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Evaluating the Effects of Climate Change on Tea and Sustainable Livelihood: A Study of Sri Lankan Tea Plantation Labours

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Abstract:
The tea industry of Sri Lanka serves as the backbone of its economy. It gives the highest share of GDP from agricultural production and employment opportunities to a large section of the Sri Lankan population. Tea is confined to cultivated in an optimal climate where temperature and rainfall must be equal. Climate change is an inevitable phenomenon triggering a consequential threat to tea growth and its quality. Similarly, it possesses severe implications for farmers' livelihoods. Because tea plantation plays an active role in rural poverty alleviation and ensuring the food security of estate workers. It has become mandatory for tea farmers and workers to adapt appropriately to climate change in order to ensure sustenance, livelihood, and food security. This study investigates the livelihood challenges led by climate change faced by the working communities in the tea estates of Sri Lanka. This study found that climate change has a multidimensional impact on livelihood and has a nexus with migration.

Keywords: Climate change, Tea, Sustainable Livelihood, Communities, Sri Lanka

Introduction

Sri Lanka is an island nation in the Indian Ocean that resembles a drop of rain that falls from the southern tip of India into the ocean. It holds a crucial position in South Asia's geopolitics. With a land area of approximately 65,610 square kilometres (Km), the nation is located between latitudes 5°55′ and 9°51′ north for a distance of 244 km and longitudes 79°41′ and 81°53′ east for a distance of 432 km. The tiny island nation's south-central region is home to hills and mountains, while coastal lowlands encircle it. The country's hills and mountains are primarily an agricultural region with a high concentration of perennial crops. The main crop that is widely grown in this area is tea.

People are experiencing the effects of climate change in many different ways across the globe, such as increased temperatures, rising sea levels, floods, droughts, cyclones etc. The Fourth Assessment Report of the IPCC (UN Intergovernmental Panel on Climate Change) states that decades will elapse before global climate change is halted, even with swift mitigation measures in place. It is already having detrimental effects on human welfare, and these effects will continue to worsen.

Tea is the most preferred and consumed beverage in the world. It has medicinal usage. Profitable tea production requires prevailing weather conditions that balance rainfall and temperature optimally. It observed that short-term and long-term climatic variabilities, like excessive rainfall and high temperature,

badly affect the quality and productivity of the tea. Due to the extreme changes in the climatic pattern, tea plantation is affected by the emergence of pests and diseases, reducing the quality of the tea leaves.

Climate change stress factors influence the livelihood options of vulnerable and poorly marginalised farming communities who depends on tea plantation. Livelihood consists 'the capabilities, assets (stores, resources, claims and access) and activities required for means of living' (Victor & Munatswa 2014). The livelihood concept drawn from the developmental aspects to a more coherent policy and practice has established the sustainable livelihood framework. This concept entails integrating and diversifying poverty alleviation by settling household livelihood in the broader developmental ecosystem. In totality, a livelihood perspective places people at the centre "of the analysis, located within, rather than dominated by, ecosystems, technologies, political contexts, markets, and resource networks" (Tanner et al., 2015).

Methodology

In this study, both qualitative and quantitative data were used. The primary data was collected using structured open-ended questionnaire surveys and focus group interviews. The survey conducted with 110 planation labours households in the Nuwara Eliya district of Sri Lanka. Interviews were conducted with key informants such as ministerial officers, estate managers, stakeholders, and local government representatives to learn more about how climate change impacts tea production.

Tea Industry and Sri Lankan Economy

Tea is vital to the economic and social security of Sri Lanka by occupying the largest portion of GDP (Gross Domestic Product) within the agricultural GDP share. Estate tea lands belong to the government, but private companies solely run its management and tea production. Tea exports in Sri Lanka sustain the food security of the country by contributing to meeting the food import bills, for instance in 2011 alone tea export earnings paid 71 per cent of Sri Lanka's food import bills (FAO, 2015). More precisely, tea has brought a global brand name to the country popularly known as "Ceylon Tea" by reaching out to significant consumer economies such as Europe, Eurasia, and West Asian and Latin American countries. However, the tea sector has been stagnant and less productive in the last few years, deliberately weakening its comparative competitiveness and demand in the global market. The primary reasons contributing to the recent decline of Sri Lankan tea are a) high cost of production, b) less labour productivity, c) Orthodox and CTC method, d) uneconomic policies, and finally, e) adverse weather patterns and climate change.

