

GS GEOGRAPHY SERIES · BOOK 3 OF 4

World Geography & Mapping

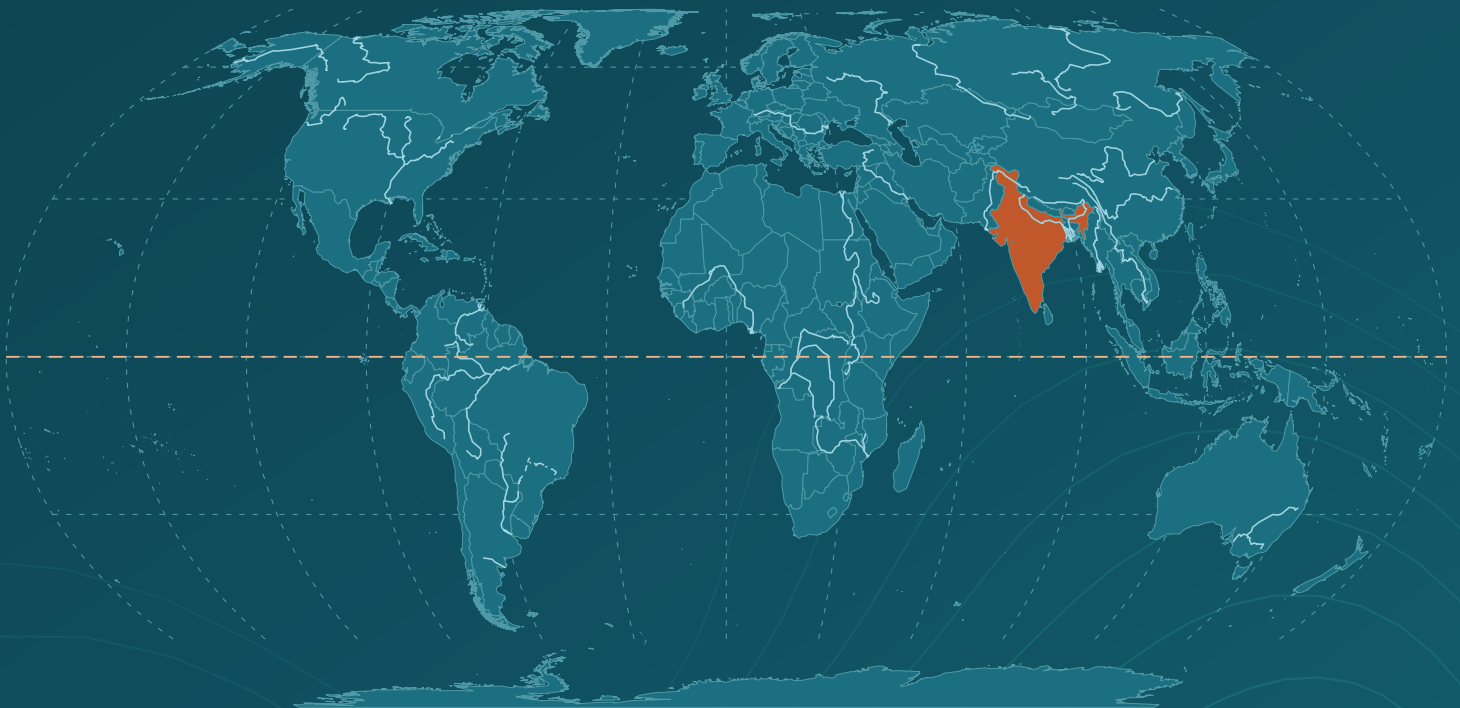
Continents, seas, rivers, mountains, borders and places in the news, mapped for the UPSC Civil Services Examination: Prelims and GS Paper I

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STRAITS

BORDERS

IN THE NEWS



14
chapters

300+
maps, diagrams and photos

160+
previous-year questions

2026
edition, updated to Oct 2026

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This free sample contains Chapters 3 and 9 in full. Page numbers are those of the complete book.

WORLD GEOGRAPHY

PRELIMS · GS PAPER I

Africa

Africa is a vast, ancient block of crust that has stayed near the centre of the world's plates for hundreds of millions of years. Most of it is plateau: high and rimmed in the south and east, lower and broken into basins in the north and west. The Equator runs almost through its middle, so its climate belts repeat like a mirror image on either side, from rainforest through savanna and desert to a Mediterranean fringe at each end. Along its eastern side the continent is slowly tearing apart in the Great Rift Valley, leaving a chain of deep lakes and great volcanoes. Its rivers tumble off the plateau edge in falls and rapids; its deserts include the largest hot desert on Earth; and its rocks hold much of the world's cobalt, platinum, gold and diamonds.

SYLLABUS

PRELIMS Indian and World Geography: Physical, Social, Economic Geography of the World (Africa: relief, rift valley, rivers, lakes, deserts, islands, countries, resources and places in the news)

MAINS · GS PAPER I Salient features of world's physical geography; distribution of key natural resources across the world (Africa's minerals); changes in critical geographical features (including water-bodies such as Lake Chad); important geophysical phenomena (rifting, volcanism)

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01 Africa at a Glance	02 Regions and Countries
03 Relief: High Africa and Low Africa	04 Mountains and Massifs
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11 Islands, Coasts, Peninsulas and Gulfs	12 Landlocked States, Corridors and Suez
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This chapter covers:

- Africa's size, position and extremities, and its six regions and 54 countries;
- the plateau structure of High and Low Africa, the Great Escarpment, the main ranges and massifs, and the Great Rift Valley with its lakes and volcanoes;
- the Nile, Congo, Niger, Zambezi and other rivers, with their falls and dams, the GERD dispute and the great lakes;
- the Sahara, Kalahari, Namib and Karoo, the Sahel and the Great Green Wall, and the mirror-image climate and vegetation belts;
- the islands, coasts, gulfs, landlocked states and corridors, a brief survey of resources, and the places in the news from 2024 to 2026.

The next chapter turns to Europe, the "peninsula of peninsulas" across the Mediterranean.

Africa at a Glance

Africa is the **second-largest continent** both in area and in population. Its 30.3 million km² (with its islands) make up about a fifth of the world's land and about 6 per cent of the Earth's surface. Its population passed 1.5 billion in 2025 and it is the youngest continent, with a median age of about 19 years.

- **Position.** Africa lies across the Equator, which passes close to its middle, and it is the **only continent crossed by the Equator, the Tropic of Cancer and the Tropic of Capricorn**. About two-thirds of it lies north of the Equator, because the northern bulge is much wider than the southern tail. The Prime Meridian crosses its western part (Algeria, Mali, Burkina Faso, Togo and Ghana), so the 0° parallel and 0° meridian meet in the **Gulf of Guinea**.
- **Neighbours.** The Mediterranean separates it from Europe (only about 14 km apart at the Strait of Gibraltar). It joins Asia by the **Isthmus of Suez**, roughly 120 km wide and cut by the Suez Canal, and faces Arabia across the narrow Red Sea and the Bab-el-Mandeb.
- **Extent.** The mainland stretches about 8,000 km from north to south and about 7,400 km from west to east (Fig. 3.1).
- **A compact shape.** Its coastline, about 30,500 km, is shorter than Europe's although Africa is three times larger: there are few deep gulfs, peninsulas or natural harbours, and a narrow continental shelf. This has long made the interior hard to reach from the sea.
- **An old shield.** Most of Africa is ancient Precambrian rock, the core of the former **Gondwana** supercontinent (see *Physical Geography*, Chapter 07). It has seen little folding since; only the Atlas in the north-west are young fold mountains. Instead Africa has been raised, warped into basins and swells, and split by rifts.

Physical Africa: Plateaus, Basins, Ranges and the Two Africas

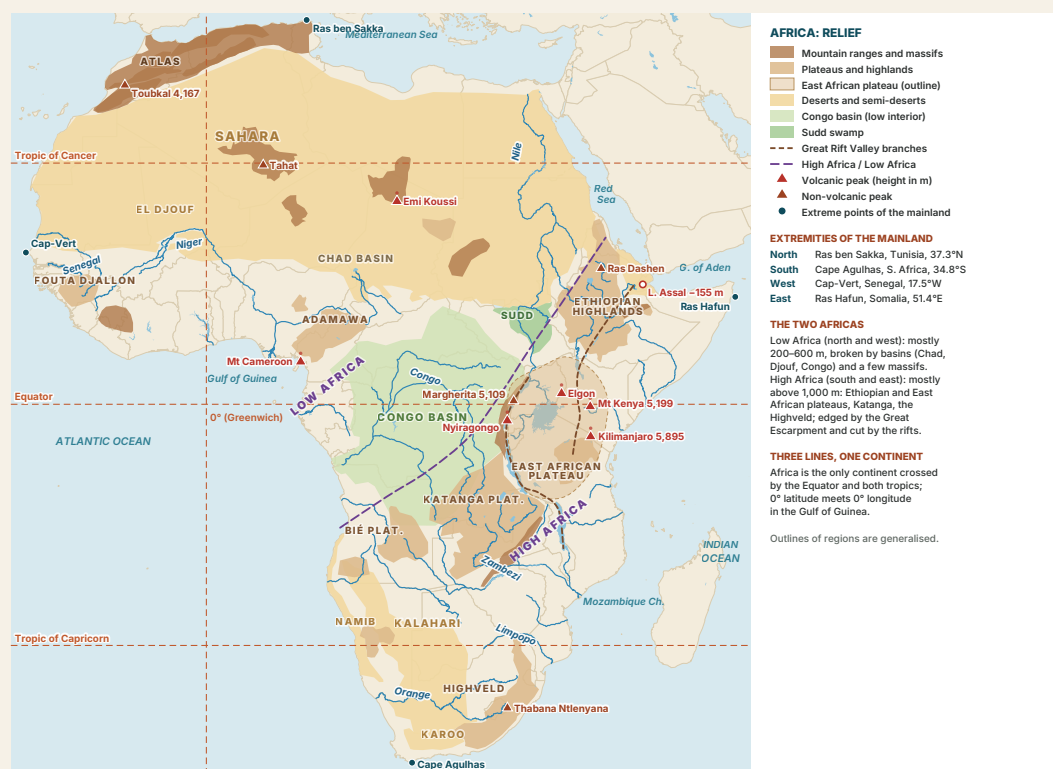


Fig. 3.1 Africa's relief in outline. High Africa (south and east) is mostly plateau above 1,000 m; Low Africa (north and west) lies lower and is broken by basins and isolated massifs. The rift branches and the main volcanoes run down the east.

FEATURE

AFRICA

Largest countries by area

Algeria, DR Congo, Sudan, Libya, Chad (Sudan was largest until South Sudan separated in 2011)

Most populous	Nigeria, Ethiopia, Egypt, DR Congo, Tanzania
Smallest	Seychelles (area and population); Gambia is the smallest on the mainland
Highest and lowest points	Kilimanjaro, 5,895 m (Tanzania); Lake Assal, about 155 m below sea level (Djibouti)
Longest rivers; largest lake	Nile, Congo, Niger, Zambezi; Lake Victoria (by area), Tanganyika (by volume and depth)
Equator passes through	Gabon, Republic of the Congo, DR Congo, Uganda, Kenya, Somalia (and an islet of São Tomé); it crosses Lake Victoria, not Lake Tanganyika
Tropic of Cancer	Western Sahara, Mauritania, Mali, Algeria, Niger, Libya, Egypt
Tropic of Capricorn	Namibia, Botswana, South Africa, Mozambique, Madagascar

CLEARING A COMMON MISCONCEPTION

The **Cape of Good Hope is not the southern tip of Africa**. The southernmost point is **Cape Agulhas**, about 150 km to the east-south-east, which is also taken as the boundary between the Atlantic and Indian Oceans. The Cape of Good Hope is a rocky headland at the end of the Cape Peninsula, south of Cape Town, famous because it marked the turning point of the sea route round Africa.

02 Regions and Countries

Africa has **54 sovereign states**, all members of the United Nations, plus a few dependent territories and the disputed **Western Sahara** (Section 14). For study they are grouped into regions (Fig. 3.2). The United Nations scheme has five regions; the Horn of Africa is usually treated as a sixth because of its distinct geography and politics.

Political Africa: Six Regions and 54 States

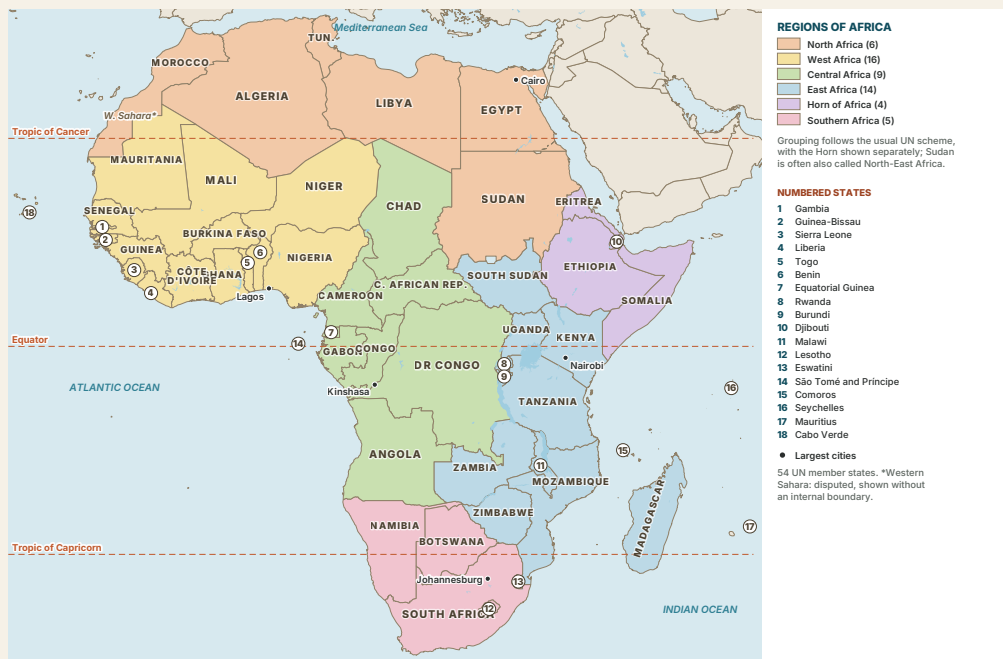


Fig. 3.2 The countries of Africa, coloured by region. Small states are numbered. Western Sahara is shown within the boundary drawn by the base data without an internal line; its status is disputed.

- **North (6):** Morocco, Algeria, Tunisia, Libya, Egypt, Sudan (plus Western Sahara); the Maghreb and the Nile lands.
- **Horn (4):** Ethiopia, Eritrea, Djibouti, Somalia.
- **West (16):** Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Benin, Burkina Faso, Mali, Niger, Nigeria, Cabo Verde.
- **Central (9):** Chad, Cameroon, Central African Republic, Equatorial Guinea, Gabon, Republic of the Congo, DR Congo, São Tomé and Príncipe, Angola.
- **East (14):** South Sudan, Uganda, Kenya, Tanzania, Rwanda, Burundi, Malawi, Zambia, Zimbabwe, Mozambique, Madagascar, Comoros, Mauritius, Seychelles. **Southern (5):** South Africa, Namibia, Botswana, Lesotho, Eswatini.
- **Capitals worth knowing.** South Africa has three: Pretoria (executive), Cape Town (legislative, the seat of Parliament) and Bloemfontein (judicial). Nigeria's capital is Abuja (not Lagos), Côte d'Ivoire's is Yamoussoukro (Abidjan is the main city), Tanzania's is Dodoma, Burundi's is Gitega, and Eswatini has Mbabane and Lobamba. Addis Ababa hosts the African Union. Kinshasa and Brazzaville face each other across the Congo, the closest pair of national capitals after Rome and Vatican City.
- **Old names.** Gold Coast is now Ghana, Dahomey Benin, Upper Volta Burkina Faso, Bechuanaland Botswana, Basutoland Lesotho, Nyasaland Malawi, Rhodesia Zambia and Zimbabwe (Salisbury is Harare), Zaire the DR Congo (Léopoldville is Kinshasa), Abyssinia Ethiopia and Swaziland Eswatini.
- **The newest state** is South Sudan (2011). Somaliland, in north-west Somalia, has claimed independence since 1991; it is not a UN member and is treated here as part of Somalia (Section 14).

03 Relief: High Africa and Low Africa

Africa is often called the **plateau continent**. Its average height is about 600 m, yet it has few long mountain chains. A line drawn from the coast of Angola near Benguela to the Red Sea coast of Eritrea divides it into two parts (Fig. 3.1).

- **Low Africa**, to the north and west, is mostly 150–600 m high. Its surface is a series of wide, shallow **basins** (the Chad basin, El Djouf in Mauritania and Mali, the Sudd basin of South Sudan, the Bodélé depression, and the great

Congo basin), separated by swells and crowned by isolated **massifs** such as the Ahaggar, Tibesti, Aïr, Fouta Djallon, Jos and Adamawa plateaus.

- **High Africa**, to the south and east, is mostly above 1,000 m. It includes the **Ethiopian Highlands**, the **East African plateau** around Lake Victoria, the **Katanga** and **Bié** plateaus, and the **South African plateau**. Rifting, volcanoes and uplift over the last 30 million years have raised this half.

Because the plateau edge stands close to the coast, rivers drop off it in **falls and rapids** a short way inland: poor for navigation, but a huge **hydroelectric potential**, much of it on the lower Congo.

The Plateaus

PLATEAU	WHERE	KEY POINTS
Ethiopian (Abyssinian) Highlands	Ethiopia, Eritrea	Basalt piles about 30 million years old, split by the Ethiopian Rift; source of the Blue Nile, Atbara and Sobat; cool despite the low latitude; home of coffee (Kaffa)
East African plateau	Uganda, Kenya, Tanzania	900–1,800 m; the Lake Victoria basin lies in a sag between the two rift branches; Serengeti plains and Masai Steppe; volcanoes on its rim
Katanga (Shaba) plateau	South-east DR Congo, into Zambia	Source area of the Lualaba (upper Congo); the Copperbelt of copper, cobalt and uranium
Bié plateau	Central Angola	Up to about 2,600 m; source of the Cuanza, Cunene, Okavango and some Zambezi headwaters; farming and cattle

Southern Africa: a Rimmed Saucer

The interior of southern Africa is a high plateau that slopes gently towards the Kalahari basin in the middle. Around it runs the **Great Escarpment**, a steep edge that separates the plateau from a narrow coastal strip and runs, with breaks, from Angola round the Cape to Zimbabwe (Fig. 3.4). It is an erosional edge, not a fold range: rivers have been eating back into the plateau since Gondwana broke up.

- Its highest part is the **Drakensberg** ("dragon mountains") in South Africa and Lesotho, capped by thick Karoo basalt. **Thabana Ntlenyana** (3,482 m) in Lesotho is the highest point of southern Africa. The **Tugela Falls** plunge about 950 m over the Amphitheatre wall, one of the highest waterfalls in the world.
- The plateau surface is the **veld** (Afrikaans for "field"). The **Highveld** (1,200–1,800 m), around Johannesburg, is temperate grassland used for maize, sheep and cattle; the lower, warmer **Bushveld** to the north is wooded savanna on a huge igneous body rich in platinum; the **Lowveld** lies below the escarpment in the east.
- In the south-west rise the **Cape Fold Belt** ranges, true fold mountains but **old** ones, folded about 250 million years ago when Gondwana was being assembled. **Table Mountain** (1,086 m), with its flat sandstone top and "tablecloth" of cloud, stands at their western end above Cape Town.
- Between the Cape ranges and the escarpment lies the **Karoo**, a dry plateau (Section 09).

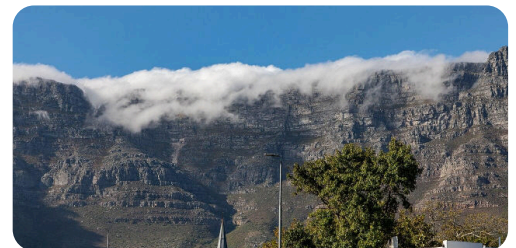


Fig. 3.3 Table Mountain above Cape Town wearing its "tablecloth" of cloud, formed as south-easterly winds rise over the flat sandstone top.

