

GROUNDWATER STATUS BULLETIN

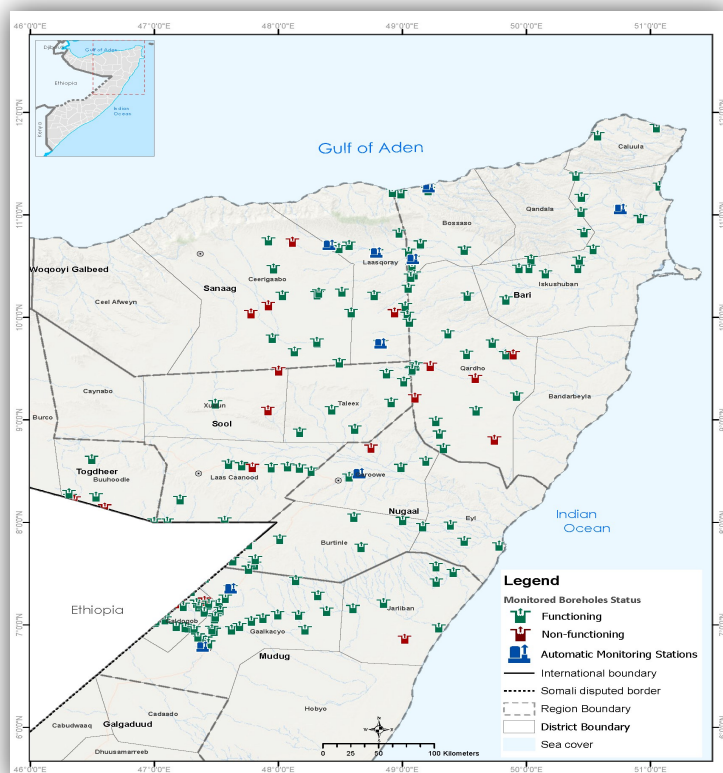
Issued: 5 March 2025

Introduction

Groundwater is the primary water source for Puntland's communities, livestock, and small-scale agriculture in a region characterized by arid climates and erratic rainfall. Recognizing its critical importance, [Puntland Water Development Agency](#) (PWDA), in partnership with [FAO SWALIM](#) and the support of USAID BHA, has implemented a comprehensive groundwater monitoring initiative.

This initiative involved installing 10 telemetry groundwater monitoring stations at strategic boreholes to track real-time water levels (m), temperature (°C), and electrical conductivity (EC). In addition, 170 Android mobile phones preinstalled with the kobo toolkit forms were distributed to the selected borehole operators, who were trained to collect and transmit weekly data on functionality, cause for malfunctioning, operational hours, yield, consumption patterns (human, livestock, irrigation, and trucking), water prices, and EC levels (covering about one quarter of all boreholes in Puntland State).

Amid persistent climatic challenges, including the lingering impacts of La Niña, irregular Deyr 2024 rains, and forecasts of below-average Gu' 2025 rains, this report underscores the urgency of adaptive water management. It highlights regional disparities in groundwater availability, borehole functionality, and escalating water prices driven by rising demand and climatic stressors. The analysis of rainfall trends, aquifer recharge, and seasonal usage patterns provides crucial insights for immediate interventions and long-term policy planning.



Map 1 - Monitored boreholes distribution and status as of Feb 2025

This bulletin is produced by PWDA with the technical support of [TerraTech solutions](#) and aims to furnish stakeholders with timely, actionable data on the status of groundwater resources—ensuring both the sustainability of water supply and informed decision-making for the future.



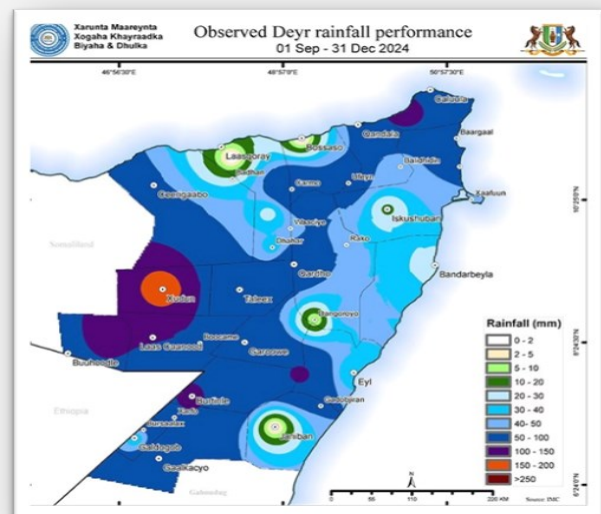
Key highlights:

