Monthly Hydro Meteorology Bulletin

Forward

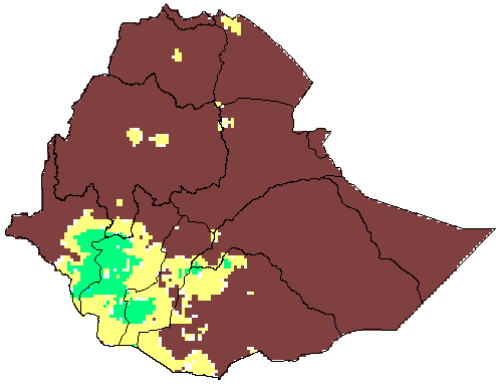
This Monthly Hydro Meteorological Bulletin is prepared and disseminated by the Ethiopia Meteorological institute (EMI). The ultimate objective of producing and disseminating this bulletin is to inform all level decision makers with the updated and relevant hydro meteorological information. This monthly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

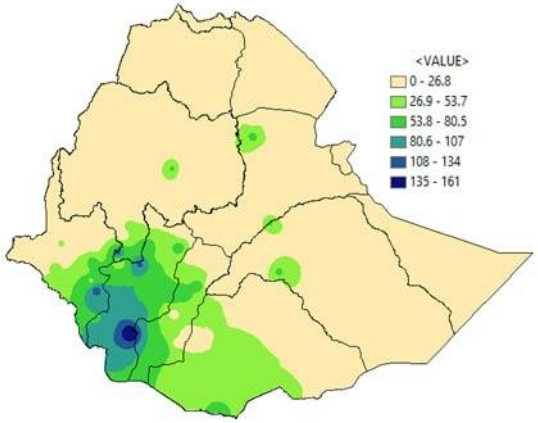
1.1.1 Monthly surface water flow Climatology over the Ethiopian River Basin



December climatology, under normal climatic conditions, the western, northern, central, and most southern parts of the river basin experiencing humid to very wet moisture conditions. This situation primarily resulted from the persistence of rainfall and the continued inflow of atmospheric moisture. As a result, most parts of the Abay, Baro Akobo, Omo Gibe, Rift Valley, Wabishebele, Genale Dawa, and Ogaden basins were received substantial moisture, with rainfall amounts surpassing the potential evapotranspiration across the respective areas. This reflects a positive moisture balance, which contributed to increased soil water availability, Improves hydrological response, and favorable conditions for agricultural and ecological activities throughout the basins.

Figure 1. Monthly Moisture Climatology over the river basin during December

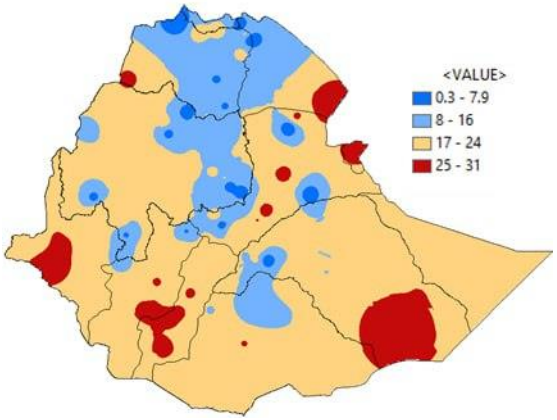
1.1.2 December 2025 Rainfall Assessment over the River Basins



As can be seen in figure 2 During December, the western and south-western basins, including lower Abay, most parts of Baro Akobo, Omo Gibe and Genale Dawa**, received** moderate to high rainfall (135–161 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 (26–53 mm)**,** maintaining arid conditions and limited water availability**,** which may constrain agricultural activities and reduce ecological productivity.

Figure 2 December monthly Total rainfall over Ethiopian River Basin.

