

The Probable Climate Scenarios *of* **2023 and 2024 in Kenya**

(A period of failed rainfall seasons and elevated off-seasonal rainfall)

ICHA International Center for
Humanitarian Affairs
At the Kenya Red Cross Society

• Inquire • Understand • Influence

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Climate change is not a distant threat, it is happening now and it is hitting vulnerable communities the hardest. In Kenya, we are already seeing the effects of rising temperatures and unpredictable weather patterns, with devastating consequences for farmers, herders, and those living in coastal areas. We must take urgent action to mitigate and adapt to the impacts of climate change, or risk leaving these communities even more vulnerable in the years to come.



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We have observed that the drought in Kenya's ASAL regions had a detrimental effect on the most vulnerable communities, particularly the pastoralists and small-scale farmers whose livelihoods are mostly dependent on the seasons of rainfall. This is due to the fact that Kenya had five consecutive rainy seasons that have been unsuccessful, beginning in October-November-December (OND) of 2020 to ending in OND 2022. It is anticipated that these vulnerable communities will require at least eight rainy seasons over the course of five years in order to properly recover from the consequences of the prolonged drought



about the cover photo

The image used in the cover is of a dry river bed in Kitui County. The river used to flow seasonally but due to the effects of climate change the river has not flown for the past two seasons leading to water scarcity and poor yields for the local farmers. Credits: Ronald Mwawaka



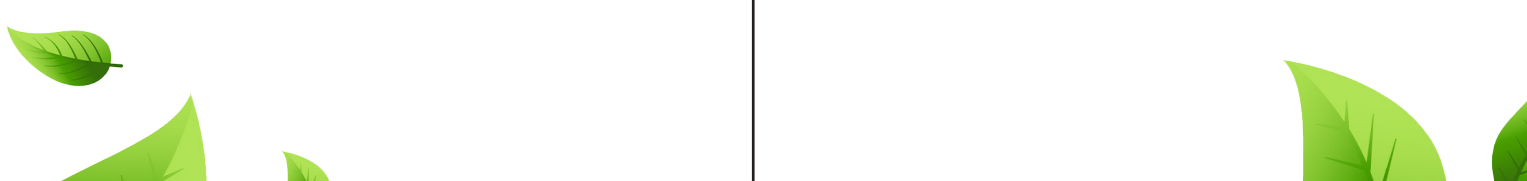
Introduction

The vagaries of drought felt frequently in Kenya in the recent times is as a result of cumulative rainfall deficits for many years. In the last 20 years, we've had more failed rainfall seasons than is the normal. At the same time, there have been cases of rainfall seasons with intense rainfall episodes generating enormous rainfall amounts, however, the amounts do not seem to counteract the effects of the rainfall deficits. In 2022 alone, we saw signs of a serious hydrological and ecological drought in many places and that caused a lot of anxiety and concern to the people and the government.

In the last few years, there has been a very distinctive situation where opposite climate extreme conditions (e.g. floods and droughts) have been experienced close to each other. Sometimes, these occurrences have been experienced within a single season but the occurrences have been more common within the same year. For example, March-April-May -MAM 2018 was a very wet season in the whole country, however, the following season, October-November-December -OND 2018, was a very dry season. Close to these kinds of climate swings were witnessed in 2019, 2020 and 2021. It has become like a new normal.

