Meteorological Data and Climatology Lead Excutive

Climatology and Remote Sensing Desk

Ten Daily Satellite Ranfall Estimation and Vegetation Coverage Bulletin

3rd Dekad of January 2024

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Contents

Forward

As an entity responsible for monitoring local and country wide climatic features and their day-to-day evolution, the National Meteorological Agency of Ethiopia strives hard to present useable information to different socio- economic activities. The production of satellite-based rainfall estimates and vegetation greenness bulletin is part of this effort.

The launch of meteorological satellites which happens as a result of technological advancement opens a new horizon in weather and climate monitoring. Unlike manned point observations, satellites collect data on cloud, vegetation and other parameters from part of the world that are not easily reachable or accessible. Satellite observation supplements ground manned observation and when it comes to vegetation cover, it is the only source of information.

The Ethiopian Meteorological institute uses products from TAMSATA group based in UK and Copernicus for producing dekadal rainfall estimate and vegetation greenness bulletin. We have a strong belief that various socio-economic activities related to planning disaster mitigation, water resources management, construction, environmental protection, transportation, recreation, tourism and others will be benefited most by the careful and continuous use of this bulletin. Meanwhile, your comments and constructive suggestions are highly appreciated to make the objectives of this bulletin a success

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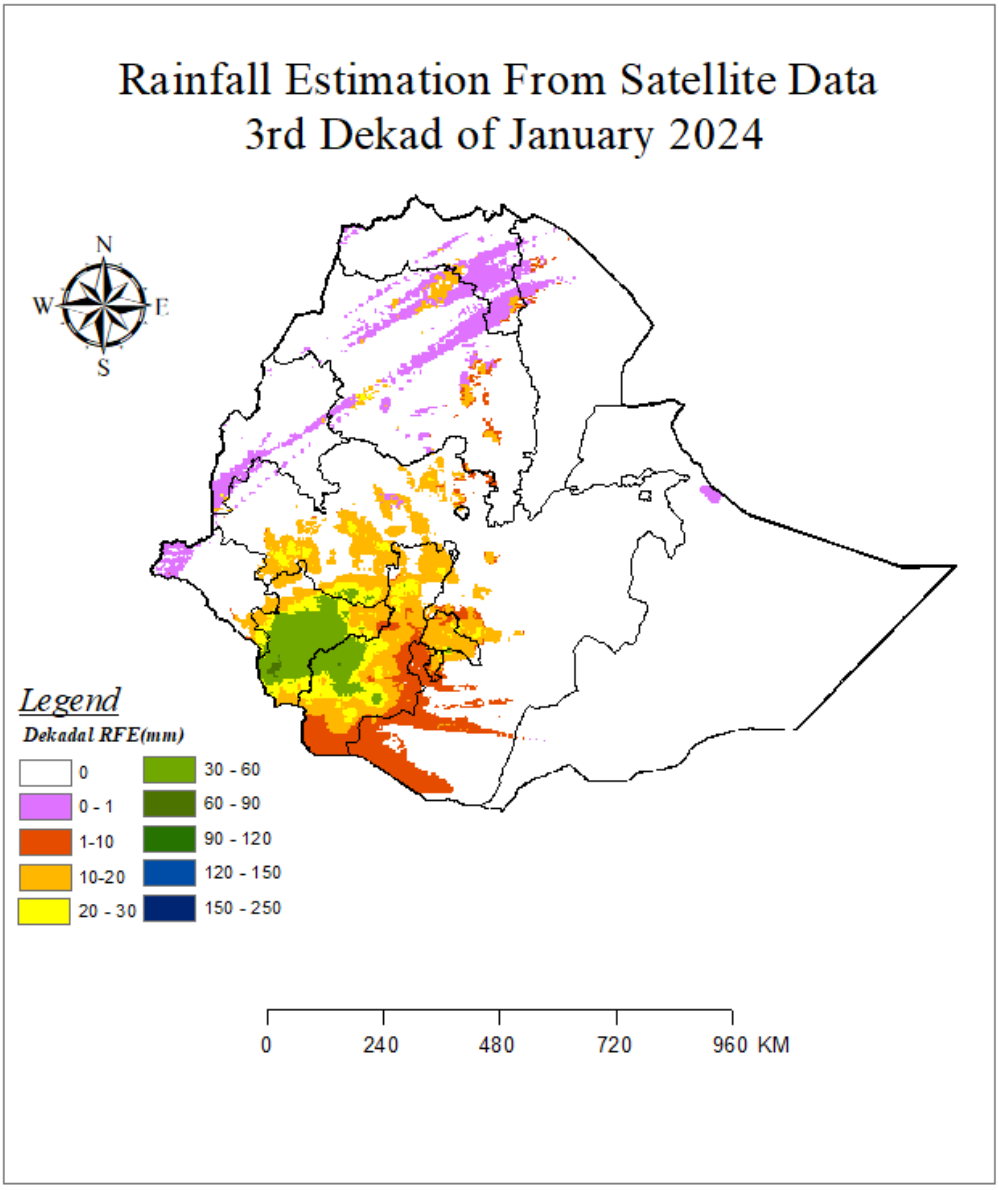
Introduction

