period is zero (Edwards and McKee, 1997).

The SPI is designed to quantify the precipitation deficit for multiple timescales and can be calculated from 1 month up to 72 months. Statistically, 1–24 months is the best practical range of

application (Guttman, 1994, 1999). The Flood and Drought bulletin of Ghana considers only the 1-month, 3-month, 6-month and 12-month SPI.

1-month SPI

The 1-month SPI compares the precipitation of a specific month with the precipitation totals from the same month for all the years included in the historical record.

3-month SPI

The 3-month SPI provides a comparison of the precipitation over a specific 3 consecutive month period with the precipitation totals from the same 3-month period for all the years included in the historical record.

6-month SPI

The 6-month SPI compares the precipitation for a specific 6 consecutive months with the same 6-month period over the historical record.

12-month SPI

The 12-month SPI is a comparison of the precipitation for 12 consecutive months with that recorded in the same 12 months in all previous years of available data.

These timescales reflect the impact of drought on the availability of the different water resources. Meteorological and soil moisture conditions (agriculture) respond to precipitation anomalies on relatively short timescales, for example 1 to 3 months (SPI-1 to SPI-3), whereas streamflow, reservoirs, and groundwater respond to longer-term precipitation anomalies, for example 3 months to 12 months (SPI-3 to SPI-12) or longer (EDO, 2020).

A real strength of the SPI is its ability to be calculated for many timescales, which makes it possible to deal with many of the drought types described above. The ability to compute the SPI on multiple timescales allows for temporal flexibility in the evaluation of precipitation conditions in relation to water supply.

In the Flood and Drought bulletin, the SPI values for any given location and accumulation period, are classified into nine different precipitation regimes (from dry to wet), as shown in Table 1. As can be seen, increasingly severe rainfall deficits (i.e., meteorological droughts) are indicated as SPI decreases below -0.5, while increasingly severe excess rainfall is indicated as SPI increases above 0.5.

ANOMALY	*RANGE OF SPI VALUES*	*PRECIPITATION REGIME*	*COLOUR*
Negative	Min <= SPI <= -2.0	Extreme dry	
	-2.0 < SPI <= -1.5	Severe dry	
	-1.5 < SPI <= -1.0	Moderate dry	
	-1.0 < SPI <= -0.5	Mild dry	
None	-0.5 < SPI <= 0.5	Normal precipitation	
Positive	0.5 < SPI <= 1.0	Mild wet	
	1.0 < SPI <= 1.5	Moderate wet	
	1.5 < SPI <= 2.0	Severe wet	
	2.0 < SPI <= Max	Extreme wet	

Table 1: SPI classification scheme used in the Flood and Drought bulletin

SPI ANALYSIS FOR JULY 2024

The SPI analysis for July 2024 has been generated in multiple timescales of 1-month (July 2024), 3-month (May 2024 – July 2024), 6-month (February 2024 – July 2024) and 12-month (August 2023 - July 2024). The maps generated depict the severity (positive or negative) of rainfall anomalies for the period under review.

