

Hydrogeology of Egypt

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Egypt's geography and history have been shaped by the Sahara desert and the Nile River. Irrigated agriculture on fertile flood plains supported the great ancient civilisations that flourished for three millennia until the 1st century CE. After this, Egypt was ruled by successive waves of incomers: Romans, Byzantines, Arabs, Ottomans, French and finally British. French investment supported the construction of the strategic Suez Canal, completed in 1869. Egypt was a British protectorate from 1882 to 1953, when after a revolution in 1952 it became an independent republic. Since then, Egypt has seen a number of periods of military, civil and political unrest, including internal conflict and external war. The Arab Spring of 2011 saw a popular uprising followed by further unrest, culminating in the 2014 election of a new president who had initially claimed control as the head of the Egyptian Armed Forces. The military continues to play a large role in political and economic sectors.

Egypt's population is concentrated along the Nile valley, with very low concentrations in the Sahara. The economy is fairly diverse, depending in large part on agriculture (including the export of cotton and citrus fruit), hydrocarbons, and tourism, although tourism has declined since 2011. Remittances from Egyptians working abroad are also an important contributor. There is an expanding information technology sector, and revenue from the Suez Canal bolsters income. Built between 1960 and 1970, the Aswan dam on the Nile provides water for irrigation, allowing the expansion of irrigated areas, as well as hydroelectric power potential, and regulates floodwater flows.

Egypt is an arid country. The only perennial surface water resource is the major transboundary River Nile, which is the main source of irrigation water, on which nearly all agriculture in the country relies. There is a dense network of canals branching from the Nile. Away from the Nile valley, the rural population depends on groundwater.

□

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Compilers

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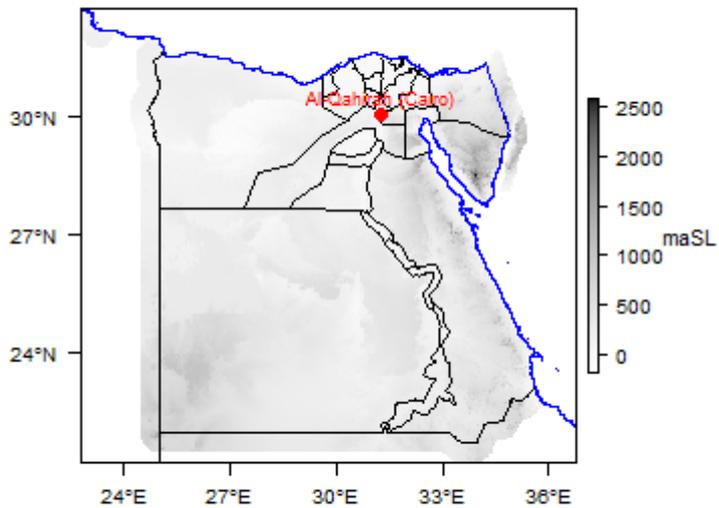
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Geographical Setting



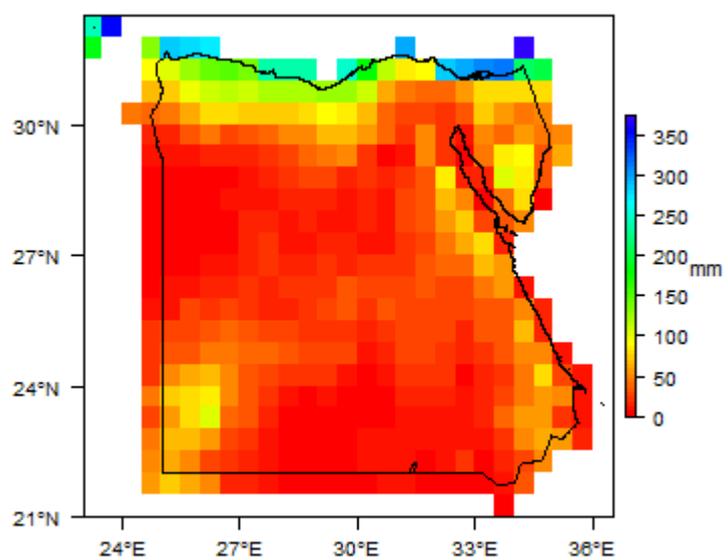
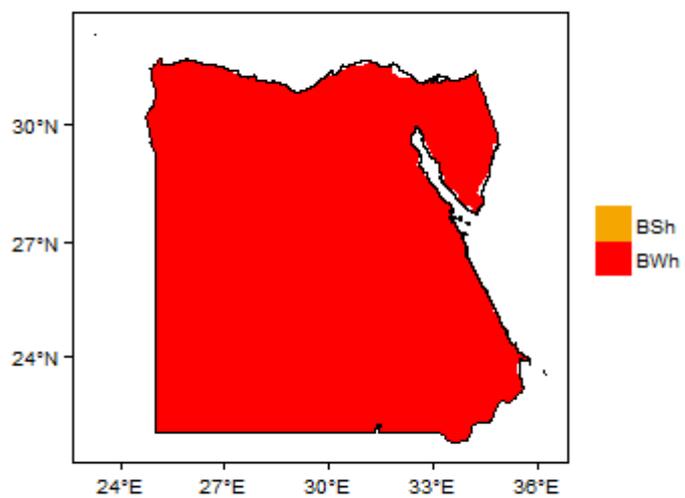
Egypt. Map developed from USGS GTOPOPO30; GADM global administrative areas; and UN Revision of World Urbanization Prospects. For more information on the map development and datasets see the [geography resource page](#)