- Groundwater levels remained mostly stable across Puntland, with fluctuations observed in Sanaag and Mudug, where some boreholes showed a declining trend.
- The below-average Deyr 2024 rains and projected below-normal Gu' 2025 rains are expected to limit groundwater recharge and increase reliance on boreholes.
- 9% of monitored boreholes were non-functional during the reporting period, mainly due to pump failures (46%), main raiser pipes (27%) and power supply issues (13%).
- Water prices have risen steadily, from \$0.24 per barrel (mid-2023) to \$0.38 (Feb 2025), with the sharpest increase occurring in late 2024 and early 2025 due to rising demand.
- Borehole pumping hours ranged between 6–10 hours daily, peaking during dry periods as reliance on groundwater increased.
- Livestock water demand fluctuates seasonally, with goats and sheep having the highest consumption, peaking in August–September and Jan–April.
- La Niña conditions through early to mid-2025 may lead to prolonged dry conditions, increasing groundwater stress and the need for close monitoring.
- Heightened competition for water resources is expected, potentially leading to increased conflicts and displacement in drought-prone areas.

Observed Deyr 2024 Rainfall Performance

According to the Puntland Information Management Centre (IMC) and SWALIM (see map 2), the Deyr 2024 (September–December) rains in Puntland were unevenly distributed, with notable contrasts across different regions:

- Southwestern areas around Galdogob received some of the highest totals, sporadically above 200 mm, indicating localized pockets of good rainfall.
- Central and inland districts near Garowe, Qardho, parts of Sool and Sanaag generally in 50–120 mm range, with some areas recording 120–200 mm. These amounts are around average to slightly below-average for the Deyr season.
- Northern coastal areas near Bosaso, Qandala and some adjacent coastal zones recorded minimal precipitation (5–20 mm), falling well below the seasonal norm.



Map 2—2024 Deyr Rainfall Performance—IMC Puntland

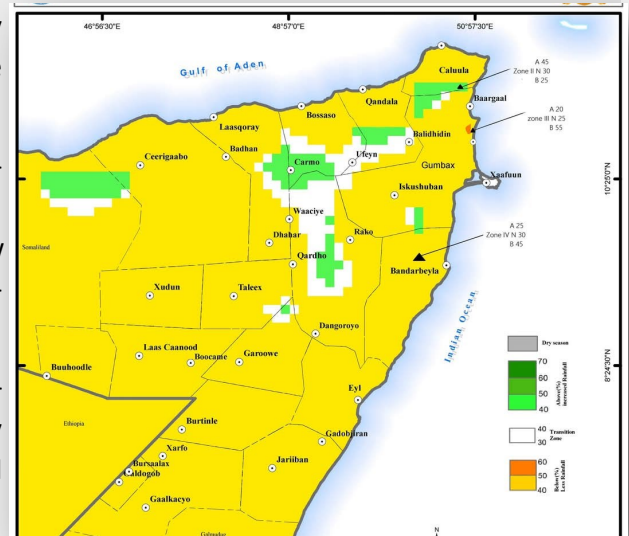
Overall, IMC notes that many areas in Puntland remained below their long-term mean for Deyr, despite a few localized pockets of average to above-average rainfall. This patchiness often forced communities in the driest spots to rely on water trucking and other emergency measures.

Gu' 2025 Seasonal Outlook (March–May)

Based on Puntland IMC, SWALIM and Intergovernmental Authority for Development (IGAD) Climate Prediction and Applications Centre (ICPAC) projections (see map 2):

- Most of Puntland shows a heightened likelihood of below-normal to near-normal rainfall.
- Some localized areas (especially in the northeast and a few pockets inland) may experience close-to-average rains, indicated by slightly more favorable coloring on the map.

The general consensus is that below-average Gu' rainfall could predominate across large swaths of Puntland. This forecast is closely linked to global La Niña conditions, which tend to suppress rainfall in the eastern Horn of Africa, including Puntland.



