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# *El Nino Effect –An Overview*

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***Abstract***

*El Nino was first recognized by the Peruvian fishermen off the coast of Peru as the appearance of unusually warm water. The Spanish immigrants called it as the El Nino, meaning "the little boy" in the Spanish. El Nino soon came to describe irregular and intense climate changes rather than just the warming of the coastal surface waters. El nino is a climate pattern and the assessment of climate pattern in varying regions are reviewed in this paper.*

***Keywords:*** *El Nino, climate, pattern, changes, warming*

## INTRODUCTION

The El Nino event is not a regular cycle; they are not predictable and also occur irregularly at two- to seven-year intervals. The climatologists determined that the El Nino occurs simultaneously with the Southern Oscillation. The Southern Oscillation is a drastic change in the air pressure over the tropical Pacific Ocean. 2/6 when the coastal waters become warmer in the eastern tropical Pacific (El Nino), the atmospheric pressure above the ocean steeply decreases. Climatologists define these linked phenomena as the El Nino-Southern Oscillation (ENSO). Monitoring El Nino and the La Nina Scientists, governments, and non-governmental organizations (NGOs) collect data about El Nino availing a number of technologies such as scientific buoys. A buoy is a type of an object that floats in water and is availed in the middle of the seas as locators or as the warning points for the ships (Zhang, et al., 1997).They are generally bright (fluorescent) in colour. These buoys measure oceans and air temperatures, currents, winds, and humidity. The buoys transmit data daily to the researchers and forecasters around the world enabling the scientists to more accurately mainly predict El Nino and visualize its development and impact around the globe (Francis,


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1997). The Oceanic Nino Index (ONI) is availed to measure deviations from normal sea surface temperatures. The intensity of the El Nino events varies from weak temperature increases (about 4- 5° F) with only the moderate local effects on weather and the climate to very strong increases (14-18° F) associated with worldwide climatic changes(Glantz,2001).

**El Nino-FACTS**

When the trade winds weaken or ceases, the equatorial current weakens or stops. Deep water and nutrients can no longer rise to the surfaces. Phytoplankton, zooplankton, and fish die or move away (Bjerknes, 1966). „ El Niño was the name given by the Peruvian fishermen to a period of warm waters and the poor fishing that often coincided with the Christmas season. „ El Niño typically persists for 12 to 18 months and also recur approximately every two to seven years Hadley Circulation, Walker Circulation, and the ENSO. „ Hadley circulation: Latitudinal (N-S) convective circulation. Warm air rises over the equatorial regions, which draws air in to replace it. Hadley circulation – coupled with the Earth's rotation - is the main reason for the trade winds. „ Walker Circulation: The Longitudinal (E-W) convective circulation modulated by the SST anomalies (Bjerknes, 1969).

Sea Surface Elevation and the Depth of the Thermocline during the ENSO Cycle „ In the tropical eastern Pacific during the La Niña, strong Trade Winds move water westward, resulting in lower sea level, a rises in the thermocline, and a drop in sea-surface temperature.

In the tropical eastern Pacific during the El Niño, weakened Trade Winds results in higher sea level, a deeper thermocline, and warmer seasurface temperatures (Blench, R., & Marriage, Z.1998).

NOAA's Climate Prediction Center has determined precisely the average monthly sea surface temperature for a particular swath [5°N-5°S, 170°W-121°W] of the tropical Pacific Ocean by averaging measurements collected there over the 3 decade period 1986-2015. Scientists refer to that swath as the Niño 3.4 region (Boulanger, et al., 1995). The observed difference from the average temperatures in that region– w h e t h e r warmer or c o o l e r – i s used to i n d i c a t e the current phases of ENSO.


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**ENSO INDEX:**

Average sea surface temperatures in the Niño 3.4 region is calculated for each month, and then averaged with values from the previous months and following months (Broad et al., 2007).

This running three-month average value is compared with average sea surface temperatures for the same three months during 1986 – 2015.

The departure from the 30-year average of the threemonths average is known as the Oceanic Niño Index or ONI. • El Niño is characterized by a positive ONI greater than or quiet equal to +0.5°C. • La Niña is characterized by a negative ONI less than or equal to -0.4°C. • Whenever the ONI is between +0.5 and -0.5, conditions are referred to as ENSO-neutrals (Busalacchi, et al.,1995).