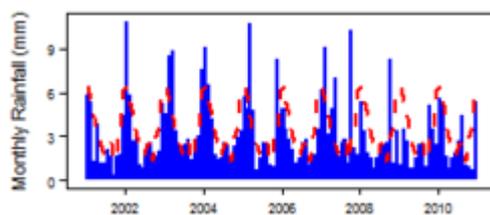
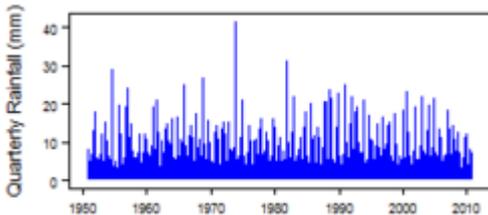
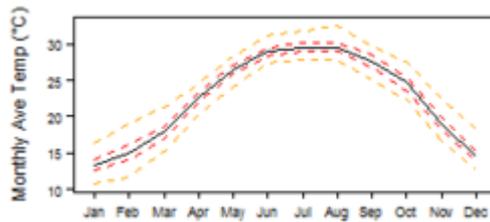
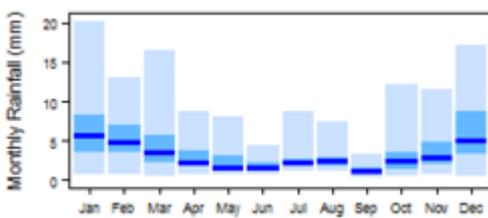
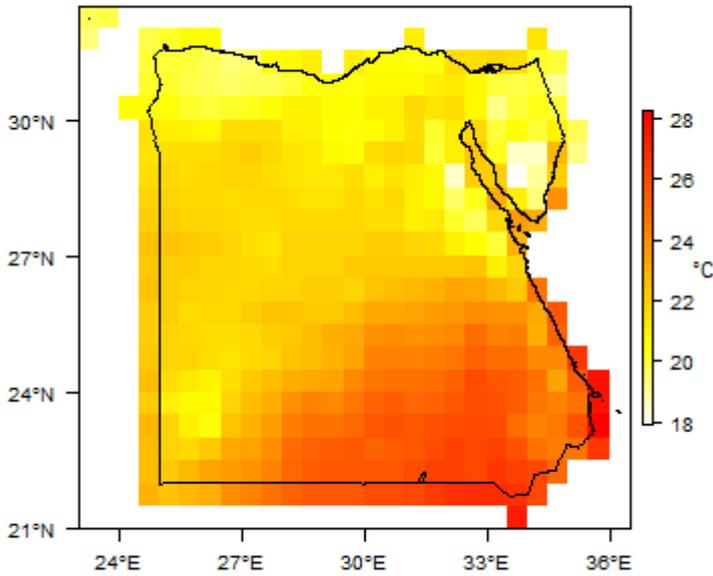
General

Capital city	Cairo
Region	Northern Africa
Border countries	Libya, Sudan, Israel, Gaza Strip
Total surface area*	1,001,450 km ² (100,145,000 ha)
Total population (2015)*	91,508,000
Rural population (2015)*	54,970,000 (60%)
Urban population (2015)*	36,538,000 (40%)
UN Human Development Index (HDI) [highest = 1] (2014)*	0.6899

* Source: [FAO Aquastat](#)