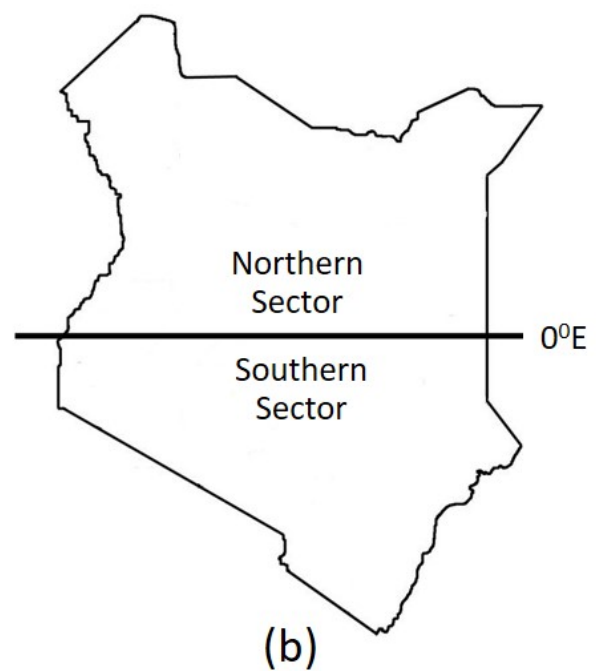
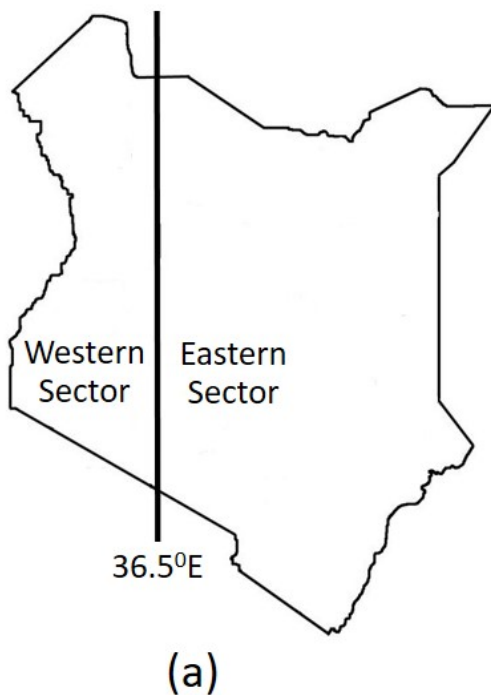
Is the new normal likely to spread into the period 2023 and 2024 or are we looking forward to a new unknown climate regime? This is a question that ringers in our minds and it can only be answered if we look at the analogue years based on the astronomical observations of the planets of the solar system, a method that seem to have answered similar questions successfully in the past. This line of thought should allay or confirm the fears of an occurrence of an anomalous climate situation in 2023 and 2024 that may make the current situation worse or better.

Re-analysed rainfall data is used. In situ station data was also used to validate it. A list of the astronomical factors have been given in Table 1. For ease of understanding, Kenya is divided into four sectors; Western, Eastern, Southern and Northern sectors as shown in Figure 1(a) and 1(b). In the figures, these are the terms used in the proposed climate scenarios in Table 2.



Indicator	Seasons and Areas of Influence
Saturn	Good indicator for all areas and all seasons.
Jupiter	Good for ASAL areas (mainly lowland areas) in off season periods, JF and JJA. It works well when considered together with Saturn. A combination of Jupiter with Mercury or Venus is given a lot of attention even in the main rainfall seasons, OND and MAM.
Venus	Good for ASAL areas (mainly lowland areas) in off season periods, JF and JJA. It works well when considered together with Saturn. A combination of Venus with Mercury or Jupiter is given a lot of attention even in the main rainfall season, OND and MAM.
Mars	Works well in the JF and MAM seasons but has relatively low skills in most areas in JJA and OND seasons.
Mercury	Good indicator for all areas and all seasons.

Table 1: Indicators used and the associated seasons and areas of influence.



(a) The longitude 36.5°E divides the region into western and eastern sectors (or West and East respectively)

(b) The longitude 0°E (Equator) divides the region into Northern and Southern sectors (or North and South respectively)

