



Climate Change Impact on Panama Canal

For Prelims: [Panama Canal](#), [Lake Gatun](#), [GDP](#), [Isthmus of Panama](#), [Tectonic Plates](#), [Evaporation](#), [Humidity](#), [Precipitation](#), [Algal Bloom](#), [Ocean Currents](#), [Mangroves](#), [Drip Irrigation](#).

For Mains: Impact of Climate Change on Water Resources and Mitigation Strategies.

Source: [IE](#)

Why in News?

The [Panama Canal](#), a critical global **shipping lane**, is facing significant challenges due to prolonged drought conditions exacerbated by **climate change**.

- This situation has led to reduced water levels in [Lake Gatun](#), prompting discussions about long-term **solutions to sustain the Panama canal's operations**.

What is the Impact of Climate Change on the Panama Canal?

- **Drought and Reduced Passage of Ships:** The Panama Canal is experiencing a prolonged [drought](#) that began in early 2023.
 - Rainfall in October 2023 was **43% below average**, making it the driest October since the 1950s.
 - Traffic through the canal dropped to as low as **22 ships per day in December 2023**, down from the usual **36 to 38 ships**, due to low water levels in Lake Gatun.
- **Restriction on Size of Ships:** Lower water levels restrict the size of ships that can pass through the canal, as larger, heavier vessels are at higher risk of **running aground** in shallower waters.
 - Large ships also require more lake water to lift them in the locks.
- **Effect on Global Trade:** The Panama Canal accounts for **5% of global shipping**, so disruptions here affect the worldwide supply chain, resulting in delayed shipments, more fuel usage, and [GDP losses](#).
 - Ships are forced to take the long way around i.e., travelling down to the southern points of South America.

What are Key Facts about the Panama Canal?

- **About Panama Canal:**
 - It is an **artificial** 82 kilometers waterway in Panama that connects the [Atlantic Ocean](#) with the [Pacific Ocean](#).
 - It cuts across the [Isthmus of Panama](#), and is a conduit for maritime trade.
 - It saves approximately 12,600 km in a **trip between New York and San Francisco**.
 - The **first ship** passed through the Panama Canal on **15th August 1914**.
- **Functioning of Panama Canal:**
 - It is a sophisticated, highly-engineered system which uses a system of **locks and**

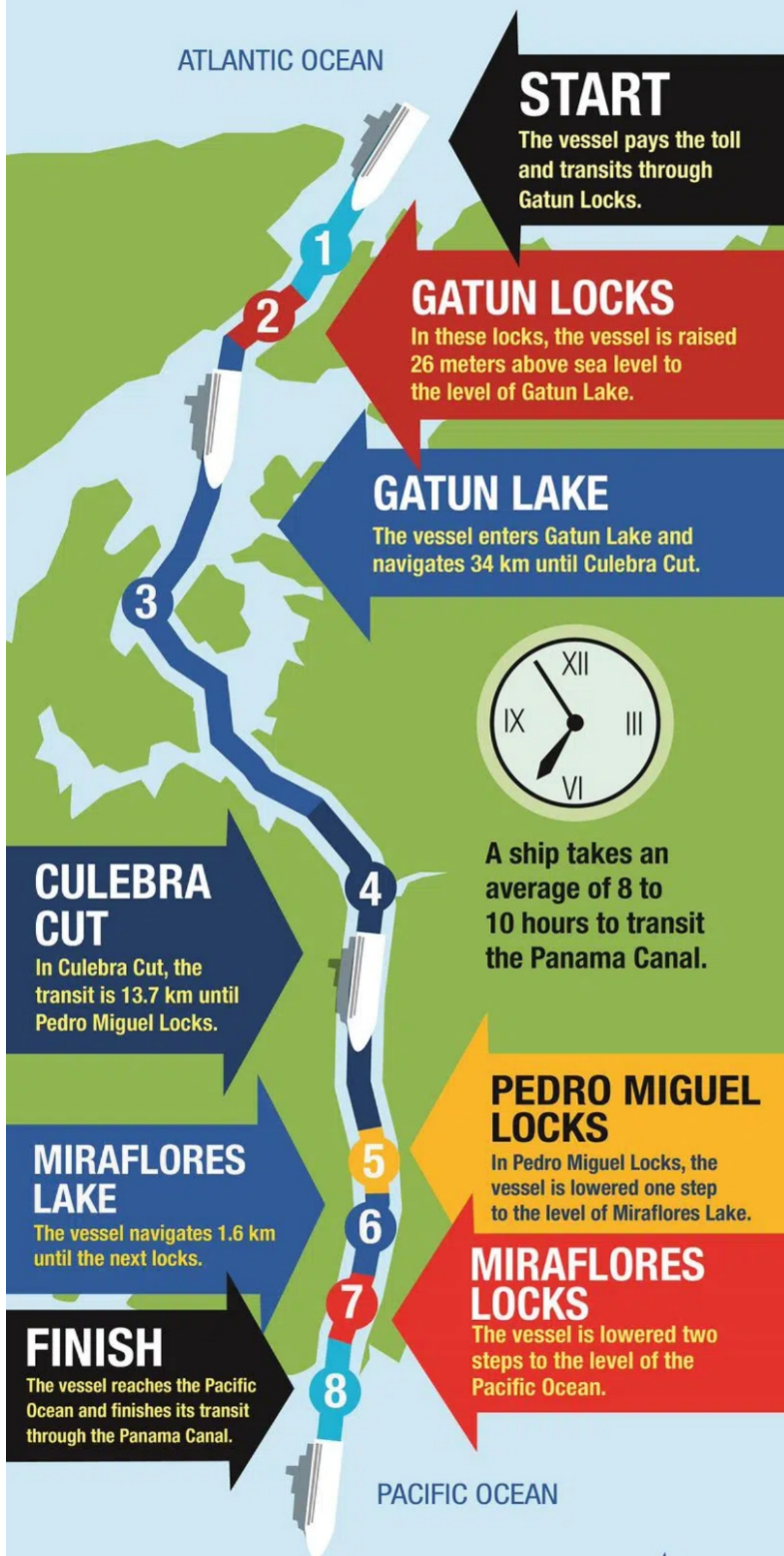
elevators to take ships from one end to the other.

