

A Monthly e Magazine  
ISSN:2583-2212

June, 2026 Vol.6(6), 1669-1674

Popular Article

## The Great Pacific Seesaw: Demystifying El Niño, La Niña, and the Impending 2026 "Super El Nino"

Manoj Kumar Tripathy<sup>1</sup>, Nityananda Das<sup>1</sup>, Dharitri Choudhury<sup>1</sup>, Brundaban Sahu<sup>1</sup>  
and Arpit Acharya<sup>1, \*</sup>

<sup>1</sup>College of Fisheries, Odisha University of Agriculture and Technology, Berhampur-760007

\*Corresponding author: [acharya.arpit18@gmail.com](mailto:acharya.arpit18@gmail.com)  
[doi.org/10.5281/ScienceWorld.20776712](https://doi.org/10.5281/ScienceWorld.20776712)

### Abstract

A quiet revolution is brewing under the surface of the Pacific Ocean, one that will soon dictate the price of food in India, the severity of wildfires in Australia, and the winter temperatures of North America. This is the El Niño-Southern Oscillation (ENSO) cycle—Earth’s most powerful natural climate driver. As the world transitions rapidly out of a brief La Niña phase, scientists are sounding the alarm: a historically powerful "Super El Niño" is developing at a record pace for late 2026. Here is a comprehensive look at how these massive oceanic engines operate, what the current crisis means, and how they interact with global weather systems

### 1. The Basics: What are El Niño and La Niña?

At its core, the ENSO cycle is a game of thermal tug-of-war between the ocean and the atmosphere across the tropical Pacific

Phase	Sea Surface Temperatures (SST)	Pressure in Tahiti (East)	Pressure in Darwin (West)	SOI Value
Normal	Cool East / Warm West	High	Low	Positive
El Niño	Unusually Warm East	Low	High	Negative
La Niña	Unusually Cold East	Very High	Very Low	Positive

### Normal Conditions

Under typical circumstances, strong equatorial trade winds blow from east to west (from South America toward Asia). They push warm surface water into a giant pool near



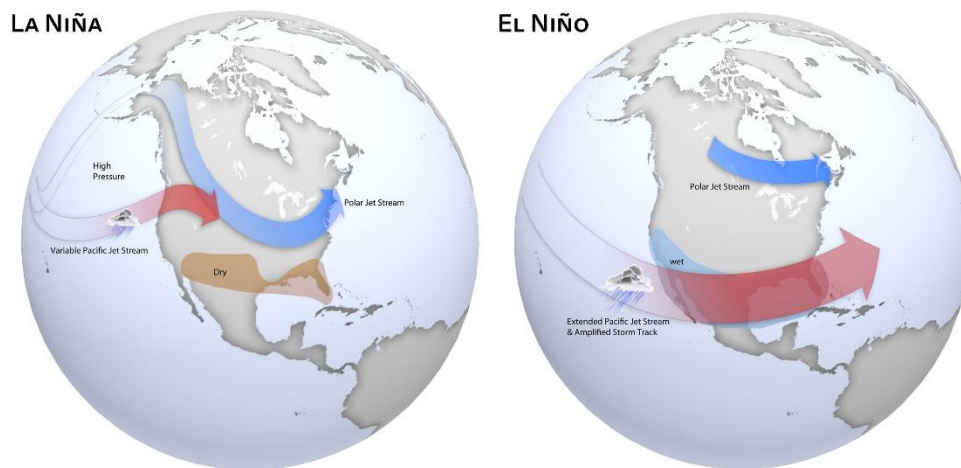
Indonesia. To replace this displaced water, icy-cold, nutrient-rich water rises from the deep ocean floor along the Peruvian coast—a vital process known as upwelling.

**El Nino ("The Little Boy")**

During an El Niño event, these trade winds weaken significantly or even reverse direction. Deprived of the driving force pushing it west, the massive pool of warm water sloshes back eastward toward South America. The cold upwelling stops, heating the eastern Pacific Ocean by at least 0.5° to 2.0° above average. This massive shift alters global atmospheric pressure and cloud formations.

**La Nina ("The Little Girl")**

La Niña is the hyper-active opposite phase. The normal trade winds don't just blow; they surge fiercely. This packs an excessive amount of warm water into the western Pacific while amplifying cold water upwelling in the east, triggering an entirely opposite set of global climate disruptions.