Figure 1: Map of Kenya showing the different sectors proposed for the scenarios

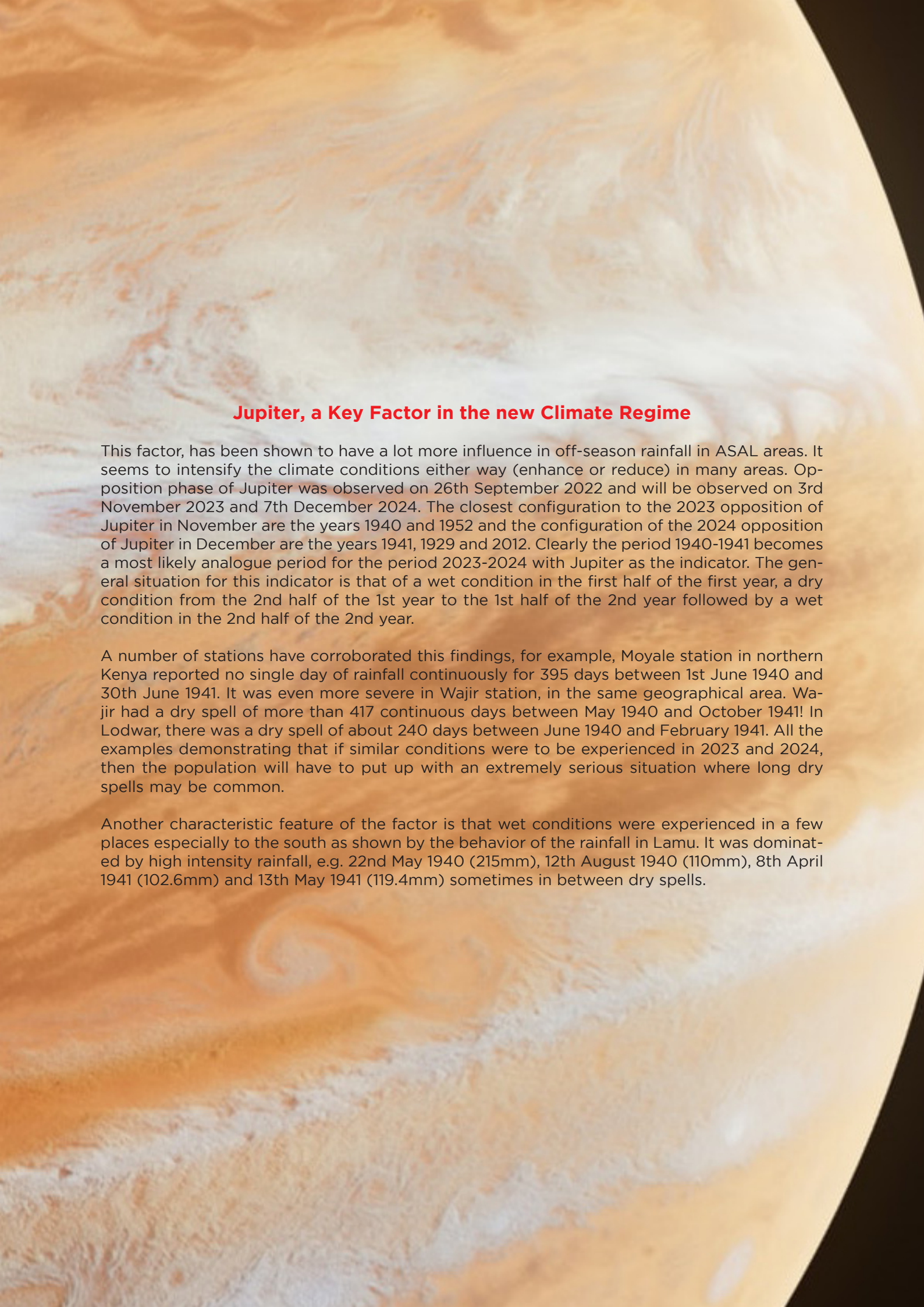
Saturn as the main Factor in a new Climate Regime

According to our astronomical analysis, there seem to be a slow ushering-in of a new climate regime. The regime may be coinciding with the planet Saturn in opposition phase when observed any time in the months of August and September. Saturn was observed at opposition on 14th August 2022 and will be observed on 27th August 2023 and 8th September 2024.

The closest configuration to the 2023 opposition of Saturn in August are the years 1905 and 1935 and the configuration of 2024 opposition of Saturn in September are the years 1936 and 1965. Clearly, the period 1935-1936 becomes the analogue period closest to the period 2023-2024. The general situation for the 1935-1936 was that of a wet condition in January-February (which is normally dry) and June-August (which is normally cold and dry in most places) and low rainfall or dry conditions in the main rainfall seasons, MAM and OND.

And to demonstrate this finding with examples, we used a few stations whose rainfall data was made available for the period 1935-1936. The Sotik Moniera Tea Estate Rainfall Station, in the highlands west of the rift valley reported no rainfall from July 1935 to December 1935, while there were low levels of rainfall in 1936 which was highly unusual for a station in a high potential area. Voi station, the Arid and Semi-Arid Land (ASAL) area, had only 7 days of rain in the whole MAM 1935 season and 17 days in MAM 1936. There was more rainfall in the January-February period, an off season period, where there were 7 days of rainfall 1935 and 24 days of rainfall in 1936. Similarly, Makindu station, in an ASAL area, had 7 days of "good" rains in February 1935 and only 3 days in MAM 1935.

Lamu, a coastal station also supported a similar rainfall behavior. The rainfall tended to fall more into the June-July-August (JJA) season period in both 1935 and 1936. The peak of the season in both cases was in the month of June. Lamu station had 16 rain days in June 1935 and 24 rain days in June 1936. Normally the peak of the long rains season is in the month of May for the coastal stations.



