

COUNTRY DOSSIER

Djibouti

Water, climate, agriculture and fertilisers: The water resource, the six regions, the role of the port for Ethiopia, potential benefits of our products

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Lake Assal, the lowest point in Africa, in 2024.

Foreword

This dossier describes Djibouti from the angle of water, climate, agriculture and fertilisers. It is written for the ministry in charge of agriculture, water, fisheries and livestock, the water services and the operators of the farming schemes. Djibouti is a small arid country: Its agriculture fits on a few thousand hectares, but every cubic metre of water counts there, and its port is Ethiopia's gateway.

How to read this document

- **A**: Official statistics or international database (INSTAD, FAO, World Bank).
- **B**: Foreign administration, United Nations agency, development bank, research institute or recognised climate model.
- **C**: Manufacturer statement, press or estimate.
- "M" means million; "Mm³" means million cubic metres; "t" means tonnes.
- A "scenario" is a calculation based on the trials cited. It is not a measurement made in Djibouti.

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Summary

1,066,809
Inhabitants at the 2024 census (INSTAD), 72% of them in Djibouti City.

264 m³
Of renewable fresh water per person per year (World Bank), one of the lowest levels in the world.

228 mm
Of rain a year in Djibouti City, for 2,017 mm of evapotranspiration (ERA5, 1991-2020).

1,010 ha
Equipped for irrigation (FAOSTAT, 2023). Local production covers about 10% of food consumption.

$579 M
Of fertilisers received in 2022, almost all re-exported to Ethiopia (UN Comtrade, via the French Treasury).

697,000 m³
Of agricultural water saved per year in the central scenario, 31 days of output of the Doraleh desalination plant.

Seven key points

1. **An urban and port country.** 767,250 of the 1,066,809 inhabitants live in the Djibouti City region (2024 census). Agriculture provides 2.3% of GDP and 1.2% of jobs (World Bank, 2025).
2. **Very little fresh water.** Renewable resources reach 0.3 km³ a year, 264 m³ per person. Groundwater supplies most of the water and is becoming saline under pumping.
3. **Rising heat.** The mean temperature of Djibouti City rose from 28.6 °C (1981-1990) to 29.8 °C (2015-2024), 0.32 °C per decade (ERA5).
4. **New water sources.** The Doraleh desalination plant has produced 22,500 m³ a day since 2021; a second phase is to raise its capacity to 45,000 m³. A pipeline also brings groundwater from Ethiopia.
5. **Agriculture of gardens and orchards.** About 9,896 t of plant products in 2019/2020 (INSTAD): Market gardening and tree crops along the wadis. Pastoral livestock accounts for about three quarters of agricultural GDP.
6. **Ethiopia's gateway.** The ports of Djibouti handle about 97% of Ethiopia's external freight, including almost all its fertilisers.
7. **Every cubic metre saved counts.** In the central scenario, our products would save 697,000 m³ of agricultural water a year, 14% of the estimated annual deficit of Djibouti City.

1. Green Solutions and our products

Green Solutions develops products for water, fertilisation and crop protection. Four families concern this dossier.

Products covered by this dossier

Product	Claimed use	Published evidence	Level
EVERGREEN® (water retainer)	Holds rain or irrigation water as a gel, close to the roots	Trials on maize, potato, watermelon, date palm and soybean	B to C
ECOSORB® (water retainer based on maize starch)	Same use; effect lasts 2 to 3 years according to the website	Soybean trial (China); laboratory acrylamide analysis	B to C
ECOFERT® (fertiliser)	Fertiliser certified by SOHISCERT and EU Organic	Published certificate; potato trial combined with EVERGREEN	A (certificate), C (results)
Paulownia ALTIFOLIA®	Fast-growing tree for agroforestry	Website figures; no trial in Djibouti	C
Water Vital®, NAPEMA®	Outside the scope of this dossier	No independent source in the documents consulted	—

Source: Green Solutions website (product sheets and published trials), Annex A, sources A20 to A25.

The trial closest to Djibouti's conditions is the ICBA trial in Dubai: 27 date palms about eight years old, in sandy and saline soil, under a climate of about 50 mm of rain a year. The treated trees used 82% less irrigation water and gave 20% more dates at the 300 g dose.

2. Djibouti in figures

The third general population census (RGPH-3), with 20 May 2024 as reference date, counts 1,066,809 inhabitants (INSTAD). The Djibouti City region holds 767,250, 72%. Between 2009 and 2024, the capital gained almost 300,000 people, while the Ali Sabieh, Dikhil and Tadjourah regions lost population.