Satellite remote sensing is often used to estimate vegetation distribution and productivity at large spatial scales. The normalized difference vegetation index (NDVI) is the most widely used surrogate for large-scale assessments of vegetation greenness and has been applied in a wide range of studies (Brandt et al. 2015, Chen et al. 1998; Santos and Negri, 1997; Zhang et al 2009). The spatial distribution of remotely sensed NDVI and consequently of terrestrial vegetation, is a function of prevalent climatic conditions such as rainfall and temperature. The relationship between NDVI and rainfall is well established at various spatial and temporal scales (Davenport et al. 1993; Grist et al. 1997; Nicholson et al. 1990; Potter and Brooks 1999; Wang et al. 2001). The results of these studies, although varying, indicate that rainfall is an important predictor of the geographical distribution of vegetation in many environments, particularly in transitional zones, such as from humid to arid and semi-arid environments (Zhao et al. 2015) as found in the Sahel of Africa.

Rainfall is a crucial resource in many socioeconomic activities, and particularly for those African countries relying predominantly on rain-fed agriculture. Many countries have been affected by rainfall variability and long-term changes in both rainfall amount and distribution over recent decades. However, the number of rain gauges throughout Africa is small and unevenly distributed, and the gauge network is deteriorating. Satellite rainfall estimates are being used widely in place of gauge observations or to supplement gauge observations. (Tufa dinku etal).

In this bulletin, the satellite rainfall estimation and vegetation greenness for the 3rd Dekad of January 2024 were produced with the help of TAMESAT and METOSAT vegetation products. During this Dekad, some parts of Bega, which benefit from rain, received minimal rainfall due to the strong relationship between rainfall and the Normalized Vegetation Index (NDVI). Most Bega rain-benefiting areas, namely the southern, southwest, and southeast parts of the country, were covered by vegetation. On the other hand, in the northern, northeast, and northwest parts of the country, no rainfall was observed, and low to bare greens were evident.

