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La Niña Strikes Again: Brace for Big Changes in Agriculture?

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Abstract

The Indian economy heavily depends on agriculture and faces significant challenges and opportunities due to climatic phenomena like El Niño and La Niña. With the primary forecast from the Asia-Pacific Economic Cooperation (APEC) Climate Centre indicating a shift from El Niño to La Niña, India is expected to experience above-average monsoon rainfall from July to September. This change is likely to benefit the *Kharif* crops, which rely heavily on monsoon rains, potentially improving yields and agricultural productivity. However, excessive rainfall also poses risks such as flooding, increased pest and disease prevalence and potential crop damage. Effective water management, flood control measures and integrated pest management practices are essential to mitigate these risks. Additionally, government policies, crop insurance and timely weather forecasts are crucial in supporting farmers' adaptation strategies.

Keywords: Agricultural productivity, Climate change, Kharif crops, La Niña

Introduction

The Indian agriculture sector significantly supports the country's economy, with farmers relying heavily on the monsoon for their livelihoods. Approximately 70% of the Indian population depends on agriculture and allied sectors, contributing to about 50% of total employment and 18% of the GDP. The state receives an average annual rainfall of 1153 mm, with the Southwest Monsoon accounting for 74%, followed by the Northeast Monsoon at about 16%. This monsoon, lasting from June to September, heavily influences the outcomes of Kharif crops. Adequate rainfall during this period results in bountiful crops, benefiting farmers.

Prediction of La Nina by Asia-Pacific Economic Cooperation (APEC) Climate Centre

The Asia-Pacific Economic Cooperation (APEC) Climate Centre issued the first monsoon forecast for India, predicting above-average rainfall from July to September, the main monsoon season. This forecast is attributed to the shift from El Niño to La Niña condition, as indicated by the recent ENSO alert (Figure 1). The APCC updated its ENSO alert system April to September 2024. The Niño3.4 index is expected to be 0.1 °C in May 2024, gradually decreasing to -1.2 °C by October, 2024. The probability of ENSO neutral conditions is anticipated to decrease from 55% in May-July, 2024. Conversely, the likelihood of La Niña conditions is expected to gradually increase and become dominant (approximately 61%) from August to October 2024.

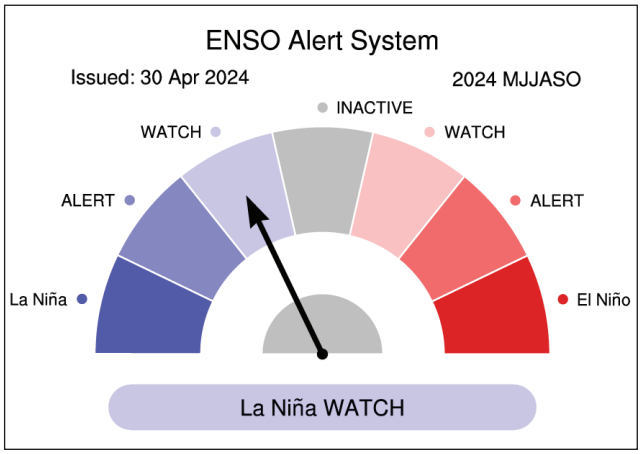

Figure 1: ENSCO alert status for May, 2024 - October, 2024 (Source: APCC, 2024)

MD Director General Mrutyunjay Mohapatra mentioned intense heat during the summer due to persistent El Niño conditions, which are expected to neutralize after the summer season due to the foreseen La Niña condition

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(Business Today Bureau, 2024). The persistence of El Niño conditions will result in a sweltering summer before a good monsoon. Regions like the Northeastern peninsula of India may experience more hot days than usual. March rainfall across the nation is likely to be above average (greater than 117% of the long-term average of 29.9 mm).

What are ENSCO, La Nina and El Nino?

In normal condition the trade winds flow from the Peru region of the eastern Pacific Ocean to the Australia region or the western part of the Pacific Ocean. These trade winds are the warm winds which result in creating a low temperature region and a high pressure in the Peru region. This also makes the Australian region high in temperature and low-pressure area. Under this condition the Australian regions receive a high amount of rainfall which also affects the Asiatic countries Majorly India. Also upwelling of the eastern Pacific Ocean results is a great factor for Peru's rich fisheries. This is called the normal phase or the neutral phase of ENSCO cycle. The movement of heat wave from the eastern area of the Pacific Ocean to the western area of the Pacific Ocean is shown in the figure 2.

