Monthly Hydro Meteorology Bulletin

Forward

This Monthly Hydro Meteorological Bulletin is prepared and disseminated by the Ethiopia Meteorological institute (EMI). The ultimate objective of producing and disseminating this bulletin is to inform all level decision makers with the updated and relevant hydro meteorological information. This monthly Bulletin reviews the October 2025-month climate condition and its impacts over the river catchment across the country and highlights the November 2025 climate outlook along with the likely impact over the water dams and the rivers basins.

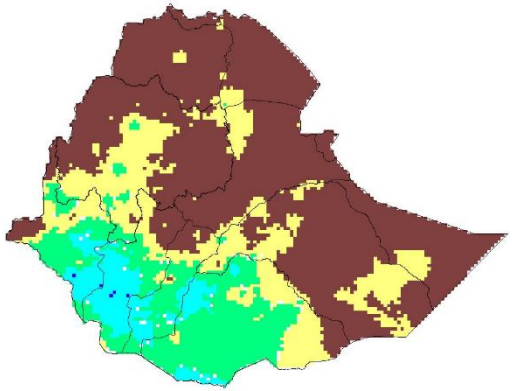
The information contained in this bulletin is believed to assist the water professionals for planning the capacity expansion of reservoirs, water supply, ecosystem restoration as well as rehabilitation of existing systems including dams, irrigation, canals, pumps, wetlands and the likes. In addition to the aforementioned benefit the bulletin also reveals the aridity levels of each basin, extremes heavy rainfall events and areas where significant amount of moistures loss through evapotranspiration. In the impact outlook section of the bulletin it provides the likelihood of the climate in the coming month and its potential impact over various aspect of the river basins including the hydraulic structures such as culverts, bridges, reservoir spillways, road embankments and dikes. It also indicates the measures need to be taken as the early actions so as to reduce the possible negative impact of the upcoming month climate condition. Meanwhile, your comments and constructive suggestions are highly appreciated to make the objectives of this bulletin a success.

1. Introduction

The provision of hydro meteorological services can contribute a significant role toward water resource management and socio-economic development. both surface water and groundwater management are essentially linked to climate variability. Therefore, the provided climate information and knowledge in this monthly hydro meteorological bulletin have a critical importance for efficient, equitable and sustainable development and management of the national water resources and for coping with any climate related risks. The information illustrates the impact of previous month climate on each and every water basins and the associated climate risks observed during the month under review. In addition to the previous month impact assessment, the bulletin also provided the expected climate condition for the coming months and its impact on the water resource. The design of water-use and flood-control facilities, mainly dams and reservoirs, is frequently based on these analyses. Estimating the likelihood of precipitation, the distribution of precipitation and the rate of evaporation in location and time, the heavy rainfall and the subsequent Runoff, extreme temperature and wind are among issues that hydro meteorologists are concerned with.

1.1 Monthly Hydro Meteorological Assessments

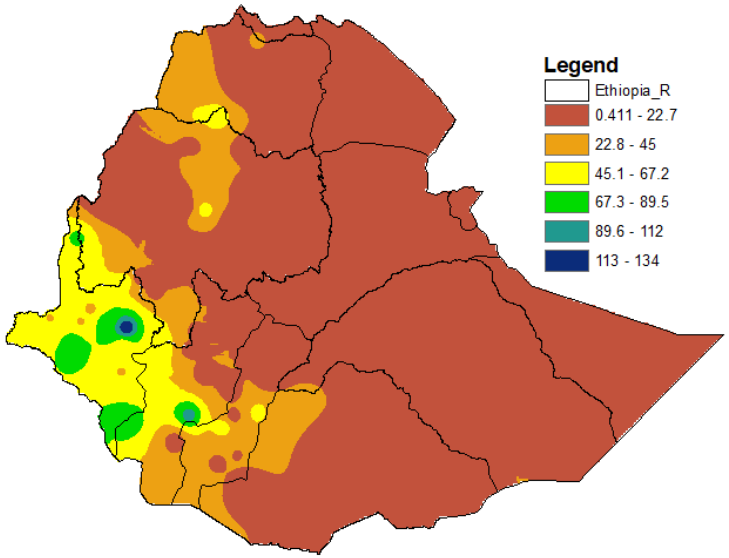
1.1.1 Climatology of the Monthly Aridity Index for Ethiopia's River Basins



