Meteorological Data and Climatology Lead Excutive

Climatology and Remote Sensing Desk

Ten Daily Satellite Ranfall Estimation and Vegetation Coverage Bulletin

2nd Dekad of January 2024

Date: Jan 23, 2024

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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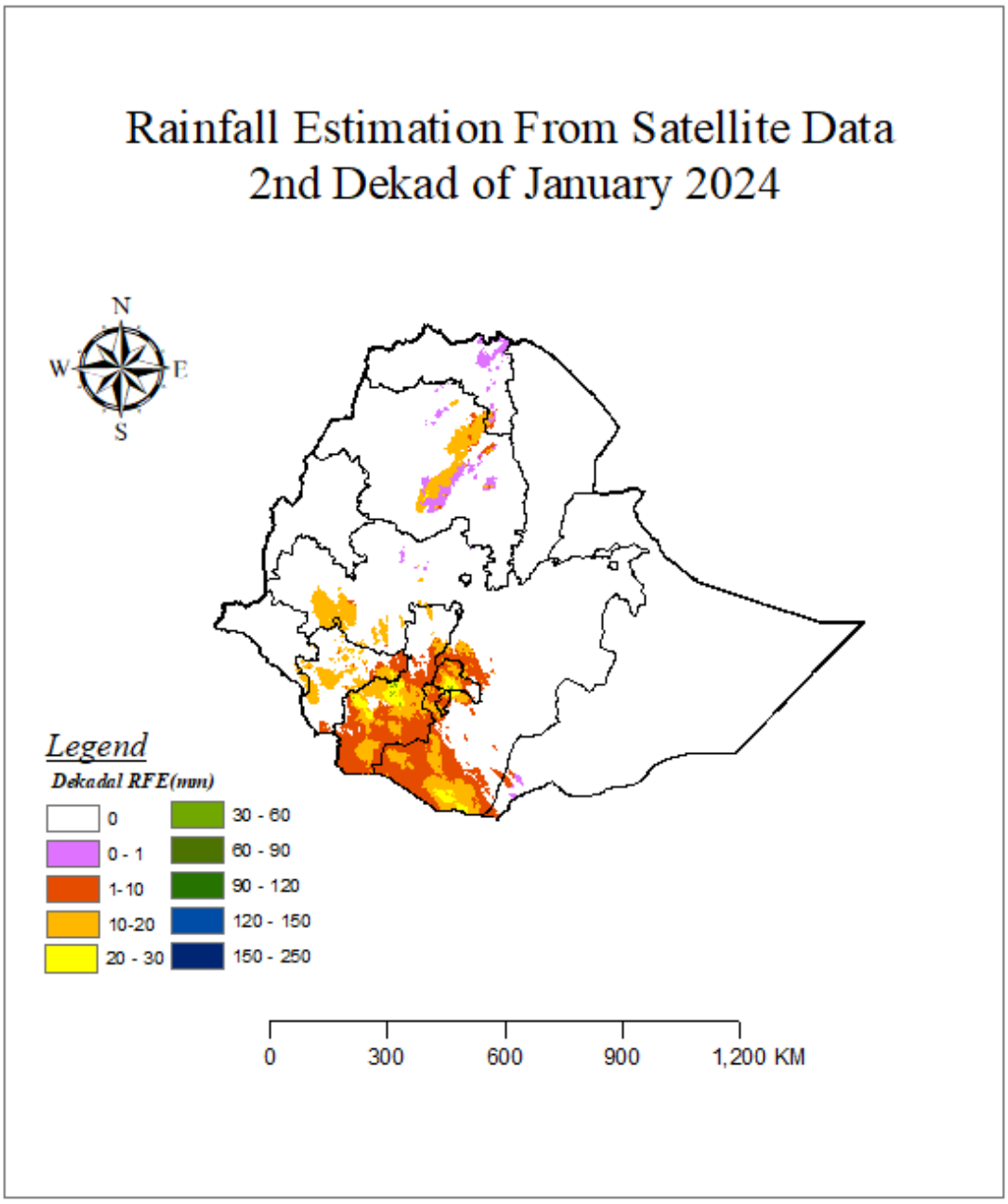
Introduction

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 2nd 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