Jupiter, a Key Factor in the new Climate Regime

This factor, has been shown to have a lot more influence in off-season rainfall in ASAL areas. It seems to intensify the climate conditions either way (enhance or reduce) in many areas. Opposition phase of Jupiter was observed on 26th September 2022 and will be observed on 3rd November 2023 and 7th December 2024. The closest configuration to the 2023 opposition of Jupiter in November are the years 1940 and 1952 and the configuration of the 2024 opposition of Jupiter in December are the years 1941, 1929 and 2012. Clearly the period 1940-1941 becomes a most likely analogue period for the period 2023-2024 with Jupiter as the indicator. The general situation for this indicator is that of a wet condition in the first half of the first year, a dry condition from the 2nd half of the 1st year to the 1st half of the 2nd year followed by a wet condition in the 2nd half of the 2nd year.

A number of stations have corroborated this findings, for example, Moyale station in northern Kenya reported no single day of rainfall continuously for 395 days between 1st June 1940 and 30th June 1941. It was even more severe in Wajir station, in the same geographical area. Wajir had a dry spell of more than 417 continuous days between May 1940 and October 1941! In Lodwar, there was a dry spell of about 240 days between June 1940 and February 1941. All the examples demonstrating that if similar conditions were to be experienced in 2023 and 2024, then the population will have to put up with an extremely serious situation where long dry spells may be common.

Another characteristic feature of the factor is that wet conditions were experienced in a few places especially to the south as shown by the behavior of the rainfall in Lamu. It was dominated by high intensity rainfall, e.g. 22nd May 1940 (215mm), 12th August 1940 (110mm), 8th April 1941 (102.6mm) and 13th May 1941 (119.4mm) sometimes in between dry spells.

Other Associated Factors

Other planets considered (with associated analogue years for the period 2023/2024) are Mercury (1945/1946, 1958/1959, 1971/1972, 1984/1985, 1997/1998 and 2010/2011), Mars (1929/1930, 1944/1945 and 1991/1992) and Venus (1999/2000, 2007/2008 and 2015/2016). All these planets have different rainfall influences in different seasons, however, most of the analogues unanimously point towards dry conditions.

Mercury is associated with some of the severe drought events 1944-1946, 1984-1985, 1998 and 2010-2011. The other analogue years of Mercury, 1971-1972 and 1997, were periods when the negative phase of El Niño-Southern Oscillation- ENSO (El Niño event) was present or dominant and would have outweighed the effects of Mercury. Venus is associated with severe droughts 1999-2001, 2007-2009 and 2016-2017. The Venus analogues are unanimous in dry conditions and were some of the severest in the recent times.

Finally, planet Uranus is another salient factor. The current period 2018-2033, associated with Uranus, has analogues in the period 1934-1947 and 1850-1865. Both the periods 1934-1947 and 1850-1865 are known to have had some of the severest drought events in the region that follow an 84 to 88-year cycle. The analogue period for the period 2023-2024 falls in the period 1939-1940 coinciding with the severe drought event of 1939-1941, where many deaths were reported amongst the African populations in Kenya.

Probable Scenarios of 2023-2024


It is clear from all the analogues presented before that a situation where the climate conditions may trigger a situation where an emergency intervention may be required in the near future. A new set of climate swings is likely to occur in 2023 and 2024, but these will be between the main rainfall season and the off-seasonal rainfall periods. These are emerging rainfall features that are not known to us today but have been there in the past at a time only a few people living today were alive.

With all the planets put together, a probable climate condition is generated. Table 2 shows a summary of the probable climate scenarios per season in 2023 and 2024 derived directly from the analogues given above. We deduce from the table that wet conditions are mainly in the off-seasonal periods while the main rainfall seasons are mainly dry in many areas.


The **MAM 2024** and **OND 2024** are likely to be mainly dry in most places. Both **JJA 2023** and **JJA 2024** will be mainly wet, while the **JF 2023** and **JF 2024** will have a portion of the country in wet conditions which in normal circumstances would have remained dry.




Conclusion




Overall, there will be failed rains seasons in the years **2023 and 2024** in most areas.