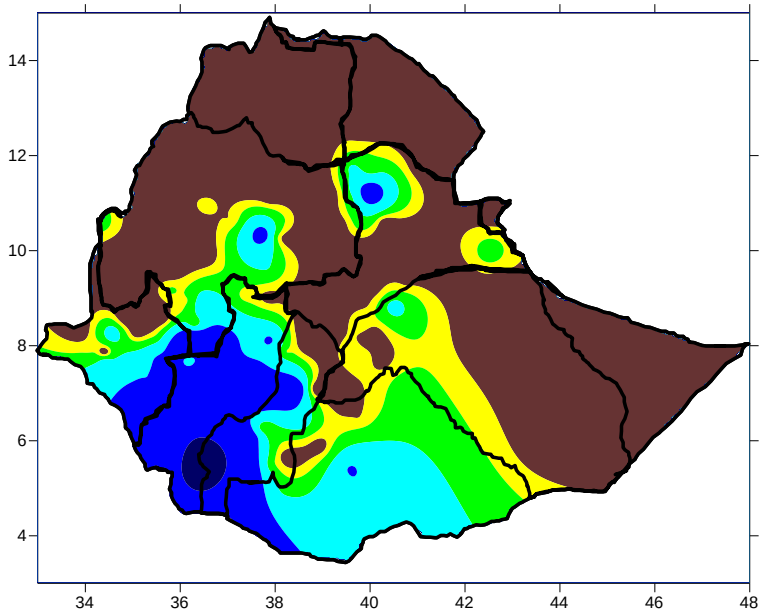
1.1.3 Monthly Mean Temperature over the River Basin



In December, the monthly mean temperature shows a clear regional distribution. As illustrated in Figure 3, daily averages of 8–16°C were recorded across most of the Tekeze, Mereb-Gesha, Afar-Denakil, and Upper Abay catchments, as well as in isolated areas of the Upper Genale-Dawa. Monthly averages below 25°C prevailed in parts of the eastern Upper Abay, most of the Upper and Middle Abay, Upper Baro-Akobo, the margins and upper reaches of the Omo-Gibe basin, isolated sections of the Upper Rift Valley, and portions of the Upper Wabi-Shebelle, Awash, and Genale-Dawa catchments. Conversely, monthly average temperatures exceeding 25°C were observed in the remaining areas, including parts of the Middle and Lower Baro-Akobo, Rift Valley, Afar-Danakil, Awash, Abay, Wabi-Shebelle, Genale-Dawa, and Ogaden basins.

Figure 3 December monthly mean temperature over Ethiopian River Basin

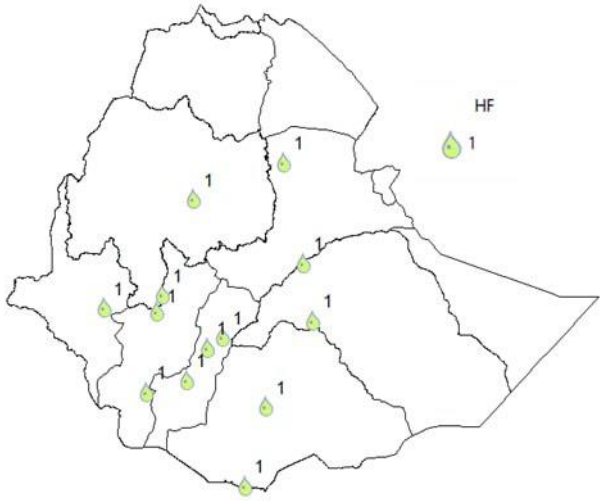
1.1.4 Assessments of Surface water flow during December,2025



Based on an assessment of the impacts of the December 1-31, 2025 weather conditions on the water sector, hydro-meteorological analysis indicates that during the past December, humid to high surface water flow conditions prevailed across much of the Baro-Akobo, Omo-Gibe, Rift Valley, Genale-Dawa, Upper Wabi-Shebelle, and Middle Abay basins, as well as in limited areas of the Middle and Lower Awash and Afar–Danakil basins. Moreover, very high surface water flows were observed in the Lower Omo–Gibe, Rift Valley, and Upper Baro–Akobo catchments, reflecting generally favorable reservoir and water availability conditions, as confirmed by analyzed hydro-meteorological data. In contrast, predominantly arid conditions persisted over large parts of the Awash, Afar–Danakil, Tekeze, Abay, Ogaden, Aysha, and Mereb-Gash basins during the same period.