Population by region, 2009 and 2024 censuses

Region	2009	2024	Change	Share in 2024
Djibouti City	475,322	767,250	61%	71.9%
Ali Sabieh	86,949	76,414	-12%	7.2%
Dikhil	88,948	66,196	-26%	6.2%
Tadjourah	86,704	60,645	-30%	5.7%
Arta	42,380	48,922	15%	4.6%
Obock	37,856	47,382	25%	4.4%
Total	**818,159**	**1,066,809**	**30%**	**100%**

Source: INSTAD, RGPH-2 (2009) and RGPH-3 (2024), regional figures as reported by citypopulation.de (A3).

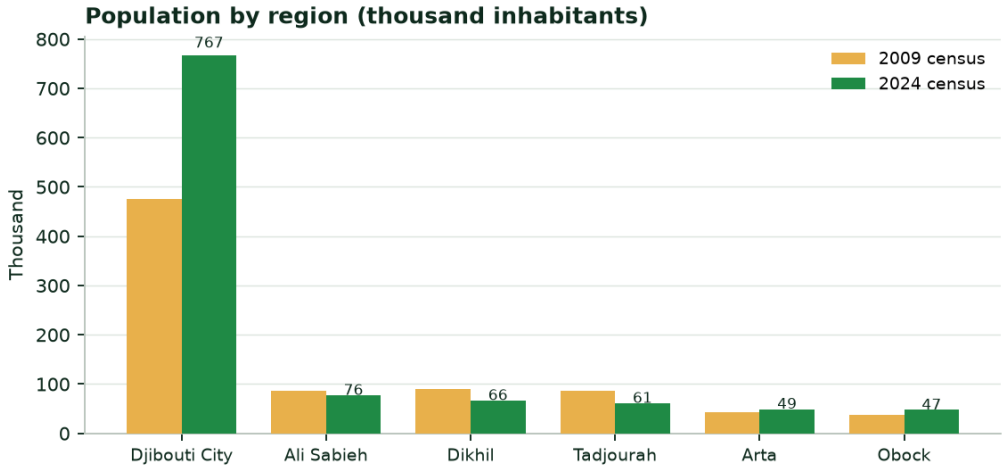


Figure 1. Population by region, 2009 and 2024 censuses. Source: INSTAD (A3)

Economic and agricultural indicators

Indicator	Value	Year
GDP (current dollars)	$4.62 bn	2025
GDP per person	3,906 $	2025
Agriculture, share of GDP	2.3%	2025
Agricultural employment	1.2%	2025
Rural population	27%	2025
Undernourishment	14.7%	2024
Access to basic drinking water	80%	2024
Cropland (FAOSTAT)	4,340 ha	2023

Indicator	Value	Year
Area equipped for irrigation	1,010 ha	2023
Permanent pastures	1.7 million ha	2023

Source: World Bank (A1); FAOSTAT (A2).

3. Sunshine, rainfall and climate change

Djibouti receives between 2,150 and 2,359 kWh/m² of solar radiation a year (PVGIS). Rain is scarce and irregular: From 142 mm a year at Dikhil to 284 mm at Ali Sabieh in the ERA5 grid cells (1991-2020 mean); the French Treasury uses a national average of about 130 mm. Reference evapotranspiration exceeds 1,800 mm everywhere and reaches 2,398 mm at Dikhil.