**2. The 2026 "Super El Nino" Narration**

Following the conclusion of the 2025–26 La Nina, the tropical Pacific has undergone an unprecedented transformation. Global climate agencies, including the World Meteorological Organization (WMO) and NOAA have confirmed that sea surface temperatures are rising at an alarming velocity

Metric	Current Status & Projections (Late 2026)
Probability of Emergence	Over 96%–98% certainty of staying established through winter.
Subsurface Precursor	Massive subterranean heat reservoirs moving east via oceanic Kelvin waves.



Intensity Projections	A 1-in-3 chance of sea surface anomalies crossing the + 2.0° C threshold.
Historical Equivalents	Pacing to rival or exceed the landmark super-events of 1997-98, 2015-16, and even 1876-78.

The rapid escalation is being exacerbated by rare atmospheric anomalies, such as triple tropical cyclones in the West Pacific that have effectively acted as giant fans, pushing warm water directly eastward into the El Nino monitoring zones. Because El Nino releases immense oceanic heat into the atmosphere, this super-event is highly projected to bump global temperatures to unprecedented baselines, positioning 2027 to potentially become the hottest year in recorded human history.

### 3. Atmospheric Choreography: The Southern Oscillation

Ocean temperatures do not act alone; they are perfectly synchronized with the atmosphere. The Southern Oscillation is the atmospheric component of this cycle, measured by comparing air pressure variations between two distinct locations: Tahiti (in the central Pacific) and Darwin, Australia (in the western Pacific).

#### During La Nina / Neutral Phases

Low pressure dominates over warm western waters (Darwin), causing air to rise, cool, and dump torrential rain over Indonesia. The air then travels east high in the atmosphere and sinks over the cold high-pressure zone of South America (Tahiti), keeping it dry.

#### During El Nino

The atmospheric loop breaks down. As warm water shifts east, the low-pressure zone and its accompanying rain clouds follow it. The atmospheric pressure flips: Tahiti experiences unusually low pressure, while Darwin registers abnormally high pressure. This coupled dance is why scientists universally use the acronym ENSO

### 4. The Teleconnection: Global Impacts

When the tropical Pacific engine alters its rhythm, it shifts the global jet streams, bending weather patterns worldwide.

#### Global Footprint of El Nino vs. La Nina

- **El Nino Impacts:**
  - **The Americas:** Excessive, flooding rainfall along the coastlines of Peru and Ecuador, and a much wetter, stormier winter across the southern United States.
  - **Asia & Australia:** Severe, prolonged droughts, blistering heatwaves, and historic bushfire conditions across Australia, Indonesia, and Southeast Asia.



- **Marine Life:** The collapse of Peruvian upwelling starves the marine food chain of nutrients, causing massive declines in local fish populations

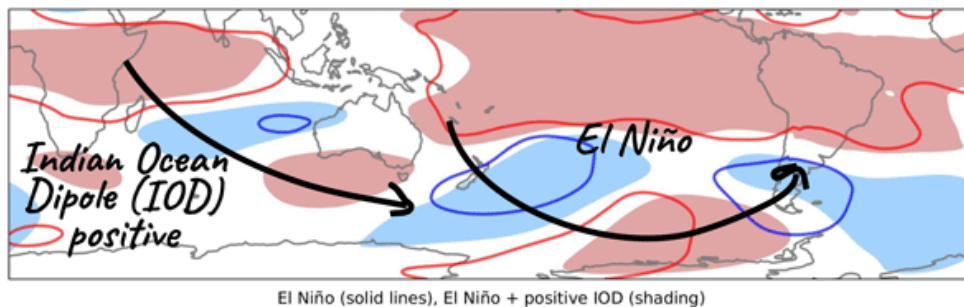
**La Nina Impacts:**

- **The Americas:** Extreme droughts hit America's agricultural southwest, while northern states endure brutally cold, snowy winters.
- **Asia & Australia:** Catastrophic flooding across Eastern Australia and Southeast Asia

**5. The Indian Monsoon, El Niño, and the Indian Ocean Dipole**

For India, the ENSO cycle is quite literally a matter of economic survival. The Southwest Monsoon (June to September) supplies over 70% of India's annual rainfall, dictating the success of vital Kharif crops like rice, cotton, and sugarcane.

