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El-nino and It`s Varied Impacts: A Review

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ABSTRACT

El-Nino is a periodic flow of warm Pacific equatorial waters southward, usually around Christmas time. El-Nino is linked to the Southern Oscillation and it affects the atmosphere, disrupting weather condition of the world. Its disastrous effects have resulted in drought in Australia and Papua New Guinea, a delayed monsoon in South-East Asia leading to massive forest fires choking smog, storms on the Pacific coast of South and Central America, drought in Southern Africa, and threat of flood in Peru and California. Its increasing sensitivity and frequency through the 1980s and 1990s, suggests that El-Nino is affected by an increase of heat trapping greenhouse gases in the upper atmosphere. Global Warming could make the El-Nino a permanent feature of world`s weather system. El-Nino and Southern Oscillation largely affect developing countries that are largely depending upon fishery and agriculture for employment, foreign exchange, and food supply. Global warming increases severity and frequency of El-Nino which has great socio-economic impact on these countries.

Keywords: *El-Nino; Southern Oscillation; Smog; Greenhouse Gas; Global Warming; Forest Fires; Flood*

INTRODUCTION

It is known that there are many anthropogenic factors in the climate, especially CO_2 and greenhouse gases such as methane (Ch_4), CFC, and N_2O as part of the daily activities. However, there are many natural processes that affect local climate, regional climate and global conditions. Other effects on the climate are the result of fluctuations and inconsistencies with the world's most complex seawater. This fluctuation is known as oscillation and the most popular oscillation is El Nino (Kunzer *et al.*, 2009; Mc Phaden, 1993). Understanding El Nino requires knowledge of a wide range of data from most studies.

LITERATURE REVIEW

El Nino

El Nino is a natural phenomenon that involves a change in the temperature of oceans in the Pacific and the equator, along with changes in the atmosphere. This situation has a profound effect on climate patterns in various parts of the world. Scientific advances in understanding and modeling of El Nino have improved forecasting skills one to nine months in advance, helping the public to prepare for similar dangers such as heavy rain, floods and droughts. The value of this forecast could translate into hundreds of millions, if not billions, of dollars in potential savings.

The cycle begins when warm water in the western Pacific Ocean flows eastward toward the equator toward the coast of South America. Most of the hot water lakes are near Indonesia and the Philippines. During El Nino, the warm Pacific water resides on the northwest coast of South America.

There is the opposite of El Nino, called La Nina. This refers to a time when the eastern tropical pacific waters are much colder than normal and commercial winds are blowing harder than usual. Together, El Nino and La Nina are part of the complexity of the space system in the ocean called the El Nino Southern Oscillation or ENSO cycle (Shaw & Moore, 1988), which also has a neutral phase.

La Nina

La Nina is an integral part of the El Nino spacecraft as part of the El Nino - Southern Oscillation. The

name La Nina comes from Spanish, meaning "little girl", which is similar to El Nino meaning "little boy". It has previously been called anti-El Nino, and El Viejo (meaning "old"). During La Nina, sea temperatures across the equatorial Eastern Central Pacific Ocean drops below normal by 3° to 5° C.

Impact of La Nina on global climate

La Nina has an impact on the global climate and disrupts normal climatic patterns, which can lead to severe storms in some areas and droughts in other parts.

Causes of El Nino

The name given to a change in the current flow of the Pacific Ocean near the equator is known as El Nino. El Nino is a Spanish word meaning 'Boy' because it happens at Christmas time - it repeats every five to seven years (Caviedes, 2001).

The following are the features of the Pacific Ocean before the El Nino events:

- The pacific topical is characterized by continuous western trade winds. The western wind, also known as the commercial wind, blows warm water from the ocean floor east to west. As a result, warmer waters form off Asia's west coast.

- On the other hand, cold water is pushed upward on the ocean's eastern shore, near the center of South America. As a result, the equatorial Pacific has a temperature gradient, with warm water in the west and cold water in the east. Warm water in the west warms the air, causing a rise in warmer air, which leads to inclement weather such as rain and thunderstorms. The rising warm air causes the east-west flow to spread across the Pacific, bringing warm, wet air rising to the west, and a cool dry air flowing down the east (Walker, 1988).

- All these natural factors contributed to the strengthening of the eastern winds, which resulted in a windward movement that propelled them into the Pacific.

This self-sustaining flow of air in the Pacific continues until slow changes occur in the ocean around the equator and cause a series of El Nino-like phenomena:

- When conditions are favourable, the trade winds weaken, causing less warm surface water to be pushed westward and less cold water to be drawn to the surface in the east. Parts of the ocean that are cold during the normal self-perpetuating cycle warm up, cancelling out the normal temperature difference between east and west in the equatorial Pacific.

- Rainfall patterns over the equatorial Pacific are changing as trade winds weaken and warm water moves.