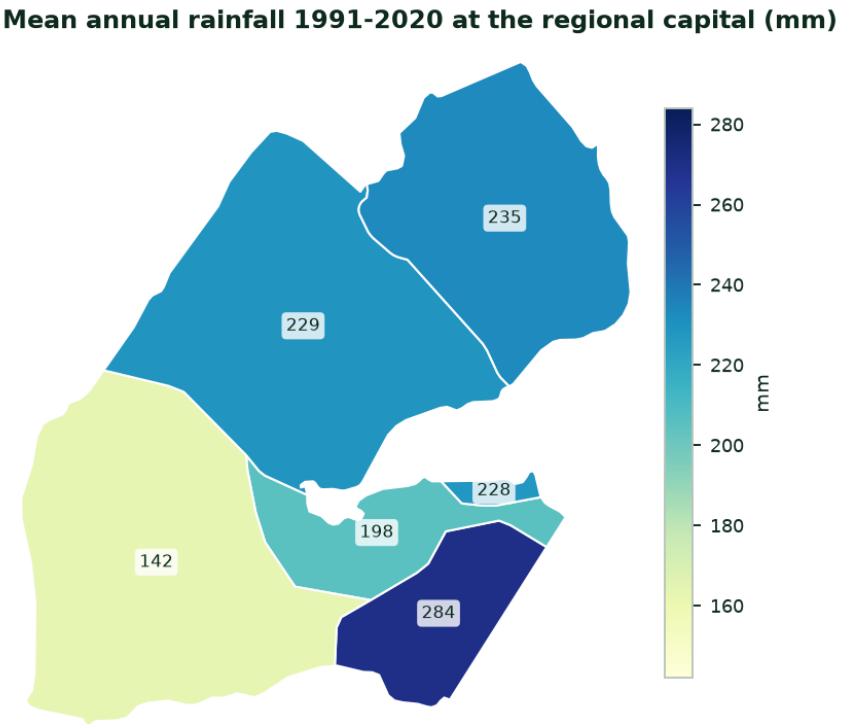


Figure 2. Mean annual rainfall 1991-2020 at each regional capital. Source: ERA5 via Open-Meteo (A8)

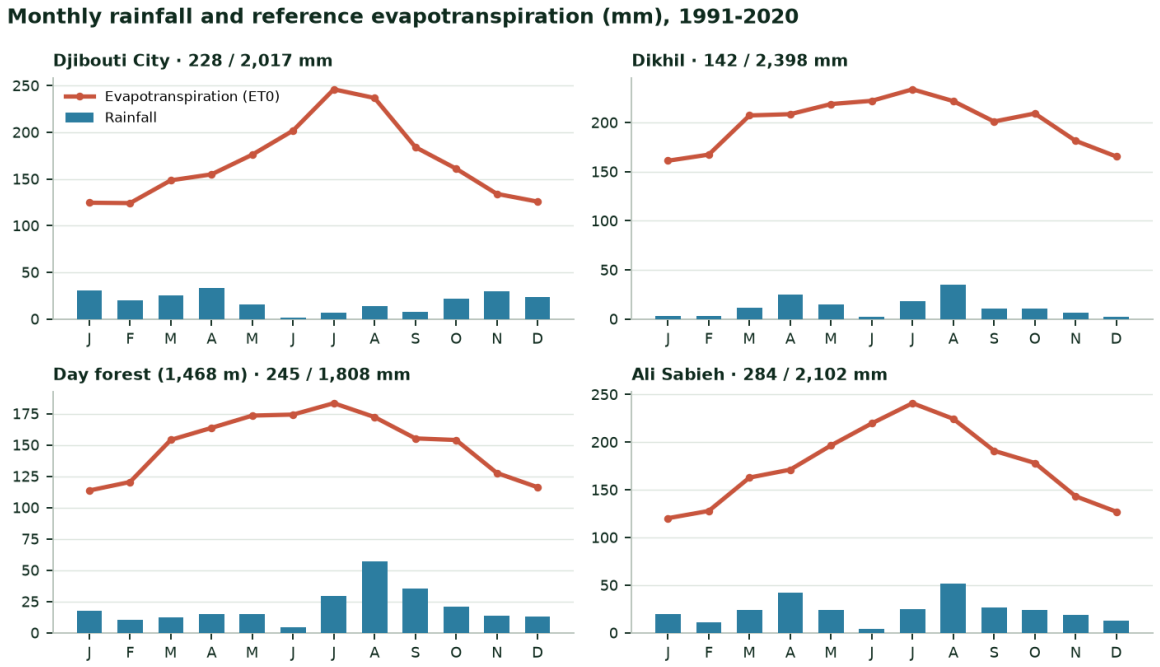


Figure 3. Monthly rainfall and reference evapotranspiration, 1991-2020. Source: ERA5 via Open-Meteo (A8)

Rain falls mainly from autumn to spring on the coast, with a second summer peak inland. No month brings enough water for a crop: All plant production needs irrigation. The Day heights (nearly 1,500 m) are the only clearly cooler area.