Figure 4. December monthly Surface water flow condition over the river basins

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



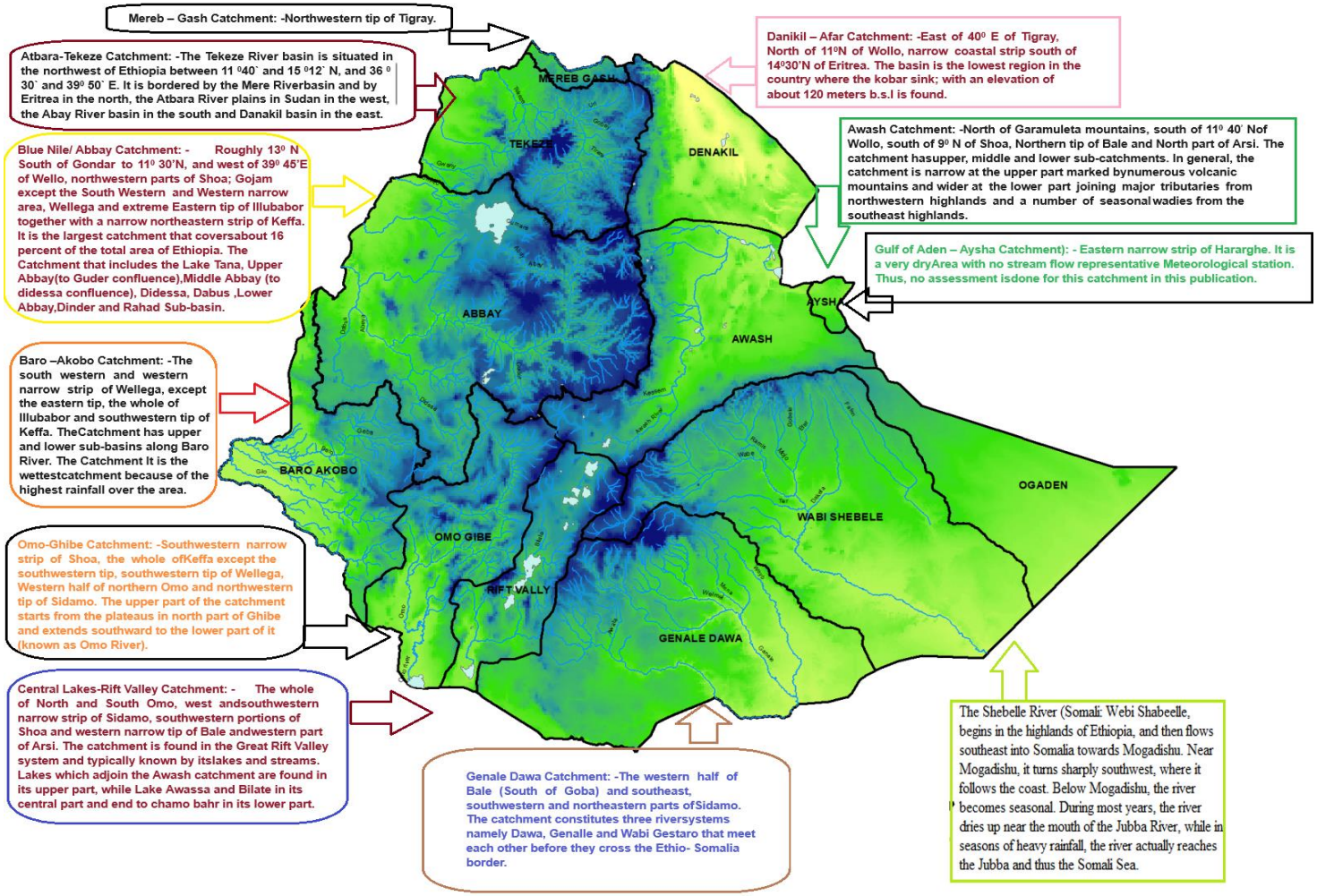
As depicted in Figure 5, one or more consecutive heavy rainfall events occurred in December across several key basins, including the Upper and Lower Abay, most of Omo-Gibe, Upper Baro-Akobo, Lower Awash, and the Upper and Middle Genale Dawa and Upper Wabi-Shebelle catchments. This frequency of substantial rainfall is significantly enhancing water retention in dams and reservoirs, particularly in regions that benefit from Bega season precipitation. Consequently, this month presents a valuable opportunity to bolster water storage capacity in these Bega-dependent basins ahead of the drier period.

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

2.1. Expected weather impact on water resource during the coming January 2026

Based on the January 1-31, 2026 weather outlook, most river basins across the country are expected to remain under the influence of the Bega season arid conditions. Although limited to moderate surface water flows are anticipated in selected basins, including the Baro-Akobo, middle and lower Omo-Gibe, Genale-Dawa, and middle Abay, the prevailing high evapotranspiration is likely to significantly reduce effective runoff and inflows to reservoirs and other water bodies. Consequently, water availability may decline during the period, and it is therefore recommended that early precautionary and water resource management measures be implemented to mitigate potential water scarcity impacts.

APPENDIX **Major Ethiopian River Basin**



Number of weather stations used for Hydro Meteorological Analysis