Under normal climatic conditions, the November climatology shows that the western half, central areas, and much of the southern and south-eastern portions of the river basins experience humid to very wet moisture conditions. This pattern is mainly driven by the persistence of rainfall and the continued influx of atmospheric moisture. Consequently, most parts of the Abay, Baro-Akobo, Omo-Gibe, Rift Valley, Wabi-Shebele, Genale-Dawa, and Ogaden basins receive substantial moisture, with rainfall amounts exceeding potential evapotranspiration across these regions. This positive moisture balance enhances soil water availability, strengthens the hydrological response, and supports favorable agricultural and ecological conditions throughout the basins.

Figure 1. Monthly Moisture Index of Climatology over the river basin during November

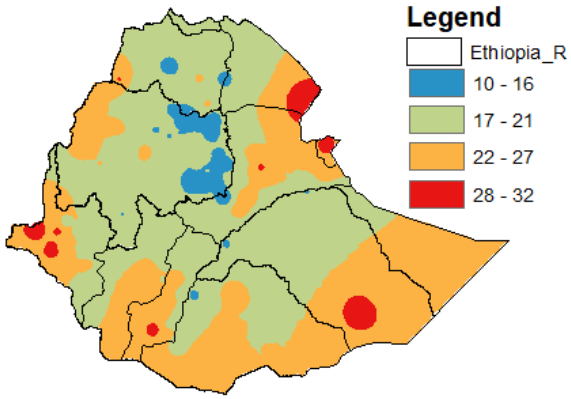
1.1.2 November 2025 Rainfall Assessment over the River Basins



As can be seen in figure 2 During November, the western and south and south-western basins, including Abay, Baro Akobo, Omo Gibe, Rift Valley and Genale Dawa**,** **received** moderate to high rainfall (67-134 mm)**,** leading to enhanced soil moisture, improved surface water flow, increased groundwater recharge, and favourable conditions for agriculture and ecosystems**.** In contrast, the eastern and north-eastern basins, such as Wabi shebele, middle and lower Tekeze, and Ogaden**,** experienced low rainfall (1–67 mm)**,** maintaining arid conditions and limited water availability**,** which may constrain agricultural activities and reduce ecological productivity.

Figure 2 November monthly Total rainfall over Ethiopian River Basin.

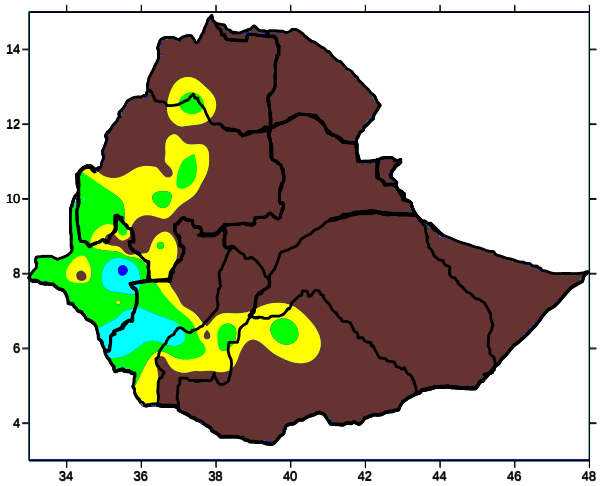
1.1.3 Monthly Mean Temperature over the River Basin



As shown in Figure 3, during November the monthly average daily temperatures of 10°C to 17°C were observed over limited highland areas of the upper Abay, Tekeze, upper and middle Wabi-Shebele, Genale-Dawa, Awash, Omo-Gibe, and Baro-Akobo basins. In contrast, most parts of Ogaden, middle and lower Wabi-Shebele, Genale-Dawa, the Rift Valley, Afar-Danakil, and the lower Baro–Akobo catchments experienced moderate temperatures ranging between 17°C and 21°C. However, higher monthly average temperatures exceeding 25°C were reported in several lowland catchments, including sections of the middle and lower Baro–Akobo, Rift Valley, Afar–Danakil, Awash, Abay, Wabi-Shebele, Genale–Dawa, and Ogaden basins. These elevated temperatures enhance evapotranspiration and can reduce available surface moisture, particularly in already arid or semi-arid areas.