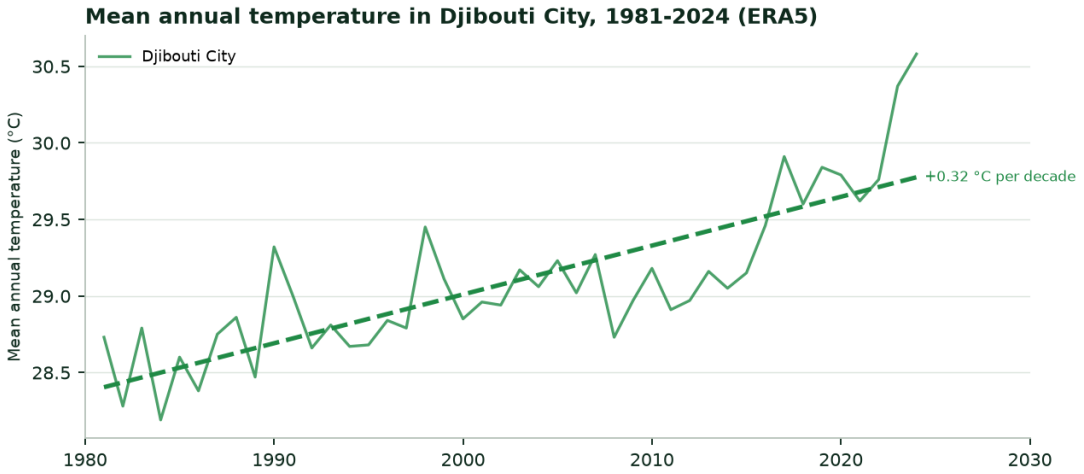


Figure 4. Mean annual temperature in Djibouti City, 1981-2024, and linear trend. Source: ERA5 via Open-Meteo (A8)

The warming is clear: 0.32 °C per decade since 1981, more than one degree in forty years. Each additional degree increases the water needs of crops and animals.

4. Water: Resources, desalination, transfers

The country has no permanent river. Renewable resources are estimated at 0.3 km³ a year, 264 m³ per person (World Bank, 2022). Withdrawals reach 19 million m³ a year, of which 84% for domestic use and 16% for agriculture, 3.0 million m³.

Groundwater supplies 99% of the rural population (IFAD). The aquifer that feeds the capital is pumped at the limit of its boreholes: Japanese (JICA) and academic studies observe salinisation linked to pumping and

seawater intrusion. A senior official quoted by the press estimates the deficit of Djibouti City at more than 5 million m³ a year.

Two new sources have been opened. The Doraleh desalination plant, inaugurated in March 2021, produces 22,500 m³ a day; its second phase, financed in particular by a 79 million euro loan from the European Investment Bank (2023), is to raise capacity to 45,000 m³ a day with a 12 MW solar plant. A pipeline brings groundwater from the Hadagalla area in Ethiopia: Designed for about 100,000 m³ a day, it delivered about 20,000 according to figures reported in 2024.

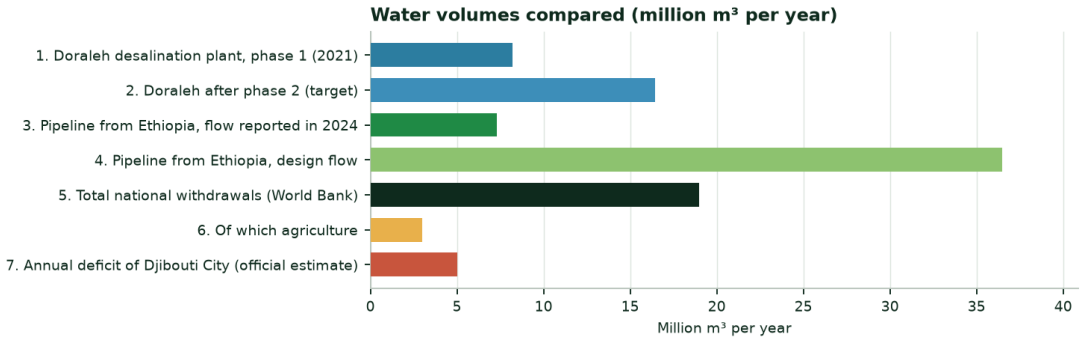


Figure 5. Water volumes compared. Source: World Bank (A1); EIB and press (A9, A10); official estimate reported by the press

5. Agriculture, livestock and food

According to the National Statistics Institute (INSTAD), 9,896 t of plant products were harvested in 2019/2020. Production is limited to market gardening and tree crops along the wadis: Vegetables, citrus (lemons and limes), mangoes, guavas, dates. It covers about 10% of national food consumption (French Treasury, 2024).

FAOSTAT crop statistics for Djibouti are FAO estimates (flag "I" or "E"): They show for example 22,242 ha of dry beans in 2023, more than all cropland (4,340 ha). This dossier therefore does not use them for the crop detail.

Livestock, linked to nomadic pastoralism, accounts for about three quarters of agricultural GDP. FAOSTAT estimates the herd at 519,555 goats, 470,288 sheep, 316,306 cattle and 71,852 camels (2023).

