El Niño-La Niña Weather Patterns

Why in news?

A new study projects that climate change will significantly impact El Niño-La Niña weather patterns approximately by 2030.

What are the findings of the study?

- **Study published in Nature journal** – It has projected that climate change will impact El Niño-La Niña weather patterns approximately by 2030, a decade before what was earlier predicted.
- If Central Pacific and Equatorial Pacific are not separated, sea surface temperature (SST) variability from ENSO will occur almost four decades earlier than previously suggested.
- **WMO prediction** – In 2022, the World Meteorological Organisation (WMO) predicted the first "Triple dip" La Niña of the century.
- This is only the third time since 1950 that a triple dip La Nina has been observed.

At present, India is witnessing an extended triple dip La Niña.

What is El Niño?

- El Niño is a loose translation of **"little boy"** or **"Christ child"** in Spanish.
- Earlier, it was also called **"El Niño de Navidad"** since it peaks around December.
- El Niño is the warming of sea waters in Central-east Equatorial Pacific that occurs every few years (**Warm phase off the coast of Peru**).
- During El Niño, surface temperatures in the equatorial Pacific rise
- This weakens the trade winds — east-west winds that blow near the Equator.
- Due to El Niño, easterly trade winds that blow from the Americas towards Asia change direction to turn into westerlies.
- It thus brings warm water from the western Pacific towards America.

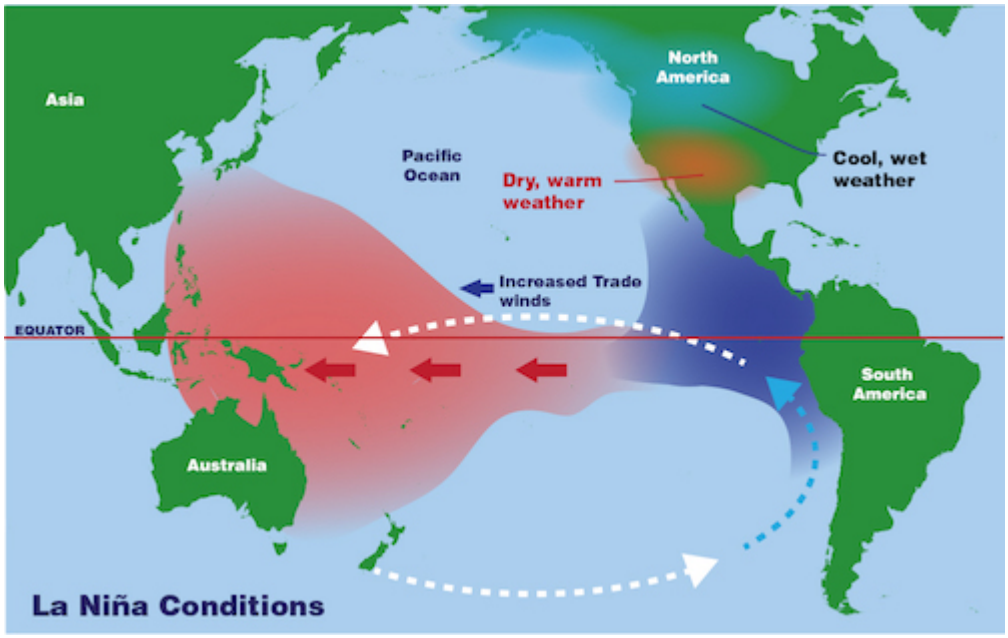
Effects of El Niño Phenomenon

- **Weather -** El Niño causes dry, warm winter in Northern U.S. and Canada and increased flooding risk on the U.S. gulf coast and southeastern U.S.
- It brings drought to Indonesia and Australia.
- In India, an El Nino event is strongly linked to suppressed rainfall in the monsoon season.
- **Marine resource** - Under El Niño, upwelling (deeper waters rise towards the surface)

of deeper waters is reduced, thus reducing phytoplankton off the coast.
- Fish that eat phytoplankton are affected, followed by other organisms higher up the food chain.
- **Warm water** - Warmer water carries tropical species towards colder areas, disrupting multiple ecosystems.
- **Airflow above the ocean** - Heat redistribution on the surface impacts airflows above the ocean.

What is La Niña?

- La Niña or **"Little girl"** is the opposite of El Niño.
- La Niña sees cooler than average sea surface temperatures in the equatorial Pacific region.
- It is the **"Cool phase".**
- Trade winds are stronger than usual, pushing warmer water towards Asia.



Effects of La Niña Phenomenon

- **Weather** - Pacific cold waters close to the Americas push jet streams (narrow bands of strong winds in the upper atmosphere) northwards.
- La Niña leads to drier conditions in Southern U.S.
- La Niña has been associated with heavy floods in Australia.
- In the Indian context, La Niña is associated with **good rainfall** during the monsoon season.
- **Ocean water** - On the American west coast, upwelling increases, bringing nutrient-rich water to the surface.

La Nina	El Nino
The Trade winds become stronger than normal	The Trade winds weaken in the western Pacific
Trade winds cause warmer waters in the west	Trade winds cause warmer waters in the East
The sea surface temperature reduces across the Eastern pacific by 3-5 °c	The sea surface temperature increases across the Eastern Pacific by 6-8 °c
La Nina events occur half the amount of time El Nino events do	El Nino events occur every 3-7 years
Enhanced upwelling of nutrient rich waters increasing fish populations along S. America coast	Reduced upwelling of deep nutrient rich water leads to reduction in fish populations along S. America coast

What about El Niño Southern Oscillation (ENSO)?

- The combination of El Niño, La Niña, and the neutral state between the two opposite effects is called the El Niño Southern Oscillation (ENSO).
- The phenomenon was discovered by Sir Gilbert Walker.

Quick facts

Triple dip La Nina - The extended spell of La Nina lasting across three winter seasons in the northern hemisphere is called 'Triple dip La Nina'.

Walker circulation - The air circulation as a result of difference in surface pressure and temperature over the western and eastern tropical Pacific Ocean is known as Walker circulation.

References

1. The Hindu | El Niño, La Niña and changing weather patterns
2. The Indian Express | The 'triple dip' La Niña
3. National Ocean Service | What are El Niño and La Niña?