



## Mains Practice Question

**Q.** What are the causes of ocean currents? How do currents affect the temperature of a region? (250 words)

18 Nov, 2019 GS Paper 1 Geography

### Approach

- Write in brief about Ocean Currents.
- Enumerate the factors responsible for their formation.
- Explain how currents affect the temperature and climatic conditions of a region with examples.

### Introduction

- Ocean currents are continuous movements of water in the ocean that follow set paths, kind of rivers in the ocean.
- There are two types of Ocean Currents, based on depth, viz. surface currents (surface circulation- which make up about 10% of all the water in the ocean) and deep water currents (thermohaline circulation- which makes up the other 90% of the ocean).
- Based on temperature, Ocean currents are classified into two types: cold currents (ex: Labrador current, Peruvian current, Benguela current, etc) and warm currents (ex: Kuroshio current, Gulf stream, North Atlantic drift, etc).

### Body

Factors which impact the ocean current formations are:

- **Planetary winds:** The planetary winds are permanent winds (Trade winds, Westerlies and Polar Easterlies) that blow from one pressure belt to the other. The oceanic circulation pattern roughly corresponds to the earth's atmospheric circulation pattern. E.g.: There is a change in the direction of ocean currents with a change in direction of the monsoon winds in the Indian Ocean.
- **Temperatures:** The differential heating of the Sun at the equator and the poles causes a difference in the temperature of ocean water. Warm water from the equator slowly moves along the surface towards the poles, while the cold water from the poles slowly creeps along the bottom of the sea towards the equator.
- **Salinity:** Waters of low salinity have lower density enabling them to flow on the surface of waters of high salinity while waters of high salinity flow at the bottom.
- **Earth's rotation:** According to Ferrel's law - **Coriolis forces** deflect winds and freely moving objects to the right in the northern hemisphere and to the left in the southern hemisphere. Therefore, the movement of ocean currents in the northern hemisphere is in the clockwise and in the southern hemisphere it is in the anti-clockwise direction.
- **Landmass:** A landmass obstructs the direction of flow of ocean current and divides the ocean current to flow in a different direction.

The ocean currents influence the temperature and climate of different regions of the world, especially those regions bordering on the ocean.

- **Local Climate:** Warm and Cold currents affect the local climate of a region. E.g.: the North Atlantic Drift keeps the coasts of the North Sea (western coast of Europe) warm which is unusual for such high latitudes. Similarly, the warm waters of the Kuroshio Current in the North Pacific Ocean keep the ports of the Alaskan coast ice-free in winter.
- **Desert Formation:** Cold ocean currents have a direct effect on desert formation in west coast regions of the tropical and subtropical continents. E.g.: Peru Current, also called Humboldt Current, is a cold-water current of the southeast Pacific Ocean and a primary reason for the aridity of the Atacama Desert (driest desert of the world).
- **Moderating effect:** They are responsible for moderate temperatures at coasts. For eg: Warm North Atlantic Drift in England, Canary cold current in Spain, Portugal etc.
- **Precipitation:** Warm currents flow along the east coast of continents resulting in warm and rainy climates while cold currents flow along the west coast of continents.
- **Tropical cyclones:** They pile up warm waters in the tropics and this warm water is the major force behind tropical cyclones.

## Conclusion

Not only there is a number of factors which impact the formation of ocean currents, but also the ocean currents themselves play a major role in determining regional as well as global climate.

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