Whereas moving to its two extreme phases two other conditions are seen namely La Nina and El Nino. El Niño is a climate pattern caused by the uneven warming of water surfaces in the eastern tropical Pacific Ocean. Also known as the warm phase of the El Niño-Southern Oscillation (ENSO), it occurs more frequently than La Niña. In contrast, La Niña, the cool phase of ENSO, is characterized by the cooling of the tropical eastern Pacific Ocean. La Niña events can last between 1 to 3 years, while El Niño typically lasts no more than a year. The only take through from the above is the El Nino is responsible for less rainfall or the drought season in the country where as the La Nina is responsible for the good amount of rainfall in the country. Both the El Nino and La Nina condition is displayed in figure 2.

Impacts of La Nina on India and Indian Agriculture

The monsoon in India mainly from the month of June to September drives a bulk of $3 trillion economy. But during the last 5 years due to the impact of El Nino it is marked as the weakest south west monsoon in India. August is marked to be the month with lowest rainfall in the century, resulting in a season with a decrease of more than 6% of the average rain fall. El Niño has negatively impacted crop yields this year, resulting in a decrease of 1.4% in food grain production for 2023-24 (July-June), bringing the total down to 309.38 million tonnes. This decline in output has driven up food prices. In response, the government has implemented measures such as banning the export of rice and onions. Government also played a major role in regulating the retail sales of major food items. According to the Consumer Food Price Index, inflation rose to 8.66% by February 2024, slightly down from the 9.53% recorded in December.

The arrival of La Nina from this year will significantly impact Indian agriculture due to its influence on the monsoon patterns, which are crucial for the agricultural sector, leading to a higher monsoon during the month of July to September which is the crucial month for the crop production in India.

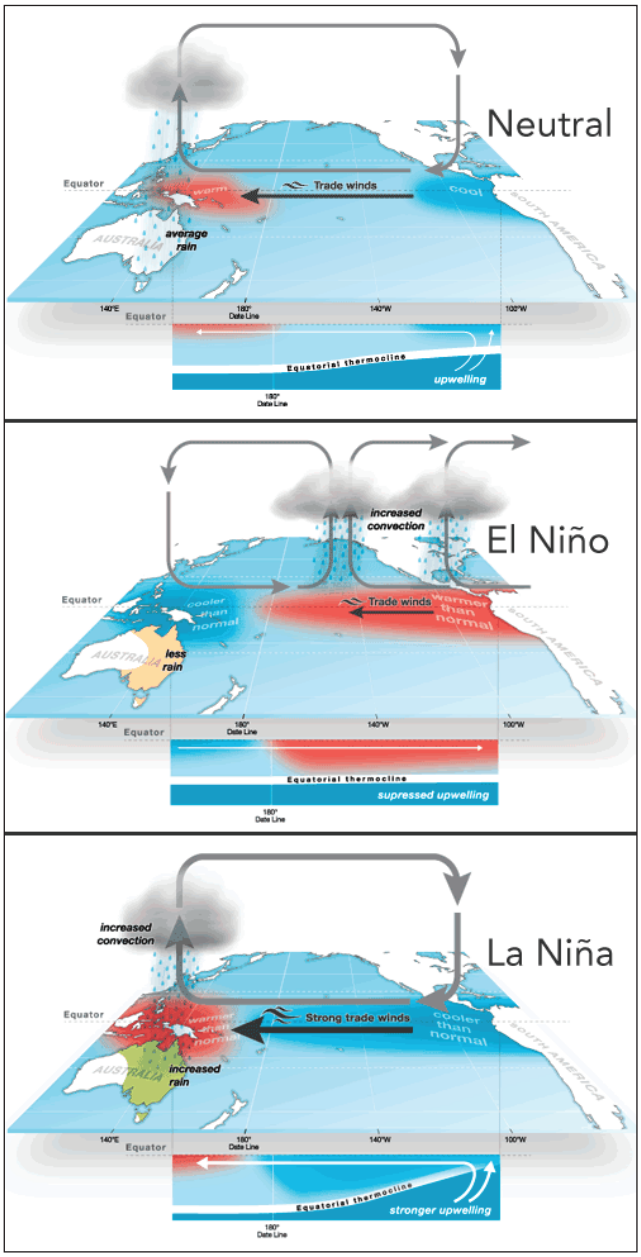

Figure 2: The ENSCO cycle (Source: Drishti IAS, 2021)

La Niña typically leads to stronger and more consistent southwest monsoon rains in India. This is beneficial for the Kharif crops (sown in the rainy season) such as rice, maize and pulses, which depend heavily on monsoon rains. Enhanced monsoon rains can improve the water availability in reservoirs and groundwater, aiding in better irrigation for crops, increasing yields and improving overall agricultural productivity. The fisheries sector will be contented.