Climate

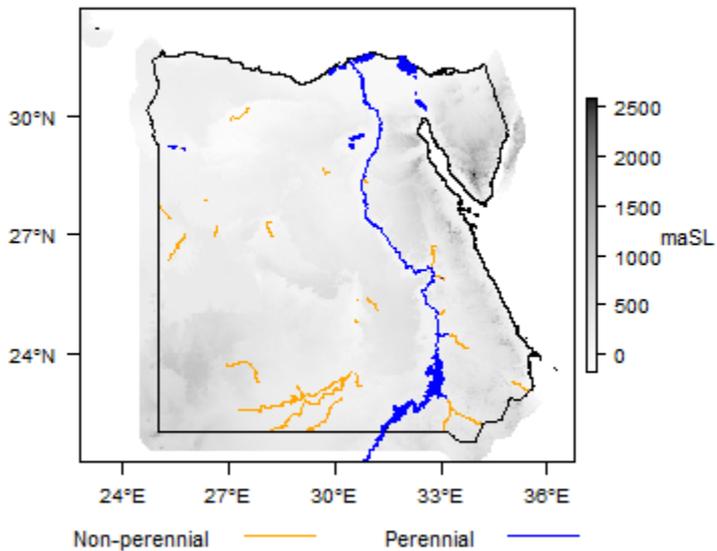




More information on average rainfall and temperature for each of the climate zones in Egypt can be seen at the [Egypt climate page](#).

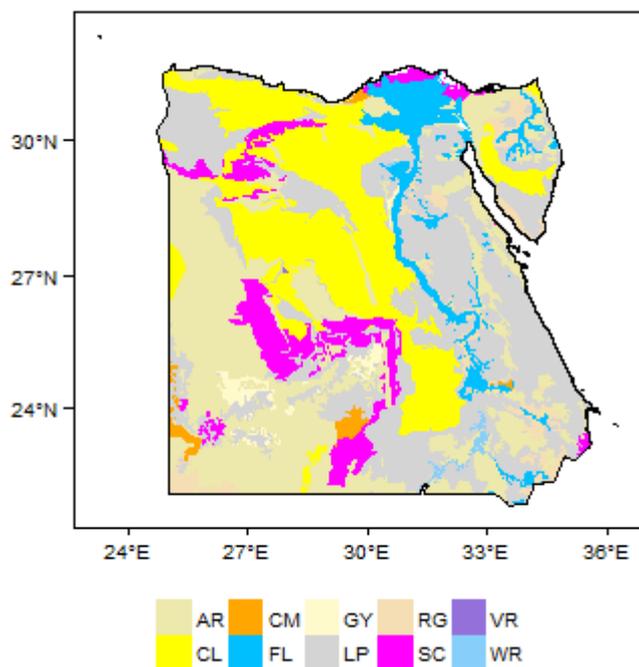
These maps and graphs were developed from the CRU TS 3.21 dataset produced by the Climatic Research Unit at the University of East Anglia, UK. For more information see the [climate resource page](#).

Surface water



Major surface water features of Egypt. Map developed from World Wildlife Fund HydroSHEDS; Digital Chart of the World drainage; and FAO Inland Water Bodies. For more information on the map development and datasets see the [surface water resource page](#)

Soil



Soil Map of Egypt, from the European Commission Joint Research Centre: European Soil Portal. For more information on the map see the [soil resource page](#)

Land cover

Industrial water withdrawal (all water sources) (Million cubic metres/year)							2,000
Municipal water withdrawal (all water sources) (Million cubic metres/year)							9,000
Agricultural water withdrawal (all water sources) (Million cubic metres/year)							67,000
Irrigation water withdrawal (all water sources) ¹ (Million cubic metres/year)	No data	No data	No data				
Irrigation water requirement (all water sources) ¹ (Million cubic metres/year)	45,110						
Area of permanent crops (ha)							1,075,000
Cultivated land (arable and permanent crops) (ha)							3,745,000
Total area of country cultivated (%)							3.74
Area equipped for irrigation by groundwater (ha)		227,600					
Area equipped for irrigation by mixed surface water and groundwater (ha)	No data	No data	No data				