Figure 3 November monthly mean temperature over Ethiopian River Basin

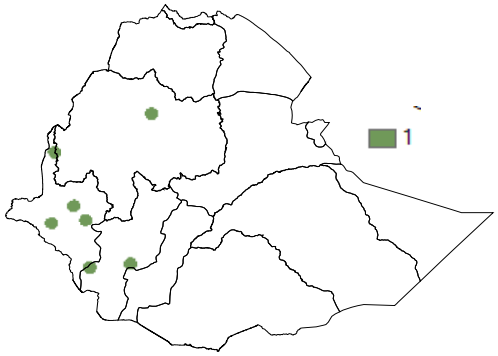
1.1.4 Assessments of Aridity Index during the month of November



During November, most parts of the Baro-Akobo, Omo-Gibe, Middle Rift Valley, Genale-Dawa, Wabi Shebele, Middle and Lower Abay, and Tekeze basins experienced enhanced surface flow conditions, reflecting improved soil moisture recharge and favorable runoff generation. Likewise, localized areas within the Afar–Danakil and Ogaden basins recorded sub-humid to arid moisture levels, indicating moderate but spatially variable wetness during the reviewed month. The southern and south-western segments of the Bega rainfall–benefiting catchments received moisture amounts that exceeded the monthly potential evapotranspiration. This positive moisture balance supported greater atmospheric humidity, enhanced soil moisture retention, and increased groundwater recharge potential. Conversely, arid moisture conditions persisted across the eastern half of the river basins, notably affecting large portions of the Tekeze, Mereb-Gash, Awash, Afar-Danakil, and Upper Eastern Abay catchments, where limited rainfall and high evaporative demand suppressed surface flow and soil moisture availability.

Figure 4. November monthly Aridity Index condition over the river basins

1.1.5 Distribution of Heavy fall (>30mm a day)



As illustrated in Figure 5, upper and lower part of Abay, middle Omo Gibe and most parts of Baro Akobo basins experienced one occurrences of heavy rainfall events during this month. These episodes of intense rainfall significantly contribute to improving water storage conditions by increasing the inflow to dams, reservoirs, and natural storage systems.

This pattern is particularly important for the Bega-season rainfall benefiting catchments, where such events provide a valuable opportunity to enhance water availability for both short-term and seasonal needs. Overall, the observed frequency of heavy rainfall in November indicates favorable conditions for surface water recharge, reservoir replenishment, and improved hydrological status across key Ethiopian river basins.