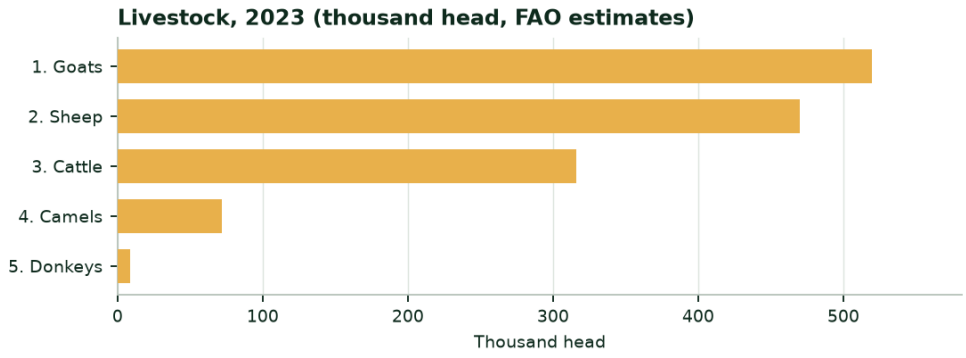


Figure 6. Livestock, 2023. Source: FAOSTAT, estimates (A2)

Food depends on imports. In 2019, the average supply was 2,770 kcal per person per day, of which 989 from wheat, 487 from rice, 395 from sugar and 232 from palm oil (French Treasury, 2022). Undernourishment still affects 14.7% of the population (2024).

The national strategy (PNIASAN) provides for the development of farms granted by Ethiopia and Sudan, a food reserve, hydro-agricultural basins, the use of deep groundwater and the reuse of treated wastewater for irrigation. FAO supports model farms financed by the European Development Fund.



Harvest in an irrigated garden near Dikhil.

6. Fertilisers and the Ethiopian corridor

Djiboutian agriculture uses very little fertiliser: 104 t of nitrogen and phosphate in 2023 according to FAOSTAT, 31.0 kg per hectare of arable land (World Bank, 2024). Yet FAOSTAT records 488,000 t of nutrients imported the same year. The difference is transit: Fertilisers bound for Ethiopia are unloaded and often bagged in Djibouti.

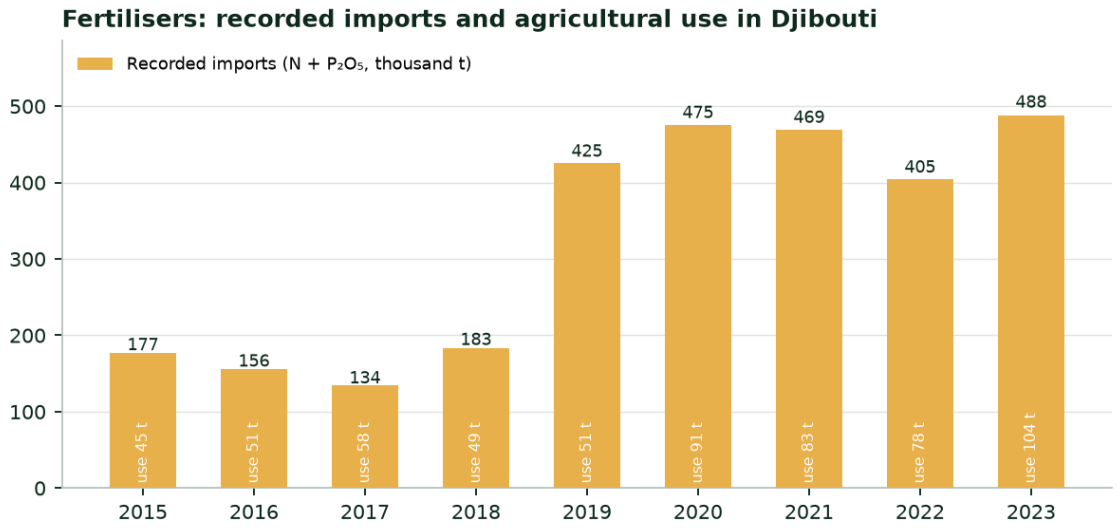


Figure 7. Fertilisers: Recorded imports and agricultural use, 2015-2023. Source: FAOSTAT (A2)

In 2022, Djibouti received 579.3 million dollars of fertilisers, almost entirely re-exported to Ethiopia (UN Comtrade, quoted by the French Treasury). The Tadjourah mineral port, built in 2017 for Ethiopian minerals, notably potash from northern Ethiopia, could also serve regional fertiliser production. For the 2025/26 season, Ethiopia was aiming for 2.4 million tonnes of fertilisers, almost all shipped through Djibouti.