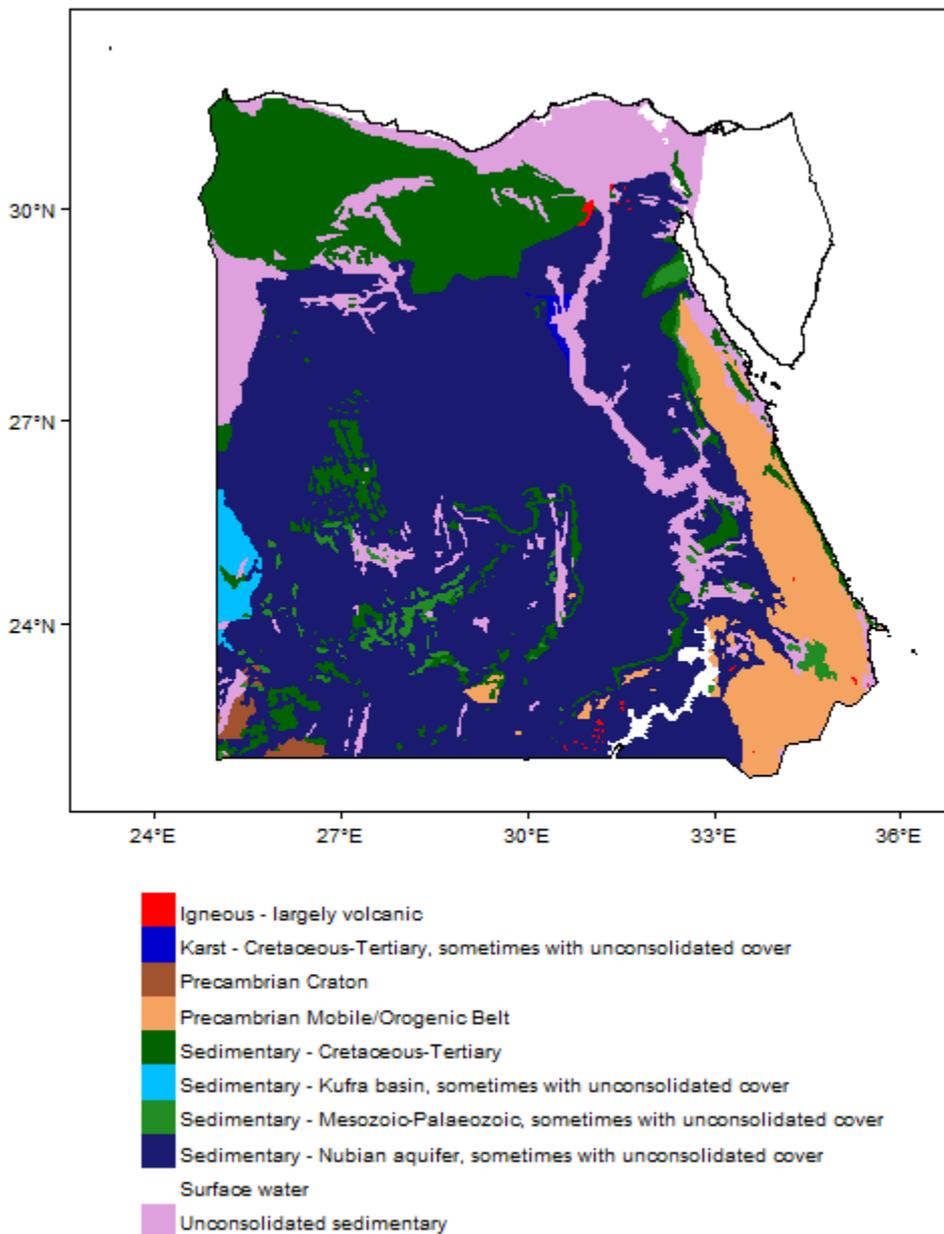
These statistics are sourced from [FAO Aquastat](#). They are the most recent available information in the Aquastat database. More information on the derivation and interpretation of these statistics can be seen on the FAO Aquastat website.

Further water and related statistics can be accessed at the [Aquastat Main Database](#).

¹ More information on [irrigation water use and requirement statistics](#)

Geology

The geology map shows a simplified version of the geology at a national scale. More information is available in the report [UN \(1988\)](#) (see References section, below).



Geology of Egypt at 1:5 million scale. Developed from USGS map (Persits et al. 2002). For more information on the map development and datasets see the [geology resource page](#)

