



Is Indian Agriculture Becoming Resilient to Droughts? Evidence from Rice Production

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Introduction

Extreme climatic events, such as droughts, always pose a significant threat to sustainable development of agriculture; and thereby to the agriculture-based livelihoods. The threat is more pronounced in developing countries like India where agriculture still engages about half of the workforce. A widespread severe drought may cause a significant decline in food production, aggravate food insecurity, exacerbate rural poverty and lead to depletion of productive assets (Pandey et al. 2007).

More than two-third of India's geographical area is prone to droughts; and almost every third year is a drought year (GoI 2009). In the past four decades, India experienced 13 major droughts, of which four occurred between 2000 and 2012. Nonetheless, India's capacity to cope with droughts has also improved due to a paradigm shift in drought management strategy, from crisis management to risk management. The new strategy emphasises prevention and mitigation of climate risks using innovations in water management and technological advances in crop breeding besides a focus on developing infrastructure and institutions for delivery of advisory services, information and inputs (Rathore et al. 2014). This strategy seems to have worked, as is reflected by a small decline (2.5%) in rice production in 2009-10 over its

previous level, despite a rainfall deficit of more than 20%. In this brief, focusing on rice, a water-intensive crop, we provide an evidence that Indian agriculture is becoming resilient to droughts.

Frequency and Severity of Droughts

Often, a drought is defined in terms of rainfall-deficit¹ or alternatively degree of dryness. Scientific evidence, however, suggests that dry and hot weather, rather just the dryness, is more damaging to crops (O'Brien et al. 1996). Therefore, a drought can be conceptualized as an outcome of rainfall being below normal and temperature being above normal. Following Yu and Babcock (2010) we construct a drought index using mean monthly temperature and cumulative rainfall during the *kharif* season (June to September) for the period 1969/70 to 2005/06. This index is the 'product of the standardized deviations of temperature being above normal and the standardized deviations of rainfall being below normal'². The index ranges from zero to eight (Figure 1); zero implying rainfall being above normal and temperature being below normal. Abnormally low values of the index can be considered representative of the normal weather. The index is skewed toward left, indicating most drought events during this period were not severe. The incidence of severe droughts, say of drought index of 3 or more, was rare.