Enhanced rainfall can improve water levels in dams and reservoirs, which is beneficial for irrigation during dry spells and in electricity generation. This supports continuous agricultural activities even in the non-monsoon months.

Also the farmers must be aware of the negative impacts of the La Nina. The excessive rains can lead to flooding, which can damage crops, especially in low-lying areas. Proper water management and flood control measures are crucial to mitigate this risk. Also, excessive rainfall and humidity

can create favourable environment for pests and diseases, potentially impacting crop health and yields. They need to be vigilant and adopt integrated pest management practices to protect their crops. Thus, Farmers may need to adapt their planting schedules and crop choices based on the La Niña forecast. Diversifying crops, using drought-resistant varieties and adopting better water management practices can help mitigate adverse effects.

Government policies and support systems, such as crop insurance, timely dissemination of weather forecasts and extension services, play a crucial role in helping farmers adapt to the impacts of La Niña.

Future Prospects

The arrival of La Niña conditions offers both opportunities and challenges for Indian agriculture and its allied sectors. As the sector prepares for the predicted shift in climate patterns, *i.e.*, from the El Nino to La Nina condition, several prospects emerge:

1. Enhanced Agricultural Productivity

• *Improved Yields*: The above-average rainfall which is expected in this monsoon season can significantly boost the yields of Kharif crops like rice, maize and pulses. The enhanced water availability will also replenish groundwater and reservoirs, ensuring better irrigation during the dry season which will benefit in the production of Rabi crops also.

• *Expansion of Cultivable*: The Increase in rainfall could enable the cultivation of additional land areas that were previously fallow due to water scarcity, thereby increasing the agricultural output.

2. Infrastructure and Technological Advancements

• *Irrigation Systems*: Investment in improved irrigation infrastructure will be crucial to harness the excess rainwater effectively. Developing efficient water storage and distribution systems can mitigate the risks of flooding and ensure water availability during dry spells.

• *Climate-Resilient Technologies*: Adoption of climate-resilient farming practices and technologies, such as drought-resistant crop varieties and advanced weather forecasting tools with proper water management system, will be essential for increasing agricultural outcomes and minimizing risks.

3. Policy and Support Mechanisms

• *Government Initiatives*: Continued support from the government in the form of subsidies, crop insurance and disaster relief funds will be very vital for the farmers. Policies aimed at promoting sustainable agricultural practices and providing financial assistance during adverse climatic events will help stabilize the sector.

4. Economic and Market Implications

• *Stabilized Food Prices*: Increased agricultural productivity due to favourable monsoon rains can help stabilize food prices, reducing inflationary pressures and enhancing food security. This can also lead to increased export opportunities for surplus produce resulting a higher return to the farmers.

5. Environmental and Ecological Balance

• *Sustainable Farming Practices*: Emphasizing sustainable farming practices will be crucial in maintaining soil health and preventing long-term ecological damage. Integrated pest management and organic farming techniques can help in achieving this balance.

• *Balanced Ecosystem*: The Impact of El Nino has brought a dry spell over the country thus the arrival of La Nina would be restoring the unbalance.

Conclusion

The shift towards La Niña conditions in the year 2024 is likely to affect Indian agriculture in a recognisable way with both opportunities and threats. La Nina will be bringing above-average monsoon rainfall thus, forecast offers the prospect of improved agricultural output, especially for Kharif crops, which are mostly rainfed. This can lead to higher crop yield, increased area under cultivation and thus better agricultural production contributing positively to the Indian economy.

But the El Niño is also linked with unfavourable conditions like floods, crop damage and increased pest and diseases incidences. To deal these problems, it is recommended to prepare for the necessary measures in the form of efficient irrigation systems, proper water usage and efficient pest control. Thus, climate-resilient technologies and sustainable farming practices will be crucial to achieving better yields for agriculture. Policies, subsidies, crop insurance and disaster relief funds are expected to be vital in the stabilization of the agricultural sector by the government. Further, increasing farmer awareness on water management and crop diversification through education and training will enable them to cope with the changes in climate. Therefore, it can be concluded that even though La Niña conditions are beneficial for Indian agriculture, proper and timely measures need to be taken to combat the risks.

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