- With the ocean temperature evened out, the warmest waters are closer to the centre of the ocean, resulting in the cloudy, rainy weather that is typical of the centre of the ocean.

All of these events cause abrupt changes in temperature and weather all over the world.

El Nino affects condition

El Nino is occurring every five years and it is a common occurrence due to atmospheric warming caused by winds, leading to the spread of this global warming. It alters atmospheric pressure with the effects of rainfall, wind patterns, sea surface temperatures and can sometimes have positive effects and, sometimes having a detrimental effect on climate limits. In Europe, for example, El Nino reduces the incidence of hurricanes in the Atlantic. The start of the El Nino program was seen in North America in the previous winter. El Nino includes:

- Low temperatures in winter in western Canada and northwestern USA.
- Rainfall increases in the Gulf Coast including Florida.
- The dry season is in the middle of Ohio and the Pacific Northwest.

Effects of El Nino on weather

Major effects of El Nino occur in tropical and subtropical areas. The following are some of the effects El Nino has on climate in this part of the world:

• In South America, the west coast is experiencing an increase in flood danger, while the east coast is experiencing an increase in drought risk (Marengo *et al.*, 2009). Inferenced Oceanic Kelvin/Rossby Wave Influence on North American West Coast, Pacific post-El Niño heat transfer mechanism associated with oceanic Kelvin/Rossby waves that potentially affect atmosphere (Lee & Chelton, 1998)

• Drought is becoming more likely in eastern countries like India and Indonesia. Rainfall is prevalent in the eastern Pacific (west coast of South America) and extreme weather is common in the western hemisphere, including India and Indonesia. As a result, all of the excess heat on the Pacific Ocean's surface, as well as the heat released into the atmosphere, has resulted in temporary global warming (Glantz *et al.*, 2001).

• The influence of El Nino is on the weather peaks in December and can linger for a few months after that.

• After El Nino, trade with the winds of the east, a cycle of self-assertion becomes the norm. However, in the case of La Nina the effects are reversed, and the trade winds intensify, making the normal cycle much larger and having a dynamic El Nino effect.

• Atmospheric CO_2 levels increase as the effects of El Nino increase with greenhouse gases. This warm and dries the tropical environment, reducing their carbon intake and intensifying forest fires.

Economic effects of El Nino

• Rice production is declining in Asian countries. With increasing drought on the west side of the equatorial Pacific, GDP in the region is often falling during the El Nino cycle. Water is needed to harvest the rice. Drought is having a major impact on rice production in countries that harvest rice. As rice is an important crop in many of these Asian countries, El Nino has a negative impact on the economies of these countries.

• In non-Asian countries harvesting other crops, such as wheat is reduced due to drought. For the farmers and harvesters of these crops El Nino has a very negative impact on the economy, such as rice production and exports to Asian countries (Fagan,1999).

• Fish harvesting in coastal countries such as Ecuador and Peru is difficult, as the fish in the water near these countries usually disappear during the months of December and January (Philander, 1990).

• In general, the severe El Nino climate change is wreaking havoc on the economies of several countries around the equator. While typical years have a steady climate, resulting in predictable market results, El Nino years have a drastic change in climate, resulting in harsh weather on both sides of the Pacific.

DISCUSSION

During the winter, El Nino promotes warmer conditions across the Indian subcontinent. It causes dry conditions and low rainfall in the summer. In Australia, it causes drought. La Nina, on the other hand, resulting in a better position in India than typical Australia, on the other hand, has seen floods (Li *et al.*, 2013).

• India has previously received high rainfall during El Nino events in 2002 and 2009, as well as frequent rainfall during El Nino events in 1994 and 1997.

• Analysis by the Indian Meteorological Department shows that, in the 18 El Nino years from 1880 to 2006, twelve were in short supply of rain or less - common in India. This means that, for the third time,

there was no convergence, and that led to surprisingly incorrect weather forecasts.

• Recent research aimed at finding a stronger link shows that not all El Nino's cause drought and heat only in central Pacific correlates and drought in India while warming in the eastern pacific means a common storm (Hayes *et al.*, 1991).

• Indian meteorological department, the official forecasting agency, has set to issue its first long range forecast of summer temperatures on 2015. Andhra Pradesh and Telangana witnessed a severe heat wave on 2015. In 2016, the winter temperatures have been markedly above normal in most part of the country. Due to negative effect of this phenomenon thousands of people lost their lives in Andhra Pradesh.

CONCLUSION

El Nino is a natural occurrence that has no control over the weather or the lives of people all around the planet. However, because it is usually visible to meteorologists, individuals in the afflicted countries should take precautions to avoid further harm.

People in El Nino-affected areas must take the required precautions to safeguard themselves, whether they are planning for floods or droughts. This might result in additional flooding during a drought or ensure that their homes are flood-proof. Due to the impact on many key crops in these nations, further precautionary measures could include storing these crops in anticipation of drought or damage caused by excessive rainfall.

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