

# Interpretation of Climate Change and Agricultural Adaptations by Local Household Farmers: a Case Study at Bin County, Northeast China

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## Abstract

Although climate change impacts and agricultural adaptations have been studied extensively, how smallholder farmers perceive climate change and adapt their agricultural activities is poorly understood. Survey-based data (presents farmers' personal perceptions and adaptations to climate change) associated with external biophysical-socioeconomic data (presents real-world climate change) were used to develop a farmer-centered framework to explore climate change impacts and agricultural adaptations at a local level. A case study at Bin County (1980s-2010s), Northeast China, suggested that increased annual average temperature (0.6°C per decade) and decreased annual precipitation (46 mm per decade, both from meteorological datasets) were correctly perceived by 76 and 66.9%, respectively, of farmers from the survey, and that a longer growing season was confirmed by 70% of them. These reasonably correct perceptions enabled local farmers to make appropriate adaptations to cope with climate change: Longer season alternative varieties were found for maize and rice, which led to a significant yield increase for both crops. The longer season also affected crop choice: More farmers selected maize instead of soybean, as implicated from survey results by a large increase in the maize growing area. Comparing warming-related factors, we found that precipitation and agricultural disasters were the least likely causes for farmers' agricultural decisions. As a result, crop and variety selection, rather than disaster prevention and infrastructure improvement, was the most common ways for farmers to adapt to the notable warming trend in the study region.

**Key words:** perception, adaptation, survey, climate change, agriculture

## INTRODUCTION

Understanding of climate change has evolved over several decades. Given the importance of food security and human sustainability in the changing climate, agriculture

under climate change gained great attention from the scientific community, who mainly investigated it from two angles: climate change impacts and agricultural adaptations (Yu *et al.* 2012a; Wu *et al.* 2014). A survey of the literature revealed numerous research papers that assess climate change impacts on agriculture. They were based on empirical-based panel data analysis (Lo-

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