Rainfall Estimation from Satellite Data

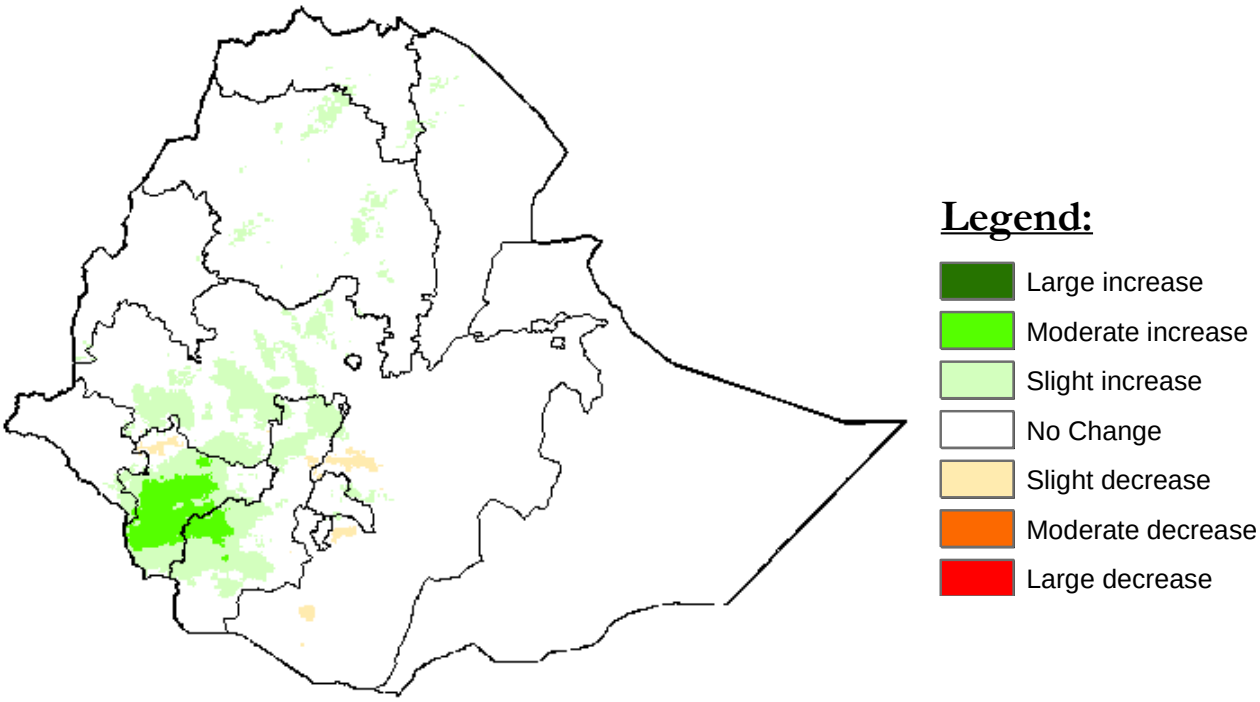


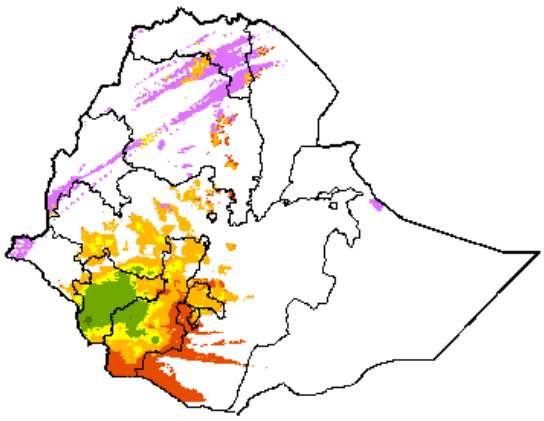
Rainfall distribution

The rainfall activity of January 3rd dekad was dry for most parts of the country, except some areas in southern Ethiopia. However, during this dekad, rainfall activity has covered certain regions. Specifically, South west Ethiopia, South Ethiopia, Sidama, Central Ethiopia some parts of Oromia and very few pocket areas of Amhara region received 1–60 mm of rainfall. There has been no rain in the rest of the country.

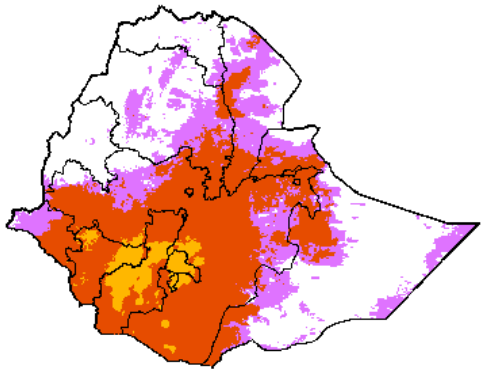
Comparison with climatological normal

In this dekad the comparison of satellite rainfall estimation and climatological average shows that there was Moderate to slight increase of rainfall was observed in south west Ethiopia, south Ethiopia, central Ethiopia, some part of Oromia and few parts of Amhara region. On the other hand, slight decrease of rainfall was observed in few parts of South west Ethiopia and pocket areas of Oromia regions.