Map 3—2025 Gu' Outlook—IMC Puntland

Regional Trends Analysis

The regional groundwater monitoring data reveals fluctuations influenced by seasonal patterns and localized demand. During the rainy season, groundwater levels stabilize or rise due to recharge, while in the dry seasons (Hagaa and Jilaal), levels decline as reliance on boreholes increases. Boreholes in urban areas and IDP camps show less variability due to consistent human consumption, whereas those in rural and pastoral regions exhibit sharper fluctuations driven by livestock usage and agricultural activities. Identifying these trends helps in assessing groundwater sustainability, planning water resource management, and prioritizing critical areas for intervention.

Mudug

The below graph shows groundwater levels for Galkayo (blue line) and Harfo (green line). Galkayo remains highly stable near 80 meters, with only a single spike indicating a possible measurement anomaly or brief recharge event. In contrast, Harfo exhibits significant fluctuations, ranging from near 0 to over 40 meters, reflecting dynamic groundwater behavior influenced by rainfall, withdrawals, and recharge events.

Several sharp declines, especially in early October and late November, suggest heavy water consumption and rapid depletion, followed by quick recoveries.

The variability in Harfo indicates a more responsive, while Galkayo's stability suggests, less reactive to season fluctuations.

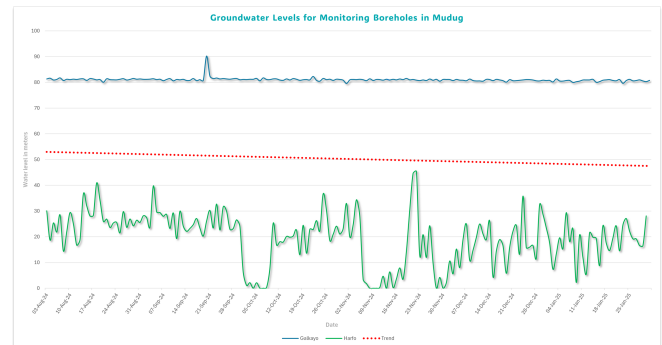


Chart 1—Groundwater levels in Mudug

Sanaag

This graph presents groundwater levels of Cawsane (green line) and Dhahar BH (blue line). Cawsane exhibits stable yet fluctuating levels between 65–75 meters, indicating seasonal variations and pumping effect but remains relatively stable. While Dhahar BH shows a steady decline from late June to early October, reaching its lowest point near 35 meters, suggesting significant groundwater abstraction and reduced recharge. A sharp recovery follows in mid-October, likely due to rainfall or recharge events, before stabilizing just below the trend line.

After December, Dhahar BH shows a gradual decline, indicating ongoing depletion.

The contrasting behaviors suggest differing recharge mechanisms, with Cawsane responding more dynamically and Dhahar BH exhibiting deeper aquifer depletion and recovery cycles.

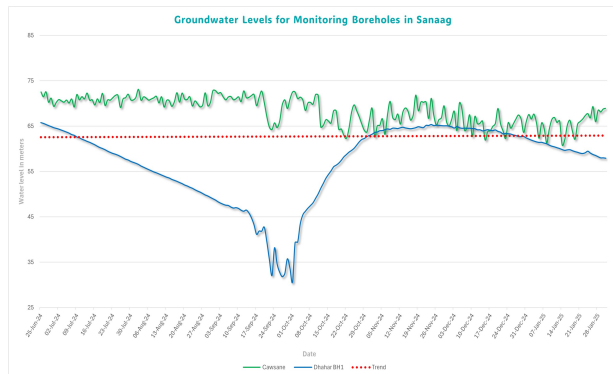


Chart 2 – Groundwater levels in Sanaag

Bari Region

The graph shows groundwater levels for Qorraxad BH (blue line) and Bosaso_WadajirIDPs (green line). Qorraxad BH remains stable around 48–50 meters, indicating minimal seasonal fluctuation, except for a sharp drop in late November, likely due to sudden abstraction or a sensor error, followed by a quick recovery. Bosaso_WadajirIDPs, representing shallow groundwater, remains consistently below 5 meters, showing slight variations but overall stability. The data suggests that the Qorraxad BH is largely unaffected by short-term changes, while the Bosaso_Wadajir IDP BH remains steady, possibly due to a balance between recharge and exploitation rate. The data suggests that the Qorraxad BH is largely unaffected by short-term changes, while the Bosaso_Wadajir IDP BH remains steady, possibly due to a balance between recharge and exploitation rate.

