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Climate Vulnerability Assessment and Sensitivity Analysis in Rainfed Farming Communities of Kerala, India

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Abstract

Smallholder farmers, over 1.5 billion people worldwide, are disproportionately vulnerable to the impacts of climate change as a result of poverty, reliance on natural resources and limited capacity to adopt new livelihood strategies. For them, climate change is a daily reality that threatens their source of livelihood: agriculture. In India, more than fifty percent of farmers rely on rainfed agriculture in which ‘delayed, deficient or erratic rains’ lead to severe decline in production and productivity. There is, therefore, an urgent need to identify approaches that strengthen the adaptive capacity of smallholders. Here comes the importance of Watershed Development Programmes (WDPs) as they have the potential to make a significant contribution to enhance the resilience of rain-fed farmers through natural resource management and livelihood support system activities. The Government of India initiated WDPs for rainfed areas more than five decades ago and doubled the financial support for every five year plan. Therefore, it is of great importance to exercise a closer scrutiny over the WDPs, especially in the light of growing concerns about climate change.

In this context, our study analyses and compares the effectiveness of the WDPs against climate vulnerability in one of the most vulnerable hotspots in Kerala, India. For this, we deduced a Climate Vulnerability Index (CVI), which comprises of three vulnerability dimensions, ten major components that describe the dimensions and 59 individual indicators for the assessment of the major components. The primary data used for this study were obtained from household surveys and key informant interviews. We used a bootstrapping method and conducted a sensitivity analysis to test the performance of the CVI among three different communities. First, there are no significant differences in the adaptive capacity between the communities, i.e. the CVIs are similar. However, we found significant differences in sensitivity and exposure dimensions. Secondly, the sensitivity analysis shows that ‘Livelihood Strategies’ and ‘Social Network’ are the most influencing major components of vulnerability in the watersheds. The bootstrapping approach proved to be very helpful in testing for the robustness of our results and is replicable to evaluate the potential effectiveness of various other climate change programmes.

Keywords: Adaptive capacity, bootstrapping, climate vulnerability, sensitivity analysis