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Assessing the climate change vulnerability of rice farmers in below mean sea level regions: An agro-ecological unit-based approach

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Abstract

Food security is a pressing concern in the face of climate change, particularly for the developing economies such as India. The country supports 1.39 billion people, which is 17% of the current global population. As the world's fifth most vulnerable country to climate change, it is reported that the country could face hunger issues by 2030 due to the adverse impacts of climate change in the agricultural sector. The rice production systems in the country perform a critical role in securing the food security and the associated value chains. Hence, there is a pressing need to assess the vulnerability of the food production systems and the dependent communities to put in place appropriate adaptation measures to ensure food security. In this context, we developed a composite vulnerability index (CVIAEU) to compare the vulnerability of rice farmers in two major rice-growing below mean sea level agro-ecological units (AEUs) of the Indian subcontinent located in Kerala. The CVIAEU is based on three key dimensions of climate change vulnerability viz, adaptive capacity, sensitivity, and exposure. Each dimension is characterised by nine major components and 39 indicators specifically tailored to the rice production systems of the AEUs under consideration. A comprehensive field survey was conducted covering 263 farm households in the two AEUs, using a well-structured and pre-tested interview schedule to elicit field-level data for index construction. We find that the exposure dimension shows the greatest differences among AEUs, followed by sensitivity and adaptive capacity. Following the assessment of major components under the dimensions framework, components where interventions can be planned were identified, and policy-level suggestions were made to improve these components through training and a change in insurance policy to improve livelihood strategy diversification, credit borrowing capacity, water management, technology adoption, and flood risk management capacity. In addition, the CVIAEU framework can be extended to other rice-growing areas with necessary modifications in the selection of indicators from the indicator framework.

Keywords: Adaptive capacity, agro-ecological units, climate vulnerability, exposure, rice farmers, sensitivity