



# Water KIDZ

Climate's  
troublesome kids  
– El Niño and  
El Niña

*South Africans are hearing a lot about El Niño these days, especially in the areas affected by hot, dry conditions. But what is this weather phenomenon exactly?*

We don't often think about the ocean and its influence over our climate, even though it covers so much of the Earth's surface. While the sun is the engine that drives all weather on Earth, the ocean and atmosphere steer the sun's energy along certain paths to produce both regional climate and individual weather phenomena.

The ocean plays a crucial role in determining climate because of its ability to absorb, store and transport heat from the sun. Ocean water also affects atmospheric temperature and circulation around the world. In addition, seawater is the source of most precipitation (e.g. rain).

Normally trade winds blow from east to west across the tropical Pacific, pushing water away from the South American coast and piling it up around Indonesia. As a result, the sea level is usually about half a metre higher in Indonesia than it is on the coast of Ecuador and Peru. The offshore movement of surface water causes cold, nutrient-rich water to well up from the ocean depths to replace it. This upwelling accounts for the high productivity of Peruvian waters, as the nutrient-rich water encourages the growth of phytoplankton, which is a food source for many fish species.

But sometimes ocean phenomena, called El Niño and El Niña, disrupt these normal patterns, exerting dramatic influences on the world's climate.

Hundreds of years ago, South American fishermen observed that some years around Christmas, coastal waters of the Pacific Ocean became warmer as a current flowed from north to south. This change often meant a smaller catch, but more rainfall inland. And that translated into more abundant crops. They said the current came from El Niño (pronounced EL-NEEN-yo), which is Spanish for 'the boy'.

During El Niño, trade winds slacken and may even reverse direction. The warm water sloshes back across the Pacific and the thermocline (the transition layer between warm surface water and cold bottom water) flattens and deepens. Together with the cessation of wind-driven offshore movement of surface water, the thermocline inhibits upwelling, so sea surface temperatures rise rapidly.



*South Africa is experiencing a hot, dry summer, which could affect production of crops such as maize.*

Evaporation from warm sea surfaces increases moisture content in the air above, resulting in cloud formation. In normal years, this leads to monsoon rains over Indonesia and dry conditions along the west coast of South America. During El Niño, however, the rain clouds follow the warm water eastward, bringing heavy rain to Chile and Peru and leaving behind drought, dust storms and wildfires in Indonesia and Australia.

The dense tropical clouds also distort the flow of high-altitude winds, or jet-streams, which affect global atmospheric circulation, causing unseasonable weather patterns as far afield as North America and southern Africa.

The warming in the central and eastern Pacific Ocean triggers changes in air pressure across the ocean. Air pressure is the force of the weight of the atmosphere pushing down on a place. Scientists call these pressure changes the Southern Oscillation (oscillation means fluctuation).

These are triggered by the temperature changes brought on by El Niño. So the phenomenon's full name is El Niño-Southern Oscillation or ENSO. Climate scientists usually detect El Niño

toward the end of a year. Its major effects, however, typically are not felt until the following year. In countries such as South Africa, El Niño could lead to warmer-than-usual temperatures, and lower-than-normal rainfall.

Today, researchers use the term El Niño only for those periods when the surface water around the Equator in the eastern and central Pacific Ocean warms for an extended period of time. Scientists declare the development of an El Niño when they observe a temperature increase of at least 0.4 °C for five months in a row in the eastern Pacific near the Equator. An El Niño event occurs every seven years or so and usually lasts about a year.

At other times, the surface water in the eastern Pacific instead may cool down for long stretches of time. When the average temperature drops by at least 0.4 °C, climate scientists will announce the arrival of La Niña (Lah-NEEN-yah). This is Spanish for ‘the girl’. In general, effects of a La Niña run opposite to those triggered by an El Niño. This means South Africa might face higher rainfall and even floods.

