

Economic Consequences of Climate Change on Sri Lanka's Agriculture: A Computable General Equilibrium Analysis

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Abstract

The agriculture sector in Sri Lanka is central to the national economy, making a significant contribution to GDP, employment, and rural livelihoods. However, the rising impacts of climate change are increasing the vulnerability of the agricultural sector by reducing agricultural productivity and causing ripple effects that extend across the broader economy. The Sri Lankan economy is heavily dependent on climate-sensitive crops such as paddy, coconut, and tea. While previous studies in Sri Lanka have often relied on partial equilibrium models, Computable General Equilibrium (CGE) models have been extensively used globally to assess the broader macroeconomic and sectoral impacts of climate change, especially in agriculture-dependent economies. However, the economy-wide impacts of climate-induced agricultural productivity decline in Sri Lanka have been evaluated in only a limited number of studies. Hence, this study aims to address that gap by applying a static multi-sector CGE model. A static model was chosen, as it effectively captures short-term structural changes and cross-sector interactions, which are important in analyzing agricultural climate shocks. A Social Accounting Matrix (SAM) for 2021 was used to calibrate the CGE model. Prices, exports, household income and consumption, welfare, factor prices, and GDP composition were captured endogenously within the model through a set of behavioral and market-clearing equations. Two distinct climate shock scenarios were simulated. In the first case, 5%, 10%, and 20% productivity shocks were applied, and in the second, paddy-specific shocks of 5%, 18%, and 31% were applied. According to the results, high (20%) shocks substantially reduce agricultural exports and the GDP contribution of major crops. Welfare and household income also decline as shock magnitude increases, while labor prices drop more than capital prices, reflecting the labor intensity of the agricultural sector in Sri Lanka. The non-agricultural sectors showed minimal effects, while food manufacturing exhibited slight gains due to forward linkages. These findings emphasize the urgent need for proactive and climate-resilient strategies to safeguard the long-term economic stability of the country.

Keywords: climate change, GAMS, general equilibrium, SAM, static CGE