Southern Africa: Escarpment, Veld, Deserts and Currents

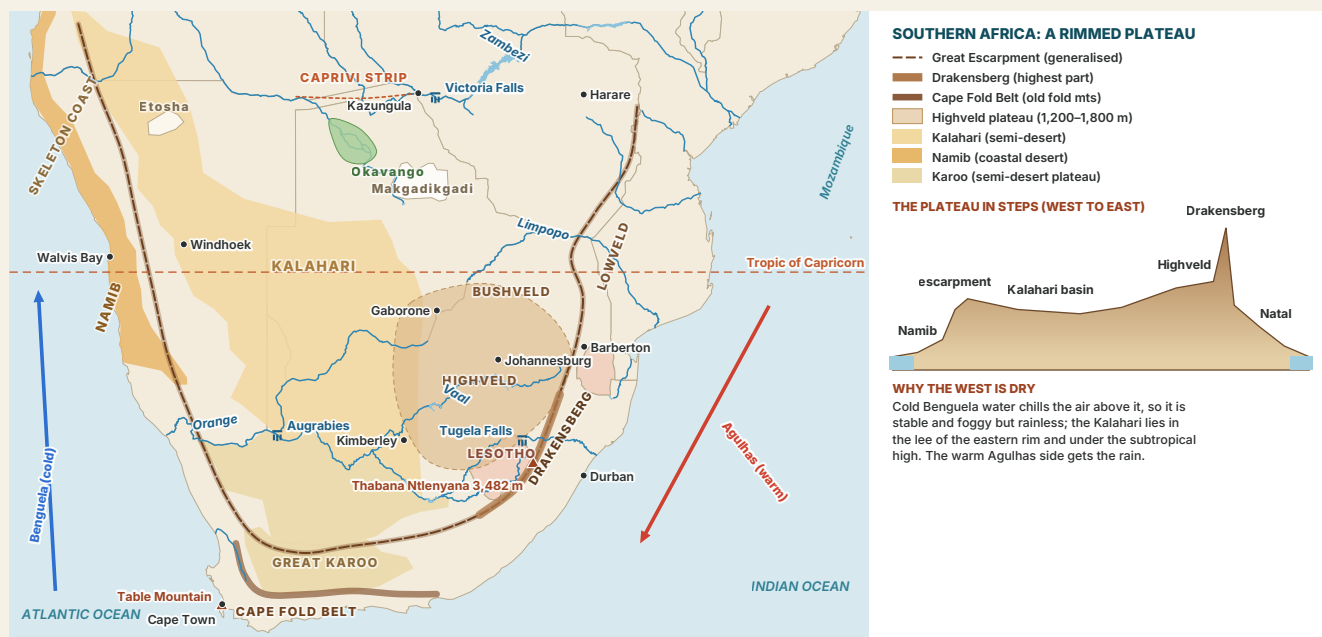


Fig. 3.4 The South African plateau is rimmed by the Great Escarpment, highest in the Drakensberg. The cold Benguela current makes the west dry; the warm Agulhas current brings rain to the east.

04 Mountains and Massifs

Africa is a stable shield with little folding, not a land of young fold mountains. Its mountains are of four kinds: one belt of **young fold mountains** (the Atlas), one of **old fold mountains** (the Cape ranges), **escarpment edges** (the Drakensberg) and **volcanic or uplifted massifs**, most of them tied to rifting or to hot spots.

The Atlas

The **Atlas Mountains** run about 2,500 km through Morocco, Algeria and Tunisia, the region called the **Maghreb**. They were folded in the same Alpine collision of Africa and Europe that raised the Alps (see *Physical Geography*, Chapter 08), and they are still active: the **Al Haouz earthquake of September 2023** struck the High Atlas south of Marrakesh.

- Sub-ranges: the **High Atlas** (with **Jebel Toubkal**, 4,167 m, the highest peak of North Africa), the Middle Atlas, the Anti-Atlas (older rocks to the south), the Tell Atlas along the coast and the Saharan Atlas facing the desert. The **Rif** of northern Morocco belongs to the same arc as Spain's Betic ranges.
- The ranges separate the Mediterranean and Atlantic coasts, with winter rain, from the Sahara. Their snows feed the oases on the desert side.

RANGE OR MASSIF	COUNTRY	HIGHEST POINT	NOTES
Ahaggar (Hoggar)	Southern Algeria	Tahat, 2,908 m	Ancient basement with volcanic peaks near the Tropic of Cancer; Tuareg homeland; Tassili n'Ajjer rock art nearby. The Aïr (Niger) and Jebel Marra (Darfur) are similar massifs
Tibesti	Northern Chad, into Libya and Niger	Emi Koussi, 3,415 m	Volcanic massif; highest point of the Sahara
Fouta Djallon	Guinea	About 1,500 m	Sandstone plateau; source of the Senegal, Gambia and a Niger tributary; the "water tower of West Africa"
Guinea Highlands	Guinea, Sierra Leone, Liberia, Côte d'Ivoire	Mt Nimba, 1,752 m	Source of the Niger; iron ore of Nimba and Simandou

**Cameroon
Volcanic Line**Cameroon and the
Gulf of Guinea
islandsMt Cameroon,
4,040 mActive volcano, highest in West and Central Africa; the line
continues as Bioko, Príncipe, São Tomé and Annobón; crater lakes
Nyos and Monoun**Rwenzori**

DR Congo–Uganda

Margherita
Peak, 5,109 mA block thrust up inside the Western Rift, **not a volcano**; glaciers on
the Equator; the "Mountains of the Moon"

05

The Great Rift Valley and Its Volcanoes

The **Great Rift Valley** is a system of linked troughs about 6,000 km long, running from the Jordan valley and the Dead Sea through the Gulf of Aqaba and the Red Sea to the Afar region of Ethiopia, and from there through East Africa to Mozambique. In Africa it is called the **East African Rift**. It is the largest active continental rift on Earth: the African plate is being stretched and is slowly splitting into the **Nubian plate** to the west and the **Somali plate** to the east, at a few millimetres a year. Each trough is a **graben** dropped down between parallel faults, with raised blocks and plateaus on either side (see *Physical Geography*, Chapter 07, on divergent boundaries).

The East African Rift: Two Branches, Great Lakes and Volcanoes

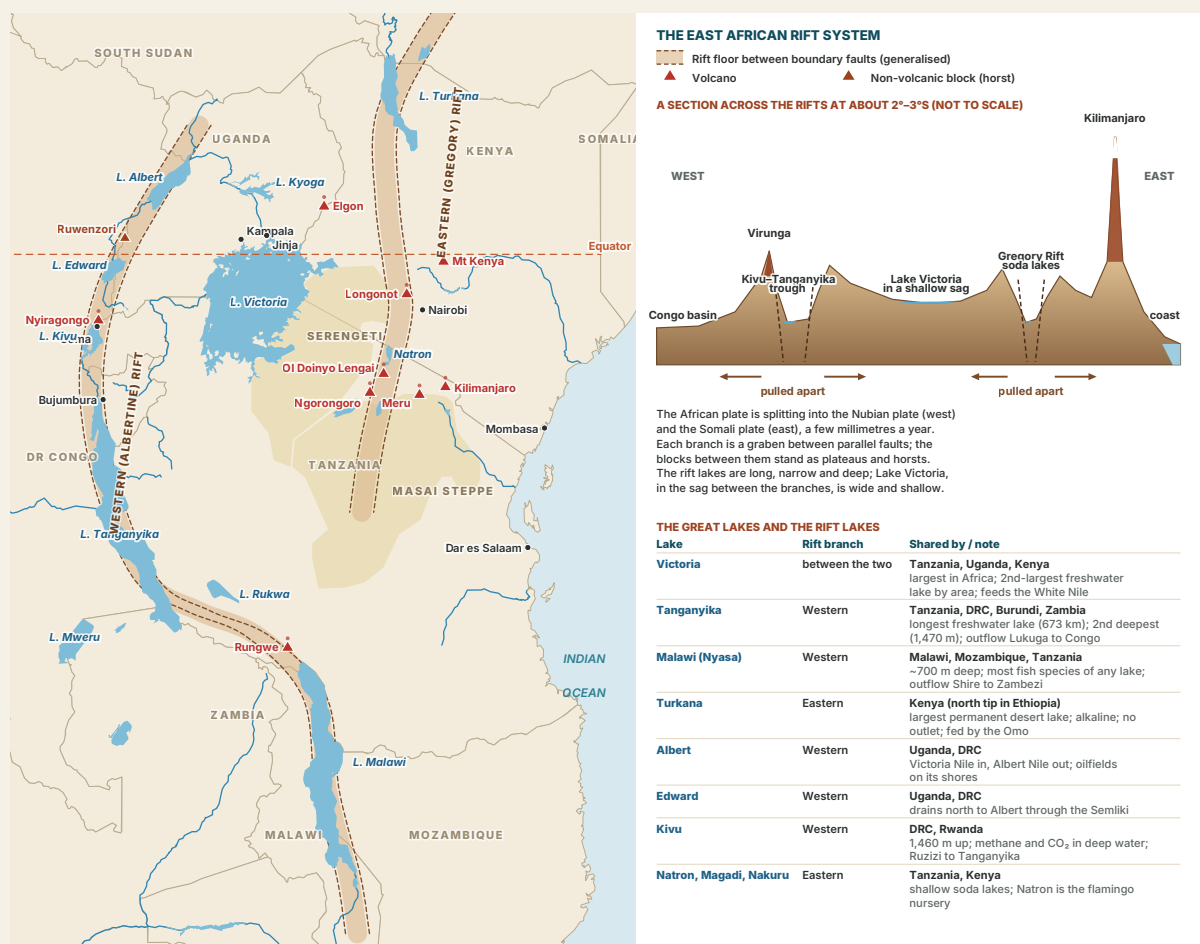


Fig. 3.5 The Western (Albertine) Rift curves round the west of Lake Victoria; the Eastern (Gregory) Rift runs through Kenya into Tanzania. Volcanoes stand on the shoulders of the rifts, and the deep rift lakes fill the troughs.

The Two Branches

- The **Eastern or Gregory Rift** runs from the Ethiopian Rift through Lake Turkana and the Kenya Rift into northern Tanzania, where it fans out and fades. Its floor is dotted with shallow **soda lakes** (Turkana, Baringo, Bogoria, Nakuru, Naivasha, Magadi, Natron), fed by streams and hot springs that dissolve volcanic ash, and with volcanoes

and geothermal fields such as **Olkaria**, which helps make Kenya one of the world's leading geothermal power producers.

- The **Western or Albertine Rift** curves in an arc from Lake Albert through Lakes Edward, Kivu and Tanganyika to Lake Rukwa and Lake Malawi. Its troughs are narrower and deeper, holding some of the deepest lakes on Earth. It is one of Africa's richest areas for wildlife, with the mountain gorillas of the Virunga.
- Between the branches lies the East African plateau and the broad, shallow **Lake Victoria**, which sits in a sag of the plateau, **not in a rift**.

Afar: Where a New Ocean Is Being Born

In north-east Ethiopia, Eritrea and Djibouti the rift widens into the **Afar triangle**, the meeting point of three spreading arms: the **Red Sea**, the **Gulf of Aden** and the **Ethiopian Rift** (Fig. 3.6). This **triple junction** joins the Nubian, Somali and Arabian plates. The two sea arms have already become narrow young oceans floored with new basalt; the third is still on land. If rifting goes on for millions of years, the sea may flood the Ethiopian and Kenyan rifts and the Horn of Africa would drift away as a separate block.

- The **Danakil Depression** in Afar is one of the lowest, hottest and driest places on Earth. At **Dallol** (about 125 m below sea level) hot springs build yellow and green terraces of salt and sulphur (Fig. 3.9); it has the highest average yearly temperature recorded at any inhabited place. Salt is still cut from the pans by hand.
- **Lake Assal** in Djibouti, about 155 m below sea level, is **the lowest point in Africa**, and one of the saltiest lakes in the world.
- **Erta Ale** is a shield volcano with a long-lived lava lake. In 2025 the region was unusually restless: a swarm of earthquakes opened fissures near **Fentale** in the Awash valley in January, and in November **Hayli Gubbi**, just south of Erta Ale, erupted for the first time in recorded history (Section 14).
- Fossil hominins such as "Lucy" (found in 1974 at Hadar in the Awash valley) and Olduvai Gorge in Tanzania make the rift valley the "cradle of humankind".

The Horn of Africa and the Afar Triangle

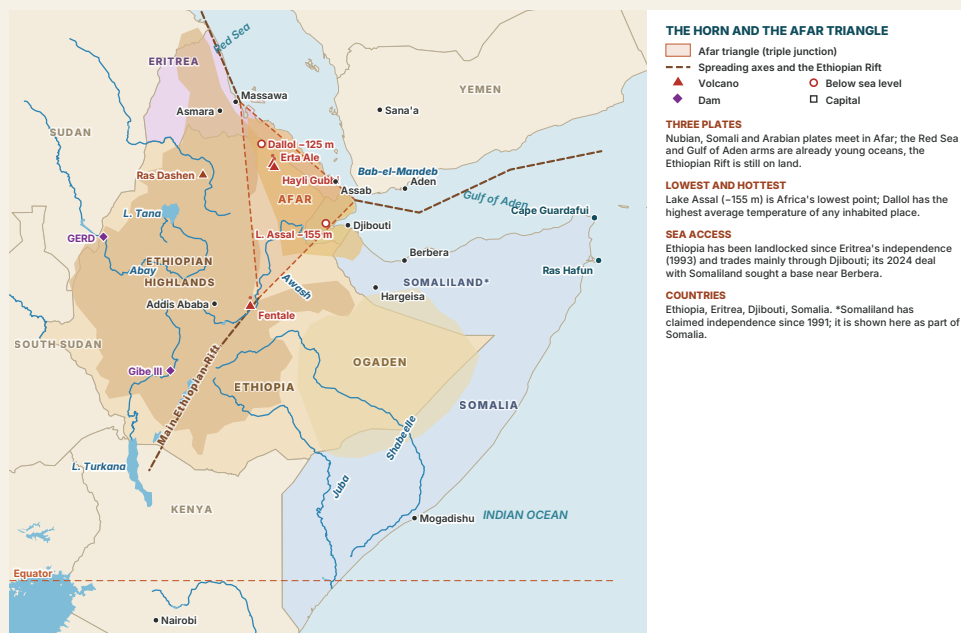


Fig. 3.6 The Red Sea, Gulf of Aden and Ethiopian Rift meet in Afar. The Horn's four countries, the chokepoint of the Bab-el-Mandeb, and Ethiopia's search for a port are marked.

The Volcanoes

Rifting thins the crust so that magma rises easily, and East Africa has more large volcanoes than any other region of the continent (see *Physical Geography*, Chapter 10). Most stand on the shoulders of the rifts rather than in the troughs.

- **Kilimanjaro** (Tanzania), with three cones, **Kibo**, Mawenzi and Shira, is a dormant stratovolcano. Uhuru Peak on Kibo, 5,895 m, is Africa's highest point, and Kilimanjaro is the world's highest free-standing mountain, rising about 4,600 m from the plains. Its ice fields have lost most of their area since the early twentieth century and may disappear within a few decades.
- **Mount Kenya** (5,199 m, Batian), an extinct volcano just south of the Equator, is Africa's second-highest peak; **Mount Elgon** on the Kenya–Uganda border is an old shield volcano with a very wide caldera; **Meru** stands near Arusha.
- **Nyiragongo** in the Virunga range above Goma holds one of the world's largest lava lakes. Its lava is so low in silica that it flows extremely fast; flows reached Goma in 1977, 2002 and 2021. Its neighbour **Nyamuragira** is Africa's most active volcano. **Karisimbi** (4,507 m) is the highest of the eight Virunga volcanoes.
- **Oi Doinyo Lengai** in Tanzania, "mountain of God" to the Maasai, is the only active volcano that erupts natrocarbonatite lava, a sodium carbonate melt at only 500–600 °C that comes out black and weathers white within days.
- **Ngorongoro** is a vast unbroken caldera full of wildlife; **Longonot** and **Menengai** rise from the Kenya Rift floor.



Fig. 3.7 Kilimanjaro's Kibo cone above the clouds. Its summit glaciers are shrinking fast.



Fig. 3.8 The lava lake in Nyiragongo's crater, above Goma on the DR Congo–Rwanda border.



Fig. 3.9 Hot springs at Dallol in the Danakil Depression, coloured by salt, sulphur and iron.

INDIA CONNECT · A SHARED GONDWANA PAST

India and Madagascar broke away from Africa about 160–120 million years ago and from each other about 88 million years ago. The matching rocks, Gondwana coal measures and fossils of Africa, Madagascar and the Peninsula are classic evidence of continental drift; the Seychelles granite is a sliver left behind.

06 The Nile

The **Nile**, about 6,650 km long, is usually counted as the longest river in the world (the Amazon is a close rival on some measurements, and carries far more water). Its basin covers about a tenth of Africa and **11 countries**: Tanzania, Uganda, Rwanda, Burundi, DR Congo, Kenya, Ethiopia, Eritrea, South Sudan, Sudan and Egypt. It flows from south to north, and for its last 2,700 km it crosses the Sahara without receiving a single tributary, an **exotic river** that carries water from a wet region through a desert. Egypt depends on it for almost all its water; most Egyptians live on the narrow strip of the valley and delta.

The Nile Basin: Two Sources, One River and Its Dams

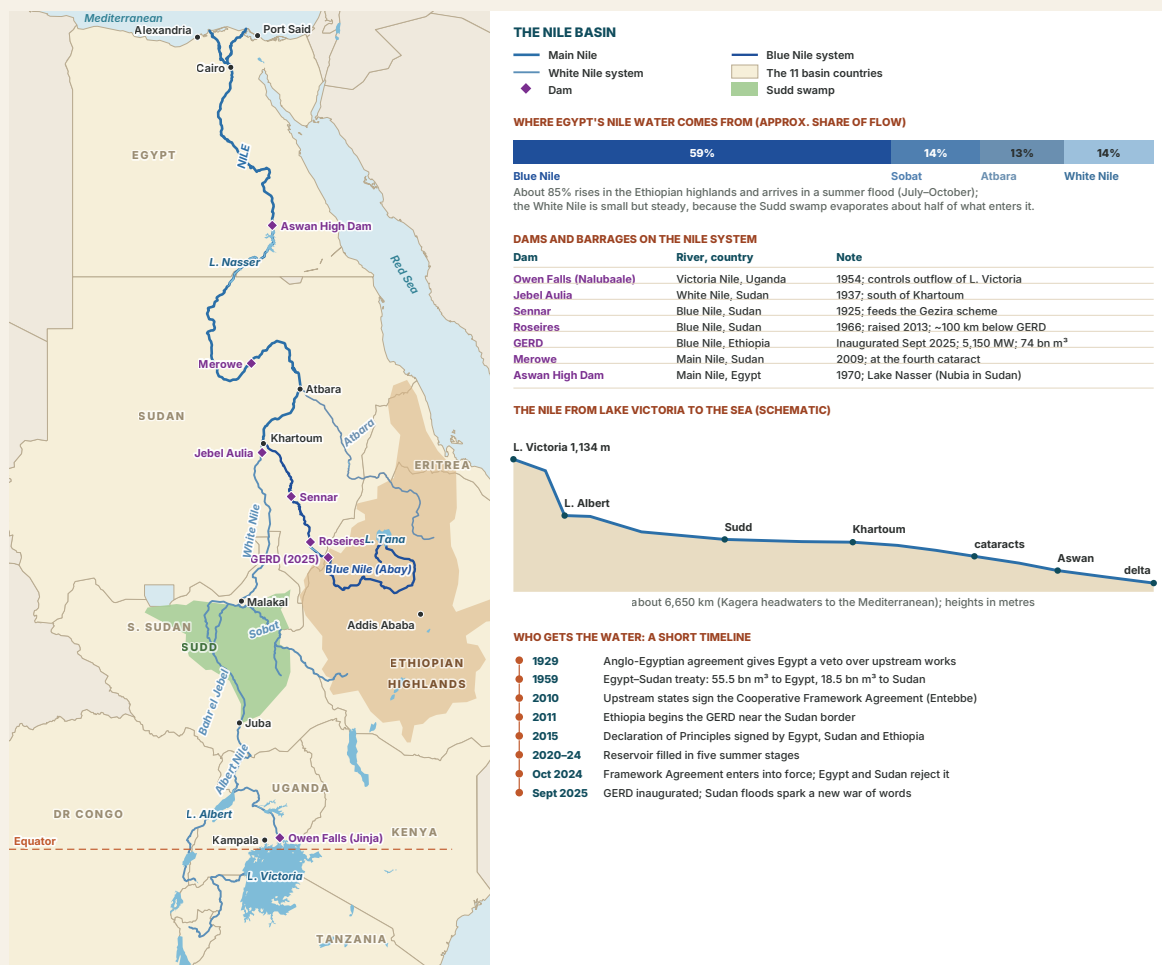


Fig. 3.10 The steady White Nile from the equatorial lakes and the flood-bringing Blue Nile from Ethiopia meet at Khartoum. The Grand Ethiopian Renaissance Dam (GERD) lies on the Blue Nile just inside Ethiopia.