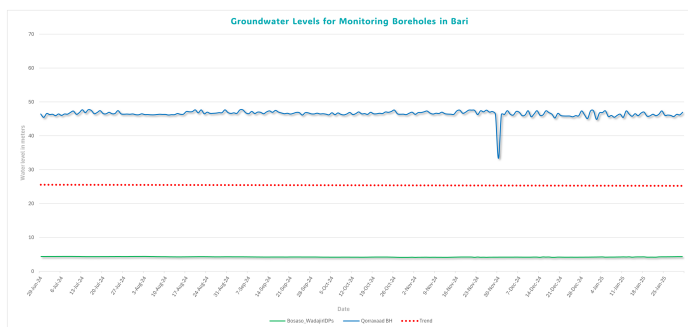


Chart 3 – Groundwater levels in Bari

Functionality and Reason for Breakdown

The bar chart presents borehole (BH) functionality by region as of February 2025, showing the number of functioning and non-functioning boreholes across nine regions. Mudug has the highest number of operational boreholes (47), followed by Bari (23) and Nugal (21). The regions with the least operational boreholes are Gardafuu (3) and Cayn (4). The total number of non-functioning boreholes is relatively low, with the highest counts in Mugud and Sanaag (3 each), followed Sool, Nugal, Cayn and Karkaar (2 each).

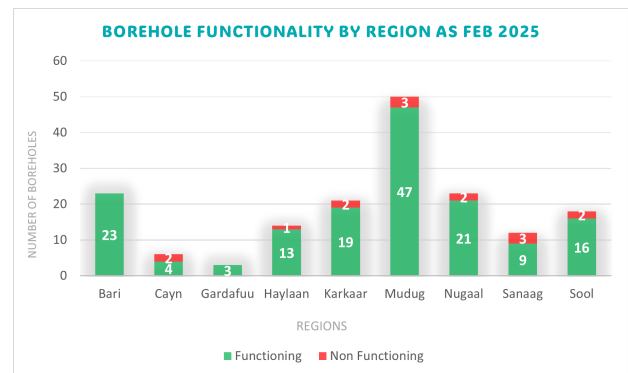


Chart 4 – Borehole functionality by region

The pie chart illustrates the causes of borehole malfunctions. The majority of failures (46%) are attributed to pump failure, followed by main riser corrosion (27%) and power supply disruption (13%). Notably, only one borehole has dried up, and another has suffered structural collapse, suggesting that technical failures—rather than groundwater depletion—are the primary issues affecting functionality. Prioritizing pump maintenance and ensuring reliable power supply could significantly enhance borehole operations across Puntland.

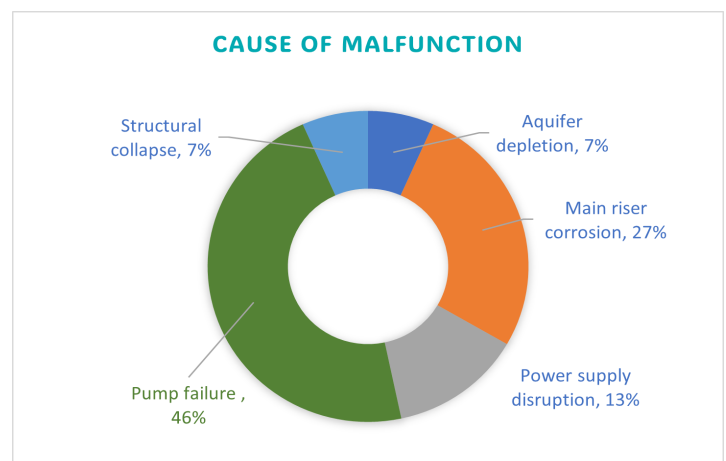


Chart 5– Cause of the borehole malfunction

Water Price

The below graph illustrates the average water price per barrel at the boreholes from July 2023 to February 2025, showing a general upward trend. The price remained relatively stable around \$0.30/barrel, with minor increases until early 2024. A notable dip occurred around May 2024, likely due to seasonal factors or surface water availability. However, prices rebounded quickly and resumed gradual rise through late 2024 to February 2025, peaking at \$0.38/barrel. This suggesting that seasonal demand and dried-up surface water sources are placing additional stress on the boreholes, thereby driving prices higher.