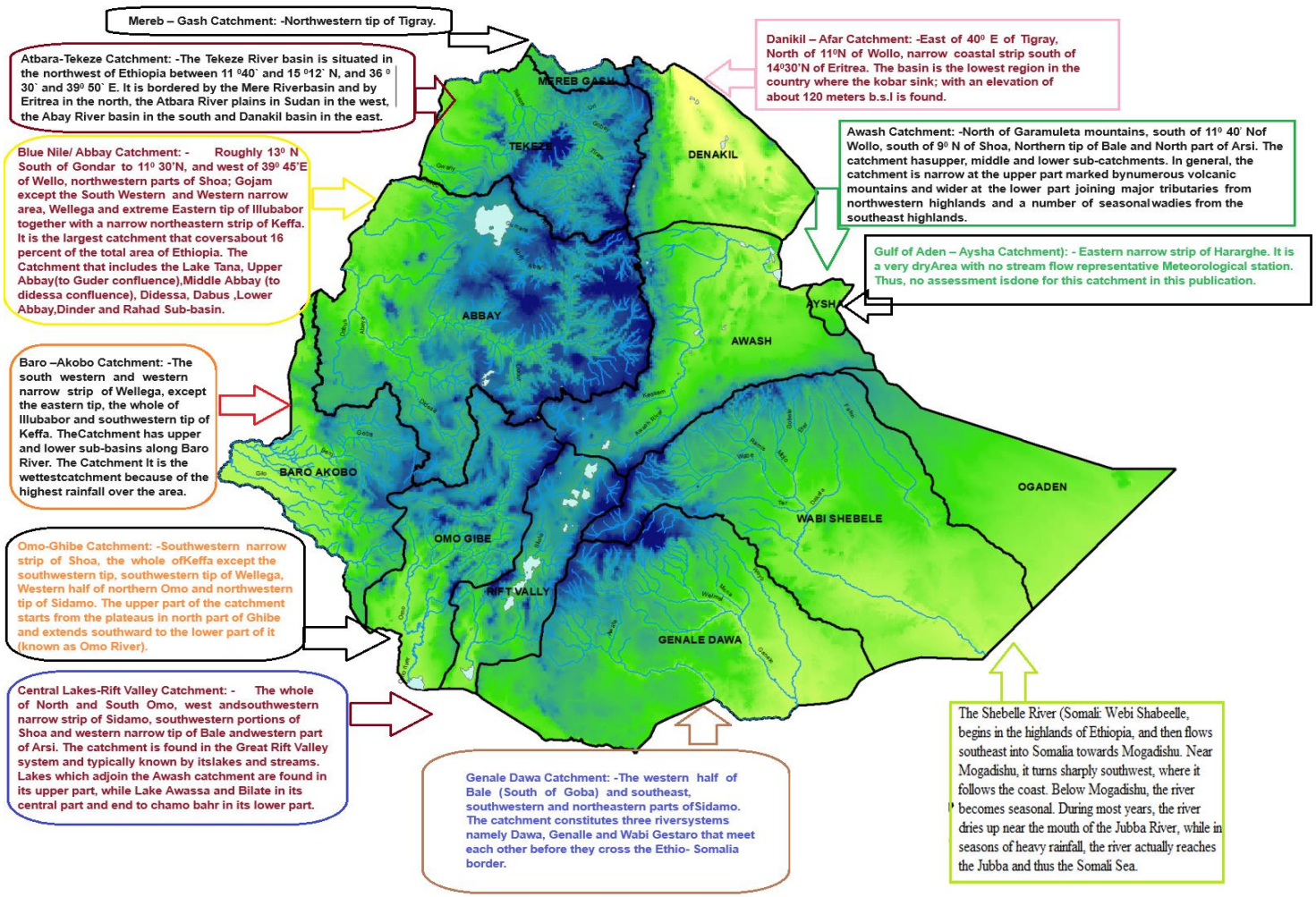
Figure 5 Heavy fall Frequency during the November month over Ethiopian River Basin

