

The effects of flooding and drought on clean water accessibility in Ethiopia

By Tassew Mekuria

In Ethiopia, the daytime temperature is constant throughout the year. The dry season has bright, sunny days with moderate to cool temperatures. From September to February is the long dry season known as Bega. The long rainy season is in June, July, and August known as Kiremt. Excessive heavy rains in Ethiopia start in April, peak in May, and continue up to August. Overall, Ethiopia has a tropical monsoon climate. The interior plateaux, usually above 2,400 meters in elevation, experience warmer days and cold nights. The hot zone consists of areas of low elevation which are very hot year-round and humid in the tropical valleys and the East of the country. The main economic source of the country is agriculture, for which activities such as plowing land for cash crops and fostering grass food for livestock are carried out after the soil is moistened from the rainwater during and after the rainy season. Recently, climate change is affecting the timing of the dry and rainy seasons. The unusual and unexpected flooding and droughts negatively affect cash crops, grasses, fruits, and vegetables, significantly reducing their production. This article aims at sharing information on some of the recent flooding and drought events in Ethiopia and their impacts on human life, health, well-being, and development.

Background

Ethiopia is in the horn of Africa within the tropical latitudes and with similar North-South and East-West dimensions¹. Most of the country's land is the mountainous plateau. The Ethiopian Highlands is a rugged mass of mountains in northeast Africa². The Ethiopian highlands cover large regions and form the largest continuous mountainous area in the horn of Africa. This type of topography is susceptible to rain runoff and creates flooding in downstream areas. According to the world health organization and UN reports, between 80-90% of all documented disasters from natural hazards during the past 10 years have resulted from floods, droughts, tropical cyclones, heatwaves, and severe storms. The frequency and intensity of extreme precipitation, and related flood events, are expected to continue to increase due to climate change³.

Global climate change and environmental degradation increase the flood risk. Flooding causes displacement and loss of lives, damage to infrastructures in different parts of the country. According to national authorities, flooding has so far affected more than 470,000 people in the Somali region in the past 2 years, including more than 300,000 people who have been displaced. The Somali region was severely hit, with nearly 80% of the flood-affected and displaced people located in this region. Floods often cause major damage to basic civil infrastructures such as water supplies, sanitation, waste disposal systems, and other essential services², causing serious challenges to public health such as the spread of diseases, pathogens, and pollutants into water supplies from the flooded sewer system and open defecation. The Office for the Coordination of Humanitarian Affairs (OCHA) is part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. OCHA Ethiopia indicated that floods could pollute water sources, damage shallow wells, boreholes, and water pipes. As a result of flooding, people are unable to access safe drinking water. These effects have even more severe consequences in community-managed rural water supply systems². Global warming increases precipitation variability,

meaning there will be more periods of both extreme precipitation and drought. This creates the need for expanded water storage during drought years and increased risk of flooding, and drought.

Recent flooding events In Ethiopia

Massive flooding occurs frequently in five regions of Ethiopia, Afar, the Oromia, Gambella, Southern Nations Nationalities People's Region (SNNPR), and Amhara. According to the flood list Africa, <https://floodlist.com/africa>, floods are repeated in Ethiopia and cause deaths and significant property damages³. The OCHA Ethiopia flood reports stress that the country is getting life-threatening and infrastructure destructive flooding events frequently. Some of the major flooding destruction that occurred in Ethiopia between 2014 and 2022 are the following:

A | Addis Ababa: The flood list report indicated that at least 7 people died in flash floods that struck the city of Addis Ababa, capital of Ethiopia in August 2021. Several neighborhoods of the city were inundated after heavy rain. Roads were submerged, cars were stranded, and buildings were damaged (see [Fig. 1](#)). Such a kind of city flood creates significant contamination to nearby municipal water wells from washed-out solid wastes due to the city's poor waste management practices.

B | Afar Region: In August 2021 the Awash River broke its banks in northern Ethiopia, flooding areas of the Afar Region. The overflowing Awash River caused flooding in Asayta. Over 50 hectares of farmland were damaged, and the flooding affected thousands of people in the region from late April to early May 2021. Around 27,400 people were displaced. UN warned that several people may have been exposed to waterborne diseases in the region due to this flood event.

C | SNNPR and Somali regions: From April to May 2021, flooding affected thousands of people across the SNNPR and Somali regions of Ethiopia. In the SNNPR, hailstorms damaged crops in Chama Hembecho and Afama Mino Kebeles of Boloso Sore Woreda in Wolayta Zone, and some 250 hectares of land were



Figure 1 | Buildings and cars submerged during a flood event in Addis Ababa city. Source: Flood list Africa.

flooded in Abela Abaya Woreda. Seven people died and around 11,200 households were displaced. The flood list report indicated that these areas were not in the flood-prone zone but received heavy rains in May 2021. The Shabelle, Jarar, Dolo, Afder, Fafan, and Korahe Zones of the Somali Region were all flooded, and numerous people were displaced.