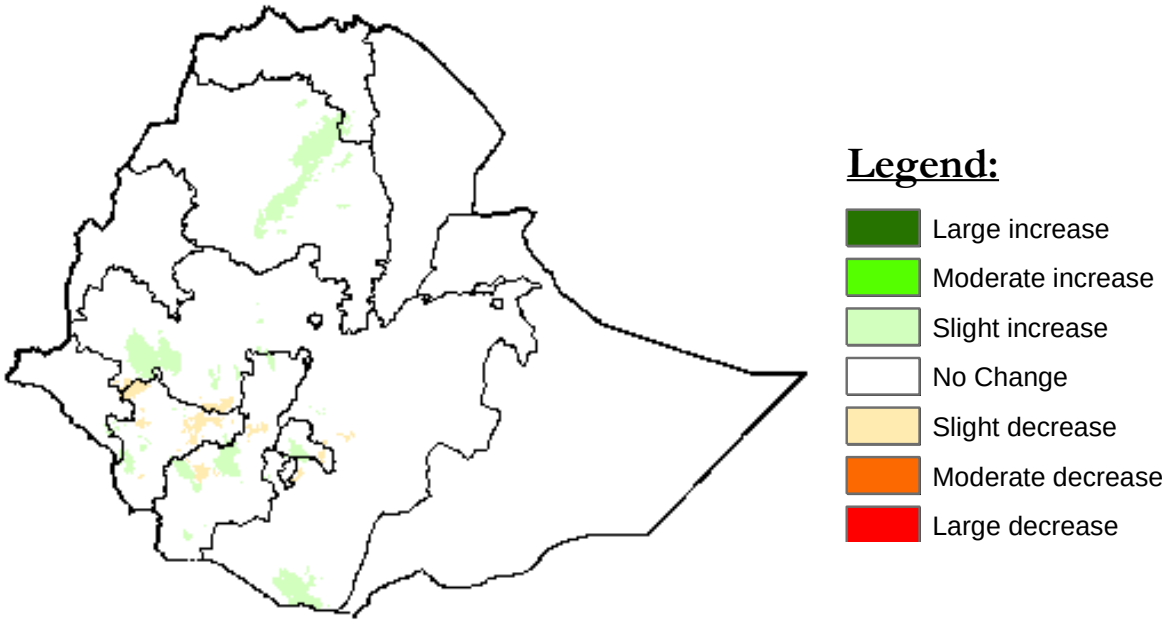


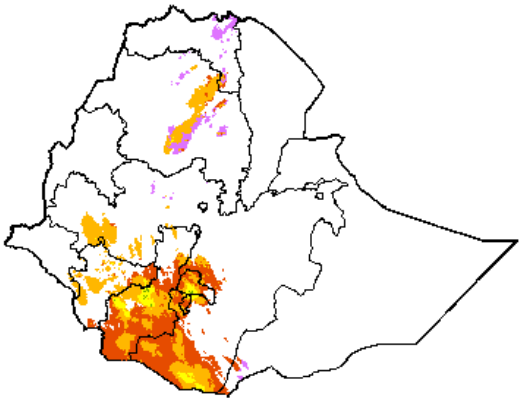
Rainfall distribution

January is the cold and dry month for most parts of the country, except for some areas in southern Ethiopia. However, during this dekad, rainfall activity has covered certain regions. Specifically, South Ethiopia, southern Oromia, Sidama, some parts of southwestern Ethiopia, Central Ethiopia, and a few areas in western Oromia and the Amhara region received 1–30 mm of rainfall. There has been no rain in the rest of the country.

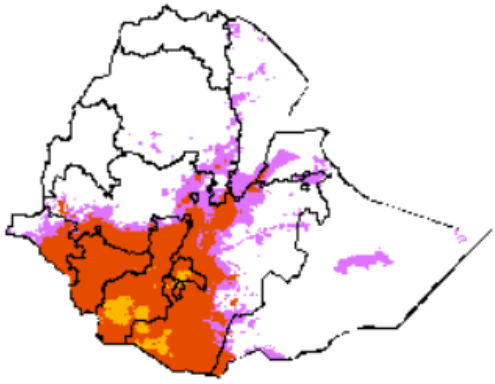
Comparison with climatological normal

In this dekad the comparison of satellite rainfall estimation and climatological average shows that there was slight increase of rainfall was observed in few parts of Amhara, western and southern Oromia, southern Ethiopia and Sidama region. On the other hand, slight decrease of rainfall was observed in few parts of South west Ethiopia and southern Ethiopia regions.





