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.

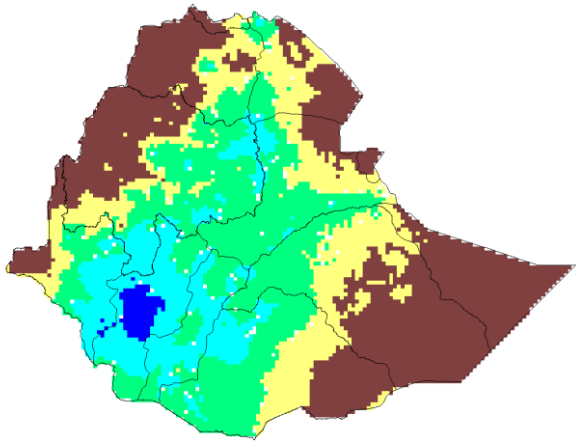
The information contained in this bulletin is believed to assist the water professionals for planning the capacity expansion of reservoirs, water supply, ecosystem restoration as well as rehabilitation of existing systems including dams, irrigation, canals, pumps, wetlands and the likes. In addition 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

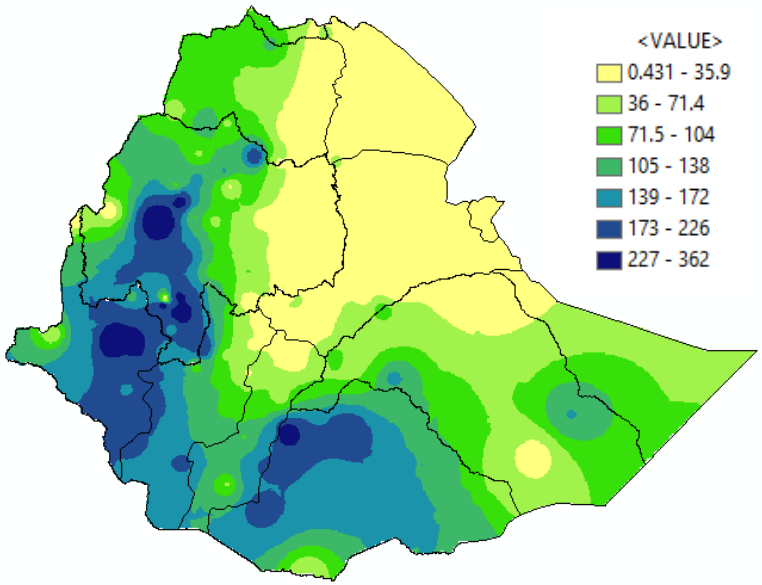
1.1.1 Monthly aridity Climatology over the Ethiopian River Basin



October 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 October

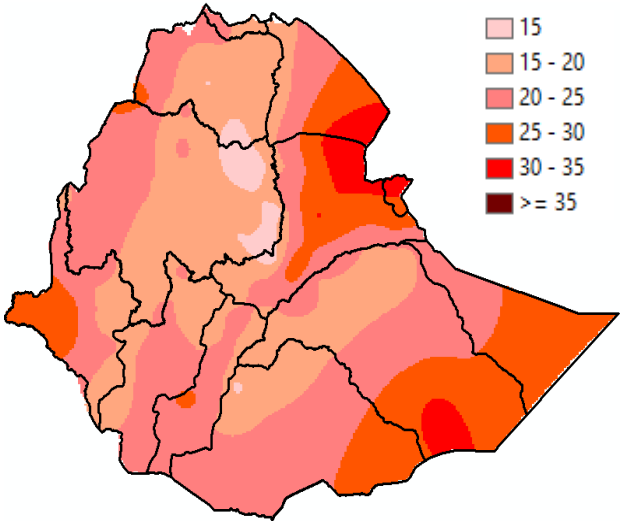
1.1.2 October 2025 Rainfall Assessment over the River Basins



As can be seen in figure 2 During October, the western and south-western basins, including Abay, Baro Akobo, Omo Gibe, Mereb Gashe, and Genale Dawa**, received** moderate to high rainfall (71–362 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 (1–71 mm)**,** maintaining dry conditions and limited water availability**,** which may constrain agricultural activities and reduce ecological productivity.

Figure 2 October monthly Total rainfall over Ethiopian River Basin.