Changes in crop yields brought on by climate change can immediately impact commodities markets and the livelihoods of those who depend on them. Since tea is Sri Lanka's primary export commodity, even a slight decline in quantity and quality will harm the nation's capacity to grow economically. Sri Lanka is trailing behind the world's leading exporters: China, India, and Kenya. The growth production of Sri Lanka was just five per cent, with 0.30 million tonnes from 2009 to 2018. It is well below the other two most prominent producers, India, which showed a 37 per cent increase, and Kenya, which has displayed a 57 per cent increase since 2009. These trends underscore that Sri Lanka is suffering from multiple challenges in production. The tea industry is in a difficult position and deals with several viability issues. The industry has expressed severe worry about the cost of production (COP), which is growing exponentially and of which labour costs make up the most significant portion.

Climate change impacts threaten the sustainability of tea yields and harm tea production in Sri Lanka. Scientific studies project that an increase of 1 °C of average temperature across all elevations would cause a 4.6% reduction in tea production. Intensive rainfall is also detrimental to tea production as it reduces photosynthesis due to increased cloud cover and difficulty in plucking, and it will decrease tea production by around 3.5 % (Gunathilaka et al., 2017). Similarly, numerous scientific studies have predicted the negative impact of climate variabilities and excessive temperature and rainfall due to climate change on tea production that would create a crisis in the national economies of major developing countries, including Sri Lanka. The pernicious effects of reduced production volume would have considerable consequences on the social and welfare systems of the country.

Climate Change and Tea Production

The significant factors plummeting the growth and productivity of tea are changes in rainfall, temperature, and extreme events like drought and high-intensity rainfall. Tea crops and their wide range of production in Sri Lanka heavily depend on moderate rainfall. The onset of heavy rain will result in leaves having more water, which will lower the quality of the leaves. In contrast, the extreme drought due to the lack of southwest monsoon has affected the yield productivity. The southwest monsoon in the Indian subcontinent will further reduce the wet monsoon in the mountain areas, affecting the healthy growth of tea. Drought impacts reduce the quality and quantity of tea and, to a large extent, minimise export earnings. However, despite mild, dry weather, Sri Lanka has proven resilient and commands a high premium. However, persistent drought conditions directly impede high-quality production, and premium prices cannot make up for the losses brought on by decreased productivity during droughts (Gunatilaka et al., 2018b). Also, air saturation deficits, reduced soil water content, radiation, variation in daylight hours and evaporation would primarily affect tea production. Most farmers reported an increased rainfall onset in recent years; the intensity of all spells is exceptionally high, detrimental to the optimal growth of tea yields.

Climate change impact on Tea and Livelihoods

Extreme weather has two effects on the industry: first, it causes a significant crop drop compared to the anticipated outcome, and second, it reduces the guaranteed job days of the plantation workers by two to three days each week. The stipulated available remuneration for plantation workers will automatically be reduced with a reduction in guaranteed job days. Concerning the production and processing of tea, the cost of production, tea export price, and labour wages have varied from region to region in Sri Lanka. Elasticity of labour concerning the four major rainfall seasons of Sri Lanka, such as the southwest monsoon, northeast monsoon, and second inter-monsoon rainfall, will reduce labour demand depending on the size of the estate. A prediction of rainfall by 2050 shows an increase in both monsoons and inter-monsoon periods, which could lead to reduced labour demands and the estimated labour demand reduction will be approximately 1,175,000 person-days per year across the three tea estate regions, which is a 2.6 per cent of reduction (Gunathilaka et al., 2018).

"The absolute reduction in labour demand for 2046–2055 due to the change in north east monsoon rainfall is predicted to be two to three times larger than in 2026–2035 under both climate scenarios. By mid-century, for the mean up-country estate, the aggregate predicted reduction in labour demand across all seasons ranges from 5,268 (Scenario A1B) to 5290 (Scenario A2) person-days per year. The corresponding figures are 3,316 (A2) and 3,336 (A1B) for the mean mid-country estate and 1,152 (A2)–1,289 (A1B) for

the mean low-country estate" (Gunathilaka et al., 2018). It is alarming and a severe livelihood security concern for the tea workers' households.