2.1. Expected weather impact on water resource during the coming December 2025

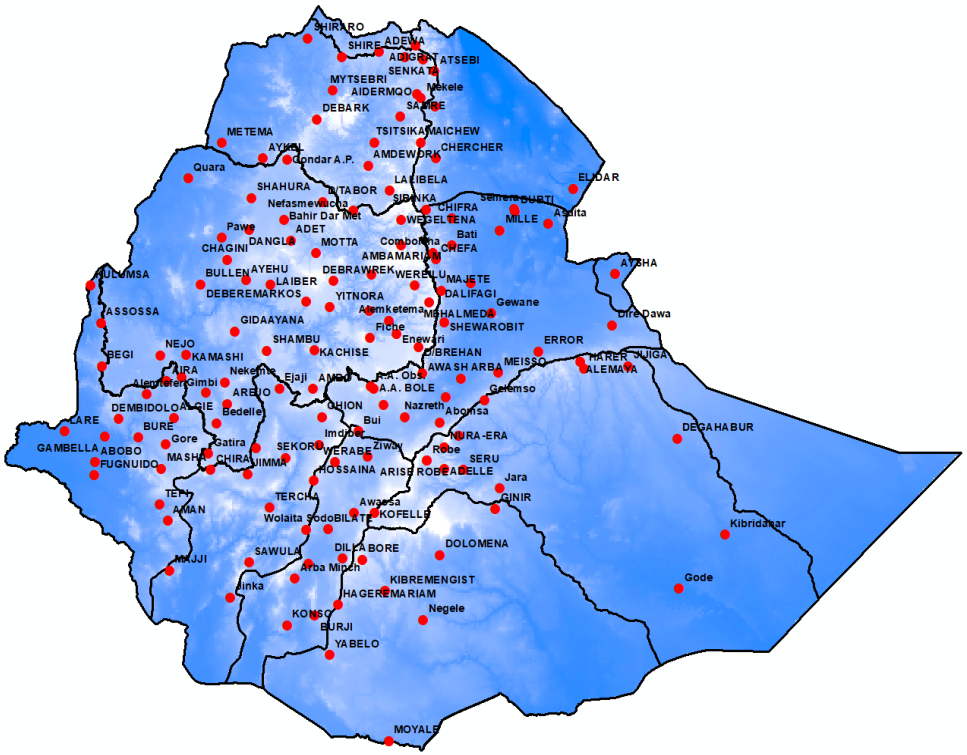
Forecast information indicates that during the upcoming month of December, most parts of the country's basins will remain under the influence of the dry Bega season. On the other hand, in limited areas such as Baro-Akobo, the middle and lower Omo-Gibe, Genale-Dawa, and the middle Abay basins, relatively better surface water flow is expected. It is recommended that these favourable conditions be utilized by preparing and implementing various water-harvesting methods in advance, in order to enhance and improve water storage.

Conversely, due to the expected high temperatures in several areas, the inflow to dams and other water bodies is likely to decrease. Therefore, in locations prone to water shortages, it is essential to use water efficiently and to implement measures that reduce the pressures and challenges associated with potential water scarcity.

APPENDIX **Major Ethiopian River Basin**



Number of weather stations used for Hydro Meteorological Analysis


SHIRARO
SHIRE
ADEWA
ADIGRAT
ATSEBI
SENKATA
MYTSEBRI
AIDERMQO
Mekele
DEBARK
SAMRE
METEMA
TSITSIKAMAICHEW
AYKEL
Gondar A.P.
CHERCHER
AMDEWORK
Quara
LALIBELA
ELIDAR
SHAHURA
B/TABOR
SIRINKA
CHIFRA
Samera
BURTI
Nefasmewcha
Bahir Dar Met
WOLDIYA
MILLE
Asaita
Pawe
ADET
DANGLA
MOTTA
Combolcha
Bati
CHAGNI
AMBAMARIAM
CHEFA
AYSHA
BULUMSA
BULLEN
AYEHU
LAIBER
DEBRAWREK
WERELU
MAJETE
DEBEREMARKOS
YITNORA
DALIFAGI
Gewane
ASSOSSA
Alemketema
MISHALMEDA
Dire Dawa
GIDAAYANA
Fiche
SHEWAROBIT
NEJO
SHAMBU
Enewari
ERROR
BEGI
KAMASHI
KACHISE
DIBREHAN
HARER
JIJIGA
AIRA
Nekemte
Gimbi
Ejaji
AMBO
A.A. Obs
AWASH ARBA
MEISSO
ALEMAYA
A.A. BOLE
ARBIJO
Geremso
DEMBIDOLO
GIE
Bedelle
OHION
Nazreth
Adamsa
LARE
BURE
Bui
DEGAHABUR
Gore
Gatira
Imdibir
NURA-ERA
GAMBELLA
ABOBO
SEKORU
Ziway
Robe
SERU
MASHA
CHIRAJIMMA
WERABE
FUGNUIDO
HOSSAINA
ARISEROBEADELLE
Jara
TEPI
TERCHA
GINIR
AMAN
Awassa
Wolaita Sodo
BILATE
KOFELE
Kibridahar
SAWULA
DILLABORE
DOLOMENA
MIJJI
Arba Minch
Gode
KIBREMENGIST
Jinka
HAGEREMARIAM
Negele
KONSO
BURJI
YABELO
MOYALE