

**TRADE-OFF BETWEEN AGRICULTURAL EMISSIONS AND RICE
PRODUCTION OF SELECT SOUTHEAST ASIAN COUNTRIES:
AN EMPIRICAL ANALYSIS USING THE EKC HYPOTHESIS**

Julia Murielle A. Bantugan
Giuseppe Cee S. Maravilla

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ABSTRACT

Southeast Asia has made remarkable progress in intensifying its rice production, which increased the region's greenhouse gas emissions (GHGs). This study examines the validity of the Environmental Kuznets Curve (EKC) hypothesis and the effects of rice production on GHG emissions in the six major rice-producing Southeast Asian countries, namely: Cambodia, Indonesia, Myanmar, Philippines, Thailand and Vietnam for the period 1970 to 2020 using secondary, annual time-series data from Our World in Data and FAOSTAT. Statistical analyses were conducted using the Mann-Kendall Test, Dickey-Fuller and Phillips-Perron Unit Root Tests, the Autoregressive Distributed Lag (ARDL) Bounds Test, and the Johansen Cointegration Test. An unrestricted error correction model (UECM) and Vector Error Correction Models (VECM) were then estimated. Diagnostic tests were also employed, and the turning points for EKC-conforming countries were calculated. The results confirmed the EKC hypothesis for Indonesia (carbon dioxide emissions) and the Philippines (both carbon dioxide and methane emissions). The Philippines had long achieved the turning point, while Indonesia had not. Rice production had a directly-proportional relationship with GHG emissions as it increased carbon dioxide emissions and decreased methane emissions for Indonesia. It decreased the amount of carbon dioxide emissions produced in the atmosphere for Indonesia and the Philippines and methane emissions for the Philippines and Thailand. In contrast, rice production increased the amount of carbon dioxide emissions in Thailand and methane emissions in Indonesia.