The estate workers have not considered climate-related factors because they are less aware of them. Nevertheless, they have seen significant and regular variations in rainfall with heavy precipitation on their plantation, and they have ranked this as the most obvious hindrance to labour and tea production (80%). However, increasing temperatures have become a tolerable strain for the tea industry and have a less likely impact on their livelihood (33%). Minor influences include wind, soil erosion, and drought. A future rise in temperature could result in evapotranspiration and a loss of soil moisture, even though the tea has grown steadily despite the slight increase in temperature. It would negatively affect the physiology of tea.

Table 1: Farmers Perception on Long Term Changes of climatic Parameters and its Likely impact on Tea

Indicators	Increased	Decreased	Impact on Tea Growth
High Rainfall	80% (100)	7.8% (10)	Very High (85%)
Rainfall Variability	53% (60)	00	High (66%)
Temperature	26% (32)	6% (9)	Moderate (35%)
Drought	40% (54)	11% (20)	Moderate (26 %)
Soil Erosion	8% (10)	6% (9)	less (17%)

Source: compiled from field data

Plantation Communities and Livelihood

Two million rural people working in Sri Lanka's tea plantations rely primarily on tea plucking for their livelihood. The fixed daily income that casual tea workers receive from the tea estate determines their quality of living and means of subsistence. The tea plantation of Sri Lanka endures a solid cultural identity that shapes the existence of a marginalised ethnic community: the Indian Tamil. The estate workers of Sri Lanka are called Up-Country Tamils or Indian Tamils. These people have concentrated in the central highlands of the tea estates, where ninety per cent of the estates are located (Samarasinghe, 1993). The tea sector has been serving these rural communities' primary livelihood source. The majority of worker actively engaged in tea-plucking are female workers. However, these workers are not considered as farmers by the government. The estate workers are the most extensive poor section of the country's population. Due to their lack of primary education, they have difficulty finding other work in the services industry or other sectors that will allow them to provide for their household needs. From generation to generation, they are passing this same employment irrespective of their plight of living in poverty.

The governments have long ignored the needs of the community of plantation workers who are facing political marginalisation, economic hardships, and social barriers. Conversely, the pay is so low and insufficient that the employees quit independently (Chandrabose, 2019). Their income and social security benefits from working on plantations are insufficient to cover their basic needs. They discovered that picking tea is only marginally appropriate for their needs as a household. Additionally, since they do not own any land and property, they are forced to live in poorly maintained line homes within estates that lack decent roads, hospitals, and schools. Most female workers run their households and are responsible for

their husbands, kids, and other family members. The majority of the workforce is uneducated and belongs to the underclass. The tea workers in the plantation sector lack human capital and financial capital, which could be supporting them in building social capital or horizontal coordination that keeps them from continuing to enjoy themselves.

Eighty per cent of the estate workers said they would only receive the daily minimum wage if they could harvest eighteen kilogrammes (Kg) of tea. They could not pluck leaves in mass; thus, they could hardly generate 18 kg. Even if they could, the management would eliminate any worthless leaves—at least 3 kg—at the final collection stage. They will also work during the heavy rainfall days; however, they cannot produce a reasonable quantity of tea to get their minimum wage. Unlike annual crops, timely harvesting is mandatory for every estate as they cannot suspend the harvesting corresponding to the low market price or erratic weather conditions because suspending harvest on time will likely reduce the quantity of the tea in the subsequent harvesting rounds. However, workers' incomes will be much lower in the rainy days than regular working days, affecting their ability to meet household requirements.