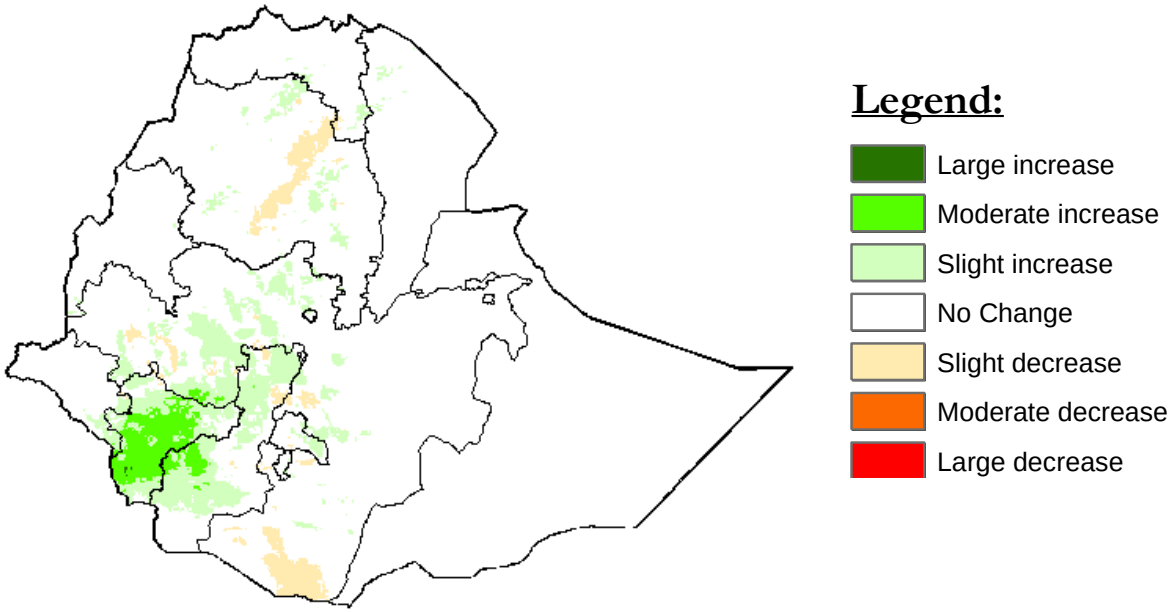
Current dekad



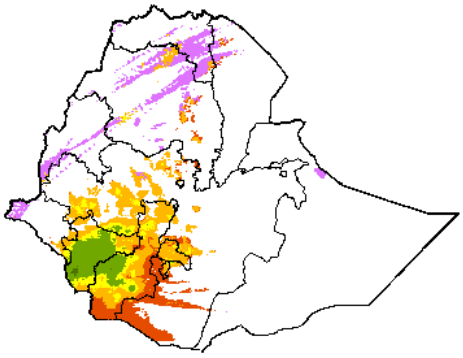
Climatological normal

Comparison with the previous Dekad

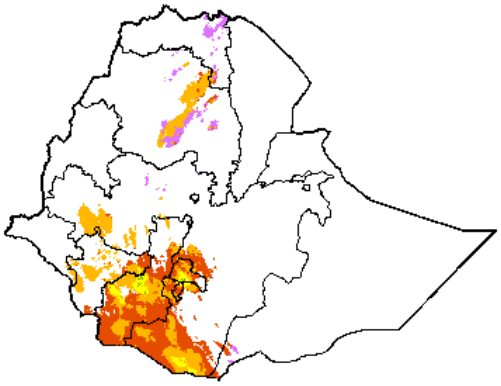
The comparison of 3nd dekad of January 2024 and 2st dekad January 2024 show that slight increase of rainfall was observed in south west Ethiopia, Southern Ethiopia, Sidama, western Oromia and few part of Amhara regions. On the other hand, slight decrease of rainfall was observed over few parts of Amhara and Oromia region. No change on the rest part of the country.