The ports of Djibouti handle about 97% of Ethiopia's external freight. The Djibouti-Addis Ababa electric railway (753 km, 2018) links the port to the Ethiopian plateau in less than twenty hours. For an input supplier, Djibouti is therefore both a small market and the logistics platform of a market of more than 130 million people.

7. A study of each region

Djibouti has six regions: The Djibouti City region and five inland regions. Each study gives the population, the climate of the capital and the known farming activities.

7.1 Djibouti City

Indicator	Value
Population (2009 → 2024)	475,322 → 767,250
Climate of the capital (Djibouti)	Rain 228 mm; ET0 2,017 mm; 29.1 °C; 2,270 kWh/m²

Source: INSTAD (A3); ERA5 (A8); PVGIS (A7).

The capital holds nearly three quarters of the population, the port, the free zone and industry. The gardens of the Ambouli wadi and urban green spaces are the main agricultural users of water. It is also where the Doraleh desalination plant and the end of the pipeline from Ethiopia are located.

7.2 Ali Sabieh

Indicator	Value
Population (2009 → 2024)	86,949 → 76,414
Climate of the capital (Ali Sabieh)	Rain 284 mm; ET0 2,102 mm; 26.4 °C; 2,264 kWh/m²

Source: INSTAD (A3); ERA5 (A8); PVGIS (A7).

Mountainous southern region, the wettest in the ERA5 grid (284 mm). It runs along the railway to Ethiopia. Gardens and orchards exist around Ali Sabieh, Ali Adde and Holl-Holl, supplied by wells and small reservoirs.



Ali Sabieh and the Arrei mountains.

7.3 Dikhil

Indicator	Value
Population (2009 → 2024)	88,948 → 66,196
Climate of the capital (Dikhil)	Rain 142 mm; ET0 2,398 mm; 28.3 °C; 2,359 kWh/m²

Source: INSTAD (A3); ERA5 (A8); PVGIS (A7).

The hottest and driest region (142 mm of rain, 2,398 mm of evapotranspiration). The Hanlé and Gobaad plains and the shores of Lake Abbé hold most of the country's farming potential: A JICA study (2014) covers sustainable irrigation in the south, including the Afka Arraba watershed.

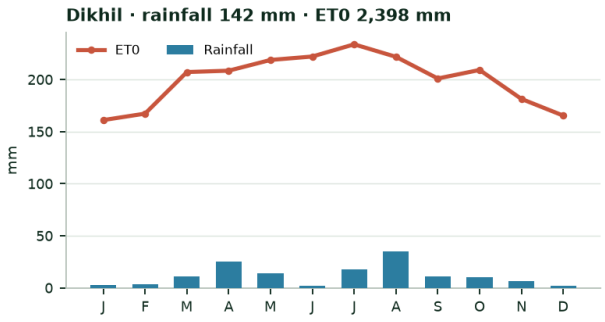


Figure 8. Monthly rainfall and reference evapotranspiration, Dikhil, 1991-2020. Source: ERA5 (A8)



The Gobaad plain, Dikhil region.

7.4 Tadjourah

Indicator	Value
Population (2009 → 2024)	86,704 → 60,645
Climate of the capital (Tadjourah)	Rain 229 mm; ET0 1,996 mm; 29.5 °C; 2,255 kWh/m²

Source: INSTAD (A3); ERA5 (A8); PVGIS (A7).

The region north of the Gulf of Tadjourah includes the Goda massif and the Day forest, the country's only upland forest (about 1,500 m), as well as Lake Assal. The Tadjourah mineral port opened there in 2017.

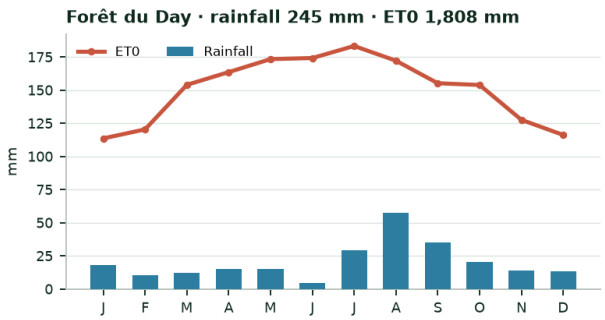


Figure 9. Monthly rainfall and reference evapotranspiration, Tadjourah, 1991-2020. Source: ERA5 (A8)



The Goda mountains, Day forest national park.

7.5 Arta

Indicator	Value
Population (2009 → 2024)	42,380 → 48,922
Climate of the capital (Arta)	Rain 198 mm; ET0 1,946 mm; 25.5 °C; 2,162 kWh/m²

Source: INSTAD (A3); ERA5 (A8); PVGIS (A7).