D | Dire Dawa: This region is flood-prone and nine people died when a wall collapsed in a residential area following hours of heavy rain in Dire Dawa city in May 2021. The flood list report indicated that the accident took place at Kebele 03, known as Shementeria, after 4 hours of heavy rain. At least four people died in the city under similar circumstances in late April last year. Recent heavy rainfall also caused buildings to collapse in neighboring Somalia. In this region, access to clean and safe drinking water is considerably challenging¹.

E | Awash River in Amhara and Afar region: In September 2021, heavy summer season rains caused flooding in many parts of Ethiopia. Over 500,000 people were affected, 300,000 people were displaced by flooding around the Awash River areas in Amibara and Awash Fentale woredas (districts) of the Afar region, and at least five people died according to the OCHA Ethiopia report. The Koka and Kesem dams on the Awash River commonly known as the lowland dams represent a flood risk for the downstream communities due to overflow. This caused the displacement of more than 144,000 people in 2020. Heavy rainfall was reported in the northern Amhara Region, Bahir Dar, and Gondar³. The Somali, Tigray, and Afar regions are leading in the number of people affected or displaced by flooding in 2020 and 2021 (**Table 1**).

F | Gamo zone in south Ethiopia: The flood list Africa noted that at least 10 people died in a landslide caused by heavy rainfall in southern Ethiopia in May 2020. The landslide buried a two-story house, and several other homes were also damaged or destroyed in the area. Flooding has blighted wide areas of the country since late April. Seasonal flooding affected over 470,000 people in southern Ethiopia (**Figure 2**).

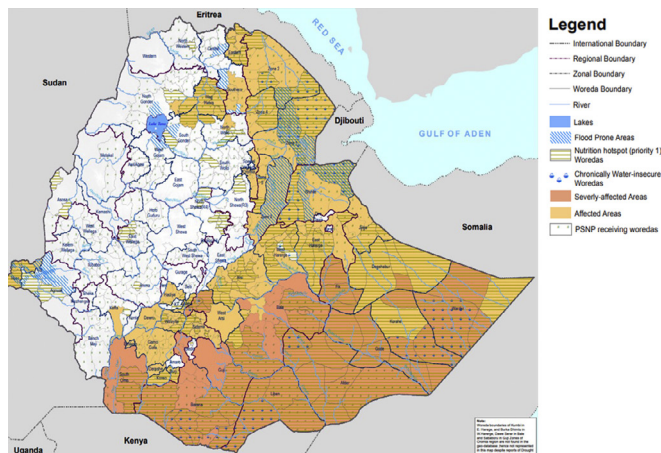


Figure 2 | Ethiopian zonal, regional, and national map contemplating flood-prone areas, rivers, lakes, and arid areas. Source: OCHA Ethiopia.

Flooding in Eastern Africa affected over 2.8 million people in 2019. In Ethiopia, about 570,000 people were affected, including more than 200,000 displaced, and rains have negatively affected the harvest season. (The OCHA Ethiopia August 2020 report).

Region	# of people affected	# of people displaced
Somali	336,810	179,140
SNNPR	398,491	98,306
Amhara	586,342	12,329
Oromia	539,761	52,429
Afar	63,410	40,490
Tigray	14,550	3,500
Gambela	44,340	30,635
Benishangul Gumz	55,979	3,915
Dire Dawa	15,000	10,000
Harari	2,000	500
Addis Ababa	10,000	3,000
TOTAL	2,066,683	434,154

Table 1 | The number of people per region displaced or affected by flood in Ethiopia in 2020. Source: Disaster Risk management and Food security sector.

It is estimated that more than 2 million people were affected by river and flash floods in the 2020 kiremt season in the flood-prone regions (**Figure 2**). Moreover, about 435,000 people, or 21% of the population across the country are likely to have been displaced (**Table 1**).

The above flooding events significantly reduced the accessibility to clean and safe drinking water supplies³. Floods are the main sources of contamination in poorly regulated water supply systems in several towns and cities of the country. Research indicated that more than 2,000 children die every year in Ethiopia due to contaminated drinking water-related diseases. Researchers estimate that 25% to 35% of the unknown causes of children’s deaths in Ethiopia may be associated with contaminated water-related illnesses².

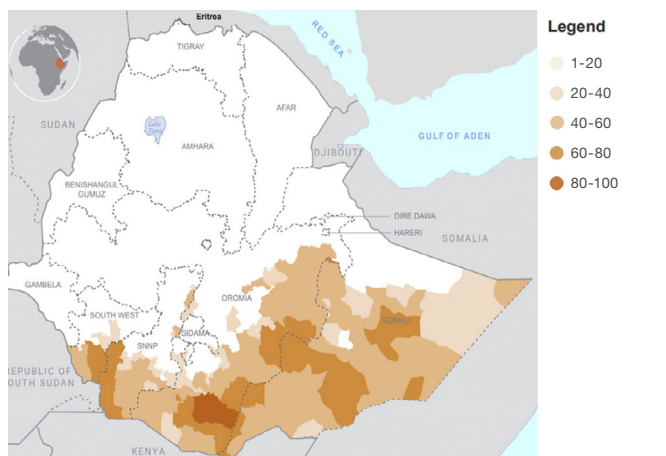


Figure 3 | Drought intensity comparison map. Several areas in southern and southeastern Ethiopia have been affected by the drought. Source: OCHA Ethiopia.



