

Indian Ocean Dipole, El Nino and Indian Monsoon

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As a part of geography prelims, many climatic phenomena especially with respect to Indian monsoon have been asked. Thorough conceptual understanding of the topic and interlinkages needs to be prepared for answering the questions. In the backdrop of climate change, the topic also assumes importance from mains perspective.

In news

Monsoon in India to 'below normal' this year due to moderate El Nino conditions

Placing it in the syllabus

Important Geographical Phenomena

Static dimensions

- What is IOD?
- Phases of IOD

Current dimensions

- Impact of IOD on Indian Monsoon
- IOD and El nino

Content

What is the Indian Ocean Dipole?

Sustained variations in the difference between tropical western and eastern Indian Ocean surface temperatures are referred to as the Indian Ocean Dipole or IOD.

It is also known as the Indian Niño, is an **irregular sea – surface temperature oscillation** in which the western Indian Ocean alternately becomes warmer and colder than the eastern part of the ocean

Three phases of Indian Ocean Dipole

The IOD has three phases such as Neutral, Positive and Negative IOD

Neutral Phase of IOD

During this phase Water flows from the Pacific between Indonesia's islands, keeping seas warm to the northwest of Australia. Air rises above this area and falls across the western half of the Indian Ocean basin, blowing westerly winds along the equator.



Positive Phase of IOD

During this phase the Westerly winds weaken along the equator, allowing warm water to move to Africa. Changes in the winds also allow a rise of cool water from the deep ocean in the east. This creates a temperature difference across the tropical Indian Ocean with cooler than normal water in the east and warmer than normal water in the west. This event has been found to be beneficial for the monsoon.



Negative Phase of IOD

During this phase westerly winds intensify along the equator, allowing the concentration of warmer waters near Australia. This creates a temperature difference across the tropical Indian Ocean, with warmer than normal water in the east and cooler than normal water in the west. This event obstructs the progression of monsoon over India.



IOD and El nino

Due to movement of warm water during IOD there would be less impact of El Nino on the Indian Monsoon, Hence, not only El Nino La Nina, but also IOD and other such ocean phenomena on which the Indian monsoon is depended upon. An IOD can either aggravate or weaken El Nino's impact on the Indian monsoon. **If there is a positive IOD, despite an El Nino year, it can bring good rains to India.** For instance, positive IODs in 1983, 1994 and 1997 facilitated normal or excess rainfall over India, despite an El Nino in those years.

IOD and Indian Monsoon

The Indian monsoon rainfall is influenced by a system of oscillating sea surface temperatures known as the Indian Ocean Dipole (IOD) in which the western Indian Ocean becomes alternately warmer and then colder than the eastern part of the ocean.

A positive IOD leads to greater monsoon rainfall and more active (above normal rainfall) monsoon days while negative IOD leads to less rainfall and more monsoon break days (no rainfall). It was predicted by some agencies that there will be impact of El Nino on Indian Monsoon this year. Hence in light of this IOD would be the saviour factor which is likely to be in the neutral or positive phase during the monsoon.