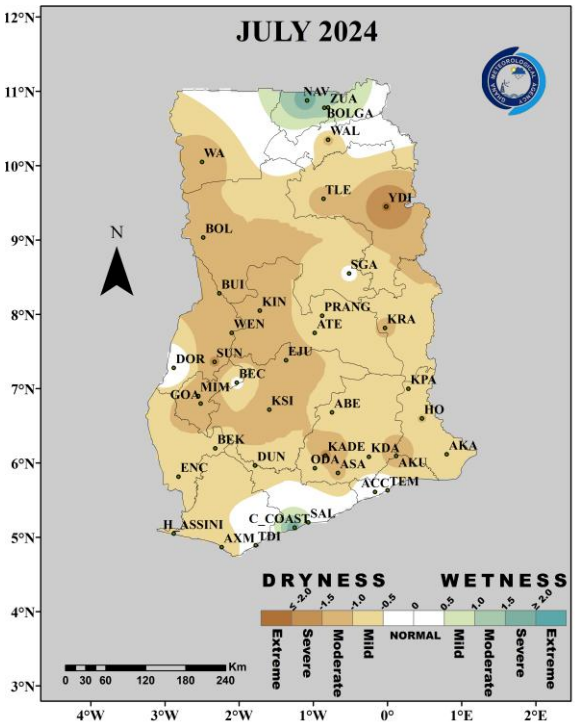

Fig. 1(a): 1-Month SPI *(for meteorological drought)*: July 2024

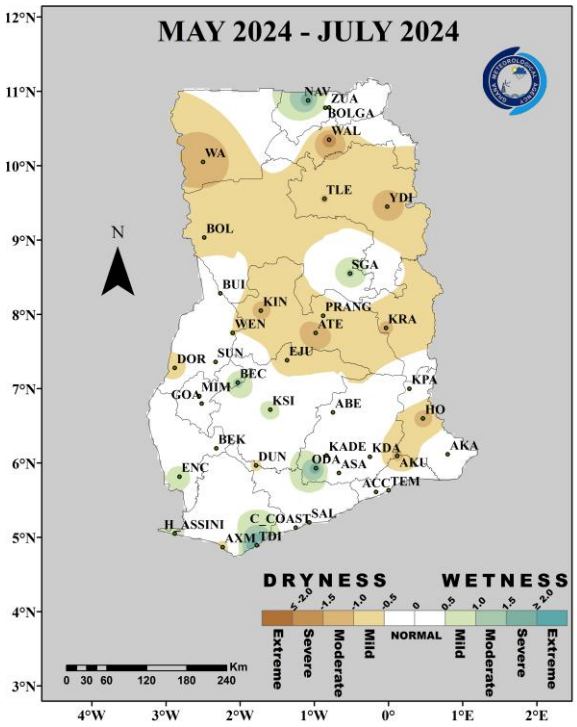

Fig. 1(b): 3-Month SPI *(for agricultural drought)*: May 2024 – July 2024

1-Month SPI (July 2024)

The 1-Month SPI shown in Fig. 1(a) indicates mostly moderate to severe dry conditions in the Savanna zone in areas including Wa, Bole, Walewale, Tamale and Yendi with Navrongo, Zuarungu and Bolgatanga showing mild to severe wet conditions. Mild dry condition dominates the Transition zone with moderate to severe dryness in areas such as Bui, Kintampo, Wenchi, Sunyani and Kete Krachi while Salaga, Dormaa and Bechem showed normal condition. Most parts of the Forest zone depict mild dry condition with moderate to severe dryness in areas such as Goaso, Mim, Ejura, Kumasi, Dunkwa, Kade, Asamankese, Akuse and Ho while Takoradi showed normal condition. Cape Coast witnessed severe wet condition in the Coastal zone with Saltpond, Accra and Tema showing normal condition while Akatsi recorded mild dry condition.

3-month SPI (May 2024 - July 2024)

The 3-Month SPI in Fig. 1(b) reveals displays mostly mild to moderate dry conditions in the Savanna zone in areas including Wa, Bole, Walewale, Tamale and Yendi with Navrongo showing severe wet condition. The Transition zone shows mild to moderate dryness in areas such as Kintampo, Wenchi, Dormaa, Atebubu, Prang and Kete Krachi while Salaga and Bechem showed moderate wet condition. Most parts of the Forest zone depict normal condition with mild to severe wet conditions in areas such as Kumasi, Enchi, Half Assini, Takoradi, and Akim Oda while mild to moderate dry conditions are shown in Dunkwa, Axim, Ejura, Akuse and Ho. The Coastal zone displayed normal condition.