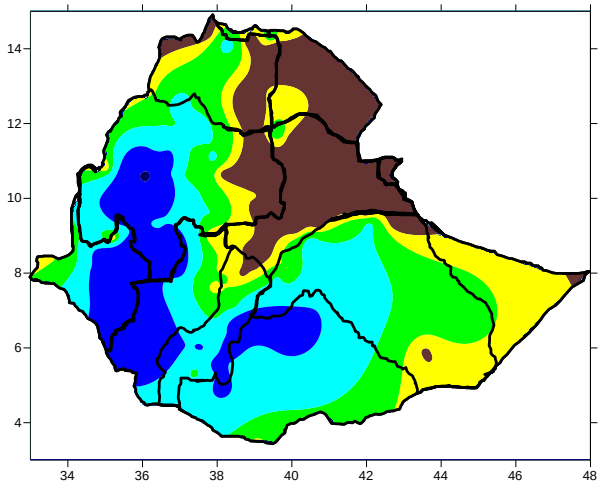
1.1.3 Monthly Mean Temperature over the River Basin



As we can see in Figure 3, In October month daily average 15 ^{o}C performed few area of upper Tekeze and few area upper eastern Abay and also most of upper and middle Abay, upper Baro Akobo, the margin and upper Omo Gibe, some pocket area of upper Rift Valley, upper Wabi shebele, Awash and Genale Dawa, experienced monthly average temperatures below 25^{o}C. However, the monthly average temperatures that were reported in the remaining catchments of some part of middle and lower BaroAkobo, Rift Valley, Afar Danakil, Awash, Abay, Wabi shebele, Genale Dawa and Ogaden were received above 25^{o}C.

Figure 3 October monthly mean temperature over Ethiopian River Basin

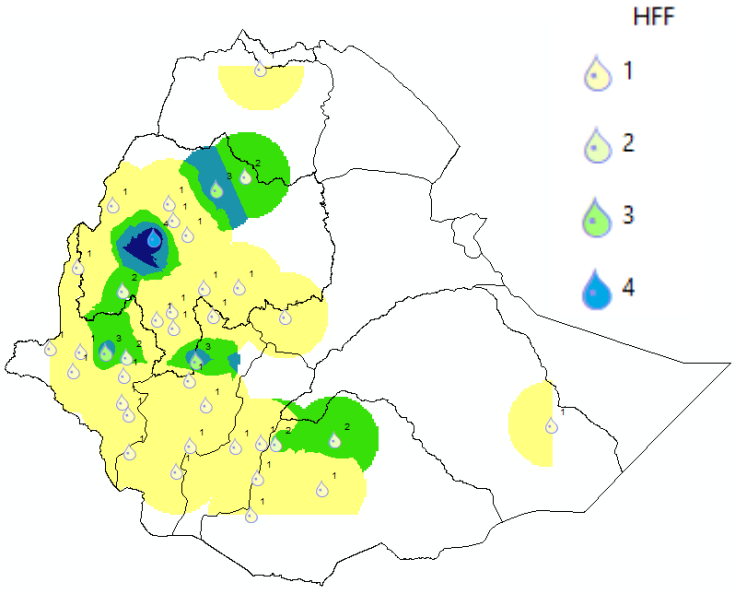
1.1.4 Assessments of Aridity Index during the month of October



During this month, most parts of Baro Akobo, Omo Gibe, Rift Valley, Genale Dawa, Mereb Gash, Wabisheble, middle and lower Tekeze have experienced wet to very wet moisture condition. Likewise, some part of Afar Danakil, Ogaden, received sub-humid to arid moisture during the month of under review. Since the received moisture over most parts of Bega rain benefiting catchment are well exceeded from the potential evapotranspiration of the month, it favours the available of plentiful humidity on the surface and ground water. On the other hand, arid moisture condition were prevailed across the eastern half river basin such as most of Awash, Afar Danakil, and upper Easter bay catchments.

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

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



As can be seen in the above figure 5, most of Abay, Omo Gibe, Baro Akobo, Tekeze, upper parts of Awash, and Genale Dawa, have received from one to four frequency of heavy fall in this month. This frequency of rainfall will be increasing water holding capacities for dams and reservoirs, whereas especially Bega rainfall benefiting area, therefore this month good chance enhance water capacity over Bega benefiting basins.