The White Nile

- Its farthest headwaters are the streams of the **Kagera** in Rwanda and Burundi, which flow into **Lake Victoria**. The river leaves the lake at Jinja in Uganda as the **Victoria Nile**, passes Lake Kyoga, plunges through a narrow cleft at **Murchison Falls** and enters Lake Albert in the Western Rift.
- It leaves Lake Albert as the **Albert Nile**, enters South Sudan and, as the **Bahr el Jebel** ("mountain river"), spreads into the **Sudd**, one of the world's largest wetlands, a maze of papyrus swamps and channels. About half the water entering the Sudd is lost to evaporation. The **Jonglei Canal** to bypass it was abandoned half-built.
- Below the Sudd it is joined by the Bahr el Ghazal and then by the **Sobat** from Ethiopia near Malakal. From here it is called the **White Nile**, from the pale clay it carries. The Jebel Aulia dam lies just south of Khartoum.

The Blue Nile and the Atbara

- The **Blue Nile** (Abay in Ethiopia) flows out of **Lake Tana**, falls over the Tis Issat (Blue Nile) Falls, and swings in a deep gorge round the Gojjam highlands before crossing into Sudan. Swollen by the June–September monsoon rains on the Ethiopian Highlands, it supplies about three-fifths of the Nile water reaching Egypt and most of its silt.
- It meets the White Nile at **Khartoum**. Between the two rivers lies the **Gezira** plain, irrigated by the **Sennar** dam (1925), one of the world's largest irrigation schemes, long known for cotton.
- The **Atbara**, with its main tributary the Tekeze, also comes from the Ethiopian Highlands and is the **last tributary of the Nile**, joining at the town of Atbara. It almost dries up in winter.

Through the Desert to the Sea

Below Khartoum the Nile makes a great S-shaped bend through Sudan and crosses **six cataracts**, rapids where it cuts across hard crystalline rock; the Merowe dam (2009) stands at the fourth and the **Aswan High Dam** (completed 1970) just above the first. The dam's reservoir, **Lake Nasser** (called Lake Nubia in Sudan), ended the annual flood, gave Egypt year-round irrigation and power, and flooded the homeland of the Nubians, whose temples at Abu Simbel were moved to higher ground. North of Cairo the river spreads into the classic **arcuate delta**, with two main branches, the **Rosetta** and the **Damietta**. Since the dam trapped the silt, parts of the delta coast have been retreating, and the delta is threatened by rising seas and sinking land.

IN THE NEWS · THE GERD AND THE NILE QUESTION

The **Grand Ethiopian Renaissance Dam** stands on the Blue Nile at Guba in Benishangul-Gumuz, about 15 km from the Sudan border. It is about 145 m high and 1.8 km long, holds about **74 billion m³** and has an installed capacity of about **5,150 MW**, making it **Africa's largest hydroelectric dam**. Building began in 2011, the reservoir was filled in five summer stages between 2020 and 2024, and Ethiopia **inaugurated it on 9 September 2025**.

The dispute. Egypt relies on the 1929 and 1959 agreements, which gave it and Sudan almost all the river's flow, and fears that filling and operating the dam during droughts will cut its share. Sudan expects cheaper power and fewer floods but wants data-sharing to run its own Roseires dam safely. Ethiopia, which supplies most of the water but has used little of it, argues for equitable use and needs power for the millions of its people without electricity. A 2015 Declaration of Principles and talks under the United States, the World Bank and the African Union produced no binding deal. In **October 2024** the upstream countries' **Nile Basin Cooperative Framework Agreement** (Entebbe, 2010) entered into force; Egypt and Sudan reject it. When heavy floods struck Sudan in late September 2025, Egypt blamed uncoordinated releases from the dam, while Ethiopia said the dam had reduced the flood.

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Congo, Niger, Zambezi and Other Rivers

Three great rivers drain the centre, west and south of the continent (Fig. 3.11). All three have unusual courses that tell of a changing plateau, and all three are broken by falls where they cross its edges.

The Congo, Niger and Zambezi Systems

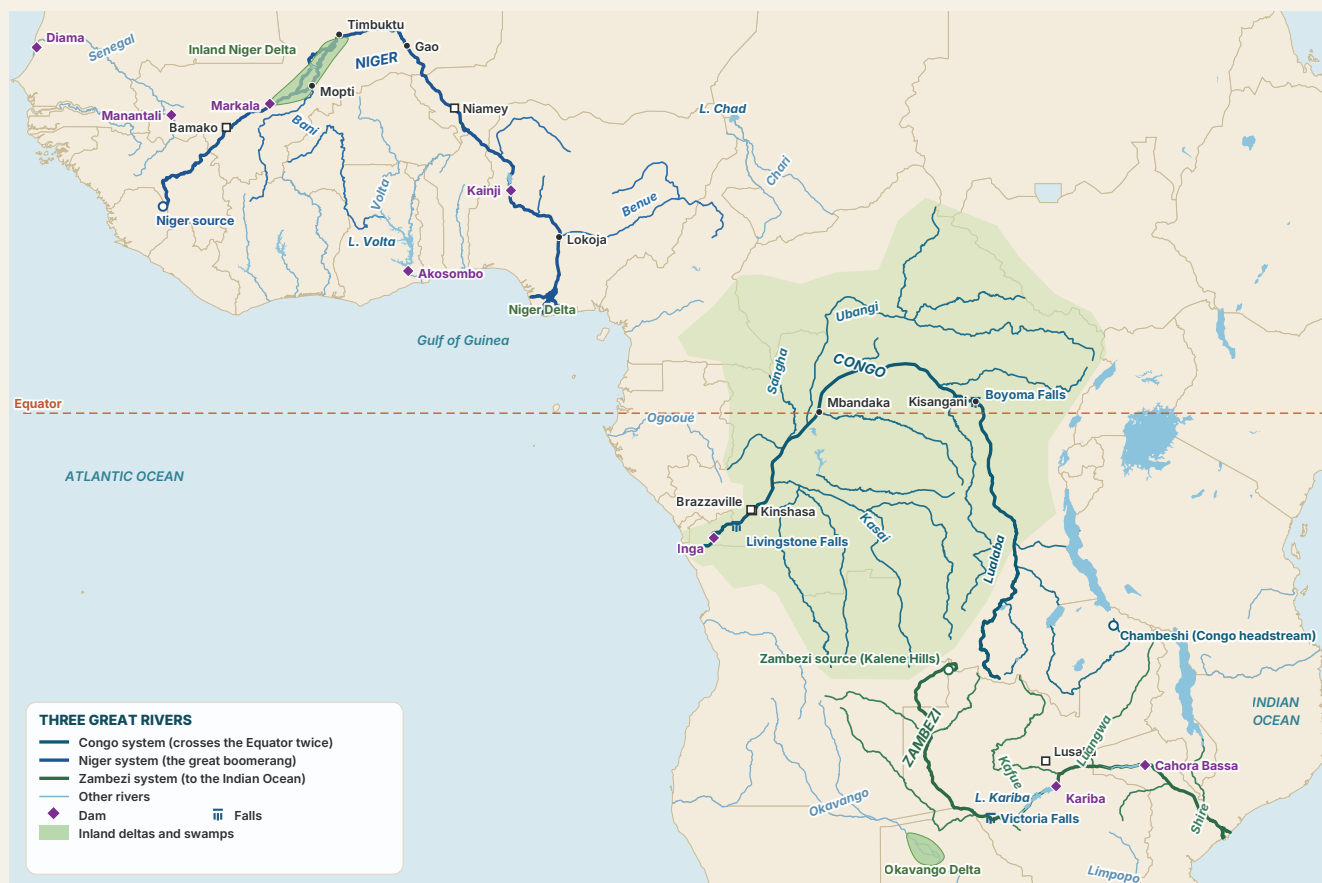


Fig. 3.11 The Congo crosses the Equator twice; the Niger rises near the Atlantic, turns inland to the Sahara and comes back to the sea; the Zambezi is Africa's longest river flowing to the Indian Ocean.

The Congo

- The **Congo** (once called the Zaire), about 4,700 km long, has the **second-largest basin and the second-largest discharge in the world**, after the Amazon. Its farthest headstream is the **Chambeshi** in north-east Zambia, which passes through Lake Bangweulu and Lake Mweru as the Luapula; the upper main stream, the **Lualaba**, rises on the Katanga plateau.
- It is the only major river that **crosses the Equator twice**: northward near Kisangani and back southward near Mbandaka. Because its tributaries rise on both sides of the Equator, one or another is always in its rainy season, so its flow is remarkably even.
- At **Boyoma (Stanley) Falls** near Kisangani the river drops off the eastern edge of the basin; below them it is navigable for about 1,700 km to **Malebo (Stanley) Pool**, where Kinshasa and Brazzaville face each other. Below the pool the **Livingstone Falls**, a series of more than 30 cataracts, carry it through the Crystal Mountains to Matadi.
- Main tributaries: the **Ubangi** (a border river of the DR Congo), the **Kasai** (largest on the left bank), the Sangha, Lomami and Aruwimi.
- The **Inga Falls** on the lower river have the greatest hydropower potential of any site on Earth. Inga I and II work today; the proposed **Grand Inga** scheme, of roughly 40,000 MW, would be the largest in the world.
- It enters the Atlantic through a deep estuary and undersea canyon instead of a delta, and is among the world's deepest rivers (over 200 m in places).

The Niger

- The **Niger** (about 4,200 km), West Africa's chief river, rises in the **Guinea Highlands** only about 240 km from the Atlantic, yet flows north-east, away from the sea, towards the Sahara.

- In Mali it spreads into the **Inland Niger Delta**, a vast seasonally flooded plain of lakes and channels between Ségou and Timbuktu, important for rice, fishing, cattle and migratory birds. At Timbuktu it turns east and then south-east in the **Niger Bend**, passes Gao and Niamey, forms part of the Benin border and enters Nigeria.
- It is joined by its great left-bank tributary, the **Benue**, at Lokoja, and ends in the **Niger Delta**, Africa's largest delta, a region of mangroves and creeks that holds Nigeria's oil.
- This "boomerang" course is explained by **river capture**: the upper Niger once ended in an inland lake near Timbuktu, and a separate river flowing to the Gulf of Guinea cut back and captured it (see *Physical Geography*, Chapter 12).
- Dams: Markala (irrigation in Mali) and **Kainji** (Nigeria's largest hydel dam). It flows through Guinea, Mali, Niger, Benin and Nigeria.

The Zambezi

- The **Zambezi** (about 2,600 km) is the longest African river flowing to the **Indian Ocean**. It rises in the Kalene Hills of north-west Zambia, loops through eastern Angola, forms the border between Zambia and Namibia's Caprivi Strip, touches Botswana at Kazungula, then runs along the Zambia–Zimbabwe border before crossing Mozambique to a delta on the Mozambique Channel.
- **Victoria Falls** (*Mosi-oa-Tunya*, "the smoke that thunders") on the Zambia–Zimbabwe border is about 1.7 km wide and 108 m high, the largest single curtain of falling water on Earth. The river drops into a crack in the basalt plateau and runs on through a zigzag of gorges, each an earlier position of the falls cut back along a line of weakness.
- Below the falls the river feeds **Kariba** (1959), whose lake is the **largest artificial reservoir in the world by volume**, and **Cahora Bassa** (1974) in Mozambique. Its main tributaries are the Kafue, the Luangwa and the **Shire**, the outlet of Lake Malawi.



Fig. 3.12 Victoria Falls from the air: the Zambezi drops into a chasm across its whole width, then escapes through a narrow gorge.

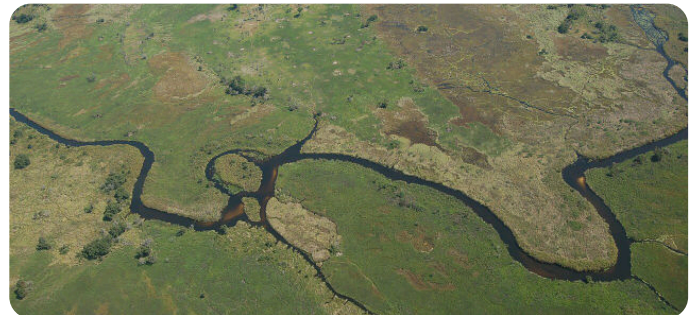


Fig. 3.13 The Okavango Delta in Botswana, an inland delta where a river from Angola spreads out and vanishes into the Kalahari.

Other Rivers

RIVER	COURSE	POINTS TO REMEMBER
Orange	Lesotho highlands (Drakensberg) west across South Africa to the Atlantic	Longest in South Africa; joined by the Vaal; Augrabies Falls; South Africa–Namibia border; diamonds at its mouth; Lesotho Highlands Water Project
Limpopo	South Africa to the Indian Ocean through Mozambique	Crosses the Tropic of Capricorn twice; forms South Africa's borders with Botswana and Zimbabwe; flood-prone in Mozambique
Senegal	Fouta Djallon (as the Bafing) to the Atlantic at Saint-Louis	Forms the Senegal–Mauritania border; Manantali dam (Mali) and Diama anti-salt barrage near the mouth
Gambia	Fouta Djallon to the Atlantic at Banjul	The country of Gambia is a strip along its banks, almost enclosed by Senegal
Volta	Black and White Volta from Burkina Faso, through Ghana	Akosombo dam (1965) made Lake Volta , the largest artificial lake by surface area

Okavango	Bié plateau in Angola (as the Cubango), across the Caprivi Strip into Botswana	Ends in the Okavango Delta , an inland delta with no outlet; its flood peaks in the dry winter months; World Heritage Site
Juba and Shabeelle	Ethiopian highlands into Somalia	Somalia's only permanent rivers; the Shabeelle often fails to reach the sea
Rufiji	Southern Tanzania to the Indian Ocean	Julius Nyerere hydropower dam (about 2,100 MW), Tanzania's largest; mangrove delta

08 Lakes of Africa

The **African Great Lakes** are the lakes of the rift region (the table in Fig. 3.5 compares them). Two types stand out: the **long, narrow and very deep rift lakes** of the Western Rift, and **broad, shallow lakes** in sags of the plateau, of which Lake Victoria is the giant. In the Eastern Rift most lakes are small, shallow and alkaline. Outside the rift lie inland-drainage lakes such as Chad, and large reservoirs.

- **Lake Victoria** (about 68,800 km²) is the **largest lake in Africa**, the **largest tropical lake** and the **second-largest freshwater lake in the world** after Lake Superior. It is shared by Tanzania, Uganda and Kenya, and the Equator crosses its northern part. Though huge, it is only about 80 m deep. Its only outlet is the Victoria Nile at Jinja. The introduction of the Nile perch in the 1950s wiped out hundreds of native cichlid fish species; water hyacinth, sewage and now "forever chemicals" (PFAS) are further threats.
- **Lake Tanganyika** is the **longest freshwater lake** (about 670 km) and the **second-deepest** (about 1,470 m) and second-largest by volume, after Lake Baikal. It is shared by Tanzania, DR Congo, Burundi and Zambia and drains to the Congo through the Lukuga.
- **Lake Malawi** (Lake Nyasa), shared by Malawi, Mozambique and Tanzania (whose boundary on the lake is disputed), is about 700 m deep and has more fish species than any other lake. It drains through the Shire to the Zambezi.
- **Lake Turkana**, in northern Kenya with its northern tip in Ethiopia, is the **world's largest permanent desert lake** and its largest alkaline lake. It has no outlet and gets most of its water from Ethiopia's Omo river; its colour gives it the name "Jade Sea", and its national parks are a World Heritage Site.
- **Lake Kivu** (DR Congo–Rwanda) holds huge amounts of carbon dioxide and methane dissolved in its deep water. A sudden overturn could release them in a **limnic eruption**, as happened at Lake Nyos in Cameroon in 1986, when a cloud of carbon dioxide killed about 1,700 people. Rwanda now extracts the methane to generate power.
- **Albert** (oil discoveries on the Uganda side), **Edward** and **Kyoga** belong to the White Nile system; **Natron** in Tanzania is a hot, caustic soda lake where the lesser flamingo breeds.



Fig. 3.14 The shore of Lake Victoria on the Ssese Islands, Uganda.

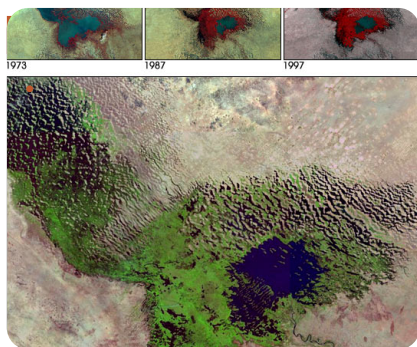


Fig. 3.15 Lake Chad in 1973, 1987 and 1997 (top) and in 2001 (below), seen from space; green is swamp vegetation.

Shrinking and Vanishing Lakes

Lake Chad, shared by Chad, Cameroon, Niger and Nigeria, lies in a closed basin on the southern edge of the Sahara. Being very shallow, it swells and shrinks with rainfall; since the 1960s it has lost most of its open water, mainly through the Sahel droughts and irrigation withdrawals, though it has partly recovered since. Some 30 million people depend on it, and its shrinking is tied to poverty and insurgency around its shores. Plans to refill it by a canal from the Ubangi (Transaqua) are debated.

Lake Faguibine in Mali, near Timbuktu, once among the largest lakes of West Africa and fed by Niger floods, dried up after the droughts of the 1970s and 1980s.

- **Reservoirs:** Lake Volta (largest by area), Lake Kariba (largest by volume) and Lake Nasser. **Lake Tana**, Ethiopia's largest lake, is the source of the Blue Nile.

CORRECTING COMMON ERRORS

(1) **Lake Victoria is not a rift lake**; it lies between the two branches. (2) Lake Turkana is in **Kenya** (with a small part in Ethiopia), **not South Sudan**, and it is far from the Sahara. (3) **The Equator does not pass through Lake Tanganyika** (3° – 9° S); it crosses Lake Victoria. (4) The deepest lake in Africa is Tanganyika; the largest in area is Victoria.

09 Deserts: Sahara, Kalahari, Namib, Karoo

Africa's deserts lie in two belts on either side of the Equator, under the subtropical high-pressure cells, where air sinks and warms and rain is rare (see *Physical Geography*, Chapters 17 and 23). The northern belt is far larger because Africa is widest there.