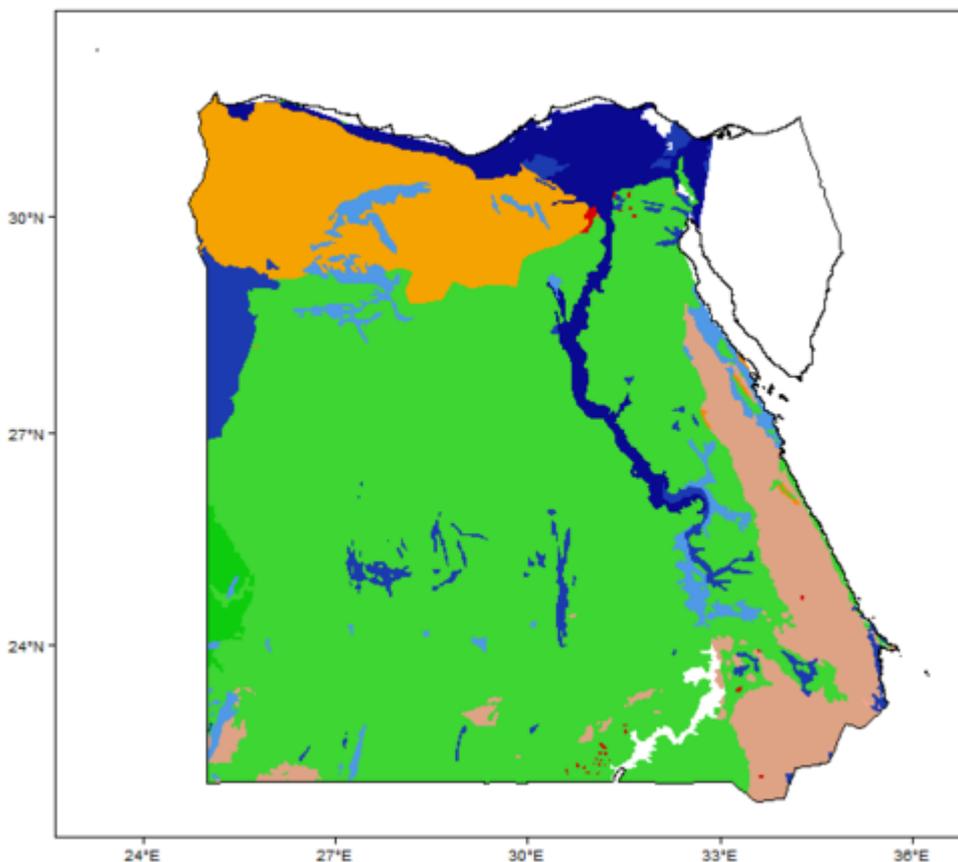
Hydrogeology

The hydrogeology map below shows a simplified version of the type and productivity of the main aquifers at a national scale (see the [hydrogeology Map](#) resource page for more details).

More information on the hydrogeology of Egypt is available in the report [United Nations \(1988\)](#) (see References section, below).

One summary of the major groundwater systems in Egypt is as follows (from [FAO Aquastat](#)):

- the Nile aquifer: this is mostly recharged by infiltration of excess irrigation water originally from the Nile river, so it is not an additional primary source of water but, does contain a secondary source of water available for use. In term of abstractions, it provides about 85% of the total groundwater abstractions in Egypt ([AfDG 2015](#)).
- the Nubian sandstone aquifer: in the southwest of Egypt; shared with Libya, Chad and Sudan. Contains fossil groundwater.
- Fissured carbonate aquifer: widely spread over more than half of Egypt; overlies the Nubian aquifer
- Moghra aquifer: towards the Qattara depression, recharged both by rainfall and lateral inflow from the Nile, but containing also saline water in the north west
- Coastal aquifer: on the northern and western coasts; recharged by rainfall; known to contain saline water below fresh recharge, which limits the amount of fresh groundwater that can be abstracted.
- Basement aquifer: found mostly in the eastern desert and southern Sinai.



Hydrogeology of Egypt at 1:5million scale. For more information on how the map was developed see the [hydrogeology map](#) resource page

Aquifer/Flow Type	Aquifer Productivity					
	Very High	High	Moderate	Low-Moderate	Low	Very Low
Unconsolidated	Dark Blue	Blue	Light Blue	Very Light Blue	Lightest Blue	White
Consolidated Sedimentary (Fracture)	Orange	Light Orange	Yellow-Orange	Yellow	Light Yellow	White
Consolidated Sedimentary (Intergranular)	Green	Light Green	Yellow-Green	Yellow	Light Yellow	White
Consolidated Sedimentary (Intergranular/Fracture)	Dark Purple	Medium Purple	Light Purple	Very Light Purple	White	White
Precambrian Basement	Brown	Light Brown	Yellow-Brown	Yellow	Light Yellow	White
Igneous (largely volcanic)	Dark Red	Red	Light Red	Very Light Red	White	White

Transboundary aquifers

For further information about transboundary aquifers, please see the [Transboundary aquifers resources page](#).

References

References with more information on the geology and hydrogeology of Egypt can be accessed through the [Africa Groundwater Literature Archive](#).

AfDG. 2015.

https://www.afdb.org/fileadmin/uploads/afdb/Documents/Environmental-and-Social-Assessments/Egypt_-_National_Drainage_Programme_ESMF_SUMMARY_-_05_2015.pdf National Drainage Programme (NDP), Egypt: Environmental and Social Management Framework Summary]. Africa Development Bank Group, April 2015.

United Nations. 1988. [Groundwater in North and West Africa: Egypt](#). United Nations Department of Technical Cooperation for Development and Economic Commission for Africa.

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