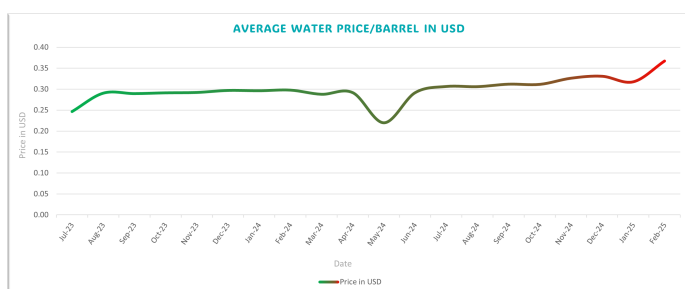


Chart 6 – Average water price

Pumping Hours

The graph indicates a clear seasonal pattern in borehole usage, with pumping hours fluctuating averagely between 6 to 10 hours daily depending on water availability. During the rainy season, pumping hours remain low due to the presence of alternative surface water sources. However, as the Hagaa and Jilaal dry periods set in, reliance on groundwater increases, driving up the pumping durations. Livestock water demand also peaks in dry periods when surface water sources dry up.

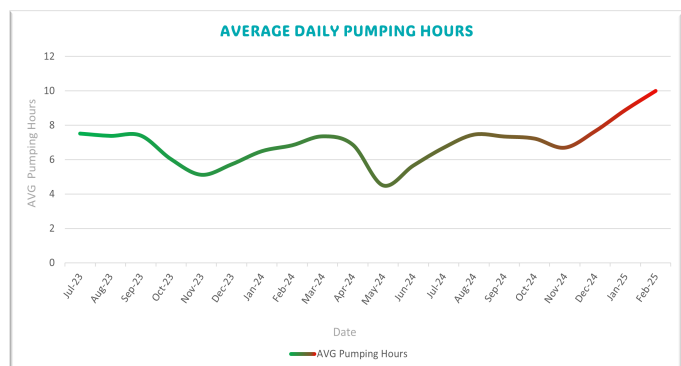


Chart 8– Average daily pumping hours

Livestock Usage

The daily average livestock usage graph indicates seasonal variations in water demand among different livestock species from July 2023 to February 2025. Goats and sheep (orange line) show the highest water usage, peaking in August-September and March-April, with a dip in November and May, likely reflecting migration patterns and pasture availability. Camels (yellow line) follow a similar trend but at a lower magnitude, peaking slightly later. Cattle (blue line) and donkeys/horses (green line) have relatively stable, lower usage, with minor fluctuations. The correlation between these trends and water availability suggests that reliance on boreholes increases during dry periods when surface water sources are depleted.

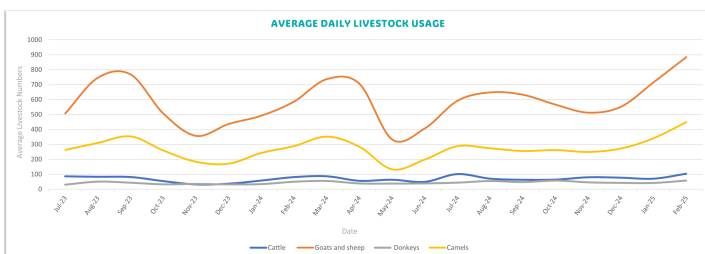
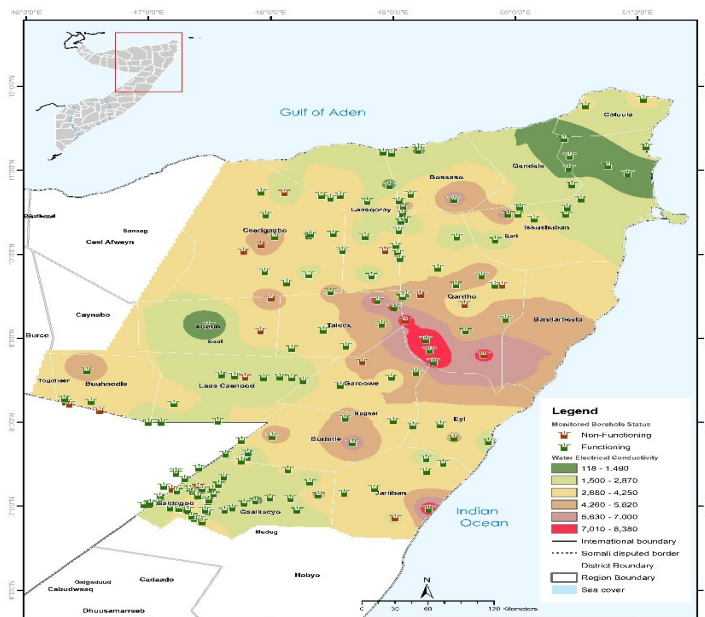


Chart 7 – Average daily livestock usage

Water Quality (Electroconductivity)

This map illustrates the spatial distribution of monitoring boreholes in Puntland overlaid on color-coded zones representing varying levels of EC ($\mu\text{S}/\text{cm}$), with darker hues generally indicating higher EC levels.