PACIFIC INFLUENCE (ENSO)	INDIAN OCEAN INFLUENCE (IOD)
El Niño -> Weakens Monsoon	Positive IOD (+) -> Strengthens Monsoon
La Niña -> Strengthens Monsoon	Negative IOD (-) -> Weakens Monsoon



**The El Nino Threat to India**

Historically, El Niño is the notorious enemy of the Indian Monsoon. By shifting the Walker Circulation eastward, the rising, rain-producing air moves far away from the Indian subcontinent. Sinking, dry air settles over India instead. This weakens the monsoon winds, leading to critical rainfall deficits, prolonged heatwaves, and agricultural droughts. The India Meteorological Department (IMD) has already warned that the fast-evolving 2026 Super El Niño threatens to trigger severe monsoon suppression

**The La Nina Blessing**

Conversely, La Niña acts as a massive booster shot for India. It builds robust low-pressure systems over the region, pulling in strong, moisture-laden winds that generate widespread, above-normal monsoon rainfall



**The Wildcard: The Indian Ocean Dipole (IOD)**

Thankfully, the Pacific Ocean does not hold a absolute monopoly over India's weather. The Indian Ocean Dipole (IOD)—often called the *"Indian El Nino"*—plays a crucial counterbalancing role based on temperature differences between the western Indian Ocean (near Africa) and the eastern Indian Ocean (near Indonesia).

**Positive IOD Phase:** The western Indian Ocean becomes unusually warm. This forces heavy evaporation and cloud formation over Africa and the Arabian Sea, which actively channels moisture straight into India. A strong Positive IOD can act as a shield, completely overriding and neutralizing the drought-inducing effects of a strong El Niño.

**Negative IOD Phase:** The eastern Indian Ocean warms instead, pulling moisture away from India toward Australia and plunging the Indian subcontinent into deep rainfall deficits.

As the world edges closer to the peak of the 2026 Super El Niño, meteorologists are keeping a laser focus on the Indian Ocean. Whether India faces a manageable dry spell or a historic agricultural crisis relies entirely on this grand, interconnected puzzle of oceanic giants.

Historically, three major "Super El Nino" events have occurred since 1950: 1982–83, 1997–98, and 2015–16. While a typical El Niño usually spells disaster for India's rains, historical data reveals that their impacts are not uniform, primarily due to the mitigating wildcard of the Indian Ocean Dipole (IOD).

**Performance Summary of Historical Super El Ninos**

The following data outlines how the three historical Super El Niño events impacted the Indian Summer Monsoon Rainfall (ISMR), calculated against the Long Period Average (LPA):

<b>Niño Event</b>	<b>Monsoon Rainfall (% of LPA)</b>	<b>Core Impact on India</b>	<b>The IOD Role</b>
1982–83	81% (Severe Deficit)	Widespread, crippling agricultural drought and crop failures.	Neutral/Weak IOD: Failed to counteract the fierce Pacific winds.
1997–98	102% (Normal/Slight Excess).	Normal monsoon; agricultural sector completely spared	Strong Positive IOD: Acted as a "shield," entirely neutralizing El Niño.
2015–16	86% (Severe Deficit)	) Back-to-back droughts; massive reservoir depletion across West/South India.	Weak Positive IOD: Unable to overpower the Pacific atmospheric breakdown.



## Detailed Case Studies

### 1. The 1982–83 Event: The Textbook Disaster

- **The Impact:** This event delivered a massive blow to India's rural economy. Rainfall plummeted to just 81% of the baseline average, triggering one of the worst droughts of the 20th century.
- **The Mechanism:** The Walker Circulation shifted drastically eastward. Strong sinking air patterns locked over central and western India, cutting off monsoon advancement and leading to widespread failure of the Kharif crop harvest.

### 2. The 1997–98 Event: The Great "Failure" of Predictability

- **The Impact:** Touted at the time as the "Climate Event of the Century," meteorologists globally predicted a devastating famine for South Asia. Instead, the monsoon delivered a surprising 102% of normal rainfall.
- **The Saving Grace:** This specific event led to the absolute discovery of the Indian Ocean Dipole. A record-breaking Positive IOD warmed the western Indian Ocean near Africa to unprecedented levels. This local engine pumped independent moisture into the Arabian Sea, totally overpowering the negative atmospheric drag from the Pacific.

### 3. The 2015–16 Event: The Modern Multi-Year Crisis

- **The Impact:** Rainfall collapsed to 86% of the long-period average. Because 2014 had also been a weak monsoon year, 2015 triggered a historic multi-year crisis.
- **The Consequences:** Over **10 states** declared severe agricultural drought conditions. Crucial water basins in Maharashtra (Marathwada), Karnataka, and Gujarat dried up completely, forcing the Indian government to send emergency water trains ("*Jaldoot Water Trains*") to heavily depleted rural regions

## Key Historical Takeaway for India

The overarching lesson from previous super-events is that all severe Indian droughts are linked to El Niño, but not all Super El Ninos cause droughts. The ultimate fate of the rainfall relies on the timing and strength of the Indian Ocean's independent temperature variations.