Difference of two Dekad



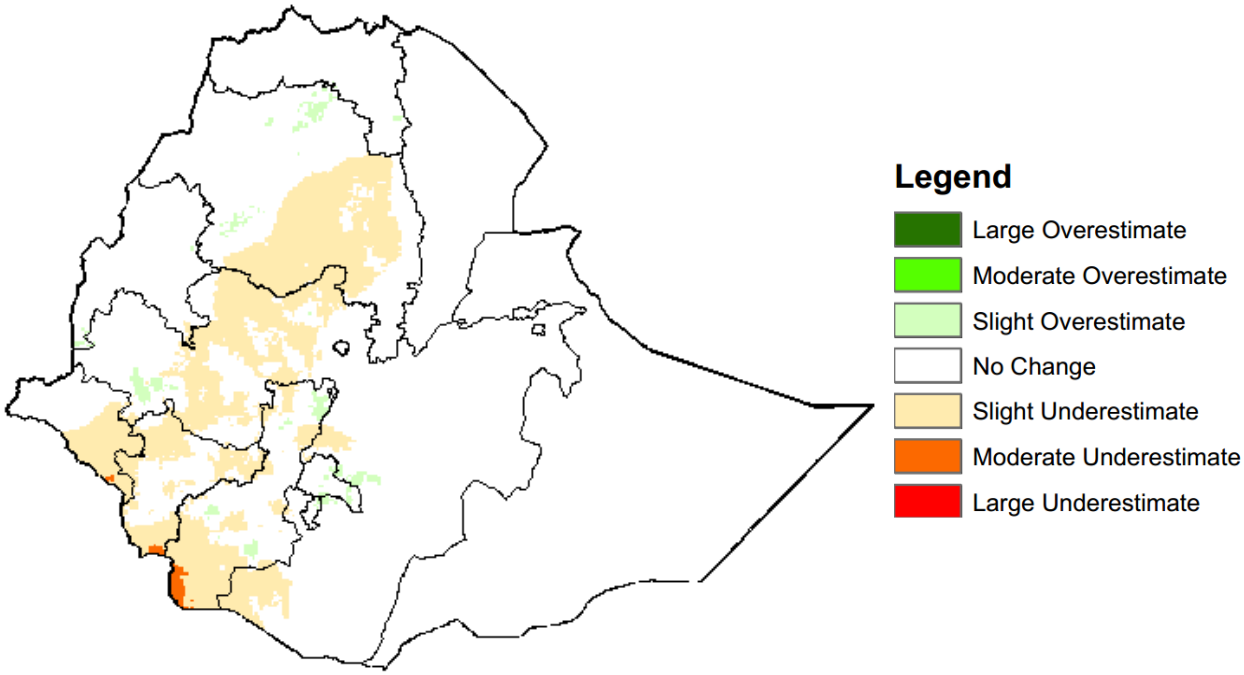
Current dekad

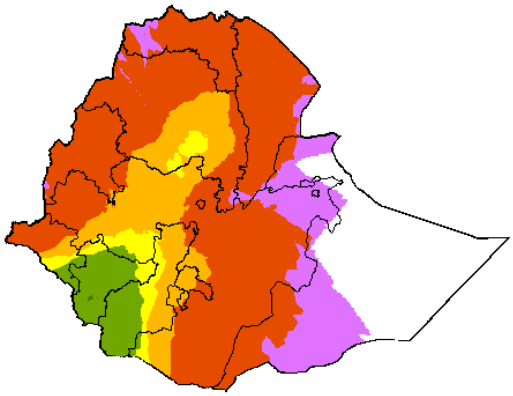


Previous dekad

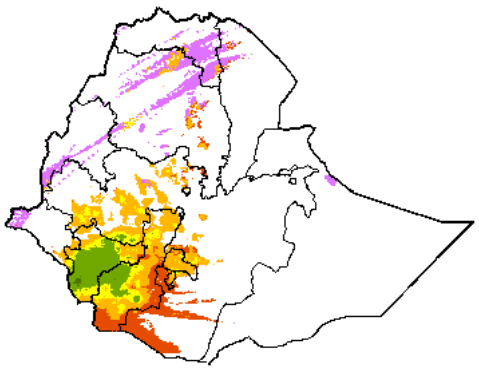
Comparison with the ground observation

The satellite rainfall estimation shows that there was slight overestimate over pocket areas of central Ethiopia and Oromia region. On the other hand, slight underestimate was observed over south Ethiopia, South West Ethiopia, Gambella, Amhara, Oromia regions. There is no significant difference on the rest parts of the country, it shows the same pattern as compared with the Actual.



