Climate Challenges in Agriculture: The effects of the phenomenon El NiÃ±o in the Brazil Central Region

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This study aims to assess the inter-regional economic impacts of El NiÃ±o on the 2023/2024 agricultural season in the central region of Brazil. El NiÃ±o, a recurrent natural phenomenon, is characterized by abnormal and persistent warming of the Pacific Ocean waters, extending from the Equator to the coast of South America. This elevation, persisting for at least six months without a defined timeframe, involves abnormal warming of at least 0.5ÂºC above the average, resulting in climatic patterns, including irregular rainfall and elevated temperatures. Nevertheless, the impact of greenhouse gases' increased emissions, responsible for climate change, has heightened the frequency and intensity of climatic events, such as El NiÃ±o. These climate changes bear significant consequences for agriculture, given that the sector is among the most vulnerable to alterations in precipitation patterns and the intensification of heat waves, impacting both planting schedules and crop development. Brazil stands out globally as one of the largest grain producers, with the Central-West region comprising the states of Mato Grosso, Mato Grosso do Sul, and GoiÃ¡s, which are significant producers of soybeans, corn, and cotton. Nevertheless, during the 2023/2024 season, climatic instability and uneven rainfall distribution in the central region resulted in significant planting delays and negative impacts on the productive potential of crops. These adverse climatic events, including the El NiÃ±o, have generated uncertainties and hindered decision-making by agricultural producers. According to the CONAB (National Supply Company) crop report, the projection indicates a 4.5% loss in grain productivity (kg/ha) in Brazil for the 2023/2024 season, with the Central-West region being the most affected, experiencing a loss of 10.3%. Nevertheless, these impacts are not evenly distributed across the country, underscoring the necessity to analyze these inter-regional effects on the local economy. For this, we will apply the Agro-CO Computable General Equilibrium Model. The model has been constructed based on two Input-Output estimation matrices for Brazilian Agribusiness. The first matrix disaggregates agribusiness segments in the national matrix, explicitly representing the soybean, corn, and cotton sectors. The second matrix employing the IIOAS method estimates an inter-regional matrix for the 53 immediate regions of the Brazilian Central-West. The Agro-CO inter-regional computable general equilibrium model is static, bottom-up, and of the Johansen type, constructed based on the B-MARIA (Brazilian Multisectoral and Regional/Interregional Analysis Model). Thus, this study aims to contribute to the literature through an analysis capable of capturing regional disparities, supporting the formulation of public policies that aim to implement adaptive and mitigating measures to address the challenges posed by climate change, such as those faced during the El NiÃ±o phenomenon, whose frequency and intensity would expect to increase over the years.