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The Red Sea: A Sea With No Rivers

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The Red Sea: A Sea With No Rivers

Most seas are fed by rivers. The Red Sea is not. Almost no rain falls on its shores, and no permanent river reaches it.

1 Where are its rivers?

How dry are its shores?



The Red Sea's clear water near Hurghada, Egypt. Photo by Marc Ryckaert (MJJR), CC BY 3.0, via Wikimedia Commons.

The land around the Red Sea is desert. Rain over the sea and its coasts averages only about 6 cm a year. It falls as short showers, often with thunderstorms.

With so little rain, rivers cannot form. No permanent river or stream drains into the sea. That is rare for a sea of this size.

What are wadis?

A **wadi** is a dry riverbed in a desert. For most of the year it carries no water. After a heavy storm it can turn into a flash flood.

Think of a school drain that is dry all term. It runs only in the one big downpour. Wadis near the Red Sea work like that. They bring water in bursts, not as a steady flow.

Key terms

Wadi. A wadi is a channel that stays dry until heavy rain fills it. A desert road that floods once in a few years is a good picture. It matters here because wadis are the only “rivers” the Red Sea has, and they do not run all year.

> **Quick check 1.** The Red Sea has a permanent river flowing into it. *(True or False?)* See answer ↓

Sources: newworldencyclopedia.org; file.scirp.org

2 How does it refill itself?

Where does the lost water go?

Strong sun and wind lift water off the surface. This is **evaporation**. The Red Sea loses about 205 cm of water a year this way. That is more than 80 inches.

Rain and rivers return almost none of it. So something else must fill the gap, or the sea would shrink.

What fills the gap?

The refill comes through the **Bab el Mandeb**, a narrow strait in the south. It joins the Red Sea to the Gulf of Aden and the Indian Ocean. Seawater flows in at the surface to replace what evaporation removed.

- **Strait length:** about 150 km.
- **Narrowest point:** the Perim Narrows, in the south.
- **Shallowest point:** the Hanish Sill, in the north of the strait.

The sill acts like a doorstep. It limits how freely water can pass in and out.

What is the exchange like?

Fresh ocean water enters at the top. Heavier, saltier water leaves along the bottom. The salty outflow sinks to about 800 m in the Gulf of Aden. So the strait does the job a river would do, but with salty water.

> **Quick check 2.** Seawater entering through Bab el Mandeb replaces the water the Red Sea loses to evaporation. *(True or False?)* See answer ↓

Sources: newworldencyclopedia.org; www2.whoi.edu

3 Why is it so salty?

What are the three causes?

Salt stays behind when water evaporates. The Red Sea has three things working together:

- **High evaporation** and very little rain.
- **No significant rivers** to dilute it.

- **A limited link** to the Indian Ocean, whose water is less salty.

Together they make the sea a “concentration basin”. Water leaves as vapour, and the salt remains.

How salty is it?

Its salinity is about 3.6 to 3.8 percent. The world average is lower. Some Red Sea water is among the saltiest produced anywhere in the open ocean.

A kitchen example helps. If you boil a pot of salted water and keep adding fresh tap water only a spoon at a time, the pot gets saltier. The Red Sea behaves like that pot.

Think it through

If evaporation is so strong, why does the sea not shrink? Because seawater keeps flowing in through Bab el Mandeb. The level stays steady, but the salt keeps building up.

> **Quick check 3.** High evaporation and no river water make the Red Sea saltier than the world average. *(True or False?)* See answer ↓

Sources: newworldencyclopedia.org; worldatlas.com

4 How was it born?

What pulled the land apart?

Millions of years ago, the Arabian Peninsula was joined to Africa. Seafloor spreading then caused the Arabian and African plates to rift apart. The Indian Ocean flooded into the gap.

Rifting means a plate splits and the pieces drift away. It is the same process that shapes the Great Rift Valley. The Red Sea sits inside that system.

When did it start?

Rifting in the nearby Afar region began about 19 million years ago. The Afar sits where the Arabian, Nubian and Somalian plates meet. Scientists still debate the exact dates for the Red Sea itself.

So the Red Sea was not carved by ice or rivers. Moving plates made the basin.

> **Quick check 4.** The Red Sea was carved by glaciers in the last Ice Age. *(True or False?)* See answer ↓

Sources: education.nationalgeographic.org; pmc.ncbi.nlm.nih.gov

5 How big is it?

What is its length?



The Red Sea, running between Egypt, Sudan, and the Arabian Peninsula, with no permanent river feeding it. Map: Eric Gaba (Sting) / Wikimedia Commons, CC BY-SA 4.0.