Region close to the capital, on the heights (about 700 m). Its population has grown since 2009. Market gardens benefit from the nearby market of Djibouti City.

7.6 Obock

Indicator	Value
Population (2009 → 2024)	37,856 → 47,382
Climate of the capital (Obock)	Rain 235 mm; ET0 2,010 mm; 28.9 °C; 2,218 kWh/m²

Source: INSTAD (A3); ERA5 (A8); PVGIS (A7).

North-eastern coastal region, facing the Bab-el-Mandeb strait. Gardens are rare and depend on wells; water is the main constraint of daily life there.



Coastal landscape near Obock.

8. Water savings: Scenarios

Method in brief

• **Agricultural water**: 3.0 million m³ a year (World Bank, 2022), for 1,010 ha equipped, 2,970 m³ per hectare.

• **Split used**: Half market gardening, 40% orchards (citrus, mango, guava), 10% date palms. In the absence of national statistics, this is an assumption.

• **Water saving**: A quarter, half or all of the saving measured in the closest trial (watermelon, Mexico; date palm, ICBA). For orchards, 5, 10 or 20%.

Agricultural water saved by scenario

Scenario	Water saved (m³/yr)	Share of agricultural water	Days of Doraleh output	Share of the capital's deficit
Cautious	348,375	11.6%	15.5	7.0%
Central	696,750	23.2%	31.0	13.9%
Strong	1,393,500	46.4%	61.9	27.9%

Source: Author's calculation (Annex B).

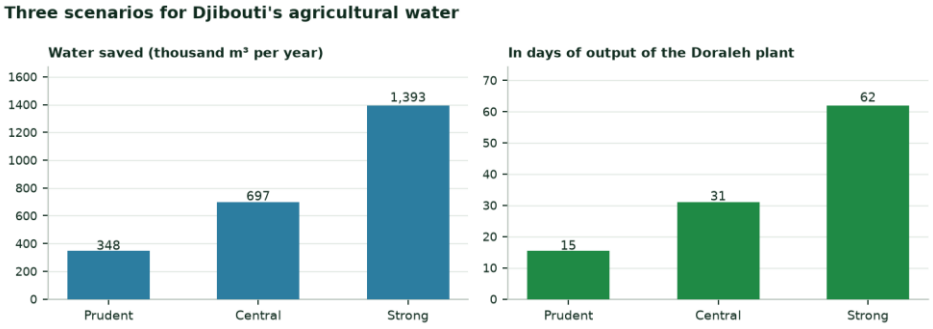


Figure 10. Agricultural water saved and equivalent in days of the Doraleh plant, by scenario. Source: Author's calculation

The volumes are small in absolute terms, but every agricultural cubic metre saved stays in the aquifer or frees costly desalinated water. In the central scenario, the saving represents 31 days of output of the Doraleh plant, or 14% of the estimated annual deficit of the capital.

9. Potential benefits of our products

Potential benefits, by situation

Situation	Figure at stake	Product	Expected benefit
Irrigated market gardens	About 505 ha; saline groundwater	EVERGREEN®, ECOFERT®	Less water per harvest, soil enriched with organic matter
Date palms and orchards	ICBA trial: −82% irrigation water	EVERGREEN®	Less frequent irrigation, better resistance in summer
Green spaces and urban planting	Desalinated water and treated wastewater	EVERGREEN®, ECOSORB®	Less watering for the same planted area
Reforestation (Day, around towns)	Day forest, degraded land	Paulownia ALTIFOLIA®, EVERGREEN®	Better seedling survival (to be measured by trial)
Platform for Ethiopia	97% of Ethiopian freight; $579 M of fertilisers in transit (2022)	Whole range	Storage and delivery to the Ethiopian market

Source: Sections 2 to 8 of this dossier; Ethiopia dossier.



Lake Abbé, on the Ethiopian border, Dikhil region.

10. External trade

Djibouti's agricultural trade statistics mix national consumption and transit. In 2024, FAOSTAT records $1,623 M of agricultural imports: Palm oil, sunflower oil, sugar, rice, wheat flour. In 2023, declared agricultural exports ($1,955 M) were mostly re-exports of these same products to the region.