The Sahara, the Sahel and the Great Green Wall

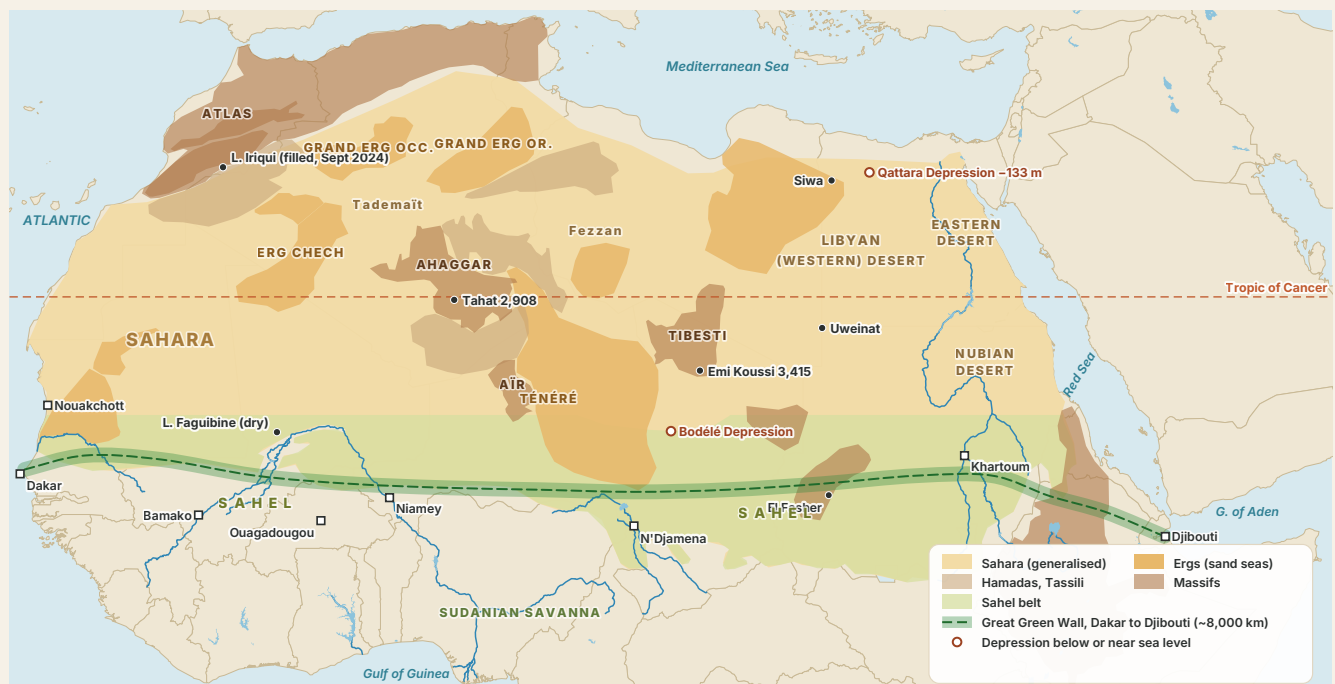


Fig. 3.16 The Sahara's sand seas, rocky plateaus and massifs, with the Sahel belt to its south and the planned Great Green Wall from Dakar to Djibouti. Outlines are generalised.

The Sahara

The **Sahara** (Arabic for "desert") is the **largest hot desert in the world**, about 9 million km², nearly three times the size of India; only the polar deserts are larger. It stretches about 4,800 km from the Atlantic to the Red Sea and touches **11 territories**: Morocco, Western Sahara, Algeria, Tunisia, Libya, Egypt, Mauritania, Mali, Niger, Chad and Sudan. Its boundaries are the Atlas and the Mediterranean to the north and the Sahel to the south.

- **Surfaces.** Contrary to the picture of endless dunes, sand covers only about a quarter of it. The rest is **hamada** (bare rock plateau, such as the Tadmait and Tassili n'Ajjer), **reg** or **serir** (gravel plains) and mountains. Sand seas, or **ergs**, include the Grand Erg Occidental and Oriental of Algeria, Erg Chech, the Ténéré of Niger and the Great Sand Sea of Egypt and Libya (see *Physical Geography*, Chapter 13).
- **Parts.** The **Libyan (Western) Desert** covers the eastern Sahara in Libya, western Egypt and north-west Sudan, with the oases of Siwa, Kharga and Dakhla and Mount Uweinat on the Egypt–Libya–Sudan border. The **Nubian Desert**, a

sandstone plateau cut by dry valleys, lies mainly in north-east Sudan between the Nile's great bend and the Red Sea hills. The **Eastern (Arabian) Desert** of Egypt lies between the Nile and the Red Sea.

- **Depressions.** The **Qattara Depression** of Egypt falls to about 133 m below sea level. The **Bodélé Depression** in Chad, an old bed of a much larger Lake Chad, is the **world's largest single source of dust**; its dust, rich in phosphorus, crosses the Atlantic and fertilises the Amazon.
- **Climate.** Rainfall is mostly under 100 mm; daily ranges of temperature are extreme. The 58 °C once claimed for Al Aziziya, Libya (1922), was rejected by the WMO in 2012; the world record is 56.7 °C in Death Valley.
- **A green Sahara.** Between about 11,000 and 5,000 years ago the Sahara was a land of lakes and grassland, as rock paintings of cattle and hippos show. In September 2024 a rare storm dropped more than 100 mm on parts of south-east Morocco and filled the dry bed of **Lake Iriqui** for the first time in about half a century.

The Kalahari

The **Kalahari**, covering most of Botswana and parts of Namibia and South Africa, is a vast basin of red sand on the South African plateau. With 150–500 mm of rain, most of it is really **semi-desert or dry savanna**, with grass and thorn scrub on fixed dunes. It is dry because it lies under the subtropical high and in the rain shadow of the eastern escarpment. Its features include the salt pans of **Makgadikgadi** (Botswana) and **Etosha** (Namibia) and the **Okavango Delta**. The San people have long lived here as hunter-gatherers. Under the sand lie some of the world's richest diamond pipes (Jwaneng, Orapa).



Fig. 3.17 Star and linear dunes of Erg Chebbi, a small sand sea on Morocco's Saharan edge.

The Namib

The **Namib** runs for about 2,000 km along the Atlantic coast from southern Angola through Namibia into South Africa. Formed perhaps 55 million years ago or more, it is often called the **oldest desert in the world**. It is a **coastal or cold-current desert**: the cold **Benguela current** and upwelling cool the air above the sea, making it stable, so fog forms but rain does not (Figs. 3.18–3.19). The coast receives less than 20 mm of rain a year, yet fog rolls in on many days and keeps alive lichens, the long-lived *Welwitschia* plant and beetles that drink the fog. Its red dunes at Sossusvlei are among the highest in the world, and the fog-bound **Skeleton Coast** is littered with wrecks. The Namib Sand Sea is a World Heritage Site.

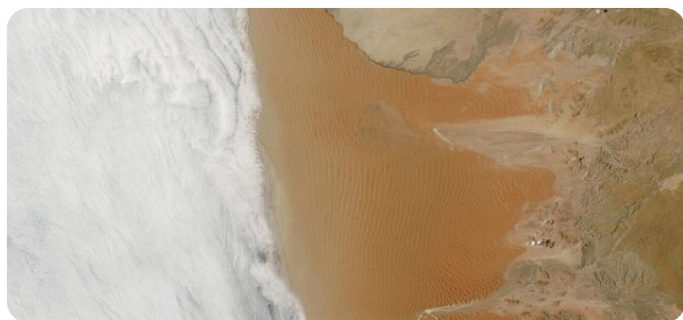


Fig. 3.18 A satellite view of low cloud and fog hugging the Namib coast, held down over the cold Benguela water.

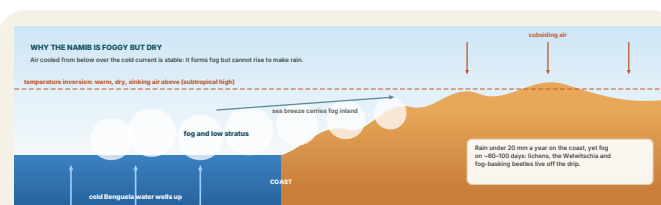


Fig. 3.19 Why the Namib is foggy but dry: cold water below and sinking air above trap moisture in a shallow layer.

The Karoo

The **Karoo** ("land of thirst" in the Khoikhoi language) is a semi-desert plateau in South Africa between the Cape ranges and the Great Escarpment, divided into the Great Karoo and the Little Karoo. It is sheep country, and its rocks, the Karoo Supergroup, hold one of the world's richest records of early reptiles and mammal-like reptiles from about 250 million years ago.

Climate, Vegetation and the Sahel

Lying almost centrally across the Equator, Africa is the most tropical of the continents and the hottest. Its climate and vegetation belts are arranged almost **symmetrically** on either side (Fig. 3.20): equatorial forest in the middle, then savanna, then steppe and desert, and a Mediterranean fringe at the northern and southern tips (see *Physical Geography*, Chapters 23 and 24).

Mirror-Image Belts across the Equator

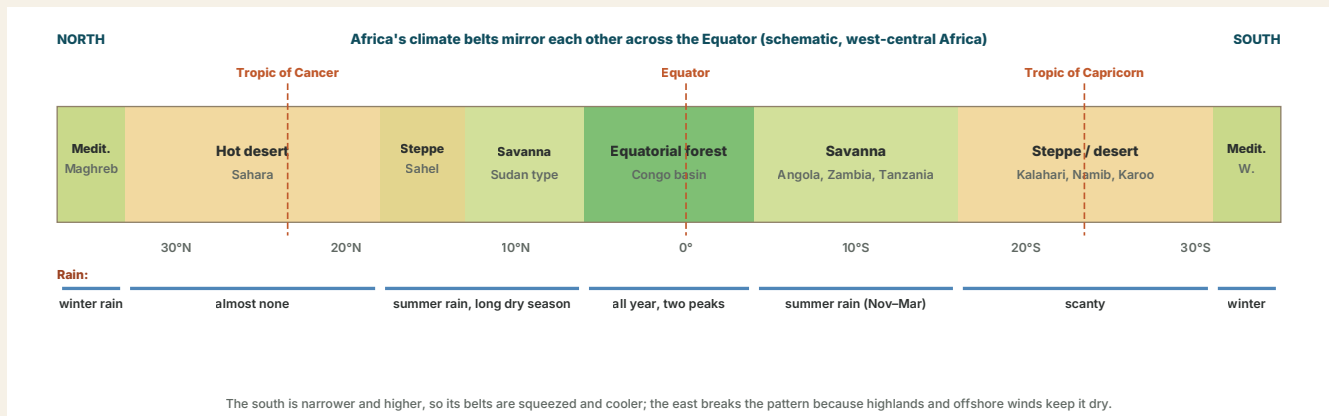


Fig. 3.20 A north-south transect through west-central Africa. Each belt has its counterpart on the other side of the Equator.

- **Equatorial rainforest** (Congo basin and the Guinea coast): rain in every month with two peaks, tall evergreen trees in layers, mahogany, ebony and oil palm. The **Congo rainforest** is the **second-largest tropical forest on Earth**, after the Amazon, and is now a net carbon sink. Beneath its swamp forests, the **Cuvette Centrale peatlands** of the Republic of the Congo and DR Congo form the world's largest tropical peatland, holding about 29 billion tonnes of carbon, roughly three years of global fossil-fuel emissions. In Ghana, Togo and Benin a dry corridor, the **Dahomey Gap**, lets savanna reach the coast and splits the West African forest in two.
- **Savanna** covers more of Africa than any other vegetation, perhaps two-fifths of it: tall grass with scattered acacia and baobab trees, a long dry season, and the great herds of the **Serengeti** and Masai Mara, where more than a million wildebeest migrate in a yearly circuit. South of the Congo forest, the savanna is the **miombo woodland** of Angola, Zambia and Tanzania. In the language of grasslands, East Africa's tropical grassland is the **savanna**, while South Africa's temperate grassland is the **veld**, used for maize farms and for sheep and cattle (see *Physical Geography*, Chapter 24).
- **Mediterranean** (Csa) climate along the Maghreb coast and in the south-western Cape: winter rain and dry summers, with cork oak, olive and cedar in the north and the unique **fynbos** heathland of the Cape Floral Region, the smallest of the world's six floral kingdoms, in the south.
- **Montane** climates on the Ethiopian and East African highlands: Addis Ababa, at about 2,350 m, has a mild "eternal spring". Equatorial East Africa is unusually dry for its latitude, because the highlands cut it off from Congo air and the monsoon winds blow parallel to its coast instead of onto it.
- **Mangroves** line the Niger delta, the Gulf of Guinea and the Rufiji and Zambezi deltas. Local winds such as the dusty **Harmattan** of West Africa and the **Sirocco** and **Khamsin** of the north are covered in *Physical Geography*, Chapter 17.

The Sahel

The **Sahel** (Arabic for "shore", the southern shore of the Sahara) is a belt of semi-arid steppe and thorn savanna, roughly between 12° and 18° N, running from Senegal and Mauritania through Mali, Burkina Faso, Niger, northern Nigeria, Chad and Sudan to Eritrea. It gets 200–600 mm of rain in a short summer season, which varies greatly from year to year. The severe droughts of 1968–74 and the 1980s killed people and livestock on a huge scale, emptied lakes (Chad, Faguibine) and made "desertification" a global issue. Rains have partly recovered since the 1990s, but the region remains one of the most climate-stressed on Earth, and the pressures of a fast-growing population on land and water are linked to its conflicts (Section 14).



Fig. 3.21 A river winding through rainforest in North Kivu, on the eastern edge of the Congo basin.

IN FOCUS · THE GREAT GREEN WALL

Launched by the African Union in **2007**, the **Great Green Wall** aims to restore a belt of land about **8,000 km long, from Dakar to Djibouti** across the Sahel (Fig. 3.16). Its eleven founding countries were Senegal, Mauritania, Mali, Burkina Faso, Niger, Nigeria, Chad, Sudan, Eritrea, Ethiopia and Djibouti; about twenty now take part. The 2030 targets are to restore 100 million hectares, store 250 million tonnes of carbon and create 10 million jobs. The idea has shifted from planting a literal wall of trees to a mosaic of farmer-managed regrowth, water harvesting and pasture management, which has worked well in Niger and Senegal. A UN review in 2020 found that only a small fraction of the target had been reached. **India's Aravalli Green Wall** project (2023), meant to green a 5-km buffer along the Aravalli hills from Gujarat to Delhi, was modelled on it.

11 Islands, Coasts, Peninsulas and Gulfs

Africa has few large islands. The largest by far is Madagascar; the rest are small volcanic or coral islands in the Indian Ocean and volcanic islands in the Atlantic (see *Physical Geography*, Chapter 25, for island types; Chapter 12 of this book compares the world's islands).

Africa's Indian Ocean Islands

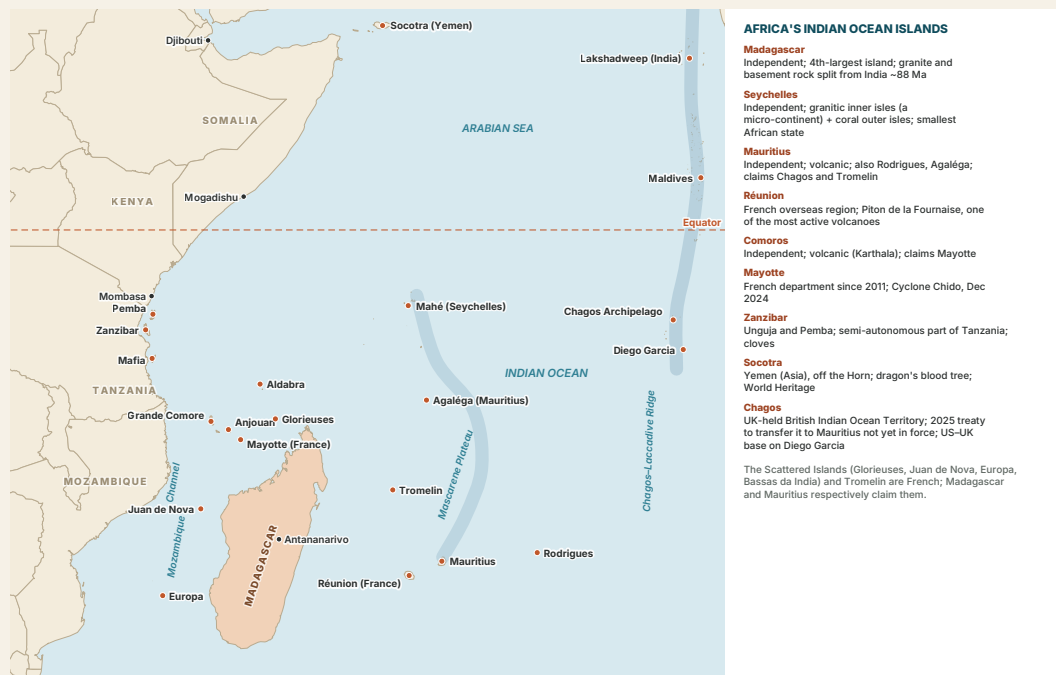


Fig. 3.22 Madagascar, the Mascarenes, the Seychelles, the Comoros, Zanzibar and the Chagos Archipelago. Lakshadweep and the Maldives sit on the same submarine ridge as the Chagos.

- **Madagascar** (about 5.9 lakh km²) is a fragment of Gondwana, separated from Africa by the Mozambique Channel. Its long isolation has made it a world centre of **endemism**: almost all its lemurs, most of its reptiles and about nine-tenths of its plants live nowhere else. It produces most of the world's natural vanilla. Its east coast is wet and faces the trade winds and cyclones; the west and south are dry.
- **Mauritius** (volcanic, capital Port Louis) includes Rodrigues and Agaléga; about two-thirds of its people are of Indian origin. **Réunion**, a French overseas region, has one of the world's most active volcanoes, Piton de la Fournaise. Together they form the **Mascarene Islands**.
- **Seychelles** (capital Victoria) has granitic inner islands, a piece of continent left behind when India drifted away, and low coral outer islands such as **Aldabra**, a World Heritage atoll famous for giant tortoises. It is Africa's smallest country.
- **Comoros** (Grande Comore, Mohéli, Anjouan) is an independent volcanic archipelago with the active Karthala volcano. **Mayotte**, the fourth island, voted to stay with France and became a French department in 2011; Comoros still claims it.
- **Zanzibar** (Unguja and Pemba) is a semi-autonomous part of Tanzania, known for cloves and the old trading town of Stone Town. Off the Horn lies **Socotra**, which belongs to Yemen.
- The **Chagos Archipelago**, at the southern end of the Chagos–Laccadive Ridge, has been held by Britain since 1965 as the British Indian Ocean Territory; its largest atoll, **Diego Garcia**, hosts a major US–UK military base. Mauritius claims it, backed by the International Court of Justice's advisory opinion (2019) and a UN General Assembly resolution (2019). A UK–Mauritius treaty signed on **22 May 2025** would transfer sovereignty while leasing Diego Garcia back to the UK for 99 years, but it had **not been ratified as of September 2026**. India supports Mauritius's claim.
- **Atlantic islands.** The volcanic **Canary Islands** (Spain; Teide, 3,715 m, is Spain's highest peak; La Palma erupted in 2021) and **Madeira** (Portugal); independent **Cabo Verde** (Fogo volcano; dry Sahel climate) and **São Tomé and Príncipe** (on the Equator, cocoa); **Bioko**, which holds Equatorial Guinea's capital Malabo; and the British **St Helena** (Napoleon's exile), **Ascension** (airbase) and **Tristan da Cunha**, the most remote inhabited archipelago.

Peninsulas, Gulfs and Coasts

- **Peninsulas.** The **Horn of Africa** (Somali Peninsula) juts into the Arabian Sea, ending at Cape Guardafui; Ras Hafun nearby is Africa's easternmost point. The **Cape Peninsula** ends at the Cape of Good Hope. The **Sinai Peninsula** belongs to Egypt but lies in Asia (Section 12).
- **Gulfs.** The **Gulf of Guinea**, with the Bight of Benin and the Bight of Biafra (Bonny), is the great bend of the west coast and a rich oil and fishing area, now also a piracy hotspot. Others: the Gulf of Sidra (Sirte) off Libya and the Gulf of Gabès off Tunisia; the Gulf of Suez and Gulf of Aqaba at the head of the Red Sea; the **Gulf of Aden** between Somalia and Yemen; the Gulf of Tadjoura in Djibouti; and the **Mozambique Channel**. The straits (Gibraltar, Bab-el-Mandeb) are covered in Chapter 09.
- **Named coasts.** Colonial trade named the Guinea coast: the Grain (Pepper) Coast of Liberia, the **Ivory Coast**, the **Gold Coast** (Ghana) and the Slave Coast (Togo, Benin, western Nigeria). Others are the Barbary Coast of the Maghreb, the Swahili Coast of East Africa, the Skeleton Coast of Namibia and the Wild Coast of South Africa.