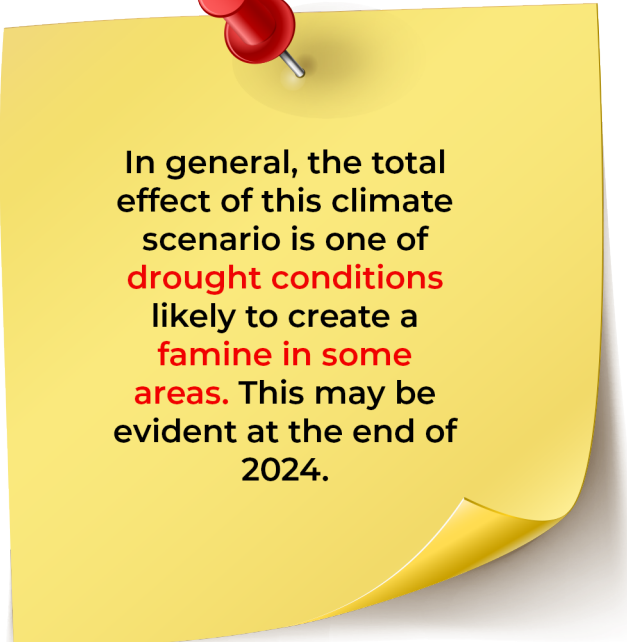
There will also be a little reprieve in form of rainfall that will be received from time to time in the off-season periods.




For agriculture, this will be a very confusing time as this kind of situation creates **difficulties in determining onsets and cessations for crop production and management** especially when the off-seasonal rains runs into the main rains season or the main seasonal rains run into the off-seasonal period.



Many sectors of our economy that depend solely on rainfall may find it difficult to adjust to the awkward rainfall scenarios but the information provided here may be considered as a rough guide in one's long-term planning.



In general, the total effect of this climate scenario is one of **drought conditions** likely to create a **famine in some areas**. This may be evident at the end of 2024.



Season	Astronomical Indicators					General Climate Conditions
	Saturn (Key Indicator)	Jupiter	Mercury	Mars	Venus	
Jan-Feb 2023	Wet (North/ West) Dry (South/ East)	Wet	Wet (west)	Wet (North) Dry (Many Places)	Dry	<i>A chance of being Wet</i> mainly to the north and west
Mar-May 2023	Normal Wet (South)	Wet	Dry (North) Wet (South)	Dry	Dry (Many Places) Wet (North)	<i>A chance of being Dry</i> except for the South
Jun-Aug 2023	Normal Wet (South)	Wet (West) Dry (East)	Wet	Very Wet	Very Wet	<i>May be very Wet</i>
Oct-Dec 2023	Dry (Many places) Wet (West)	Dry	Wet	Dry (South) Wet (North)	Dry (North/ East) Wet (South/ West)	<i>A chance of being Dry</i> in some areas
Jan-Feb 2024	Wet	Dry	Wet	Wet (North) Dry (Many Places)	Wet (East) Dry (West)	<i>A chance of being Wet</i>
Mar-May 2024	Dry	Dry (East) Wet (West)	Dry	Dry (North/ West) Wet (South/ East)	Very Dry	<i>Mainly Dry</i>
Jun-Aug 2024	Wet (South/ East) Dry (West)	Wet	Wet	Wet (North/ West) Dry (South/ East)	Normal	<i>May be very Wet</i>
Oct-Dec 2024	Dry (Many places) Wet (North)	Wet	Dry (Many Places) Wet(North)	Dry (South/ west) Wet (North/ East)	Very Dry	<i>Mainly Dry</i> except for the north

Table 2: Probable climate scenarios per season in 2023 and 2024 as derived from the analogues of the 5 indicators, Saturn, Jupiter, Mercury, Mars and Venus.



About Kenya Red Cross Society

The Kenya Red Cross Society (KRCS) is the largest volunteer-based humanitarian organization in Kenya. As an auxiliary to the national and county governments, KRCS works with communities, volunteers and partners to ensure that we are not only prepared but also respond to humanitarian and development needs. KRCS focuses on collections capabilities and resources to alleviate human suffering and save lives.

About Kenya Meteorological Department (KMD)

Provision of Meteorological and Climatological services to agriculture, forestry, water resources management, civil aviation and the private sector. Its mandate is to provide timely early warning weather and climate information for safety of life, protection of property and conservation of the natural environment. This mandate is anchored on Executive Orders on the structure and organization of the Government of Kenya and the World Meteorological Organization Convention. The Convention also recognizes the NMHSs to be the single and authoritative voice and source on matters of severe weather and extreme climate events among WMO's member states.

About the International Center for Humanitarian Affairs (ICHA)

ICHA is an independent center for research, learning and advocacy based at the Kenya Red Cross Society. ICHA seeks to facilitate learning and knowledge management in the humanitarian sector, through evidence generation, policy dialogue and trainings with a view to supporting humanitarian action and improving community resilience.

