

Climate Change Impacts on Developing Countries – Evidence from Sri Lanka

Climate Change, though a hot topic, is often viewed through the lens of catastrophic storms and wild-forest fires only. Kanesh Suresh, Clevo Wilson, Shunsuke Managi and Uttam Khanal instead present research evidence that focuses attention on the equally real issues of food security and poverty resulting from long-term impact of a changing climate, particularly in the developing world. Analysing data collected in a region of Sri Lanka, they highlight policy dimensions that, if ignored, have the potential to lead to largescale poverty and hunger, perhaps driving sizeable populations from their land and destabilising current socio-economic structures.

In recent years climate change has become a major global concern particularly in developing countries where there are profound effects on the agricultural sector. The damage is estimated to be in the [billions of dollars](#). According to the Food and Agriculture Organization (FAO), of the total losses in 2017 with regards to crop and livestock production in developing countries, 37% had been caused by floods and 19% by drought.

Needless to say, the agricultural sector in developing countries is the backbone for development of these countries in terms of self-subsistence, poverty alleviation and employment generation.

Several studies show that climate change continues to have a negative impact on agricultural output by decreasing average crop yields, arising from changes in temperatures and rainfall patterns and due to severity of extreme weather conditions. It is also reflected in the increase of price of agricultural outputs in low-income countries. Hence, rural incomes, investments, and development trajectories have all been impacted (directly and indirectly) from climate change.

Yet there is evidence that agricultural adaptation reduces the negative impacts of global warming on crop yields. Accordingly, farmers in developing countries have adopted various adaptation mechanisms ranging from changing of crops, harvesting time, to planting of crop varieties that are better adapted to severe drought. Furthermore, modern technologies have been used in irrigation, drying of seeds and in other areas of the production process. Nevertheless, the process is far from complete and understanding opportunities and scope of adaptation, particularly for **smallholder farmers**, as well as developing awareness among them about factors of successful adaptation, are still felt crucial.

Key Findings from Our Study in Batticaloa, Sri Lanka

This issue is particularly relevant to Sri Lanka as per data from [Sri Lanka's Department of Census and Statistics](#), over 90% of farmers in the country have less than 2 ha of cultivable land. This fact has important implications for national food security and poverty levels. As the majority of the food requirement of the population is met by smallholder-production, keeping output at adequate levels in this sector is crucial. Equally, the smallholders need the income from their output to remain out of poverty. At the same time, Sri Lanka has been experiencing an increase in extreme weather events, in the form of droughts and floods, in recent decades.

Against this background [our recent research](#) was carried out in the Batticaloa district in the Eastern province of Sri Lanka. Agriculture – in particular the cultivation of rice – and fishing are the mainstay of the economy in this area, providing both food and income to the people. Government action in Sri Lanka has been supportive of agriculturists, however, the success of policy interventions has been hampered by the effects of a changing climate.

In our farm household survey, it was revealed that there is substantial climate variability over the course of the crop cultivation period and farmers have been experiencing continuous unprecedent adverse weather conditions (drought and floods) over the recent decades. **All the respondents had observed an increase in temperatures** which they believed have resulted in a negative impact on their agricultural output. Moreover, the study identified some major challenges such as intensity of drought, shortages of water, pest and crop diseases that are related, directly or indirectly, to climate change.



Growing Plants in Drought Conditions

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As suggested by various studies, majority of farm households (60%) cultivated flood- and drought-tolerant and pest-resistant varieties to better adapt to climate change, but, surprisingly, relatively few farm households were involved in other adaptation. Only 9.6% of farm households grew less water-intensive varieties— a very low percentage compared to other countries such as Bangladesh and Nepal. The most interesting finding was that only 2.9% of farm households were involved in crop-switching to cope with climate change. Thus, these findings conclude that **Sri Lankan farmers have been disinclined to change their traditional cropping patterns to address the effects of climate change.**

Findings also showed that education has a positive and significant impact on adaptation to climate change. That is, households with a higher level of education show positive responses to adaptation practices in climate change. **Thus, education is expected to play a major role in modernising farming practices that are linked to climate change adaptation strategies** such as crop-switching, cultivating water-resistant varieties and changing cultivation periods.

It was also revealed that households with larger number of rice-growing plots intended to adapt to climate change. Growing different varieties was shown to depend on plot size. **Farmers with large size of plots were more willing to grow different varieties of crops and tended to adapt faster than those with smaller plots.**

Increase of disaster occurrences were found to lead to a greater use of adaptation strategies among farmers who were affected by natural disasters than those unaffected. In addition, farm households who were attached to farming organisations were found to positively respond to climate change. Gaining information on climate change proved important. Receiving timely and appropriate information on temperature, rainfall and season for cultivation had a positive impact on climate change adaptation. These measures minimised the negative impacts on productivity.

However, the findings of the study clearly showed that **adaptation to climate change may not have the same effect on the non-adapters if they choose to adapt.** Inputs such as land, labour and seeds played a significant role in increasing rice yields of farm households that adapted to climate change. Labour and off-farm income seemed to significantly affect rice yields.

The most striking result to emerge from the endogenous switching regression-based treatment effects was that **farmers adopting climate adjustment measures had a positive and significant impact on rice yields.** The expected quantity of production per hectare in terms of adopted farm households was about 3,151 kg but only 2,611 kg for those who opted for non-adaptation. Hence, climate change adaptation increased the expected rice yield by 576 kg. Whereas farmers who had not opted for adaptation increased their outputs by only 192 kg. It was interesting to note the effect of adaptation in monetary terms. Those **farmers who adapted received significant financial benefits per annum – (US\$ 39,117) – compared to farmers who did not (US\$ 13,062).**

Policy Implications

This study, therefore, confirmed that **farmers are having to pay an opportunity cost if they do not adopt new practices in responding to climate change.** The findings have significant implications for policymakers given the magnitude of overall production losses due to climate factors and the lack of awareness of smallholder farmers in Sri Lanka and other developing countries.

Successful climate change adaptation depends on a holistic approach and not a single tool approach.

Therefore, this study revealed that along with education, provision of information on climate change and membership of a farming organisation were the major drivers in mitigating the impacts of climate change.

An effective climate change adaptation process depends on a number of factors: effective institutions and governance, innovation, investment in infrastructure and practicing a sustainable livelihood. Adaptation options for agriculture included: technological support, enhancing access to markets for products and profit level of smallholder farmers. **The most common hurdle to successful adaptation in many developing countries is a lack of access to credit for cultivation. Financial institutions have imposed a number of restrictions which have reduced access to credit to farmers, which needs addressing.**

Developing countries with their diversity of economic issues depend critically on agricultural production for food-and job-security, which in turn relies on favourable climate conditions. It is, therefore, vital to pay attention to measures of climate change adaptation if we are to ensure the implementation of the United Nations' Sustainable Development Goals in developing countries.

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