Feature	Value
Length	about 1,900 km
Width at the widest point	about 300 km
Surface area	about 450,000 km²
Average depth	about 500 m
Deepest point	about 2,500 m in the central trench

What lies at its two ends?

In the north, the **Sinai Peninsula** splits the sea into two gulfs. They are the Gulf of Aqaba and the Gulf of Suez. The Gulf of Suez leads to the Suez Canal.

In the south, the narrow Bab el Mandeb leads to the Gulf of Aden. These are the only two exits. That limited link feeds the salinity you saw earlier.

> **Quick check 5.** The Sinai Peninsula divides the northern Red Sea into the Gulf of Aqaba and the Gulf of Suez. *(True or False?)* See answer ↓

Sources: worldatlas.com

6 Why does it matter?

What lives in it?

Coral reefs run for about 2,000 km along its coast. These fringing reefs are about 5,000 to 7,000 years old. They are mostly made of stony Acropora and Porites corals.

The reefs thrive despite the heat and salt. They support a rich range of fish and other sea life.

How does it help trade?

The Suez Canal joins the Red Sea to the Mediterranean. It officially opened on 17 November 1869. It stayed closed from 1967 to 1975 after the Six-Day War.

Ships from Asia reach Europe through it without sailing around Africa. That makes the Red Sea one of the busiest sea routes in the world.

> **Quick check 6.** The Suez Canal joins the Red Sea to the Mediterranean Sea. *(True or False?)* See answer ↓

Sources: worldatlas.com; education.nationalgeographic.org

7 How did UPSC ask?

What did the paper test?

The answer is (c), both 1 and 2. Rain is rare and no permanent river feeds the sea. Check the full paper, Q89.

What are the traps?

- **Rain and rivers do not refill it.** Seawater from Bab el Mandeb does.
- **Wadis are not rivers.** They run only after rare storms.
- **Rifting formed it,** not glaciers.
- **Salinity is high** because of evaporation and no dilution.

Sources: newworldencyclopedia.org

Practice MCQs

1. 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? [UPSC CSP 2024]

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

See answer ↓

2. The Red Sea's formation is linked to which geological process, separating the African and Arabian tectonic plates?

A. Glacial erosion

B. Coral reef accretion

C. Rifting, part of the Great Rift Valley system

D. Volcanic subsidence

See answer ↓

3. What term describes the seasonal dry riverbeds that occasionally carry flash-flood water into the Red Sea?

A. Deltas

B. Estuaries

C. Fjords

D. Wadis

See answer ↓

4. Approximately how much does annual evaporation exceed in the Red Sea?

A. 40 inches

B. 20 inches

C. 120 inches

D. 80 inches

See answer ↓

5. The Red Sea's high evaporation loss is compensated by an inflow of water through which strait?

A. Strait of Hormuz

B. Strait of Gibraltar

C. Strait of Malacca

D. Bab-el-Mandeb

See answer ↓

Answer Key

1. **C.** The correct answer is **both 1 and 2**. Rain over the Red Sea averages only about 6 cm a year. No permanent river reaches it. Only dry wadis carry brief flash floods. Memory hook: little rain, no rivers. ↑ Q1
2. **C.** The correct answer is **rifting, part of the Great Rift Valley system**. The African and Arabian plates are pulling apart. The gap fills with sea water. Memory hook: the Red Sea is a flooded crack. ↑ Q2
3. **D.** The correct answer is **wadis**. These are dry riverbeds that flood for a few hours after heavy rain. They are not permanent rivers. Memory hook: wadi means dry bed, wet only in a storm. ↑ Q3
4. **D.** The correct answer is **80 inches**. Evaporation can be as high as about 205 cm (81 in) a year, far above the rain that falls. Memory hook: lose over 2 metres of water a year. ↑ Q4
5. **D.** The correct answer is **Bab-el-Mandeb**. This narrow strait links the Red Sea to the Gulf of Aden. It lets in water that replaces what evaporates. Memory hook: the south gate refills the sea. ↑ Q5

Quick-check answers

1. **False.** No permanent river reaches the Red Sea. ↑ 1
2. **True.** The strait does the job a river would normally do. ↑ 2
3. **True.** Water leaves as vapour and the salt stays behind. ↑ 3
4. **False.** Moving plates made the basin, not ice. ↑ 4
5. **True.** The Gulf of Suez leads on to the Suez Canal. ↑ 5
6. **True.** It officially opened on 17 November 1869. ↑ 6

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