**IMPACT**

**South America**

ENSO events, in the South America are experienced in two ways: a) through its effectson both the ocean systems and the atmosphere, and b) throughits impactson natural ecosystems (both marine and terrestrial) and on the societal and economic sectors (like agriculture, fisheries, health). The El Niño phenomenon can have precise effect of precipitation over some regions of the South America such as the Brazilian Northeast, Amazonia, South of Brazil and also Uruguay (Cai, et al.,2015). The amount of anomalous rainfall and river flooding in the southern coast of the Ecuador and northern Peru remains the most reliable indicator of the strength of the El Niño events . The effects of precipitation by ENSO in South America was quiet less frequent in the Mid-Holocene when compared to the present climate and that the spatial distributions of the ENSO influence is considerably different in the two periods or phases. The South American hydro-climatology is extremely affected by positive (El Niño) and the negative (La Nina) events of the El Niño Southern Oscillation in various ways . Studies by environmentalist showed that there exist correlations between ENSO and the river discharge of the most pivotal South American rivers; Amazon and the Parana,( Capotondi, et al.,2015). Increase in plant productivity during the rainy El Niño years has been reported for coastal desert


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ecosystems in the north-central Chile . In NE Brazil, El Niño has been popularly known to be mainlycausing severe droughts .

**North America**

El Niño offers the greatest chance to make clever long-range winter forecasts for Canada. However, the impacts ofEl Niñoover the North America are weaker and more mutable (Carranza, 1891).

The strongest El Niño events of the 20th century occurred in the period 1982-‘83 and in1997- ‘98. The effects of 1982-‘83 encompassed significant storms throughout the southwest United States and one of the Australia's worst drought of the century(Carrillo, C,1982).

**Asia, Europe and Australia**

When the El Niño event occurs, there is eastward shift of rainfall in the west Pacific region that tends to mainly cause rainfall scarcities in western Pacific such as Australia, Philippines, Indonesia and India that may specifically experience severe droughts while central Pacific islands experience quiet surplus rainfall (Caviedes, C. N,1975). About half of the droughts over India have been related to this phenomena. According to the natures climatic changes certain new strategies of farming are implemented like arid and semiarid technology. Pollution control indicators, carbon sinks are used to control the climatic changes.

Climate entrepreneurship is one among the implemented strategies. One of the external factors responsible for the interannual variability of the Indian summer monsoon rainfall (June through September) is the El Niño phenomena. Although the climatological onset dates vary with regions, the inter annual variability of the regional monsoon onset over most of Asia is partly affected by the ENSO. The European continent is mainly located far from the tropical Pacific Ocean; however, climatic teleconnections of the ENSO can still be sensed . During a typical El Niño, the Asian monsoon generally weakens and is pushed towards equator, often bringing summer drought to the north-west and central regions of India and heavy rainfall in the north-east(Fig-1).


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***Figure- 1 India***

Most of the severe droughts over India occurred in association with the El Niño events . Since 1950, there were 23 El Niño years and only around 13 drought years and three of these droughts were precisely in non-El Niño years. Even biotechnological tools discovery has made these research possible to these extent(Dr.S.Sreeremya,2024).Biodynamic farming(S. Sreeremya,2018a), arid , semi arid technology(S. Sreeremya,2018c), wetland conservation(S. Sreeremya,2018d) and rangeland management by conserving these geographical area(Dr.S.Sreeremya,2019c), diversities are maintained. By maintaining these fields, it focuses on several aspects of climatic changes makes the atmosphere a better place (Dr.S.Sreeremya, 2019a). Techniques like Carbon sinks, to collect carbon dioxide to remove from the atmosphere, other environmental conservation strategies like carbon sequestration(S. Sreeremya,2018b), nitrogen foot printing (Dr.S.Sreeremya,2020a) have to be implemented . The effect of certain elements in the atmosphere are studied like, Initial Corrosion Behavior of Element Copper in Atmospheric Environment (Dr.S.Sreeremya, 2020e). The anthropogenic activity to harm the environment by piling of micro plastic is also studied (Dr.S.Sreeremya, 2020b).

Usage of natural pollution indicators can help to regulate the exposure of hazardous gases to environment to a certain extent (Dr.S.Sreeremya, 2019b), thereby balancing the green


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chemistry (Dr.S.Sreeremya, 2020e). The impact of natural phenomena like flugirites formation, how these effects atmosphere are researched extensively (Dr.S.Sreeremya, 2020c).

## CONCLUSION

The climate change and its scientific assessment is keenly analysed and consolidated as El Nino. The El Nino effect an year by year scenario of Asia, America, Europe is been discussed extensively in this paper.

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