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EL NIÑO E LA NIÑA

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El Niño and La Niña are major climate phenomena that occur in the equatorial Pacific Ocean, involving the abnormal warming (El Niño) or cooling (La Niña) of surface waters. These events impact global weather patterns, causing droughts, floods, heat waves, and rainfall changes in different regions. In Brazil, El Niño often leads to droughts in the Amazon and Northeast, and heavy rains in the South. La Niña usually brings more rain to the North and Northeast but causes droughts in the South. Understanding these phenomena is crucial for agriculture, disaster prevention, water management, and climate change studies. El Niño and La Niña are opposing climate events that originate in the Equatorial Pacific Ocean and have global effects. El Niño involves the abnormal warming of ocean surface waters, which disrupts wind patterns and reduces the upwelling of cold, nutrient-rich waters along the South American coast. This harms marine ecosystems and negatively impacts fishing industries. La Niña, in contrast, is marked by cooler-than-normal ocean temperatures, which enhance upwelling and support marine life and fisheries. Both phenomena affect not only ocean conditions but also global climate, agriculture, and human activities. Understanding them is essential for preparing for their impacts and managing natural resources effectively.

The municipality of Ubatuba, located on the northern coast of São Paulo, Brazil, is highly vulnerable to extreme climate events due to its geographic configuration, which

combines low-lying coastal zones with steep slopes. Large-scale ocean–atmosphere phenomena such as El Niño and La Niña, driven by sea surface temperature anomalies in the equatorial Pacific, exacerbate these vulnerabilities. During El Niño events, Ubatuba experiences increased average temperatures and more frequent episodes of intense rainfall, resulting in heat waves, floods, urban inundations, landslides, storm surges, and coastal erosion. These processes significantly affect tourism and artisanal fisheries, two key sectors of the local economy. Conversely, during the La Niña phase, intensified precipitation raises the risks of urban flooding and slope instability, further amplifying landslide hazards and producing considerable socioeconomic impacts. In light of these dynamics, Ubatuba has developed climate adaptation and resilience strategies, based on regional climate studies, to mitigate the impacts of hydrometeorological extremes and to strengthen the adaptive capacity of the local population.

Keywords: Ubatuba; El Niño; La Niña; coastal vulnerability; hydrometeorological extremes; climate adaptation; resilience.