12 Landlocked States, Corridors and Suez

Africa has 16 landlocked countries, more than any other continent: **Mali, Burkina Faso, Niger, Chad, Central African Republic, South Sudan, Ethiopia, Uganda, Rwanda, Burundi, Zambia, Malawi, Zimbabwe, Botswana, Lesotho and Eswatini**. Ethiopia, landlocked since Eritrea's independence in 1993, is the world's most populous landlocked country; Chad is Africa's largest by area. **Lesotho** is entirely surrounded by South Africa, one of only three countries enclosed by another (with San Marino and Vatican City). Their trade depends on corridors to the sea, such as Djibouti for Ethiopia, Dar es Salaam and Mombasa for the Great Lakes states, and Beira and Durban for the south. Landlocked states as a world theme are covered in Chapter 13.

- The **Caprivi Strip** (now the Zambezi Region of Namibia) is a corridor about 450 km long between Angola and Zambia to the north and Botswana to the south. Germany obtained it in 1890 to reach the Zambezi, not knowing that Victoria Falls blocked navigation downstream. At its eastern tip, near **Kazungula**, the borders of Namibia, Botswana, Zambia and Zimbabwe come within about 150 m of each other, a **near-quadrupoint** rather than the "only quadrupoint in the world" it is often called; the Kazungula Bridge (2021) links Botswana and Zambia across the Zambezi.
- The **Suez Canal** (opened 1869, about 193 km, with no locks) cuts the Isthmus of Suez from Port Said on the Mediterranean to Suez on the Red Sea, passing through the Great Bitter Lake. Egypt nationalised it in 1956. Attacks on shipping in the Red Sea from late 2023 forced many ships to sail round the Cape of Good Hope instead, sharply cutting canal traffic. The canal and its chokepoints are covered in Chapter 09.
- The **Sinai Peninsula**, the Asian part of Egypt, lies between the Gulf of Suez and the Gulf of Aqaba; Mount Catherine (2,629 m) is Egypt's highest point. Israel occupied it in 1967 and returned it by 1982 under the 1979 peace treaty.
- Along the Egypt–Sudan border, the **Hala'ib Triangle** is claimed by both countries, while the small **Bir Tawil** is claimed by neither (Chapter 13).

13 Resources in Brief

Africa holds a large share of the world's critical minerals, though much is exported raw; for India it is a source of crude, LNG, phosphate, cobalt and pulses. Mineral distribution follows geology: ancient shields with gold and diamonds, great igneous intrusions with platinum, rift and basin sediments with oil and gas.

RESOURCE	WHERE	NOTES
Copper and cobalt	Copperbelt of Zambia and Katanga (DR Congo)	DR Congo mines about three-quarters of the world's cobalt , vital for batteries; the Lobito Corridor railway to Angola's coast is being upgraded to export it

Coltan (tantalum)	Kivu provinces, eastern DR Congo	Used in electronics; fought over, including the Rubaya mines held by M23
Gold	Witwatersrand basin (Johannesburg), Ghana, Mali, Sudan	The Witwatersrand has yielded more gold than any other field; Ghana now leads Africa
Platinum, chromium	Bushveld Complex, South Africa	Most of the world's platinum-group metals; also Zimbabwe's Great Dyke
Diamonds	Botswana (Jwaneng, Orapa), DR Congo, Angola, South Africa (Kimberley), Namibia (offshore)	Botswana leads by value; Namibia dredges marine diamonds near the Orange mouth
Oil and gas	Nigeria (Niger delta), Angola (offshore, Cabinda), Libya, Algeria, Egypt, Mozambique (Rovuma)	Nigeria and Angola lead south of the Sahara; Indian (ONGC Videsh) stake in Mozambique LNG
Uranium; bauxite	Niger (Arlit), Namibia (Rössing, Husab); Guinea	Guinea has the largest bauxite reserves (and Simandou iron ore)
Phosphate, manganese	Morocco and Western Sahara; South Africa (Kalahari), Gabon	Morocco holds most of the world's phosphate reserves and is a key fertiliser supplier to India
Crops	Côte d'Ivoire and Ghana (cocoa), Kenya (tea), Ethiopia and Uganda (coffee), Madagascar (vanilla), Zanzibar (cloves)	The two cocoa giants grow about three-fifths of the world's cocoa

14 Places in the News, 2024–2026

African places in the news in 2024–26, chosen for their geography; conflict follows corridors, lakes, minerals and routes to the sea, while the land and water keep changing (world list in Chapter 14).

Africa in the News, 2024–2026

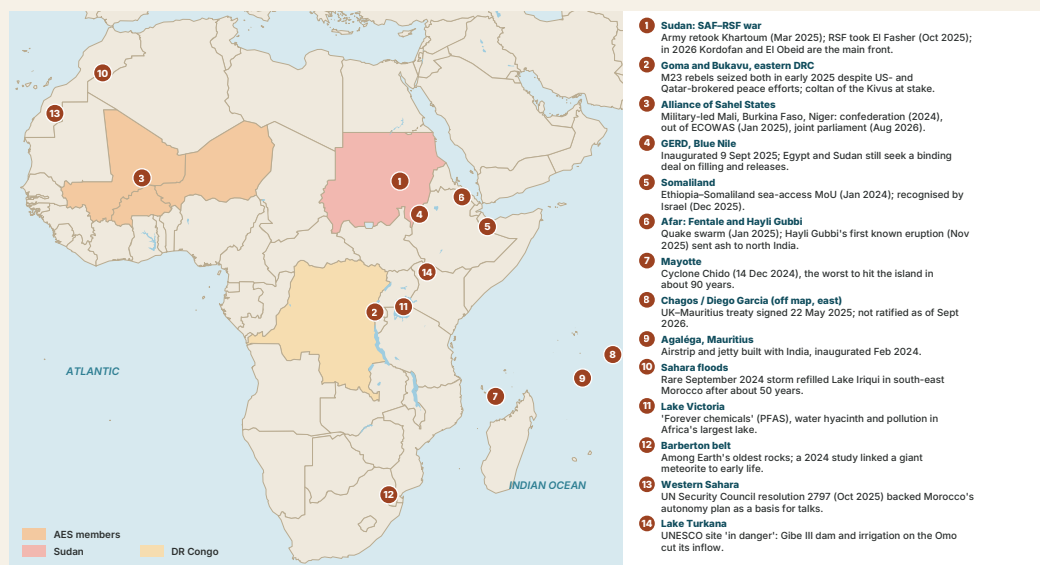


Fig. 3.23 Fourteen places in the news. Shaded: the member states of the Alliance of Sahel States, Sudan and DR Congo.

USING THIS CHAPTER IN MAINS

Rifting: East Africa and Afar as continental break-up (Section 05). **Water conflicts:** the Nile, GERD, Lake Chad (Sections 06–08). **Changing features and desertification:** Lake Chad, Kilimanjaro's ice, the Sahel and Great Green Wall (Sections 08, 10). **Resources:** cobalt, copper, platinum, phosphate (Section 13).

? Previous Year Questions

Prelims

2026

Which of the following statements with reference to Lake Turkana is/are correct?

1. It is the largest desert lake in the world.
2. The lake is situated in South Sudan along the eastern fringe of the Sahara desert.
3. The lake is listed as a UNESCO World Heritage Site and is also referred to as the 'Jade Sea'.

Select the answer using the code given below:

a 1 only

b 1 and 3 only

c 2 and 3 only

d 1, 2 and 3

Answer: (b). Largest permanent desert lake, World Heritage Site; but it is in northern Kenya, far from the Sahara (Section 08).

2024

Which of the following countries are well known as the two largest cocoa producers in the world?

a Algeria and Morocco

b Botswana and Namibia

c Côte d'Ivoire and Ghana

d Madagascar and Mozambique

Answer: (c). The two humid Guinea-coast states grow about three-fifths of the world's cocoa (Section 13).

2024

One of the following regions has the world's largest tropical peatland, which holds about three years worth of global carbon emissions from fossil fuels; and the possible destruction of which can exert detrimental effect on the global climate. Which one of the following denotes that region?

a Amazon Basin

b Congo Basin

c Kikori Basin

d Rio de la Plata Basin

Answer: (b). The Cuvette Centrale peatlands store about 29 billion tonnes of carbon (Section 10).

2023

Which one of the following is a part of the Congo Basin?

a Cameroon

b Nigeria

c South Sudan

d Uganda

Answer: (a). South-east Cameroon drains to the Congo via the Sangha; the others drain to the Niger or Nile (Fig. 3.11).

2023

About three-fourths of world's cobalt, a metal required for the manufacture of batteries for electric motor vehicles, is produced by

a Argentina

b Botswana

c the Democratic Republic of the Congo

d Kazakhstan

Answer: (c). Cobalt comes mainly from the Katanga Copperbelt of the DR Congo (Section 13).

2022

Which one of the following lakes of West Africa has become dry and turned into a desert?

a Lake Victoria

b Lake Faguibine

c Lake Oguta

d Lake Volta

Answer: (b). Faguibine, near Timbuktu in Mali, dried up after the Sahel droughts (Section 08).

2013 Which one of the following pairs is correctly matched?

Geographical Feature : Region

a Abyssinian Plateau : Arabia

b Atlas Mountains : North-Western Africa

c Guiana Highlands : South-Western Africa

d Okavango Basin : Patagonia

Answer: (b). Abyssinia is Ethiopia, the Guiana Highlands are in South America, the Okavango in Botswana.

2008 Ogaden region has been a source of conflict between which countries?

a Morocco and Algeria

b Nigeria and Cameroon

c Angola and Zambia

d Ethiopia and Somalia

Answer: (d). The Ogaden, a Somali-inhabited plateau in eastern Ethiopia, saw the 1977–78 war (asked again in 2009).

2007 Assertion (A): There are no tea plantations in any African country.

Reason (R): Tea plants need fertile soil with high humus.

a Both A and R are true and R is the correct explanation of A

b Both A and R are true but R is not the correct explanation of A

c A is true but R is false

d A is false but R is true

Answer: (d). Kenya is a leading tea exporter; Malawi, Uganda and Tanzania also grow tea (Section 13).

2005 Which one of the following cities is the seat of Parliament of South Africa?

a Pretoria

b Durban

c Johannesburg

d Cape Town

Answer: (d). Cape Town is the legislative capital; Pretoria is executive and Bloemfontein judicial (Section 02).

2005 Which one of the following pairs is not correctly matched?

Current Name — Old Name

a Harare — Salisbury

b Ethiopia — Abyssinia

c Ghana — Dutch Guiana

d Kinshasa — Leopoldville

Answer: (c). Ghana was the Gold Coast; Dutch Guiana is Suriname in South America (Section 02).

2000 Which one of the following lakes forms an international boundary between Tanzania and Uganda?

a Chad

b Malawi

c Victoria

d Zambezi

Answer: (c). Lake Victoria is divided among Tanzania, Uganda and Kenya (Section 08).

Mains

2014

GS I · 10 MARKS

How does India see its place in the economic space of rising natural resource-rich Africa?

Approach: Africa's oil, gas, phosphate, cobalt and farmland (Section 13) against India's needs; trade, ONGC Videsh, diaspora, maritime ties; contrast with China.

LOTUSARISE IAS

WORLD GEOGRAPHY

PRELIMS · GS PAPER I

Oceans, Seas, Straits, Gulfs and Canals

Seven-tenths of the planet is sea, yet the world's trade, its energy and much of its diplomacy squeeze through a handful of gaps a few dozen kilometres wide. A tanker leaving the Persian Gulf for China must thread the Strait of Hormuz and then the Strait of Malacca; a container ship from Shanghai to Rotterdam needs the Bab-el-Mandeb, the Suez Canal and Gibraltar, or else a detour of two weeks round Africa. Since 2023 the world has watched those gaps close one after another: the Red Sea under missile attack, the Panama Canal short of rain, and in 2026 the Strait of Hormuz shut by war. This chapter maps the five oceans, the seas, gulfs and bays that fringe them, every strait the examination asks about, and the canals that people have cut where nature left a narrow neck of land.

SYLLABUS

PRELIMS

Indian and World Geography: Physical and Economic Geography of the World (oceans and their limits; marginal, inland and enclosed seas and their bordering countries; gulfs and bays; straits, channels and passages and what they join; maritime chokepoints; ship canals and isthmuses; sea routes and places in the news)

MAINS · GS PAPER I

Salient features of world's physical geography; changes in critical geographical features, including water-bodies; factors responsible for the location of industries and trade. GS II-III links: freedom of navigation and UNCLOS, energy security, the Red Sea and Hormuz crises, India's maritime interests and connectivity corridors

CONTENTS

01 The Vocabulary of Water Bodies	02 The Five Oceans
03 Seas of the Atlantic, the Mediterranean and the Arctic	04 Seas of the Indian and Pacific Oceans
05 Gulfs and Bays of the World	06 Straits of the World: The Master Table
07 Straits of South-East Asia and the Indian Ocean	08 Hormuz, Bab-el-Mandeb and the Red Sea
09 Europe's Straits: Turkish, Danish and Gibraltar	10 Straits of the Pacific Rim, the Americas and Oceania
11 Maritime Chokepoints and World Trade	12 Ship Canals of the World
13 Proposed Canals and the Great Isthmuses	14 Previous Year Questions

This chapter covers:

- what separates an ocean from a sea, a gulf from a bay and a strait from a channel or canal;
- the five oceans in one table and one map: area, depth, deepest points and the conventional lines that divide them, including the Southern Ocean;
- the seas of each ocean with their bordering countries, from the Mediterranean family and the Black Sea to the Sargasso Sea that has no coast, and the important gulfs and bays;
- a master table of more than fifty straits and channels, then regional maps of each cluster: South-East Asia, the Gulf and Red Sea, Europe, the North Pacific, the Caribbean and Oceania;

- maritime chokepoints and the oil that passes them, the Red Sea crisis and the Cape route, the Panama drought and the 2026 Hormuz crisis;
- the great ship canals, the proposed ones (Kra, Istanbul, Funan Techo, Nicaragua) and the isthmuses they cut.

The next chapter turns from salt water to fresh: the rivers, lakes and waterfalls of the world.

01 The Vocabulary of Water Bodies

Map questions often turn on a single word, so the terms are worth fixing first. Names on the map are historical, not scientific: the Bay of Bengal is larger than most seas and the Caspian "Sea" is a lake.

TERM	MEANING	EXAMPLES
Ocean	One of the five great interconnected bodies of salt water, floored largely by oceanic crust	Pacific, Atlantic, Indian, Southern, Arctic
Marginal sea	A part of an ocean partly cut off by islands, archipelagos or peninsulas, but broadly open to it	South China Sea, Arabian Sea, North Sea, Bering Sea, Caribbean
Mediterranean (intercontinental) sea	A deep sea almost wholly ringed by land and joined to the ocean by a narrow strait; its waters differ in temperature and salinity from the ocean outside	Mediterranean, Red Sea; oceanographers class the Arctic Ocean and the Caribbean–Gulf of Mexico basin the same way
Inland sea; "sea" that is a lake	A sea deep inside a continent, reached only through narrow straits; an enclosed salt lake with no outlet is still called a "sea"	Black, Baltic, Marmara, Azov; Caspian, Aral, Dead Sea
Gulf; bay; bight	A gulf is a large, deep indentation of the sea into the land, usually with a narrower mouth; a bay is wider-mouthed and less enclosed; a bight is a long, gentle bend of the coast	Gulf of Mexico (largest gulf), Persian Gulf; Bay of Bengal (largest bay), Bay of Biscay; Great Australian Bight
Strait; channel; passage	A strait is a natural narrow sea passage between two land masses, joining two larger bodies of water. "Channel" and "passage" are used for wider or deeper ways, often between an island and a mainland	Strait of Hormuz; English Channel, Mozambique Channel; Drake Passage, Windward Passage
Isthmus; canal	An isthmus is a narrow neck of land joining two larger land masses with water on both sides; a canal is an artificial waterway, often cut across one	Isthmus of Suez, Panama, Corinth, Kra; Suez and Panama Canals
Chokepoint	A narrow passage on a major sea route whose blocking would force long detours or halt trade	Malacca, Hormuz, Bab-el-Mandeb, Suez, Panama, Turkish and Danish straits

CLEARING A COMMON MISCONCEPTION

Straits are made by nature: by faulting and rifting (Bab-el-Mandeb, Red Sea), by the drowning of river valleys and land bridges as sea level rose after the last glaciation (Bosporus, Dover, Bering, Bass, Palk), or by gaps between volcanic islands (Sunda, Lombok). A canal is a human cut, and a gulf is a body of water in its own right, not a "connector". Under UNCLOS, ships and aircraft of all states enjoy **transit passage** through straits used for international navigation, a right that the coastal states may not suspend (see *Physical Geography*, Chapter 28).

02 The Five Oceans

The world ocean is one connected body, divided by convention into five. The **Pacific** alone is larger than all the land on Earth put together; the **Arctic** is the smallest and shallowest. The **Southern Ocean**, the water south of 60°S round Antarctica, was proposed as the fifth ocean by the International Hydrographic Organization in 2000; its limits are still a draft, but most atlases and many agencies now show it, and it is the only ocean defined by a current (the Antarctic Circumpolar Current) rather than by the land round it (Chapter 08). Relief of the ocean floor is treated in *Physical Geography*, Chapter 25, and currents in Chapter 26.

OCEAN	AREA (SHARE)	MEAN DEPTH	DEEPEST POINT	POINTS TO REMEMBER
Pacific	≈ 168.7 million km ² (46.6%)	≈ 3,970 m	Challenger Deep, Mariana Trench, ≈ 10,935 m	Largest and deepest; ringed by trenches and volcanoes (the Ring of Fire); holds most of the world's islands; named "peaceful" by Magellan
Atlantic	≈ 85.1 million km ² (23.5%)	≈ 3,650 m	Puerto Rico Trench, ≈ 8,400 m	S-shaped and still widening along the Mid-Atlantic Ridge; the saltiest ocean on average; receives the largest share of the world's river water (Amazon, Congo, Mississippi)
Indian	≈ 70.6 million km ² (19.5%)	≈ 3,740 m	Java (Sunda) Trench, ≈ 7,190 m	Closed to the north by Asia, so its northern half has monsoon-reversing currents; the only ocean named after a country
Southern	≈ 22.0 million km ² (6.1%)	≈ 3,270 m	South Sandwich Trench (Factorian Deep), ≈ 7,430 m	South of 60°S; the Antarctic Circumpolar Current, strongest on Earth, circles it eastward
Arctic	≈ 15.6 million km ² (4.3%)	≈ 1,200 m	Molloy Deep, Fram Strait, ≈ 5,550 m	Smallest and shallowest; about half its floor is continental shelf; partly ice-covered all year (Chapter 08)

The World Ocean and Its Five Divisions



Fig. 9.1 Equal-area world map. The dashed lines are the conventional limits: 20°E from Cape Agulhas (Atlantic–Indian), 146°55'E from South East Cape in Tasmania (Indian–Pacific), the Cape Horn meridian across the Drake Passage (Pacific–Atlantic), the Bering Strait (Pacific–Arctic) and the Greenland–Iceland–Faroe–Scotland line (Atlantic–Arctic). Cape Agulhas, not the Cape of Good Hope, is where the Atlantic meets the Indian Ocean. Depths are rounded.

03

Seas of the Atlantic, the Mediterranean and the Arctic

The Atlantic is fringed by more marginal seas than any other ocean, and its Mediterranean arm is a whole family of seas in itself (Fig. 9.2). Europe's seas are described in Chapter 04 and the polar seas in Chapter 08; the table gathers the ones UPSC asks about with the countries that border them.