It is important to realise that El Niño and La Niña are natural climate phenomena, and are not due to climate change. However, it is thought that these phenomena might be influenced by a rise in global temperatures. However, scientists are still working



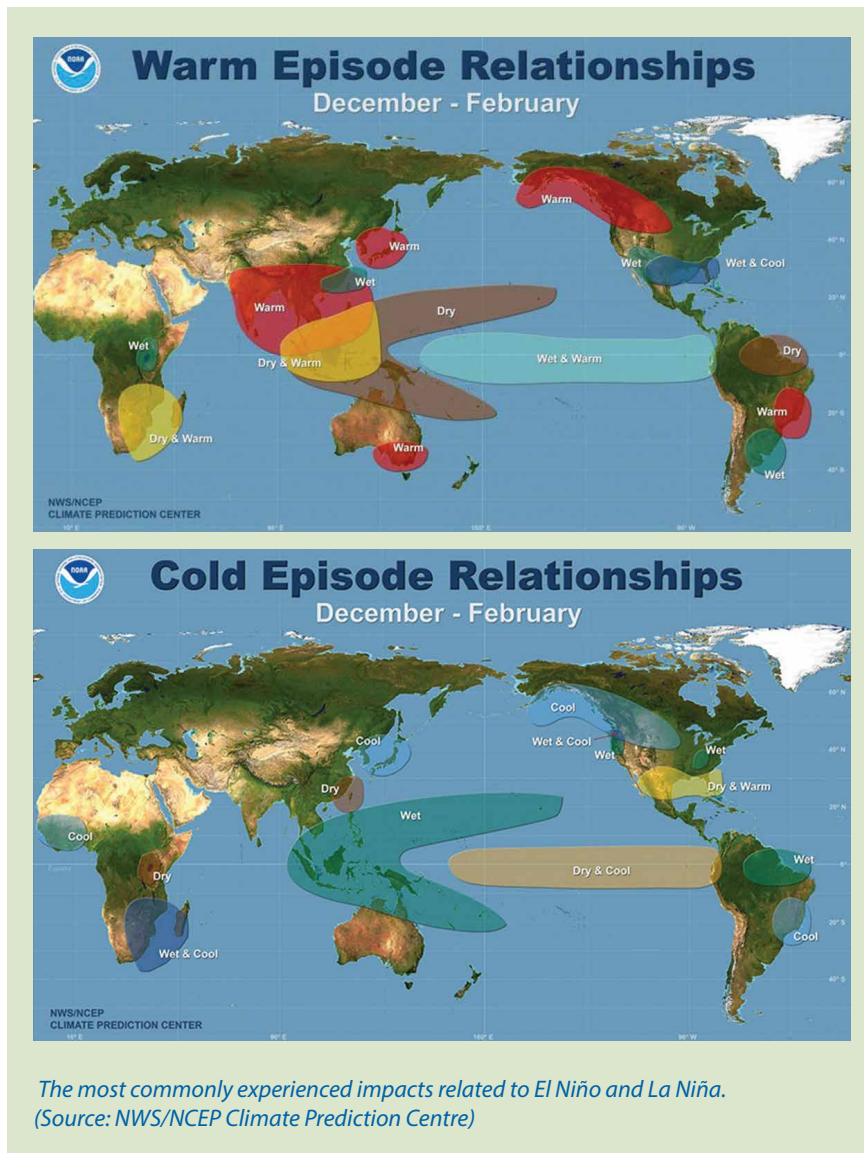
*Ocean phenomena such as El Niño and La Niña lead to flooding in some areas and drought in others.*

on exactly what this influence might be. Some experts say, however, that the combination of El Niño and global warming could be reason why the year 2015 was the warmest year on record.

The present El Niño is expected to have an effect especially on South Africa’s agriculture sector, particularly for rainfed crops such as maize. El Niño is expected to affect the region at least until March, and indications are that the country will receive lower than average rainfall. It is not only South Africa which is affected, but our neighbouring countries as well, including Botswana, Zimbabwe, and parts of Mozambique.

Climate scientists say the present El Niño might be one of the strongest ever recorded. This has come in a year that has been the warmest on record. So, we have a combination of drier season, with temperatures higher than they have ever been.

The good news is that El Niño and La Niña work in very predictable cycles. Once we get through this season, the Pacific will cool down again and conditions for a more normal summer should return again.



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