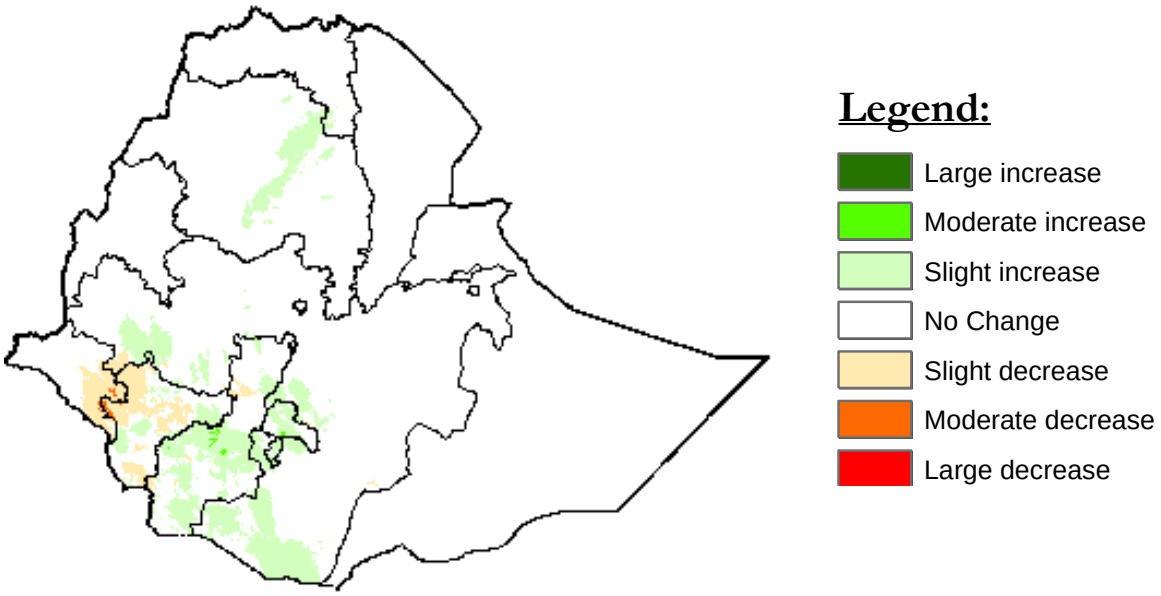
Current dekad



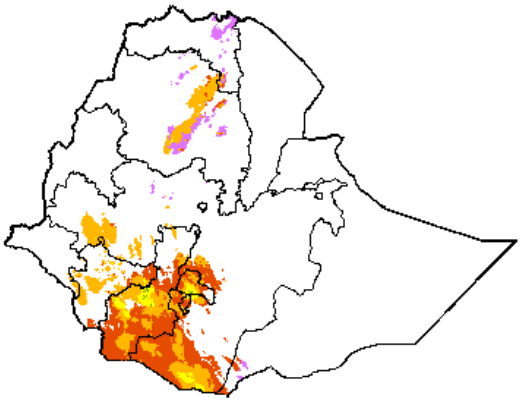
Climatological normal

Comparison with the previous Dekad

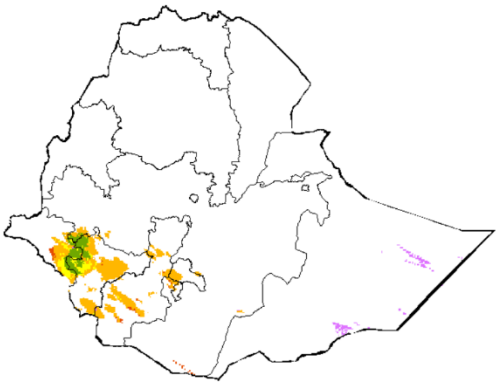
The comparison of 2nd dekad of January 2024 and 1st dekad January 2024 show that slight increase of rainfall was observed in Southern Ethiopia, Sidama, Southern and western Oromia and part of Amhara regions. On the other hand, slight decrease of rainfall was observed over South west Ethiopia and Gambella region. No change on the rest part of the country.