SEA	BORDERING COUNTRIES	KEY FACTS
NORTH ATLANTIC AND THE ARCTIC FRINGE		
North Sea	UK, Norway, Denmark, Germany, Netherlands, Belgium, France	Shallow (mean ≈ 95 m) shelf sea; Dogger Bank; oil, gas and wind farms; the Wadden Sea tidal flats on its south-east rim
Baltic Sea	Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Germany, Denmark	World's largest body of brackish water; young (post-glacial), shallow, almost tideless; northern gulfs freeze in winter; joined to the North Sea by the Danish straits

Norwegian, Greenland, Barents, Labrador Seas	Norway, Iceland, Greenland (Denmark), Russia, Canada	The North Atlantic Drift keeps the Norwegian and southern Barents Seas ice-free; the Barents Sea is a rich cod fishery; the Labrador Sea forms deep water for the global conveyor (Chapter 08)
WESTERN ATLANTIC		
Caribbean Sea	Mexico, Belize, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela and the Antilles (Cuba, Jamaica, Haiti, Dominican Republic, Puerto Rico and the Lesser Antilles)	Cayman Trough, $\approx 7,690$ m, is its deepest point; hurricane belt; the Panama Canal opens from it (Chapter 05)
Sargasso Sea	None: Bermuda is the only land within it	The only sea with no coastline, bounded by currents: the Gulf Stream (west), North Atlantic Current (north), Canary Current (east) and North Equatorial Current (south); floating <i>Sargassum</i> weed; spawning ground of the European and American eels
THE MEDITERRANEAN FAMILY		
Mediterranean Sea	21 states on three continents, from Spain and Morocco to Türkiye and Egypt, plus Gibraltar and the Gaza Strip	≈ 2.5 million km ² ; deepest at the Calypso Deep ($\approx 5,267$ m) in the Ionian basin; more evaporation than inflow, so saltier than the Atlantic
Alboran, Balearic, Ligurian, Tyrrhenian Seas	Spain, Morocco, Algeria; France, Monaco, Italy	Western basin; the Tyrrhenian lies between Italy, Corsica, Sardinia and Sicily
Adriatic Sea	Italy, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Albania	Between the Italian and Balkan peninsulas; Dalmatian coast; opens south through the Strait of Otranto
Ionian Sea	Italy, Albania, Greece	Deepest part of the Mediterranean
Aegean Sea; Sea of Crete	Greece, Türkiye	Studded with islands (the Cyclades, Dodecanese); leads to the Dardanelles
Levantine Sea	Türkiye, Syria, Lebanon, Israel, Gaza, Egypt, Libya, Cyprus	Easternmost and saltiest basin; large gas fields (Leviathan, Zohr)
Sea of Marmara	Türkiye only	Inland sea between the Bosphorus and the Dardanelles, over the North Anatolian Fault
Black Sea	Türkiye, Bulgaria, Romania, Ukraine, Russia, Georgia	$\approx 436,000$ km ² , $\approx 2,200$ m deep; fed by the Danube, Dnieper, Dniester and Don, so its surface is only half as salty as the ocean
Sea of Azov	Russia, Ukraine (whole coast under Russian control since 2022)	World's shallowest sea, at most ≈ 14 m; nearly fresh in the Taganrog Gulf; joined to the Black Sea by the Kerch Strait

The Mediterranean and Its Arms



Fig. 9.2 The Mediterranean family. A ridge between Sicily and Tunisia, crossed by the Strait of Sicily, divides it into western and eastern basins. Its gateways are the Strait of Gibraltar, the Turkish Straits and the Suez Canal.

How the enclosed seas behave

- **Mediterranean, a two-way gate:** evaporation exceeds rain and river inflow, so Atlantic water pours in at the surface through Gibraltar while dense, salty Mediterranean water spills out underneath, over the strait's sill, and spreads as a warm salty tongue at about 1,000 m depth in the Atlantic. About 6 million years ago the strait closed and the sea nearly dried out (the Messinian salinity crisis).
- **Black Sea, a layered sea:** fresh river water floats on top of saltier water that entered from the Mediterranean, and the two hardly mix. Below about 150–200 m the water has no oxygen and is laden with hydrogen sulphide, making the Black Sea the world's largest **meromictic** (permanently layered) basin.
- **Baltic, the brackish sea:** more than 200 rivers, a cool climate and narrow, shallow straits keep salinity under one-quarter of ocean values in most of the sea, and close to fresh in the inner Gulfs of Bothnia and Finland.
- **Sargasso Sea, the sea without shores:** its edges move with the currents of the North Atlantic gyre (see *Physical Geography*, Chapter 26). Since 2011 a far larger "Great Atlantic Sargassum Belt" has bloomed each summer from West Africa to the Caribbean, piling seaweed on beaches; it reached a record of close to 38 million tonnes in mid-2025.

CLEARING A COMMON MISCONCEPTION

The **Caspian** is the world's largest lake ($\approx 371,000 \text{ km}^2$, about 28 m below sea level), shared by Russia, Kazakhstan, Turkmenistan, Iran and Azerbaijan. The 2018 Aktau Convention gave it a special legal status, neither sea nor lake, for dividing its waters and seabed. It is falling fast as the Volga's inflow drops and evaporation rises (Chapter 02; lakes in Chapter 10). The **Dead Sea** and the **Aral Sea** are lakes too.

04 Seas of the Indian and Pacific Oceans

The northern Indian Ocean splits round the Indian peninsula into the Arabian Sea and the Bay of Bengal, with gulfs at the north-west (Persian Gulf, Red Sea) leading to the oil fields and the Suez route. The western Pacific is a chain of marginal seas strung behind island arcs, from the Bering Sea to the Tasman Sea (see Figs. 9.4, 9.11 and 9.13). South-East and East Asian seas are described in Chapter 01; the South China Sea dispute is there too.

SEA	BORDERING COUNTRIES	KEY FACTS
INDIAN OCEAN		
Arabian Sea	India, Pakistan, Iran, Oman, Yemen, Somalia; Maldives on its southern edge	≈ 3.9 million km^2 ; Gulfs of Aden and Oman are its arms; strong summer upwelling off Oman and Somalia; cyclones in May–June and October–November
Bay of Bengal	India, Bangladesh, Myanmar, Sri Lanka	Largest bay in the world (≈ 2.2 million km^2); low salinity from the Ganga–Brahmaputra; the world's deadliest cyclone basin (Book 2)
Andaman Sea	Myanmar, Thailand, Malaysia, Indonesia, India (Andaman and Nicobar Islands)	Behind the Andaman–Nicobar arc; Barren Island volcano; leads to the Strait of Malacca
Red Sea	Egypt, Sudan, Eritrea, Djibouti, Saudi Arabia, Yemen; Israel and Jordan through the Gulf of Aqaba	A young rift between Africa and Arabia; no permanent river enters it and rain is scarce, so salinity reaches about 40% (Section 08)
WESTERN PACIFIC, NORTH TO SOUTH		
Bering Sea	Russia, USA	Behind the Aleutian arc; rich pollock and crab fisheries; the Bering Strait leads north to the Chukchi Sea
Sea of Okhotsk	Russia, Japan (Hokkaido)	Almost wholly Russian; behind the Kuril arc; southernmost sea with large winter sea ice in the northern hemisphere
Sea of Japan (East Sea)	Japan, Russia, North Korea, South Korea	Korea calls it the East Sea; joined to the Pacific by the Tsugaru, La Pérouse and Korea straits
Yellow Sea and Bohai	China, North Korea, South Korea	Very shallow (mean ≈ 44 m) shelf sea coloured by loess silt from the Huang He; the Bohai is its inner gulf

East China Sea	China, Taiwan, Japan, South Korea	Broad shelf; Senkaku (Diaoyu) islands, administered by Japan and claimed by China and Taiwan
South China Sea	China, Taiwan, Philippines, Malaysia, Brunei, Indonesia, Vietnam (and through its gulfs Cambodia, Thailand, Singapore)	≈ 3.5 million km ² ; Paracel and Spratly islands, Scarborough Shoal; overlapping claims and the 2016 arbitral award (Chapter 01)
Philippine Sea	Philippines, Taiwan, Japan, Palau; US territories of Guam and the Northern Marianas	The largest sea by many reckonings (≈ 5.7 million km ²); bounded east by the Mariana arc, beyond which lies the Mariana Trench
Sulu, Celebes, Molucca; Java, Flores Seas	Philippines, Malaysia (Sabah), Indonesia	Deep basins between island arcs (Tubbataha Reefs in the Sulu Sea); the Java Sea, by contrast, is shallow (≈ 45 m) water over the drowned Sunda Shelf
Banda Sea	Indonesia, Timor-Leste	Very deep: the Weber Deep (≈ 7,200 m) is the deepest point in the ocean not inside a trench
Arafura and Timor Seas	Australia, Indonesia, Papua New Guinea, Timor-Leste	Shallow shelf joining Australia and New Guinea; dry land in the Ice Age; Timor Sea oil and gas (2018 maritime boundary treaty)
Coral Sea	Australia, Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia (France)	≈ 4.8 million km ² ; holds the Great Barrier Reef (Chapter 07)
Tasman Sea	Australia, New Zealand	Named after Abel Tasman; "the Ditch" between the two countries

05

Gulfs and Bays of the World

Gulfs matter for three reasons: their oil and gas (Persian Gulf, Gulf of Mexico, Gulf of Guinea), their shipping (Aden, Oman, Finland) and their tides (Fundy, Khambhat). The Indian gulfs, Kutch, Khambhat and Mannar, are treated in Book 2, *Indian Physical Geography*, Chapter 07.

GULF OR BAY	WHERE; BORDERING COUNTRIES	WHY IT MATTERS
INDIAN OCEAN AND WEST ASIA		
Persian Gulf	Iran, Iraq, Kuwait, Saudi Arabia, Bahrain, Qatar, UAE, Oman (Musandam)	Shallow (mean ≈ 50 m) arm of the Arabian Sea through Hormuz; about half the world's proven oil; the Shatt al-Arab enters at its head
Gulf of Oman	Oman, UAE, Iran, Pakistan	Links Hormuz to the Arabian Sea; ports of Fujairah, Jask, Chabahar, Gwadar lie near it
Gulf of Aden	Yemen, Djibouti, Somalia (including Somaliland)	Joins the Arabian Sea to the Red Sea via the Bab-el-Mandeb; Somali piracy peaked here in 2008–11 and revived in 2023–24
Gulfs of Suez and Aqaba	Egypt; Egypt, Israel, Jordan, Saudi Arabia	Two arms of the Red Sea on either side of Sinai; Aqaba is the deep rift arm, Suez the shallow one leading to the canal
Gulfs of Mannar, Kutch, Khambhat; Palk Bay	India, Sri Lanka; India	Mannar's marine national park and biosphere reserve; Kutch's coral and tidal potential; Khambhat's tidal range, among the highest in India (Book 2)
PACIFIC AND SOUTH-EAST ASIA		
Gulf of Thailand	Thailand, Cambodia, Vietnam, Malaysia	Formerly the Gulf of Siam; Bay of Bangkok at its head; the proposed Kra canal and Cambodia's Funan Techo canal both aim at it
Gulf of Tonkin (Beibu Gulf)	Vietnam, China	Receives the Red River; Ha Long Bay on its west; China's new Pinglu Canal reaches it at Qin Zhou
Gulf of Carpentaria	Australia	Shallow gulf between Cape York and Arnhem Land, opening north into the Arafura Sea
Gulf of Alaska	USA (and Canada's coast near it)	Ringed by tidewater glaciers (Hubbard, Malaspina); the 1964 Alaska earthquake struck here
ATLANTIC AND EUROPE		
Gulf of Mexico	USA, Mexico, Cuba	Largest gulf in the world (≈ 1.55 million km ²); Mississippi delta and its summer "dead zone"; offshore oil (the 2010 Deepwater Horizon spill); hurricanes

Gulf of St Lawrence	Canada	Outlet of the Great Lakes–St Lawrence system; the St Lawrence estuary is among the largest in the world
Hudson Bay	Canada	A vast, shallow inland sea (≈ 1.2 million km ²) on the Canadian Shield, frozen for much of the year; still rising after the Ice Age (isostatic rebound)
Bay of Fundy	Canada (Nova Scotia, New Brunswick)	The highest tides on Earth, up to about 16 m, because the bay's natural period of oscillation is close to that of the tide (resonance; see <i>Physical Geography</i> , Chapter 26)
Gulf of Guinea	Liberia to Gabon: Côte d'Ivoire, Ghana, Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, São Tomé and Príncipe, Gabon	The Equator and the Prime Meridian cross in it (0°, 0°); Niger and Volta deltas; oil; a piracy and kidnapping hotspot that has quietened since about 2021 under joint patrols
Bay of Biscay	France, Spain	Deep, stormy bay notorious for heavy swells
Gulfs of Bothnia, Finland, Riga	Sweden, Finland; Finland, Russia, Estonia; Latvia, Estonia	Arms of the Baltic that freeze in winter; St Petersburg lies at the head of the Gulf of Finland; the Gulf of Riga opens through the Irbe Strait

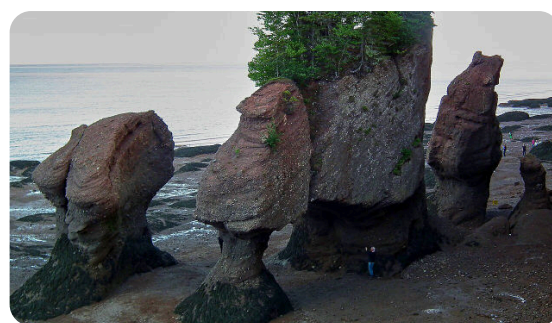


Fig. 9.3 The "flowerpot" sea stacks at Hopewell Rocks, Bay of Fundy, at low tide. At high tide the sea rises well over 10 m up their sides.

IN THE NEWS · "GULF OF AMERICA"

On 20 January 2025 a US executive order renamed the Gulf of Mexico the **"Gulf of America"** for official US federal use, and the US Geographic Names Information System adopted the change in February 2025. Mexico objected, and the International Hydrographic Organization and most other countries continue to use "Gulf of Mexico". For the examination, use the internationally recognised name and note the US usage; the water body itself is unchanged.

06 Straits of the World: The Master Table

The table lists each strait with the two land masses it separates and the two bodies of water it joins, region by region. The regional maps that follow (Figs. 9.4–9.13) show where each lies. India's own channels, from the Coco Channel to the Nine and Eight Degree Channels off Lakshadweep, are described in Book 2, Chapter 07.

STRAIT	SEPARATES	JOINS	NOTE
SOUTH AND SOUTH-EAST ASIA, INDIAN OCEAN			
Malacca	Malay Peninsula – Sumatra	Andaman Sea – South China Sea (via Singapore Strait)	≈ 900 km long; busiest oil chokepoint in the world
Singapore	Singapore – Riau Islands (Indonesia)	Malacca Strait – South China Sea	Narrowest point ≈ 2.8 km (Phillips Channel)
Sunda	Sumatra – Java	Java Sea – Indian Ocean	Krakatau stands in it; shallow at its eastern end
Lombok	Bali – Lombok	Bali Sea – Indian Ocean	Deep (≥ 250 m), used by the largest tankers; on the Wallace Line
Makassar	Borneo – Sulawesi	Celebes Sea – Java and Flores Seas	Main path of the Indonesian Throughflow

Palk	India (Tamil Nadu) – Sri Lanka	Palk Bay – Bay of Bengal	Shallow; Adam's Bridge (Ram Setu) lies south of it
Ten Degree Channel	Little Andaman – Car Nicobar	Andaman Sea – Bay of Bengal	Along 10°N
Six Degree (Great) Channel	Great Nicobar – Sumatra	Andaman Sea – Indian Ocean	Main shipping way into Malacca from the west
Mozambique Channel	Mozambique – Madagascar	Indian Ocean (north and south)	≈ 1,600 km long, ≈ 420 km at its narrowest; on the Cape route
Bab-el-Mandeb	Yemen – Djibouti, Eritrea	Red Sea – Gulf of Aden	≈ 30 km; Perim island splits it in two
Hormuz	Iran – Oman (Musandam)	Persian Gulf – Gulf of Oman	≈ 39 km; about a fifth of world oil use passes
Tiran	Sinai (Egypt) – Saudi Arabia	Gulf of Aqaba – Red Sea	Only sea access of Eilat and Aqaba
EAST ASIA AND THE NORTH PACIFIC			
Taiwan (Formosa)	China (Fujian) – Taiwan	South China Sea – East China Sea	≈ 130 km at its narrowest
Luzon	Taiwan – Luzon (Philippines)	South China Sea – Philippine Sea	Includes the Bashi and Balintang channels
Korea (Tsushima)	South Korea – Kyushu (Japan)	East China Sea – Sea of Japan	Tsushima island splits it into two channels
Tsugaru	Honshu – Hokkaido	Sea of Japan – Pacific	The Seikan rail tunnel runs beneath it
La Pérouse (Sōya)	Hokkaido – Sakhalin (Russia)	Sea of Japan – Sea of Okhotsk	≈ 40 km
Tatar	Sakhalin – Russian mainland	Sea of Japan – Sea of Okhotsk	Only ≈ 7 km at the Nevelskoy Strait
Bering	Chukotka (Russia) – Alaska (USA)	Bering Sea – Chukchi Sea (Pacific – Arctic)	≈ 82 km; the Date Line runs through it
AUSTRALIA AND NEW ZEALAND			
Torres	Cape York (Australia) – New Guinea	Arafura Sea – Coral Sea	≈ 150 km; reef-strewn and shallow
Bass	Victoria (mainland Australia) – Tasmania	Tasman Sea – Indian Ocean (Great Australian Bight)	≈ 240 km; dry land in the Ice Age
Cook	North Island – South Island	Tasman Sea – South Pacific	≈ 22 km; strong tidal currents
Foveaux	South Island – Stewart Island	Tasman Sea – South Pacific	Famous for Bluff oysters
EUROPE			
Gibraltar	Spain (Europe) – Morocco (Africa)	Atlantic – Mediterranean	≈ 14 km; two-way flow over a shallow sill
Dover (Pas de Calais)	England – France	English Channel – North Sea	≈ 33 km; Channel Tunnel; one of the busiest shipping lanes
North Channel; St George's Channel	Northern Ireland – Scotland; Ireland – Wales	Irish Sea – Atlantic	The two entrances of the Irish Sea
Skagerrak; Kattegat	Norway – Jutland (Denmark); Jutland – Sweden	North Sea – Baltic approaches	Lead to the Danish straits
Øresund (the Sound); Great Belt; Little Belt	Zealand – Sweden; Zealand – Funen; Funen – Jutland	Kattegat – Baltic Sea	The Danish straits; bridges across all three
Bosporus	European – Asian Türkiye (Istanbul)	Black Sea – Sea of Marmara	≈ 31 km long, ≈ 700 m at its narrowest
Dardanelles	Gallipoli peninsula – Anatolia	Sea of Marmara – Aegean Sea	≈ 61 km long; the Hellespont of old
Kerch	Crimea – Taman peninsula (Russia)	Sea of Azov – Black Sea	Crimean Bridge (2018) spans it
Messina	Sicily – Calabria (Italy)	Tyrrhenian Sea – Ionian Sea	≈ 3 km; Scylla and Charybdis of legend
Sicily (Sicilian Channel)	Sicily – Tunisia	Western – Eastern Mediterranean	≈ 145 km; Malta lies south of it

Otranto	Italy (Salento) – Albania	Adriatic Sea – Ionian Sea	≈ 72 km
Bonifacio	Corsica (France) – Sardinia (Italy)	Tyrrhenian Sea – western Mediterranean	≈ 11 km; marine park, hazardous for tankers
NORTH ATLANTIC AND THE ARCTIC			
Denmark Strait	Greenland – Iceland	Greenland Sea (Arctic) – Irminger Sea (Atlantic)	Dense Arctic water cascades about 3.5 km down here, the largest "waterfall" on Earth, entirely under the sea
Davis	Greenland – Baffin Island (Canada)	Baffin Bay – Labrador Sea	Iceberg route of the Labrador Current
Hudson	Baffin Island – Quebec (Ungava)	Hudson Bay – Labrador Sea	≈ 750 km long
Fram	Greenland – Svalbard	Arctic Ocean – Greenland Sea	The only deep gateway of the Arctic; Molloy Deep
Nares	Greenland – Ellesmere Island	Baffin Bay – Lincoln Sea	Hans Island in it was split between Canada and Denmark in 2022
CARIBBEAN AND SOUTH AMERICA			
Florida	Florida Keys (USA) – Cuba	Gulf of Mexico – Atlantic	≈ 150 km; the Florida Current, start of the Gulf Stream
Yucatán Channel	Yucatán (Mexico) – Cuba	Caribbean – Gulf of Mexico	≈ 200 km
Windward Passage	Cuba – Hispaniola (Haiti)	Atlantic – Caribbean	On the US East Coast–Panama route
Jamaica Channel; Mona Passage	Jamaica – Haiti; Dominican Republic – Puerto Rico	Caribbean – Atlantic approaches	Mona is a key route to the Panama Canal
Magellan	South American mainland – Tierra del Fuego (Chile)	Atlantic – Pacific	≈ 570 km, winding; Punta Arenas
Drake Passage	Cape Horn – South Shetland Islands (Antarctica)	Atlantic – Pacific (Southern Ocean)	≈ 800 km wide; roughest waters on Earth

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Straits of South–East Asia and the Indian Ocean

South–East Asia is the crossroads between the Indian and Pacific Oceans, and every route through it is a strait (Fig. 9.4). They are the busiest sea lanes on Earth, carrying Gulf oil and African and Brazilian ore east, and Asian manufactures west.