- This is needed because the **two oceans that the Panama Canal connects do not lie at the same elevation**, with the Pacific slightly higher than the Atlantic.
- For a ship entering the canal through the Atlantic, it **needs to gain elevation during its journey to the Pacific**. This is achieved using a **lock system** that lifts and drops vessels to the required sea level at either end of the canal.
- Locks are either **flooded (to gain elevation)** or **drained (to lose elevation)**, and act as water elevators.
 - In total, the system comprises **12 locks in total** which are serviced using artificial lakes and channels.

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A PANAMA CANAL TRANSIT



Isthmus of Panama

- An isthmus is a **narrow strip of land** that **connects two larger landmasses** and **separates two bodies of water**.
 - They are natural sites for **ports and canals** linking terrestrial and aquatic trade routes.
- The Isthmus of Panama **links** the continents of **North and South America**, and **separates the Pacific and Atlantic Oceans**.
- It was formed when the **Caribbean tectonic plate** got pushed between the **North and South American Plates**. The resultant tectonic activity **raised** the seafloor.

Note:

- A **strait is a narrow waterway between two pieces of land** that connects two large bodies of water e.g., **Strait of Gibraltar** links the **Mediterranean Sea** and the **Atlantic Ocean**.
- **Straits are important transportation routes** since they allow ships to pass from one body of water to another.



What are other Important Canals Around the World?

- **Suez Canal:** The canal connects the [Gulf of Suez](#) and the [Mediterranean Sea](#), separating Asia from Africa. It extends between Port Said in the north and Suez in the south.
 - It separates **Asia** from the **African** continent and provides the **shortest maritime route** between Europe and the regions around the Indian Ocean and the Western Pacific Ocean.
- **Kiel Canal:** It connects the [Baltic Sea](#) with the [North Sea](#). Opened in 1895, the 98 km-long Kiel Canal helps vessels bypass the longer route that goes via **Denmark (peninsula of Jutland)**.
- **Corinth Canal:** The Corinth Canal in **Greece** is considered the **world's narrowest canal**. It connects the **Corinthian Gulf** of the Ionian Sea and the **Saronic Gulf** of the Aegean Sea.
- **Kra Isthmus Canal (Thai Canal):** It is a **proposed canal** that would connect the **Andaman Sea to the Gulf of Thailand** across the Kra Isthmus in southern Thailand.
 - The canal would provide a **shortcut** to routes between India and China, **avoiding the Strait of Malacca**.
- **Great Lakes Seaway Navigation System:** In the United States, the five [Great Lakes](#), their connecting channels, and the **St. Lawrence River** forms one of the longest navigation systems in the world. The waterway flows from west to east and drains into the **Atlantic Ocean via the St. Lawrence River**.

Drishiti Mains Question

Q. Discuss the impact of Climate Change on water channels? How canals are inevitable for the smooth flow of global trade?

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. Between India and East Asia, the navigation-time and distance can be greatly reduced by which of the following? (2011)

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

Ans: (b)

Mains

Q. What is water stress? How and why does it differ regionally in India? (2019)

Q. "The ideal solution of depleting groundwater resources in India is the water harvesting system". How can it be made effective in urban areas? (2018)

Q. In what way micro-watershed development projects help in water conservation in drought-prone and semi-arid regions of India? (2014)

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