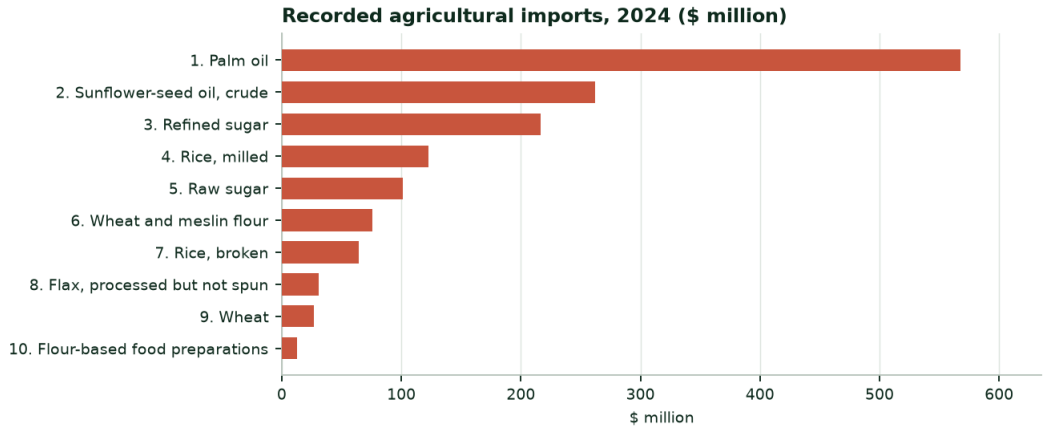


Figure 11. The ten main recorded agricultural imports, 2024. Source: FAOSTAT (A2)

Live animals are the main export of the country and its region: Sheep, goats, cattle and camels leave for the Arabian Peninsula from the terminals and quarantine centres of Damerjog and Doraleh, with animals also coming from Ethiopia.

Annex A. Sources and confidence levels

Ref.	Source	Level
A1	World Bank, World Development Indicators (API, accessed 2026)	A
A2	FAO, FAOSTAT: Crops and livestock, trade, fertilisers, land use (bulk files, 2026)	A
A3	INSTAD, RGPH-2 (2009) and RGPH-3 (2024); regional figures via citypopulation.de	A
A4	French Treasury (DG Trésor), "Sécurité alimentaire : Un environnement hostile à l'agriculture…", Djibouti, April 2022	B
A5	French Treasury (DG Trésor), "L'accès aux engrais à Djibouti…", August 2024 (UN Comtrade, INSTAD)	B
A6	IFAD, country strategic opportunities programme for Djibouti (2019)	B
A7	European Commission, JRC, PVGIS (solar radiation)	A
A8	Copernicus ERA5, via Open-Meteo: Rainfall, reference evapotranspiration and temperature, 1981-2024	B
A9	European Investment Bank, Doraleh phase 2 financing (2023); press on the 2021 inauguration	B
A10	Ethiopia-Djibouti water pipeline (Hadagalla): Ethiopian and regional press, 2017-2024	C
A11	JICA, studies on groundwater and irrigation in southern Djibouti (2014); thesis, University of Lille (2014)	B
A12	Djibouti's share of Ethiopian external freight, 2025/26; Addis Ababa-Djibouti railway (press)	C
A20	Green Solutions, date palm trial, United Arab Emirates (ICBA, 2020-2021)	B
A21	Green Solutions, watermelon trial, Mexico (2023)	C
A25	Green Solutions, product sheets (green-solutions-group.com)	C

Annex B. Calculation method

1. Agricultural water. 19 million m³ of total withdrawals × 15.79% for agriculture (World Bank, 2022) = 3.00 million m³.

2. Areas. 1,010 ha equipped for irrigation (FAOSTAT, 2023), split into market gardening (50%), orchards (40%) and palms (10%); water follows areas.

3. Water saving. Market gardening: 60.5% (watermelon trial); palms: 82% (ICBA trial), applied at a quarter, half or in full; orchards: 5, 10 or 20%.

4. Equivalences. Days of Doraleh = water saved ÷ 22,500 m³ a day; share of the deficit = water saved ÷ 5 million m³.

5. Climate. 1991-2020 means of the ERA5 grid cell containing each capital; PVGIS radiation 2005-2020; temperature trend by linear regression 1981-2024.

Annex C. Photo credits

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Assal Lake, 2024.jpg	Mheidegger	CC BY 4.0
A men picks fruit near Dikhil, Djibouti.JPG	DoD photo by Staff Sgt. Joseph L. Swafford Jr	Public domain
Arrei Mountains see from Ali Sabieh.JPG	Skilla1st	CC BY-SA 4.0
Gobaad.jpg	Benlilkon93	CC BY-SA 4.0
Goda Mountains - National Park of Forêt du Day (cropped).jpg	Singlab	CC BY-SA 3.0
Obock, Djibouti - panoramio.jpg	Vxr7475	CC BY 3.0
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