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

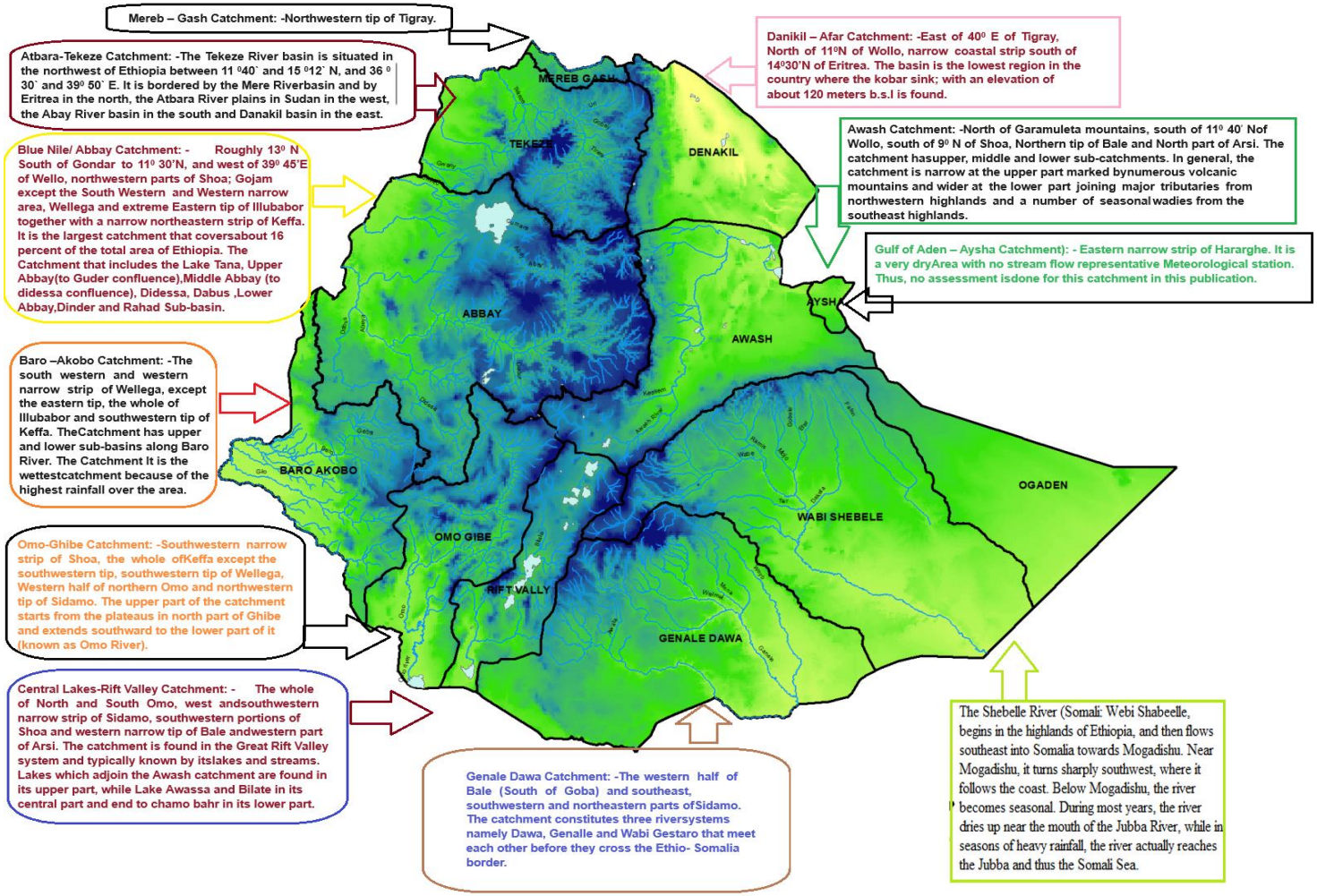
2.1. Expected weather impact on water resource during the coming November 2025

The impact of the upcoming weather conditions on water sector activities in November that most parts of the Baro Akobo, Omo Gibe, Genale Dawa, Ogaden, middle and lower Rift Valley, and Wabi Shebele basins are likely to experience improved surface water flow, creating favorable conditions for domestic water supply, irrigation, and ecological sustainability. In addition, it is expected that a variety of water harvesting and conservation methods will be actively implemented to mitigate potential water shortages during the approaching dry season, particularly in watersheds characterized by shorter rivers and limited natural storage capacities, where water availability is often constrained.

In contrast, most of the Afar Danakil, Awash, Tekeze, Mereb Gash, and Aysha watersheds are projected to remain under the influence of dry weather conditions, with limited rainfall and reduced surface water flow. These persistent dry conditions may result in water scarcity, increased on existing water resources, and potential challenges for agricultural production and ecosystem stability.

Therefore, it is strongly recommended and water resource managers develop and implement strategies for efficient and sustainable water use in these dry areas. Measures should focus on minimizing water wastage, preventing pollution, and optimizing the storage and distribution of available water resources to ensure continued supply for domestic, agricultural, and ecological needs during the forthcoming dry season.

APPENDIX **Major Ethiopian River Basin**



Number of weather stations used for Hydro Meteorological Analysis