Map 4 - EC level of the monitoring boreholes

Water Tracking

The graph illustrates the average daily water trucking volume from July 2023 to February 2025, revealing a general upward trend marked by significant seasonal fluctuations. Starting in mid-2024, the trend becomes more pronounced, peaking at averagely six trucks per day per borehole by February 2025. These fluctuations are likely driven by seasonal factors, such as reduced surface water availability and increased demand, which amplify reliance on water trucking services. This dependency culminates in the sharpest rise observed between late 2024 and early 2025.

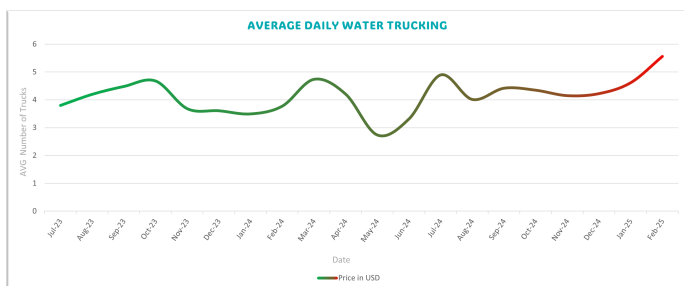


Chart 9 – Average daily water trucking

Unmonitored Non-Functional Water Sources

The table below presents list of the non-functional water sources across Puntland that are not included in the monitoring network.

Source Type	Region	District	Settlement	Source Name
BH	Gerihel	Gerihel	Qardho	Karkaar
BH	Maygaag	Maygaag	Bandar-Bayla	Karkaar
BH	Barwaaqo B	Barwaaqo	Gaalkacyo	Mudug
BH	Bursaalax BH#2	Bursaalax	Galdogob	Mudug
BH	Ceel-Ciidle	Galdogob	Galdogob	Mudug
BH	Roos BH	Roos	Gaalkacyo	Mudug
BH	Godobjiiraan BH#2	Godobjiiraan	Eyl	Nugaal
BH	Burtinle Public BH#1	Burtinle	Burtinle	Nugaal
BH	Salaama BH#3	isufaruuran	Garowe	Nugaal
BH	Awr-boogays BH	Awr-boogays	xudun	sool
BH	Xudun ICRC BH	Xudun	Xudun	Sool
Shallow well	Cadayo ShW	Cadayo	Iskushuban	Bari
Shallow well	Ceel-laas ShW	Ceel-laas	caluula	Bari

Table 1—Unmonitored non-functional Water sources

Water Source Requiring Urgent Intervention

The table below identifies water sources requiring urgent intervention. These facilities have not been serviced for several years, are under significant strain, and face a high risk of malfunction due to rising demand and prolonged pumping hours.

Source Type	Region	District	Settlement	Source Name
BH	Bari	Iskushuban	Cammaan	Cammaan BH
BH	Bari	Iskushuban	Dawacaalay	Dawacaalay BH
BH	Bari	Iskushuban	Jeedaal	Jeedaal BH
BH	Karkaar	Qardho	Shaxda	Shaxda BH
BH	Karkaar	Qardho	Dalwayn	Dalwayn BH
BH	Mudug	Gaalkacyo	Jeexdin	Jeexdin BH
BH	Mudug	Galdogob	Qod-gaashaan	Qod-gaashaan BH
BH	Mudug	Galdogob	Axmed khayr	Axmed-khayr BH
BH	Mudug	Galdogob	Galdogob	Buula-xanan BH
BH	Mudug	Gaalkacyo	Dusmada	Dusmada BH
BH	Mudug	Galdogob	Galdogob	Mareegaale BH#2
BH	Nugaal	Burtinle	Balidacar	Balidacar BH
BH	Nugaal	Garowe	Balay	Balay BH1
BH	Haylaan	Dhahar	Dhahar	Dhahar BH#1
BH	Sanaag	Ceergaabo	Dawaco	Dawaco BH
BH	Sanaag	Ceergaabo	Jiidali	Jiidali BH
Shallow well	Karkaar	Bandar-Bayla	Biyaguduud	Biyaguduud ShW
Spring water	Karkaar	Bandar-Bayla	Ceeldhidar	Ceeldhidar SW
Spring water	Karkaar	Bandar-Bayla	Dharinbaar	Dharinbaar SW
Spring water	Karkaar	Bandar-Bayla	Dur-dura	Dur-dura SW