Difference of two Dekad



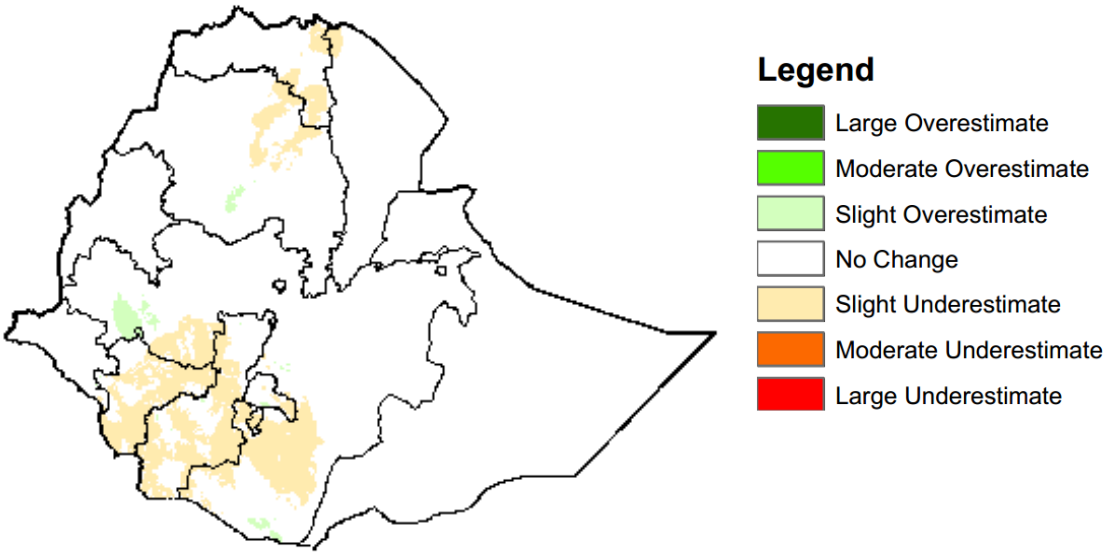
Current dekad

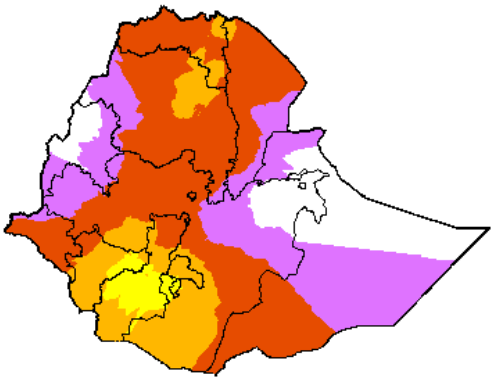


Previous dekad

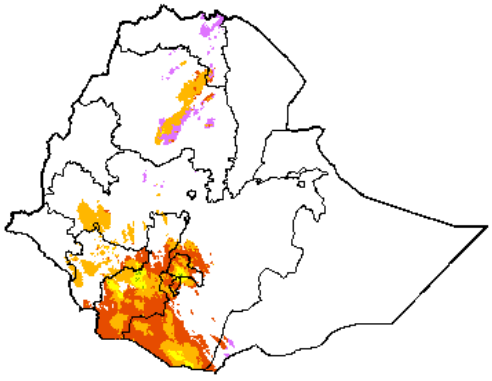
Comparison with the ground observation

The satellite rainfall estimation shows that there was slight overestimate over a few parts of western Oomiya region. On the other hand, slight underestimate was observed over south Ethiopia, South West Ethiopia, Central Ethiopia, some part of Amhara and Tigray regions. There is no significant difference on the rest parts of the country, it shows the same pattern as compared with the Actual.