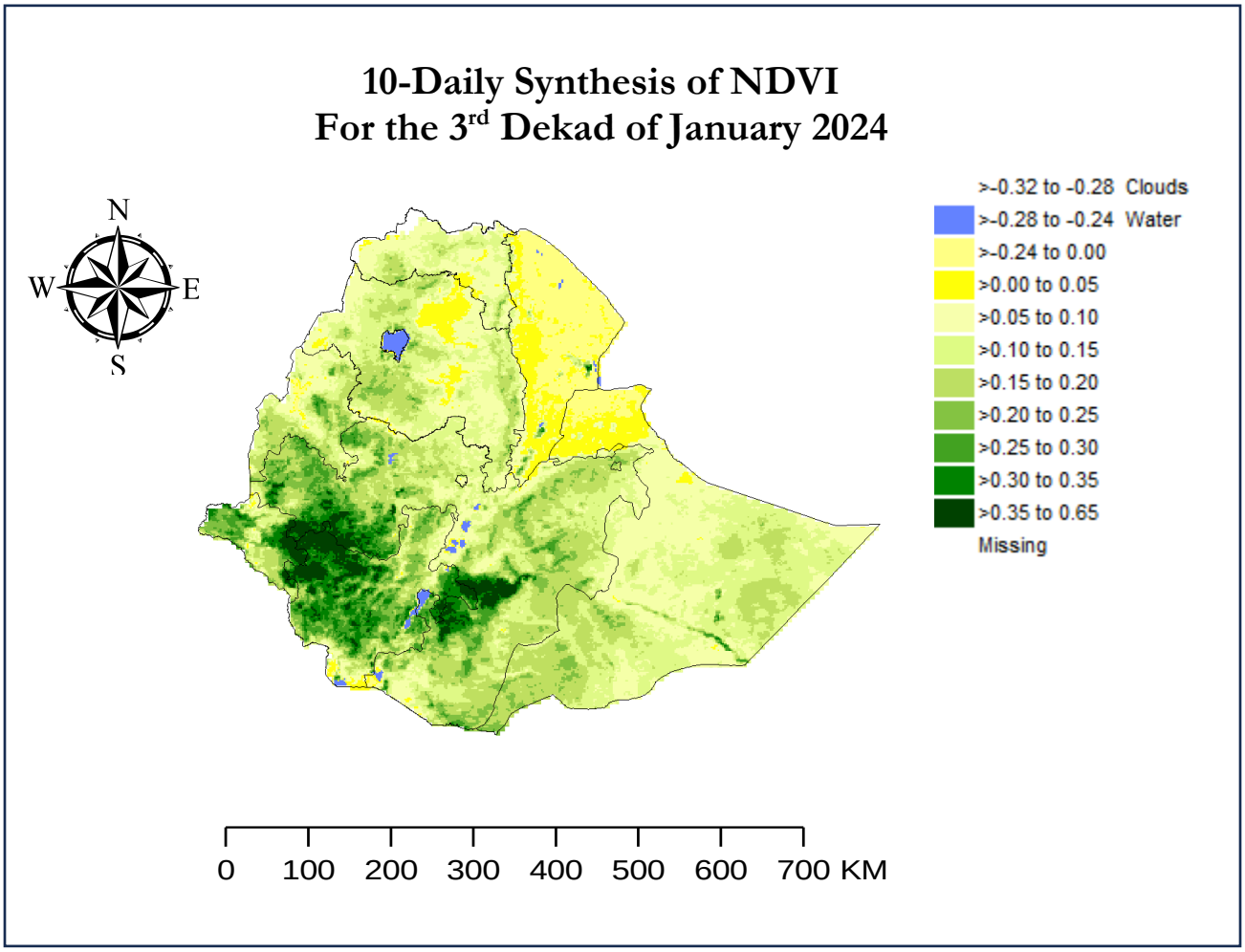


Ground Observation



Satellite rainfall estimation

10-Daily Synthesis of NDVI



Assessment of synthesis NDVI for the 3rd dekad of January 2024

NDVI distribution for this dekad declared high greenness over some parts of the country. Whereas low NDVI value have been, observe over most parts of the country. Hence, South-west Ethiopia, South Ethiopia, Gambella. Sidama, most part of Oromia and few areas of Benishangul Gumuz regions covered by high to moderate greenness. Afar, most part of Tigray, some part of Amhara, Northern Somali, few part of Benishangul Gumuz regions covered by low to bare greenness. (Refer the *actual* figure above).

Comparison with the Climatological Normal

The comparison of current dekad with climatological normal show that large to small increase of greens was observed in Somali, South west and eastern Oromia, south Ethiopia, south-west Ethiopia, Gambella and some part of Benishangul Gumuz regions. On the other hand, small decrease of greenness was observed in part of Amhara, Afar, Oromia, pocket areas of central Ethiopia, Southern Ethiopia and northern Somali regions.