Table 2—Unmonitored non-functional Water sources

Water Sources Requiring Infrastructure Upgrade

The below listed water sources need infrastructure improvement such as construction of animal troughs, elevated water tanks, kiosks and solar systems to cope with increased water stress.

Source	Region	District	Settlement	Source Name
BH	Bari	Bosaso	Carta	Carta BH
BH	Bari	Iskushuban	Hoosingaabo	Hoosingaabo BH
BH	Bari	Iskushuban	Kobriyaad	Kobriyaad BH
BH	Mudug	Jariiban	Bararwayne	Barararwayne BH
BH	Mudug	Gaalkacyo	Beledxaawo	Beledxaawo BH
BH	Mudug	Jariiban	Laamahadi	Laamahadi
BH	Mudug	Galdogob	Ramaas	Ramaas BH
BH	Mudug	Galdogob	Tuula-dhamuuke	Tuula-dhamuuke BH

Table 3—Source Requiring Infrastructure upgrade

La Niña Drivers and Implications

- Historically, La Niña episodes are correlated with reduced precipitation in many parts of Somalia, especially during the Deyr season, but impacts can also extend into the Gu' season.
- The continuation or reemergence of La Niña through early to mid-2025 would likely sustain below-average rainfall trends, exacerbating existing water stress.
- Below-average rains limit replenishment of water catchments, boreholes, and shallow wells, increasing reliance on water trucking.
- Pastoral and agro-pastoral communities face deteriorating rangeland conditions. Livestock body conditions could decline, leading to lower market values and increased vulnerability.
- Heightened competition over scarce resources can increase local conflicts and spur population movements, particularly in pastoral zones.

Conclusion:

Puntland's groundwater resources remain under significant stress due to climatic variability, uneven rainfall distribution, and escalating demand. While groundwater levels are generally stable across most regions, localized declines in Sanaag (Dhahar BH) and extreme fluctuations in Mudug (Harfo BH) highlight vulnerabilities in recharge mechanisms and over-extraction. The below-average Deyr 2024 rains exacerbated water scarcity in northern coastal zones (e.g., Bosaso), forcing reliance on emergency water trucking. Meanwhile, 9% of the monitored boreholes are non-functional as of February 2025, with pump failures (46%) and power supply issues (13%) dominating breakdown causes. Rising water prices from \$0.25 to \$0.38 per barrel since mid-2023—reflect mounting pressure on groundwater during dry seasons. Seasonal patterns in pumping hours (6–10 hours/day) and livestock demand (peaks for goats/sheep) underscore the critical link between climate, groundwater reliance, and socioeconomic stability.

Projections and Risks:

- Forecasts indicate below-normal Gu' 2025 rains (Mar–May) due to persistent La Niña, limiting groundwater recharge and worsening depletion risks in northern coastal areas in Bari, Sanaag, and Mudug.
- prolonged dry spells will increase dependence on boreholes, accelerating aquifer depletion in high-usage zones. Water prices may rise further, disproportionately affecting pastoral and IDP communities.
- Competition over scarce resources could escalate tensions in drought-prone regions, particularly in pastoral zones reliant on livestock.
- Without urgent maintenance, pump and power failures could render 20–30% of boreholes non-functional by mid-2025, deepening water access inequities.

Recommended Interventions

- Prioritize borehole repairs (pumps, main riser pipes, power systems) to restore functionality.
- Scale up emergency water trucking to northern coastal and inland drought hotspots.
- Secure funding to maintain the existing monitoring networks, ensuring uninterrupted operation to enhance data accuracy and early-warning systems, particularly following USAID support break.
- Expand the automatic groundwater monitoring and weekly monitoring networks to 20 and 250 respectively.
- Invest in rainwater harvesting and drill new boreholes in the hotspot zones to buffer against droughts.
- Strengthen community-led water governance to mitigate conflicts and ensure equitable distribution.

Thanks to:



Food and Agriculture Organization
of the United Nations



Somalia Water and Land
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