The Gateways Between the Indian and Pacific Oceans



Fig. 9.4 The Malacca–Singapore route is the shortest; the Sunda, Lombok–Makassar and Ombai–Wetar straits are deeper alternatives through Indonesia. The Six Degree Channel, south of India's Great Nicobar, is the western door to Malacca.

- **Strait of Malacca:** about 900 km long between the Malay Peninsula and Sumatra, funnelling to just 2.8 km in the Phillips Channel of the Singapore Strait. Its shallow sills limit ship draught to about 20 m ("Malaccamax"), so the very largest laden tankers go round. In the first half of 2025 about 23 million barrels of oil a day, nearly three-tenths of all seaborne oil, passed through it, more than any other chokepoint; more than 90,000 ship movements are recorded in a year. Its littoral states patrol it jointly, and piracy has crept back round Singapore since 2023. China's dependence on it, the "**Malacca dilemma**", drives its interest in pipelines through Myanmar and Pakistan and in the Kra canal idea (Section 13).
- **Sunda Strait:** between Sumatra and Java, narrowing to about 24 km; strong currents, shallow eastern reaches and the Anak Krakatau volcano (whose 2018 collapse caused a tsunami) keep most large ships away.
- **Lombok and Makassar Straits:** the Lombok Strait, between Bali and Lombok, is over 250 m deep, so ships too big for Malacca sail up it and then north through the Makassar Strait between Borneo and Sulawesi. Both lie on the **Wallace Line**, the deep-water divide between Asian and Australasian fauna, and together carry most of the **Indonesian Throughflow**, the warm water moving from the Pacific into the Indian Ocean (see *Physical Geography*, Chapter 26).
- **Archipelagic sea lanes:** as an archipelagic state under UNCLOS, Indonesia has designated three north–south sea lanes through its waters, along the Sunda, Lombok–Makassar and Ombai–Wetar routes.
- **India's channels:** the Six Degree Channel between Great Nicobar and Sumatra, the Ten Degree Channel between Little Andaman and Car Nicobar, and the Nine and Eight Degree Channels off Lakshadweep sit astride the Gulf–East Asia route. This is why the Andaman and Nicobar Command and the planned Galathea Bay transshipment port on Great Nicobar matter (Book 2, Chapter 07).

Hormuz, Bab-el-Mandeb and the Red Sea

Three chokepoints guard the seas round Arabia: the Strait of Hormuz at the mouth of the Persian Gulf, the Bab-el-Mandeb at the foot of the Red Sea, and the Suez Canal at its head (Fig. 9.5). Between them they handle the oil of the Gulf and most Asia–Europe container trade.

The Gulf, the Red Sea and Their Bypasses



Fig. 9.5 Pipelines that let oil avoid a chokepoint: Saudi Arabia's East–West line to Yanbu on the Red Sea, the UAE's Habshan–Fujairah line to the Gulf of Oman, Iran's Goreh–Jask line, and Egypt's SUMED line from the Gulf of Suez to the Mediterranean.

The Strait of Hormuz

- A crescent-shaped strait about **39 km** wide at its narrowest, between Iran and the Musandam exclave of Oman. Shipping keeps to two lanes, each 2 nautical miles wide, separated by a 2-mile buffer. Islands include Qeshm and, at the western approach, Abu Musa and the Tunbs, held by Iran and claimed by the UAE.
- Traffic: about **21 million barrels a day** in the first half of 2025, the equivalent of a fifth of world oil consumption and a quarter of seaborne oil, plus a fifth of the world's LNG (mainly Qatar's). Nearly nine-tenths of the crude goes to Asia; China, India, Japan and South Korea together take about three-quarters.
- Bypasses can carry only a part of this: Saudi Arabia's East–West pipeline and the UAE's Habshan–Fujairah line could together move about 4.7 million barrels a day, and Iran's Goreh–Jask line far less.



Fig. 9.6 The Strait of Hormuz from orbit, with Oman's Musandam peninsula jutting north and Iran's Qeshm island beyond.

IN THE NEWS · THE HORMUZ CRISIS OF 2026

After US and Israeli strikes on Iran began on 28 February 2026, Iran declared the strait closed in early March and enforced the ban with drones, fast boats and mines. Tanker traffic fell almost to nothing, Brent crude passed US\$100 a barrel within days, and thousands of ships and seafarers were stranded inside the Gulf. A ceasefire in

April, a US naval blockade of Iranian ports from 13 April and a June agreement were followed by fresh attacks on ships in July; through September 2026 only a trickle of vessels was crossing each day, against about 130 before the war, and Iran was claiming the right to decide which ships may pass. The Indian Navy escorted Indian-flagged tankers and LPG carriers out through the Gulf of Oman. For India, which buys much of its crude, most of its LPG and much of its LNG from the Gulf, the crisis is the clearest case for diversifying suppliers, building strategic reserves and backing overland corridors such as IMEC and the INSTC (Chapter 02).

The Bab-el-Mandeb and the Red Sea

- The **Bab-el-Mandeb** ("Gate of Lamentation") is about 30 km wide between Yemen and Djibouti; Perim island splits it into a narrow eastern channel and a 25 km western one. Djibouti, on its African side, hosts military bases of the USA, France, China, Japan and Italy.
- The **Red Sea** fills a young rift where the Arabian plate is pulling away from Africa (see *Physical Geography*, Chapter 07). With no permanent river, little rain and fierce evaporation it is one of the saltiest and warmest seas, and its coral reefs are unusually heat-tolerant.
- **The Red Sea crisis:** from November 2023, when Yemen's Houthi movement seized the car carrier *Galaxy Leader*, Houthi missiles and drones attacked merchant ships they linked to Israel and its backers. Ships sunk included the *Rubymar* (March 2024), *Tutor* (June 2024) and *Magic Seas* and *Eternity C* (July 2025). The US-led Operation Prosperity Guardian (December 2023) and the EU's Operation Aspides (February 2024) escorted ships; a US–Houthi truce followed in May 2025, attacks paused after the Gaza ceasefire of October 2025, and hostilities resumed during the 2026 Iran war. The Indian Navy kept warships in the Gulf of Aden throughout and in March 2024 freed the hijacked bulk carrier *Ruen* from Somali pirates. Most container lines have stayed away, so oil through the Bab-el-Mandeb fell from about 9.3 million barrels a day in 2023 to about 4 million in 2024–25.

09 Europe's Straits: Turkish, Danish and Gibraltar

Three sets of straits give Europe's inland seas their only sea access: the Turkish Straits for the Black Sea, the Danish straits for the Baltic, and Gibraltar for the whole Mediterranean. Each is governed by its own history and treaties.

The Turkish Straits

- The **Bosporus** (Istanbul Strait), about 31 km long and only about 700 m wide at its narrowest, joins the Black Sea to the Sea of Marmara; the **Dardanelles** (Çanakkale Strait), about 61 km long, joins the Marmara to the Aegean. Together they mark the conventional Europe–Asia boundary. Both are drowned river valleys.
- A fast surface current flows out of the Black Sea while saltier Mediterranean water creeps in below. More than 45,000 vessels passed in 2024 through its sharp bends.
- The **Montreux Convention** (1936) guarantees free passage for merchant ships in peacetime and gives Türkiye control over warships, limiting the size and stay (21 days) of those of non-Black Sea states. In February 2022 Türkiye invoked it to close the straits to the warships of Russia and Ukraine.
- The **Kerch Strait** (3–15 km) joins the Black Sea to the Sea of Azov between Crimea and Russia's Taman peninsula; Russia built the 19 km Crimean Bridge across it in 2018 after annexing Crimea in 2014, an annexation most UN members do not recognise. The bridge has been attacked several times since 2022.

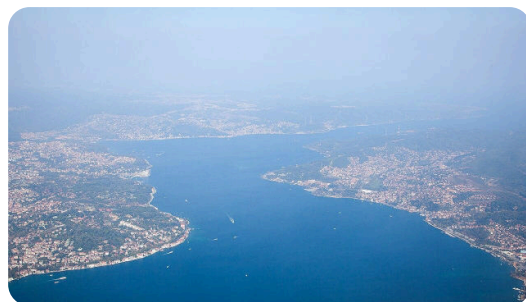


Fig. 9.7 The Bosphorus winding through Istanbul between Europe (left) and Asia (right).

The Black Sea, the Turkish Straits and the Sea of Azov



Fig. 9.8 The Black Sea reaches the ocean only through the Bosphorus, the Sea of Marmara and the Dardanelles; the Kerch Strait leads to the Sea of Azov, and the Volga–Don Canal links the Don to the Volga and the Caspian. The proposed Istanbul Canal would parallel the Bosphorus to its west.

The Danish Straits and the Baltic

From the North Sea to the Baltic



Fig. 9.9 Ships enter the Baltic through the Skagerrak and Kattegat and then one of the three Danish straits, or take the Kiel Canal across the base of Jutland. The White Sea–Baltic Canal links Lake Onega to the White Sea.

- The **Øresund** (the Sound, about 4 km wide at Helsingør–Helsingborg), the **Great Belt** and the **Little Belt** join the Kattegat to the Baltic. Denmark collected "Sound Dues" on passing ships until the Copenhagen Convention of 1857 made the straits free.
- Bridges now cross all three; an 18 km immersed road-and-rail tunnel under the **Fehmarn Belt**, between Denmark and Germany, is being built.
- About 4.9 million barrels of oil a day passed in early 2025, much of it Russian crude from Baltic ports; checks on ageing "shadow fleet" tankers and damage to undersea cables and pipelines (2023–25) have made the Baltic, now ringed almost entirely by NATO members after Finland (2023) and Sweden (2024) joined, a tense sea.

Gibraltar, Dover and the Mediterranean narrows



Fig. 9.10 The Strait of Gibraltar from the International Space Station, with Spain above and Morocco below; the Atlantic is on the left.

The **Strait of Gibraltar** is about 14 km wide between Spain's Punta de Tarifa and Morocco, with a sill only about 300 m deep. Britain's Gibraltar holds its northern shore and Spain's enclave of Ceuta its southern; Morocco's Tanger Med is now the largest port on the Mediterranean.

The **Strait of Dover**, about 33 km wide, is the narrowest part of the English Channel and one of the busiest shipping lanes in the world, with a strict traffic separation scheme; the 50 km Channel Tunnel (1994) runs beneath it (Chapter 04).

The **Strait of Messina**, about 3 km wide, separates Sicily from mainland Italy; a 3.3 km suspension bridge across it, which would have the longest span in the world, was approved by Italy's government in 2025 but met legal hurdles. The **Strait of Otranto** closes the Adriatic and the **Strait of Bonifacio** separates Corsica from Sardinia.

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Straits of the Pacific Rim, the Americas and Oceania

Straits of the North-West Pacific, with the Bering Strait

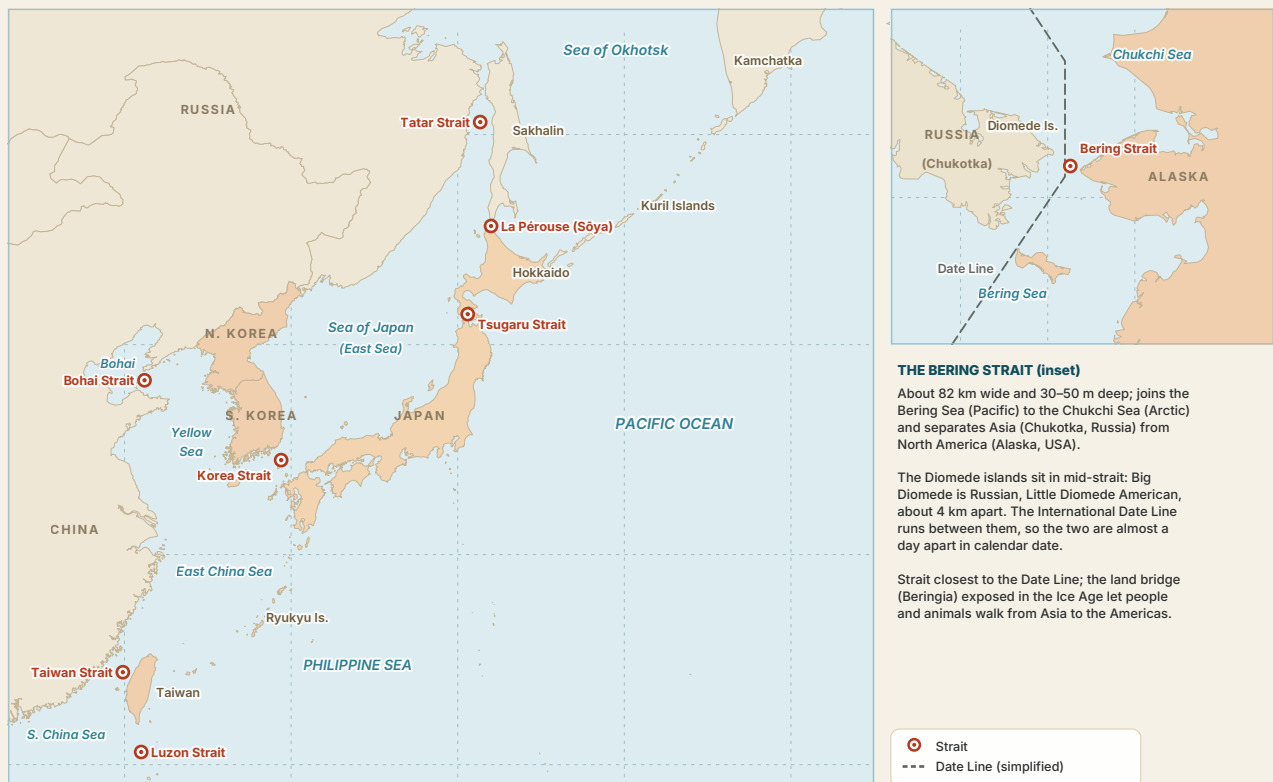


Fig. 9.11 The Sea of Japan connects to the ocean only through the Korea, Tsugaru, La Pérouse and Tatar straits; the Taiwan and Luzon straits link the South China Sea northwards. Inset: the Bering Strait, the only gap between Asia and North America.

- **Taiwan Strait** (about 130 km at its narrowest) is crossed by a large share of the world's container fleet. Chinese military drills round Taiwan in 2024 and 2025 make it one of the most watched straits.
- **Luzon Strait**, with the Bashi Channel, is the main deep-water gap from the South China Sea into the Pacific; many trans-Pacific cables cross it.
- **Korea Strait**: Tsushima island splits it into the Western Channel (off Busan) and the Tsushima Strait proper. **Tsugaru** separates Honshu from Hokkaido, with the 54 km Seikan rail tunnel beneath; **La Pérouse (Sōya)** lies between

Hokkaido and Sakhalin; the **Tatar Strait** between Sakhalin and the mainland is so narrow and shallow in the north that it freezes over in winter.

Passages of the Caribbean and the Panama Isthmus



Fig. 9.12 The Gulf of Mexico opens through the Straits of Florida and the Yucatán Channel; the Caribbean through the Windward and Mona passages and the gaps of the Lesser Antilles. The Panama Canal and the abandoned Nicaragua canal route cross the isthmus; Mexico's Tehuantepec rail corridor links its two coasts.

- The **Straits of Florida** carry the Florida Current, the start of the Gulf Stream, northward between the Keys and Cuba. The **Windward Passage**, between Cuba and Haiti, with the US base at Guantánamo Bay beside it, and the **Mona Passage**, between the Dominican Republic and Puerto Rico, are the main doors from the Atlantic to the Panama Canal.
- **Strait of Magellan** (about 570 km of winding channels between the mainland and Tierra del Fuego, wholly Chilean) and the **Drake Passage** (about 800 km of open, storm-lashed sea between Cape Horn and Antarctica) were the only routes between the Atlantic and Pacific before 1914, and are again the fallback when the Panama Canal is short of water.
- **Davis and Denmark Straits** carry cold Arctic water south: icebergs ride the Labrador Current out of Davis Strait, and in the Denmark Strait dense Arctic water plunges over a sill in the largest cataract on Earth, driving the deep Atlantic circulation.

In Oceania (Fig. 9.13), the **Torres Strait**, about 150 km wide and full of reefs and small islands (which belong to Australia), needs compulsory pilots. The shallow **Bass Strait** (about 60 m deep) has the Gippsland oil and gas fields. New Zealand's **Cook Strait**, 22 km at its narrowest, is notorious for its tidal rips and gales, and the **Foveaux Strait** separates the South Island from Stewart Island.

Straits of Australia and New Zealand



Fig. 9.13 Torres Strait separates Australia from New Guinea, Bass Strait cuts off Tasmania, and Cook and Foveaux Straits divide New Zealand's main islands. All four were dry land or narrower during the last glaciation.

11 Maritime Chokepoints and World Trade

More than four-fifths of world trade by volume moves by sea, and for India, about 95% of trade by volume and around 70% by value. That trade concentrates on a few lanes, so a single strait can hold the world economy hostage (Fig. 9.14). The US Energy Information Administration estimates that about 80 million barrels of oil a day, three-quarters of world supply, travelled by sea in the first half of 2025.

Between 2023 and the first half of 2025, oil through the Bab-el-Mandeb fell from 9.3 to 4.2 million barrels a day and through Suez and SUMED from 8.8 to 4.9, while flows round the Cape rose from 6.2 to 9.1. In shares of seaborne oil, the Strait of Malacca carried about 29%, Hormuz about 26% (a fifth of all oil consumed), the Cape route 11%, Suez with SUMED and the Danish Straits about 6% each, the Bab-el-Mandeb and the Turkish Straits about 5% each and the Panama Canal about 3%. Each has its own risk: congestion and piracy at Malacca, war at Hormuz and the Bab-el-Mandeb, sanctions and cable sabotage in the Baltic, a crowded city at the Bosphorus, and rainfall at Panama.

Oil Through the World's Chokepoints

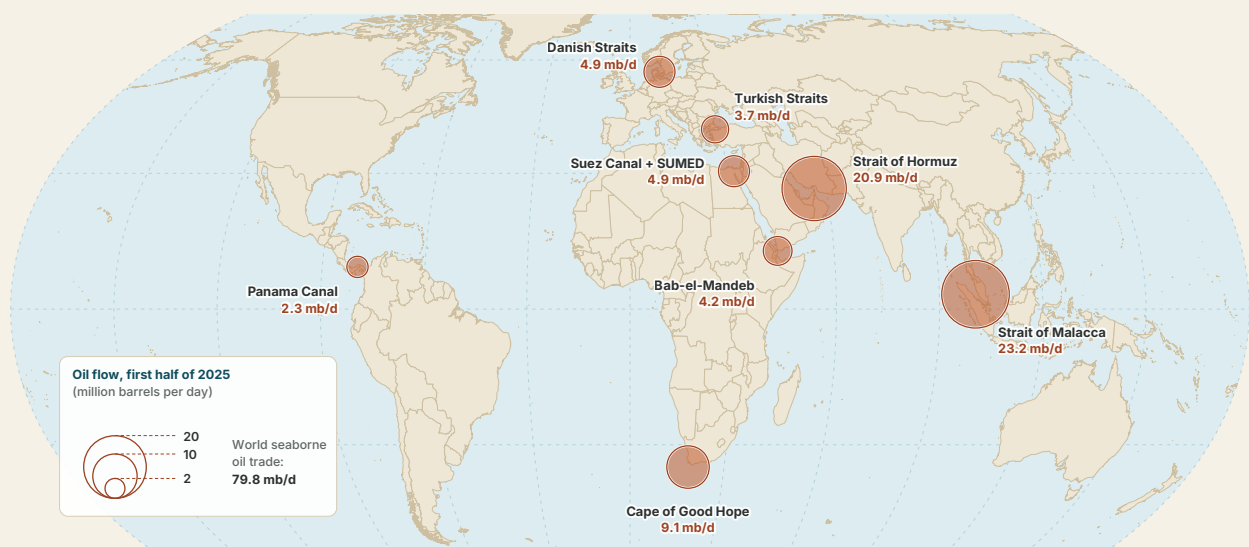


Fig. 9.14 Circle areas are proportional to oil flows (crude and products) in the first half of 2025; the Panama figure is for the fiscal year 2025. The Cape of Good Hope is not a chokepoint but is shown because so much traffic now goes round it. Data: US EIA.