Figure 4 | Photos showing the impacts of drought on children's life. Kids traveling several kilometers barefoot to fetch water. Source: African News and OCHA Ethiopia.

The impacts of Droughts on water accessibility in Ethiopia

According to UNICEF, about 6.8 million people will need urgent humanitarian assistance by mid-March 2022 due to water scarcity. In Oromia and Somali around 225,000 malnourished children and over 100,000 pregnant and breastfeeding women need urgent nutrition support⁴. The lack of clean water is further worsening the situation for children and women⁵.

Children are forced to drink contaminated water, risking contracting various diseases including diarrhea, which is a major cause of death among children under five. Children are also missing out on an education due to the drought⁶. The African news indicated that several students are out of school to help their parents in searching for safe drinking water (Figure 4). Over 155,000 children in the lowlands of Somali and Oromia regions have dropped out of school because of water scarcity. Frequently women and children travel more than 10 kilometers to fetch water¹. African News reported that in Ethiopia and Somalia children are unable to attend their school due to water scarcity as they are busy searching for water all day long.

The report also highlighted, that three consecutive failed rainy seasons have brought on a severe drought in Ethiopia's lowland regions of Afar, Oromia, SNNPR and the Somali regions drying up water wells, killing livestock, and destroying crops.

The Africa renewal report indicated that Ethiopia is in the grip of its worst drought in recent history. More than ten million people need assistance. Humanitarian needs in Ethiopia have tripled since early 2015 as severe drought in some regions, intensified by the strongest *El Niño* in decades, caused successive harvest failures and widespread livestock deaths⁴. Acute malnutrition has risen dramatically, and one-quarter of Ethiopia's districts are now officially classified as facing a nutrition crisis⁵. The accessibility to clean and safe drinking water has been reduced significantly from 2015 to the present¹. Village streams are drying, the water volume of rivers has decreased by more than 60%, groundwater is unavailable, and surface water is very little and contaminated⁴. The impacts of flooding, drought, and environmental contamination together worsen clean water

accessibility, as well as the washed-out animal and human feces, solid wastes left on open ground, and plastics easily transported by flooding and mixed in the waters of rivers, streams, ponds, and wells⁴. Similar kinds of contaminants might be blown by dry wind bringing them into different water sources⁶. That is how both flooding and droughts play important roles in affecting the availability of clean and safe drinking water in Ethiopia. Climate change is directly impacting activities of human life in countries like Ethiopia².

According to OCHA, Ethiopia is highly vulnerable to severe seasonal droughts, having experienced them every decade since 1953. The 1983-1985 drought caused up to an estimated million famine-related deaths. The droughts of 2002, 2011, and 2015-2016 left also millions of Ethiopians without enough food⁴. Droughts not only cause food and nutrition insecurity, but they also limit access to water for people and animals, increase the burden of waterborne diseases, and can lead to displacement, disruptions in school attendance, and other negative effects¹. After November 2020, four regions of Ethiopia, Afar, Oromia, Somali, and SNNP did not provide enough food, with about 12.9 million people being affected.

The intensity of drought increased significantly from 2020 to 2021. Ethiopia is experiencing a prolonged drought after three consecutive failed rainy seasons since late 2020 affecting 6.8 million people living in the Oromia, SNNPR, Southwest, and Somali regions. Several areas in southern and southeastern Ethiopia have been affected by the drought. Figure 3 shows how frequently there was a dry ten-day period between October and December 2021, the last rainy season. Dry is defined as 80 percent or less than the zonal median normalized difference vegetation index.

The drought is compromising fragile livelihoods heavily reliant on livestock and causing worsening food security and nutrition. The affected people are in urgent need of food, water, healthcare, shelter, and livestock assistance.

Large-scale humanitarian assistance will be needed throughout much of the country in 2022, coupled with unhindered humanitarian access in northern Ethiopia, to avert the loss of lives and livelihoods⁵.

Conclusions

The effect of climate change in terms of floods and droughts has become paramount in the global setting since it involves hydrological extremes affecting the natural, economic, and societal environment. The lack of access to safe and clean drinking water is aggravated by frequent flooding and drought events in Ethiopia. Climate affects the spatial and temporal availability of water across several regions of Ethiopia. However, several regions of the country including big cities such as Addis Ababa are experiencing unexpected and unseasonal rain, causing floods that destroy infrastructures and contaminate drinking water tanks, and wells. In other regions such as Somalia and

Afar, people spent several hours and travel more than 10 kilometers to fetch a bucket of water. As a result, agricultural, educational, trading, mining, nomadic, and other activities are negatively impacted, affecting the overall economy of the country.

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