

Transformational Adaptation in Agriculture under Climate Change: A Case Study in the Dry Zone of Sri Lanka

Lal Mervin Dharmasiri and Mangala Jayarathne

Senior Professor and Carder Chair, Department of Geography, University of Kelaniya, Sri Lanka and Senior Lecturer, Department of Geography, University of Kelaniya, Sri Lanka

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Correspondent email:

mervin@kln.ac.lk

Abstract Transformational adaptation defines as 'changes the fundamental attributes of a system in response to climate and its effects.' Farmers deal with the natural environment and its components such as rainfall, temperature, humidity, and soil condition, which have a high range of variability and uncertainty for their cultivation. The present study focused on the impacts of climate change on the settler community who engage in agriculture as their mainstay and respond to the scenario. Quantitative and qualitative methods have been applied. Twenty samples from a village in the NCP have been selected. Primary outcomes of this study are (a) total awareness of perceptions on climate change; (b) the ambient temperature has been increasing and resulting in more heat stress; (c) frequent and severe occurrence of extreme rainfall anomalies and increasing trend of natural calamities. The area farmers have been adopting several strategies to overcome the negative impacts of climate change, such as transforming from intensification to more intensification that can be identified as Climate Smart Agriculture; crop diversification and adaptation of drought tolerance crops; transforming from agriculture to animal husbandry, and out-migration of unemployed or evicted youth from agriculture to non-agriculture. Institutional involvement is essential to strengthening the adaptative strategies of the people by providing an appropriate crop calendar and suitable crop combination and aware of the way of improving the use of the efficiency of available water for improving the living standard of the people.

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1. Introduction

This study has three terminologies, i.e., Transformation, Agriculture under Climate change, and Climate change adaptation. Climate Change is a long-term shift in the climate of a specific location, region, or planet. The shift is measured by changes in features associated with average weather, such as temperature, rainfall, wind patterns, and precipitation. 'Climate Change' is the biggest emerging environmental challenge to date (Anu Adhikari et al., 2011). 'Transformational climate change adaptation' in agriculture as major, purposeful action undertaken at the farm or supra-farm level in response to potential or actual climate change impacts and opportunities in the context of other drivers (Rickards and Howden, 2012). Moser and Ekstrom (2010) stated that the adaptation involves changes in social-ecological systems in response to actual and expected impacts of climate change in the context of interacting non-climatic changes.

The IUCN defines (2011) 'adjustment' in natural or human systems to a new or changing environment is known as adaptation. Adaptation is a continuous process by which individuals, communities, and countries seek to cope with the consequences of climate change. It is possible to categorize different types of adaptation, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation. Adapting to climate change has been widely discussed in adaptation literature during the last couple of years by

climate change specialists in the World. It has been further distinguished into 'incremental' and 'transformational' adaptation (IPCC, 2001). According to the CASP report, incremental adaptation refers to an action where the central aim is to maintain the essence and integrity of a system or process at a given scale". Transformational adaptation defines as a "changes the fundamental attributes of a system in response to climate and its effects." In general, incrementally adaptation involves using familiar strategies and measures to overcome losses, damage, or increase the production/ yield associated with climate change. Transformational adaptation is predicated on recognizing that existing systems and practices may be unsuitable under emerging capacity and marginal returns from farm activities related to climate change. For example, they are shifting from rice cultivation to cash crop production due to decreasing yield and water scarcity.

It may be an essential change to, or replacement, or alternative of, existing system and practices. The transformational adaptation further can be broadly categorized into five types (See; Maria and Mike, 2018).

- Adaptation actions adopted at a larger scale;
- Shifting and changing agricultural systems;
- Changing business scale, structure, and location;
- Creating new croplands/irrigation; and
- Forced farm abandonment and migration.