Three crises, three lessons

- **Red Sea, 2023–26:** container lines rerouted round the Cape of Good Hope (Fig. 9.15), adding about 6,000 km and 10–14 days to an Asia–Europe voyage, raising freight and insurance costs and the fuel burnt. Ships through the Suez Canal fell from about 2,070 in November 2023 to under 900 a month by late 2024, and UNCTAD noted early in 2024 that Suez transits had dropped by about two-fifths in two months.
- **Panama, 2023–24 and 2026:** an El Niño drought lowered Gatun Lake, which feeds the locks, so the canal cut daily slots from about 36 to as few as 22 and reduced the permitted draught; traffic fell by about half from its peak, and an auction slot fetched millions of dollars. Rains restored normal operations by late 2024. With a new El Niño, the canal again cut slots to 34 a day and draught to 14.6 m from September 2026, and is building a reservoir on the Río Indio, five to six years away.
- **Hormuz, 2026:** unlike Suez or Panama, Hormuz has no long sea detour: the oil originates inside the Gulf, so a closure removes supply rather than lengthening routes. It is the strongest argument for strategic petroleum reserves, bypass pipelines and diverse suppliers.

Suez Route or Cape Route?

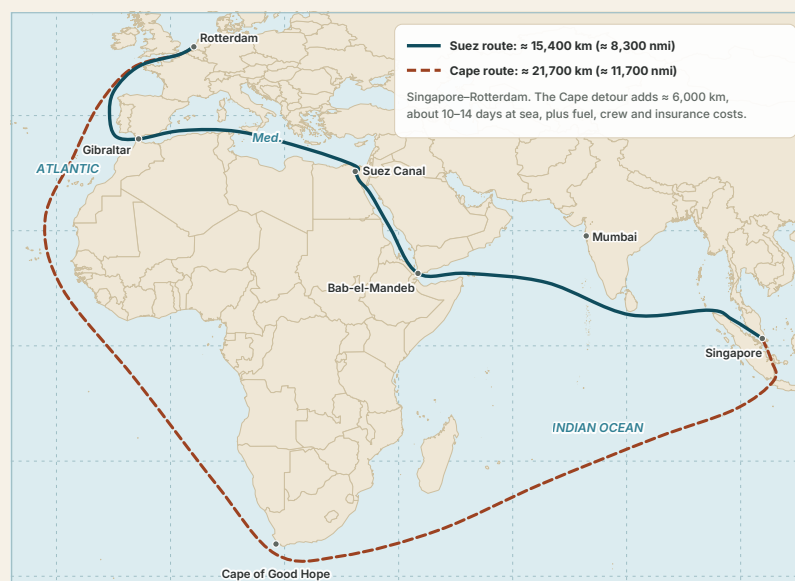


Fig. 9.15 Singapore to Rotterdam by the Suez Canal and by the Cape of Good Hope. Routes are generalised; distances are approximate sea distances.

INDIA CONNECT

India sits beside the busiest east–west lane, between Hormuz and Bab-el-Mandeb to the west and Malacca to the east, and its islands command the Six, Nine, Ten and Eight Degree Channels. Its responses include the Navy's escort missions (Operation Sankalp in the Gulf of Oman since 2019, anti-piracy patrols in the Gulf of Aden since 2008), the Information Fusion Centre–Indian Ocean Region at Gurugram, strategic oil reserves at Visakhapatnam, Mangaluru and Padur, and alternative corridors: the International North–South Transport Corridor through Iran, the India–Middle East–Europe Economic Corridor (IMEC) proposed in 2023, and Chabahar port.

12 Ship Canals of the World

Where a narrow isthmus blocks a route, a canal can save thousands of kilometres. Two kinds exist: **sea-level canals**, such as Suez, where the two seas are at nearly the same level and no locks are needed; and **lock canals**, such as Panama, which climb over higher ground in a staircase of chambers.

The Suez Canal

- Cut by Ferdinand de Lesseps's company and opened on 17 November 1869; about **193 km** from Port Said on the Mediterranean to Suez on the Red Sea, through Lake Timsah and the Great Bitter Lake, with no locks. It cuts the sea voyage from western Europe to Mumbai by some 7,000–8,000 km compared with the Cape route.
- Egypt nationalised it on 26 July 1956, triggering the Suez Crisis; it was closed from 1967 to 1975 after the Six-Day War. In 2015 the "New Suez Canal" added a 35 km parallel channel and deepened another 37 km, allowing two-way traffic along a central stretch.
- The *Ever Given* blocked it for six days in March 2021. Before 2024 it carried about a tenth of world seaborne trade and earned Egypt a record of about US\$10 billion in 2023; Red Sea attacks cut revenue to about US\$4 billion in 2024 and 2025, and it began to recover in 2026, partly as tankers diverted from the Gulf.

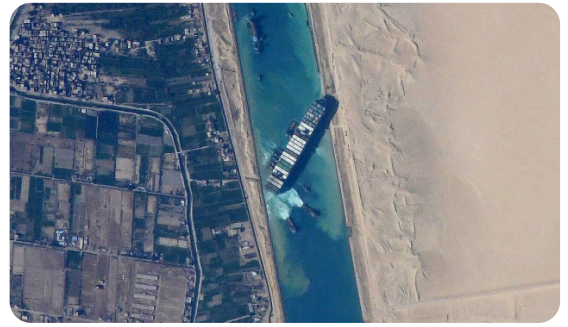


Fig. 9.16 The *Ever Given* wedged across the Suez Canal in March 2021, seen from the International Space Station.

The Panama Canal

The Panama Canal, about 82 km long, was built by the USA and opened on 15 August 1914; under the Torrijos–Carter Treaties (1977) it passed wholly to Panama on 31 December 1999. Ships climb about 26 m by locks to **Gatún Lake**, a reservoir made by damming the Chagres River, cross the continental divide through the Culebra Cut and descend again (Fig. 9.17). Each transit drains some 200 million litres of fresh water to the sea, which is why rainfall governs its capacity. A third set of larger locks (Agua Clara and Cocolí) opened in June 2016, taking **Neopanamax** ships up to 366 m long and 49 m wide; their water-saving basins recycle most of the water used. The canal handles about 5% of world seaborne trade, most of it to or from the USA. In 2025, under US pressure over Chinese influence, Panama left China's Belt and Road Initiative.

Across the Isthmus: The Panama Canal in Profile

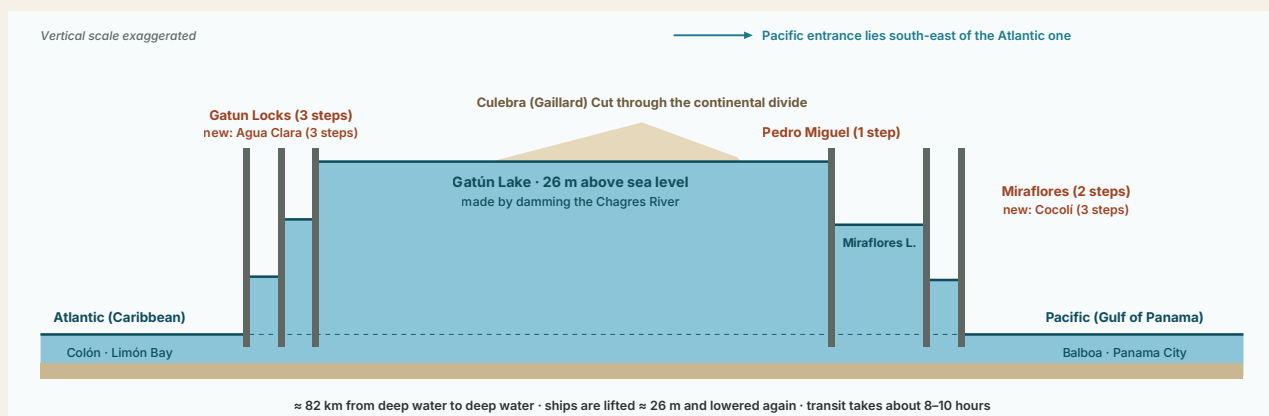


Fig. 9.17 Ships rise through three lock steps on the Atlantic side, cross Gatún Lake and the Culebra Cut, and descend through Pedro Miguel and Miraflores (or the new Cocolí locks) to the Pacific. Because the isthmus curves, the Pacific end lies east of the Atlantic end.

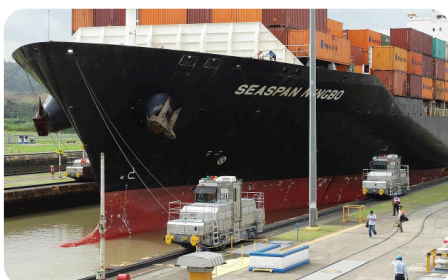


Fig. 9.18 Electric "mules" guide a container ship into the Miraflores Locks, Panama.



Fig. 9.19 A cargo ship on the Kiel Canal, the busiest artificial waterway by number of ships.



Fig. 9.20 The Corinth Canal, cut through rock walls up to about 90 m high.

Other great canals

CANAL	COUNTRY	LINKS	FACTS
Kiel (Nord-Ostsee) Canal	Germany	North Sea (Brunsbüttel, Elbe mouth) – Baltic (Kiel)	≈ 98 km, opened 1895; saves about 460 km round Jutland; world's busiest artificial waterway by number of ships
Corinth Canal	Greece	Gulf of Corinth (Ionian side) – Saronic Gulf (Aegean)	6.4 km, 1893, only ≈ 25 m wide; cuts the Isthmus of Corinth; closed for long spells after landslides in 2021–23; now mainly for tourist and small craft
Volga–Don Canal	Russia	Volga (Volgograd) – Don, hence the Caspian to the Sea of Azov and Black Sea	≈ 101 km, 1952, 13 locks; part of European Russia's "Unified Deep-Water System"
White Sea–Baltic Canal	Russia	White Sea (Belomorsk) – Lake Onega, and on to the Baltic	≈ 227 km, 1933, 19 locks; built by Gulag forced labour; too shallow for big ships
Rhine–Main–Danube Canal	Germany	Main (Bamberg) – Danube (Kelheim): North Sea to Black Sea	≈ 171 km, completed 1992; crosses the European watershed at about 406 m, the highest point reachable by ships from the sea
Grand Canal (Beijing–Hangzhou)	China	Beijing – Hangzhou, crossing the Huang He and Chang Jiang	≈ 1,800 km, the longest artificial waterway; oldest parts 5th century BCE, joined up under the Sui (7th century); World Heritage Site (2014)
Pinglu Canal	China	Xi River system (Guangxi) – Gulf of Tonkin at Qinzhou	≈ 134 km, begun 2022, completed in September 2026; China's first new river-to-sea canal in decades, shortening Guangxi's outlet to the sea by up to 560 km
Welland Canal; St Lawrence Seaway	Canada, USA	Lake Ontario – Lake Erie; Montreal – Lake Ontario	Welland (≈ 43 km, 8 locks) lifts ships about 100 m past Niagara Falls; the Seaway (1959) opened the Great Lakes to ocean ships (Chapter 05)
Erie Canal	USA	Hudson River (Albany) – Lake Erie (Buffalo)	≈ 580 km, 1825; made New York the leading US port

13 Proposed Canals and the Great Isthmuses

PROJECT	ROUTE	STATUS (2026)
Kra (Thai) Canal	Across the Kra Isthmus of southern Thailand (≈ 44 km at its narrowest), Andaman Sea – Gulf of Thailand; routes of 50–135 km studied	Discussed since the 17th century; would save ships 1,000–1,200 km and two to three days against Malacca, and loosen China's Malacca dilemma, but cost, Thai politics and Singapore's interests have kept it on paper. Thailand now promotes a road-rail "Land Bridge" between new ports at Ranong and Chumphon instead
Istanbul Canal	≈ 45 km across European Istanbul, from the Black Sea to the Sea of Marmara, west of the Bosphorus	Launched in June 2021 to relieve the Bosphorus; little progress since; critics fear for Istanbul's water supply and question whether the Montreux limits on warships would apply to it
Funan Techo Canal	≈ 180 km from the Mekong and Bassac near Phnom Penh to Kep on the Gulf of Thailand, Cambodia	Ground broken on 5 August 2024; about US\$1.7 billion with Chinese finance agreed in 2025, target 2028. It would give Phnom Penh direct sea access instead of shipping through Vietnam's Mekong delta; Vietnam worries about water flows in the delta
Nicaragua Canal	≈ 280 km from the Caribbean across Lake Nicaragua to the Pacific	Concession given to a Hong Kong group in 2013, ground broken in 2014, no real work; the concession law was repealed in May 2024, and Nicaragua has since floated a new route to Chinese investors
Interoceanic Corridor of Tehuantepec	≈ 300 km rail link across Mexico's Isthmus of Tehuantepec, Coatzacoalcos – Salina Cruz	Freight and passenger trains began in 2023; marketed as a dry-land rival to Panama

Isthmuses of the world

ISTHMUS	JOINS	SEPARATES	NOTE
Suez	Africa – Asia (Sinai)	Mediterranean – Red Sea	≈ 120 km wide; cut by the Suez Canal
Panama	North – South America	Caribbean – Pacific	Rose about 3 million years ago, letting land animals cross both ways and strengthening the Gulf Stream; cut by the Panama Canal

Kra	Malay Peninsula – mainland Asia	Andaman Sea – Gulf of Thailand	≈ 44 km at its narrowest; Myanmar–Thailand border region
Corinth	Peloponnese – mainland Greece	Gulf of Corinth – Saronic Gulf	≈ 6 km; cut by the Corinth Canal, so the Peloponnese is technically an island
Karelian	Finland – the Russian plain	Gulf of Finland – Lake Ladoga	45–110 km; St Petersburg at its base; fought over in the Winter War (1939–40)

USING THIS CHAPTER IN MAINS

- **Straits, isthmuses and trade (GS I):** classify chokepoints by what they join, give flows and shares (Malacca, Hormuz, Suez, Panama), and show how straits shaped routes, ports and power, from the Cape route of Vasco da Gama to the Suez and Panama cuts and today's Kra and Istanbul proposals (Sections 06–13).
- **Changes in critical geographical features (GS I):** the Panama Canal's dependence on rainfall and El Niño, the shrinking Caspian, sea-level change that opened and drowned straits such as Bering, Bass and Palk, and the Red Sea as a widening rift (Sections 03, 08, 11, 12).
- **Geopolitics and security (GS II–III):** the Red Sea crisis, the 2026 Hormuz closure, the Montreux Convention, the Malacca dilemma, transit passage under UNCLOS, and India's answers: naval missions, strategic reserves, IMEC, INSTC, Chabahar and the Andaman and Nicobar Islands.
- Draw a quick sketch of the Indian Ocean with Hormuz, Bab-el-Mandeb, Suez, Malacca and the Six and Nine Degree Channels, with the Cape route dashed; it fits almost any maritime answer.



Previous Year Questions

Prelims

2026 Ships from which of the following countries have to cross the Strait of Hormuz to reach out to the Indian Ocean?

1. Bahrain
2. Syria
3. Qatar
4. Egypt

Select the answer using the code given below:

a 1 and 2

b 1 and 3

c 2 and 3

d 3 and 4

Answer: (b). Bahrain and Qatar lie wholly on the Persian Gulf; Syria opens on the Mediterranean and Egypt on the Mediterranean and Red Sea (Sections 05, 08).

2024 Consider the following statements:

1. The Red Sea receives very little precipitation in any form.
2. No water enters the Red Sea from rivers.

Which of the statements given above is/are correct?

a 1 only

b 2 only

c Both 1 and 2

d Neither 1 nor 2

Answer: (c). The Red Sea lies in a desert belt with scant rain and no permanent river inflow, which is why it is so salty (Section 08).

2024 Consider the following statements:

Statement-I: Sumed pipeline is a strategic route for Persian Gulf oil and natural gas shipments to Europe.
Statement-II: Sumed pipeline connects the Red Sea with the Mediterranean Sea.

Which one of the following is correct in respect of the above statements?

a Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I

b Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I

c Statement-I is correct but Statement-II is incorrect

d Statement-I is incorrect but Statement-II is correct

Answer: (a). SUMED runs from Ain Sukhna on the Gulf of Suez to Sidi Kerir on the Mediterranean, letting Gulf oil bound for Europe bypass the Suez Canal; that link is why it is strategic (Sections 08, 11).

2019

Consider the following pairs:

Sea : Bordering country

1. Adriatic Sea : Albania
2. Black Sea : Croatia
3. Caspian Sea : Kazakhstan
4. Mediterranean Sea : Morocco
5. Red Sea : Syria

Which of the pairs given above are correctly matched?

☐ a 1, 2 and 4 only☐ b 1, 3 and 4 only☐ c 2 and 5 only☐ d 1, 2, 3, 4 and 5

Answer: (b). Croatia is on the Adriatic, not the Black Sea, and Syria on the Mediterranean, not the Red Sea (Section 03).

2011

Between India and East Asia, the navigation-time and distance can be greatly reduced by which of the following?

1. Deepening the Malacca straits between Malaysia and Indonesia.
2. Opening a new canal across the Kra isthmus between the Gulf of Siam and Andaman Sea.

Which of the statements given above is/are correct?

☐ a 1 only☐ b 2 only☐ c Both 1 and 2☐ d Neither 1 nor 2

Answer: (b). Deepening Malacca would admit bigger ships but not shorten the route; a Kra canal would cut out the loop round the Malay Peninsula and Singapore (Section 13).

2010

Which one of the following can one come across if one travels through the Strait of Malacca?

☐ a Bali☐ b Brunei☐ c Java☐ d Singapore

Answer: (d). The strait leads past Singapore into the South China Sea; Bali and Java lie far to the south-east and Brunei on Borneo (Section 07).

2008

Which one of the following straits is nearest to the International Date Line?

☐ a Malacca Strait☐ b Bering Strait☐ c Strait of Florida☐ d Strait of Gibraltar

Answer: (b). The Date Line runs through the Bering Strait, between the two Diomed islands (Section 10, Fig. 9.11).

2004

Match List I (Sea) with List II (Country) and select the correct answer:

List I: A. Black Sea B. Red Sea C. Yellow Sea D. Caspian Sea

List II: 1. Bulgaria 2. China 3. Eritrea 4. Kazakhstan

☐ a A-1, B-4, C-2, D-3☐ b A-2, B-3, C-1, D-4☐ c A-1, B-3, C-2, D-4☐ d A-2, B-4, C-1, D-3

Answer: (c). Bulgaria on the Black Sea, Eritrea on the Red Sea, China on the Yellow Sea and Kazakhstan on the Caspian (Sections 03, 04).

1997

One will NOT have to pass through the Suez Canal while going from Mumbai to

a Alexandria

b Suez

c Port Said

d Benghazi

Answer: (b). Suez stands at the Red Sea end of the canal, so a ship from Mumbai reaches it without entering the canal; Port Said, Alexandria and Benghazi are on the Mediterranean side (Section 12).

Mains

2026

GS I · 15 MARKS

"The centre of global trade is gradually shifting from the Atlantic region to the Indo-Pacific region." Examine this statement.

Approach: Use the chokepoint flows (Malacca now the busiest, Hormuz, the Taiwan and Luzon straits), the eastward pull of Asian manufacturing and energy demand, and the vulnerability shown by the Red Sea, Panama and Hormuz crises; balance with the Atlantic's continuing weight in finance and the Panama and Suez links (Sections 07, 10, 11).

2022

GS I · 15 MARKS

Mention the significance of straits and isthmus in international trade. (Answer in 250 words)

Approach: Define both; give a mapped list of key straits (Malacca, Hormuz, Bab-el-Mandeb, Gibraltar, Bosporus, Dover) and isthmuses with canals (Suez, Panama, Kiel, Kra proposal); show savings in distance and time, oil and container shares, and risks from blockage, conflict and drought, with India's stake (Sections 06–13).

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