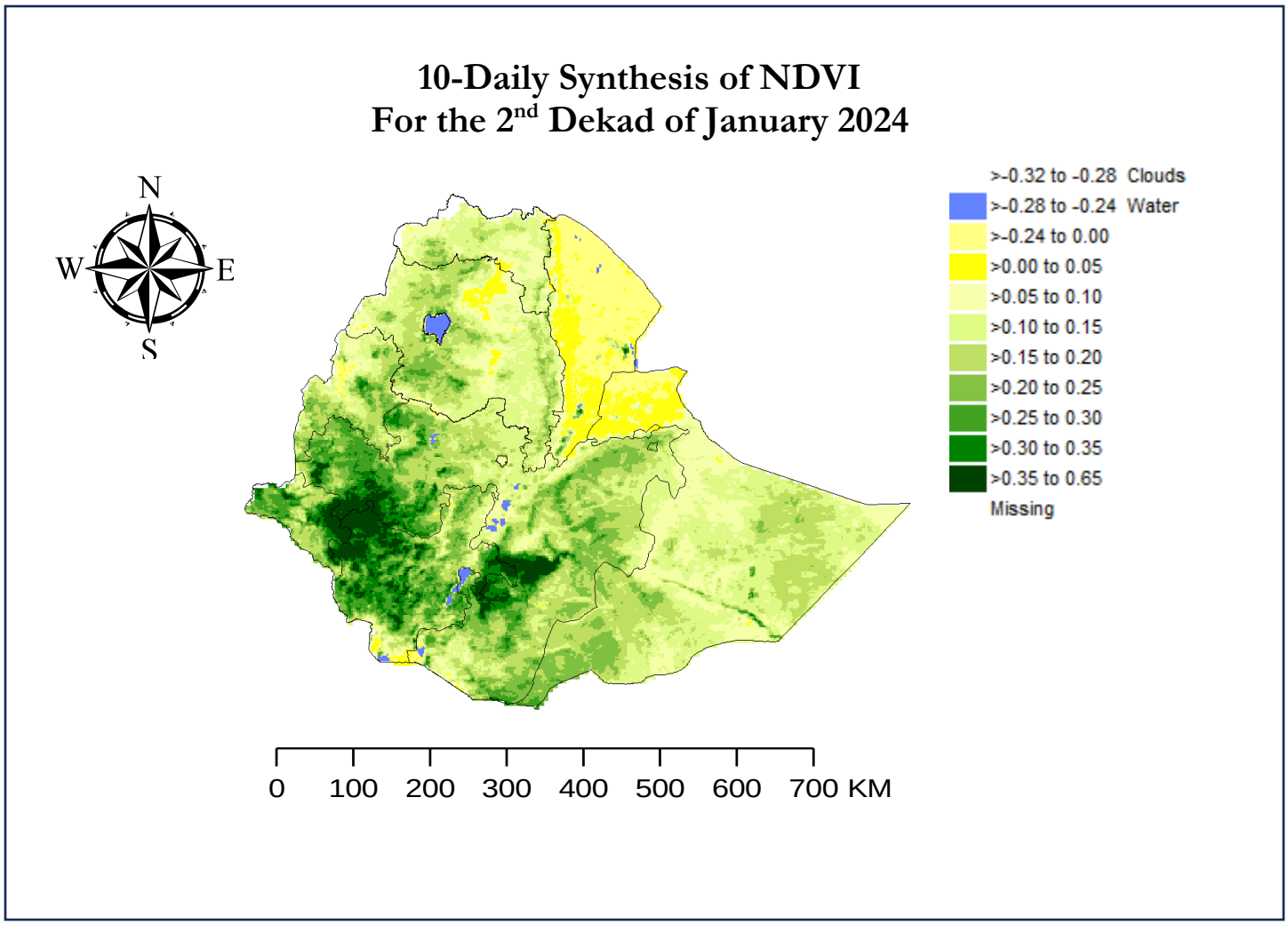


Ground Observation



Satellite rainfall estimation

10-Daily Synthesis of NDVI



Assessment of synthesis NDVI for the 2nd 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 few parts of the country. Hence, South-west Ethiopia, Sidama, Gambella, most part of Oromia, few areas of Somali and Benishangul Gumuz regions covered by high to moderate greenness. Afar, some part of Tigray, 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, Southern west and eastern Oromia, south Ethiopia, south-west Ethiopia, Gambella, some part of Benishangul Gumuz and few areas of Amhara regions. On the other hand, small decrease of greenness was observed in part of Amhara, Afar, Oromia, pocket areas of Southern Ethiopia, Benishangul Gumuz and northern Somali regions.