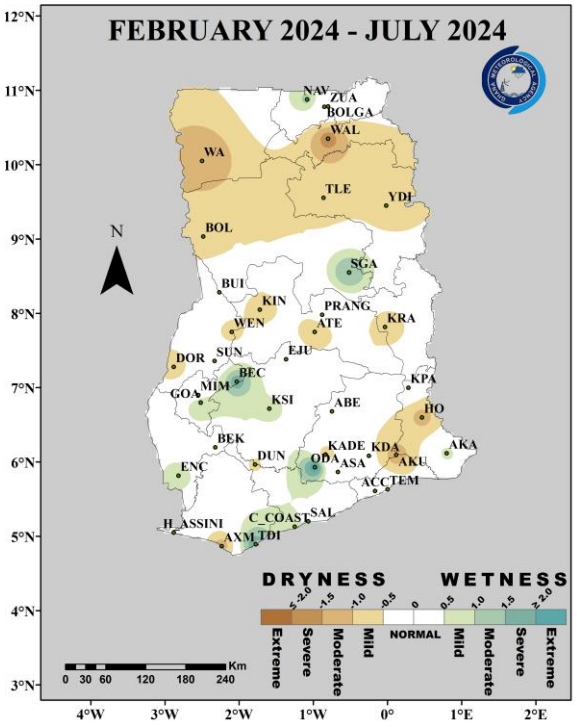

Fig. 1(c): 6-Month SPI *(for hydrological drought)*: February 2024 – July 2024

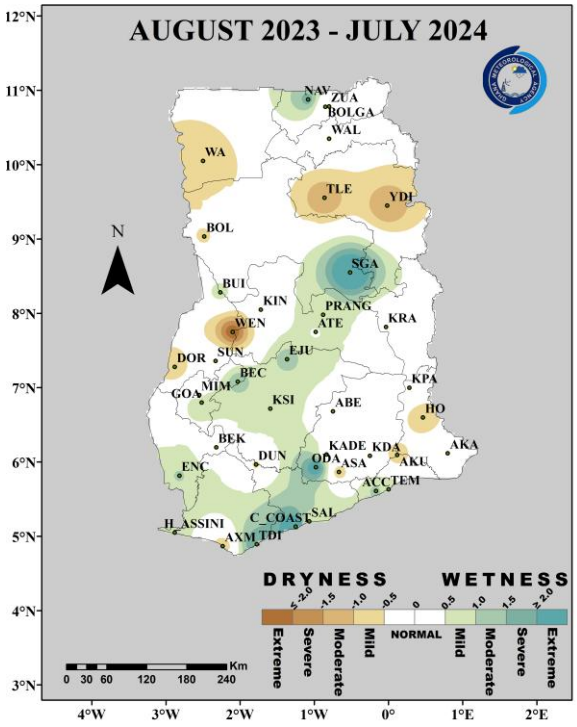

Fig. 1(d): 12-Month SPI *(for streamflow and lake storage drought)*: August 2023 – July 2024

6-month SPI (February 2024 - July 2024)

The 6-Month SPI shown in Fig. 1(c) depicts predominantly mild to severe dry conditions in the Savanna zone in areas such as Wa, Bole, Walewale, Tamale and Yendi with Navrongo showing moderate wet condition. The Transition zone is dominated by normal condition and shows moderate to severe wet conditions in Salaga and Bechem while Kintampo, Wenchi, Dormaa, Atebubu and Kete Krachi showed mild dry condition. Normal condition is seen in most parts of the Forest zone with severe to extreme wet condition in Takoradi and Akim Oda and mild wet condition is seen in Kumasi, Goaso and Enchi. Mild to moderate dry conditions are displayed in Axim, Dunkwa, Kade, Akuse and Ho. The Coastal zone shows mainly normal condition with mild wet condition in Cape Coast and Akatsi.

12-month SPI (August 2023 - July 2024)

The 12-Month SPI in Fig. 1(d) indicates mostly mild to severe dry conditions in areas such as Wa, Bole, Tamale and Yendi within the Savanna zone while moderate wet condition is seen in Navrongo. The Transition zone shows extreme wet condition in Salaga with mild to moderate wetness in Bechem, Prang and Bui while Wenchi registered extreme dry condition with Dormaa showing mild dry condition. Mild to Severe wet conditions are shown in areas such as Ejura, Kumasi, Goaso, Enchi, Half Assini, Takoradi and Akim Oda in the Forest zone with mild dry condition in Axim, Asamankese, Akuse and Ho. The Coastal zone shows extreme wet condition in Cape Coast with Accra, Tema and Saltpond depicting mild to moderate wetness.

STATIONS

Station	Abbreviation	Station	Abbreviation	Station	Abbreviation
Abetifi	ABE	Enchi	ENC	Sunyani	SUN
Accra	ACC	Goaso	GOA	Takoradi	TDI
Akatsi	AKA	Half Assini	H_ASSINI	Tamale	TLE
Akim Oda	ODA	Ho	HO	Tema	TEM
Akuse	AKU	Kade	KADE	Wa	WA
Asamankese	ASA	Kete Krachi	KRA	Walewale	WAL
Atebubu	ATE	Kintampo	KIN	Wenchi	WEN
Axim	AXM	Koforidua	KDA	Yendi	YDI
Bechem	BEC	Kpandu	KPA	Zuarungu	ZUA
Bole	BOL	Kumasi	KSI		
Bolga	BOLGA	Mim	MIM		
Bui	BUI	Navrongo	NAV		
Cape Coast	C_COAST	Prang	PRANG		
Dormaa	DOR	Salaga	SGA		
Dunkwa	DUN	Saltpond	SAL		
Ejura	EJU	Sefwi Bekwai	BEK		

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Copernicus European Drought Observatory (EDO): https://edo.jrc.ec.europa.eu/ © European Commission, 2020.

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