

El Nino and La Nina

El Nino is a Spanish word that means 'The Little Boy'. The occasional climatic change and development of warm ocean surface waters along the coast of Peru and Ecuador are called El Nino effect. South American fishermen firstly observed the El Nino effect in the 17th century.

In El Nino, the trade winds which blow along the Equator from east to west weakened and created high air pressure in the Western Pacific Ocean and low air pressure in the eastern pacific ocean. Due to this, the surface water moves towards the coast of northern South America. The central and east Pacific ocean warms up for six months, creating an El Nino effect.

During El Nino, warming the central and east pacific ocean reduces the usual upwelling of cold water, ultimately reducing the nutrient content in that region.

The warmer waters of the East Pacific Ocean cause the winds in various regions to reverse.

- El Nino effect normally occurs around Christmas and lasts a few weeks to a few months. Sometimes it may last for much longer time periods depending on the warming of the waters.
- Such a warming environment for seven to nine months is known as El Nino "conditions", and when the duration is longer, it is classified as El Nino "episode."
- Normally, the El Nino effect occurs more frequently than the La Nina effect.

- From the variations in ocean temperature, the ocean-atmosphere climatic interaction is related to the increase in the sea surface temperature in the Central and East-Central Equatorial Pacific.
- In the Equatorial Pacific Ocean, these Complex weather conditions are formed. ENSO's "cool phase" is rare, but El Nino occurs frequently.
- The El Nino effect has a ruinous impact on Indian monsoons, which affects the country's agricultural activities.
- The El Nino effect never follows a fixed cycle; they are non-predictable. And irregularly every 2-7 years, El Nino can be seen.

- Some people consider El Nino a warning of coastal surface water, but El Nino is known to cause intense climate change.

Formation of El Nino

During the El Nino period, the air pressure decreases across the broad regions of the Central Pacific and South American coast.

- The regular low-pressure system is replaced by a weak high in the region of the Western Pacific.
- The shift in the pressure pattern causes Weak Walker Cell Trade winds to decrease. This reduction allows the Equatorial Countercurrent to amass warm ocean water across the regions of Ecuadorian and Peruvian coasts.
- The concentration of warm water causes the thermocline in the eastern Pacific Ocean.
- The El Nino effect causes dryness in Western Pacific and in South America's Equatorial coast, heavy rain can be seen, and storms and hurricanes are also observed in the Central Pacific.

Impacts of El Nino

El Nino affects the speed and strength of ocean currents, ocean temperature, and the health of coastal fisheries and disrupts the weather patterns from Australia to South America.

- The convection above warmer surface water causes increased precipitation. The rainfall in South America has increased, resulting in coastal floods and erosion.
- Areas affected by natural calamities like flooding and drought are more prone to the spread of diseases.
- Many regions claim that El Nino flooding causes a rise in the spread of diseases. Cholera, Dengue fever, malaria, and other diseases cause respiratory problems.
- El Nino causes dryness in Australia and Indonesia. The reservoirs Dry up, and rivers fail to transport adequate amounts of water which causes water scarcity, and agricultural activities are also jeopardized as we need water to irrigate fields.
- Due to the El Nino effect, hurricanes in the Atlantic have become less frequent.

Previous Events of El Nino

The most intense El Nino events were between 1982-83 and 1997- 98. In the 1982-83 years, the temperature of the sea surface in the Eastern Tropical Pacific was 9-18° F above normal. The first El Nino event to be scientifically monitored from beginning to end was in 1997-98.

The 1997-98 event affected many regions, Philippines, Malaysia, and Indonesia faced drought conditions, and Peru and California suffered from heavy rain and flooding.

What is La Nina?

It means little girl in Spanish and is also referred to as El Viejo, Anti El Nina, or a "cold event". La Nina contradicts El Nino. During the La Nina phenomenon, trade winds are stronger than pushing warmer water into Asia. Upwelling increases off the west coast of the United States, bringing nutrient-rich cold water to the surface.

These cold waters of the Pacific Ocean drive the jet stream north and cause droughts in the southern United States and heavy rains and floods in the Pacific Northwest and Canada.

Winter temperatures are warmer in the south and cooler in the north. La Nina can also lead to hurricanes. The waters off the Pacific coast are colder than normal. They contain more nutrients supporting more marine life and attracting more coldwater species such as squid and salmon to places like the California coast.

Causes of La Nina

La Nina is mainly caused when easterly trade winds become much stronger. Due to this, warmer water accumulates towards the western Pacific Ocean and cold water toward the central and eastern Pacific oceans. The strong easterly trade winds blow warm water towards the western Pacific Ocean, due to which the eastern and central Pacific Ocean waters are lower than the normal temperatures.

The La Nina often follows El Nino; however, they occur at irregular intervals of around 2-7 years.

Effects of La Nina

The effects of La Nina are as follows:

- It creates heavy monsoons throughout India and Southeast Asia.
- It creates a drought-like situation in Peru and Ecuador.
- It causes wet and cool winters in southeastern Africa and wet weather conditions in eastern Australia.
- In the Southern United States, it creates winter draughts.
- It creates cold winter conditions in the northwestern United States and western Canada.
- It causes heavy floods in Australia.
- It creates high temperatures in the regions of the Western Pacific, the Indian Ocean, and off the coast of Somalia.
- It causes heavy monsoon rains across India.

Impact of La Nina and El Nino on India

India is a farm-based country, and around 50% of its area is under cultivation. Also, the Indian agricultural system largely depends on the strength of monsoons and the quantity of precipitation. Hence La Nina condition is muchly favorable for Indian agriculture and the economy at large. In this way, a La Nina effect will create sufficient precipitation in India, directly boosting the farm produce.

On the other hand, heavy rainfall sometimes creates floods in some areas, adversely affecting people's lives and the economy. The larger farm produces will enhance the economic growth of the country.

However, El Nino during the winter causes warm conditions over the Indian subcontinent and dry and deficient monsoons during summer. Hence, it creates a draught-like situation and affects agriculture. The Crops like Paddy, Groundnut, Maize, Guar, Castor, Moong, Tur, and Bajra suffer greatly from El Nino conditions.

Major Differences between El Nino and La Nina

The major difference between El Nino and La Nina are:

El Nino	La Nina
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During El Nino, the trade winds blowing from east to west gets weakened.	During La Nina, the trade winds blowing from east to west get stronger.
During El Nino, warm waters accumulate over the eastern Pacific Ocean.	During La Nina, warm water accumulates over the western Pacific Ocean.
The El Nino is laden with high air surface pressure over the western Pacific.	La Nina contains low air surface pressure over the eastern Pacific Ocean.
In El Nino, the wind speed is low	In La Nina, the wind speed is very high.
In El Nino, the strength of the Coriolis force decreases.	However, in La Nina, the strength of the Coriolis force increases.
El Nino creates heavy rainfall in the eastern pacific ocean, and nearby countries like Peru, Ecuador, and Chile	La Nina create drought-like condition over the eastern pacific ocean in nearby countries like Peru, Ecuador, and Chile.