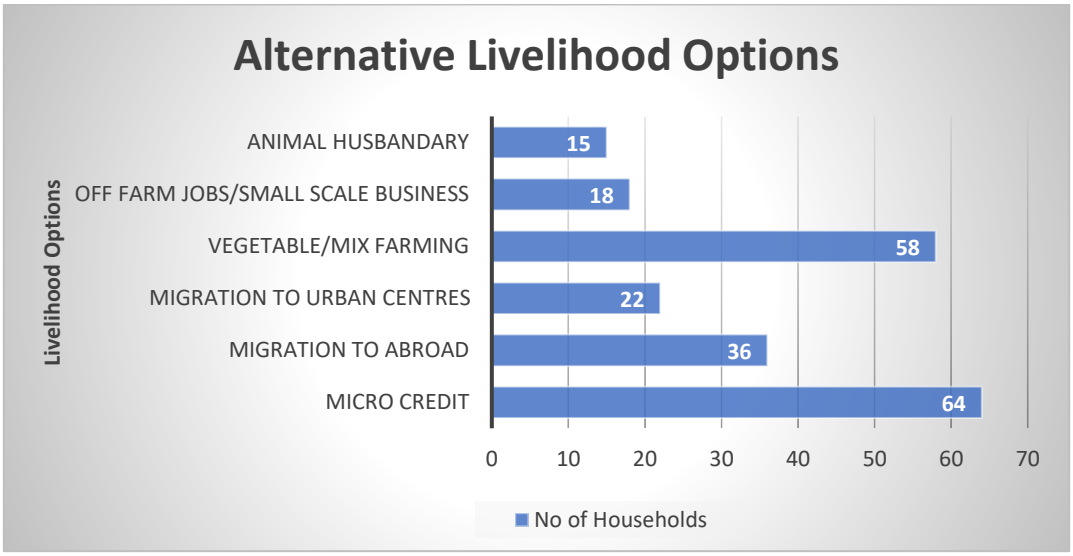
Farmers in the estate are falling into financial crisis once after the reduction of daily income. It compels them to adapt on their own. The common adaptation strategy to the reduced income in the estate households is to lend money from microfinance or cooperatives. The income loss occurs in the nexus with the climate-related stocks to economic shocks. Skipping one-time meals is a typical adaptation mechanism used by rural agricultural households owing to reduced income, climate-related stockpiles, or economic shocks brought on by an increase in the price of imported food supplies. As a result, rural communities are at higher risk of malnutrition and hunger. Women will undergo starvation and malnourishment, which is proportionately high in estate farmers. Figure 01 shows estate communities' adaptation to alternative livelihood choices.

Images 1: A Sri Lankan tea labourer weighs her harvest at the collection site.

Image 2: Labourers practice Mixed Cultivation in the Sri Lankan Tea Plantation as an alternative Livelihood option.

Similarly, farmers in other rural areas are also experiencing a financial crisis accompanied by a decline in agricultural income. For instance, the prolonged drought affected district of Hambantota has reported that 90% of households are affected by severe nutritional implications. In recent days, tea plantation workers have chosen migration, both internal and increasingly external, as a livelihood strategy. Rural-to-urban migration occurs from remote estates to capital cities for household domestic work or garment sector labour. As a result, most female employees choose to work in the urban garments industry. However, they are unable to reap the advantages of and maintain their employment at the garment companies owing to racial, religious, and linguistic hurdles.

Figure 1: Alternative Livelihood Options for Plantation Workers



In the upper and lower tea production areas, smallholder farmers are pessimistic about continuing tea production as a livelihood option despite the higher income contribution from tea farming. The primary reasons for leaving the job are a) input requirement, b) low productivity of the land, and c) weather conditions. In Sri Lanka, weather and elevation are the primary components that determine the critical livelihood capitals of the farmers (Palihakkara et al., 2015).

Conclusion

Tea is a delicate crop that is susceptible to extremes in moisture or dryness. The Sri Lankan tea industry must control seasonal variations in the weather in order to maintain higher yield results every year. The tea industry is an essential component of economies in developing countries, giving estate households a means of decreasing poverty and ensuring food security. The government provides subsidies and fertiliser to smallholder tea growers in Sri Lanka, enabling them to achieve higher yields. It is more beneficial for farm households than estate tea growing residences. Consequently, there are currently more smallholder tea farmers in Sri Lanka. In recent times, Sri Lankan tea's competitiveness in the international market has declined considerably, even with the expansion of its cultivation area. Climate change is turning out to be one of the primary reasons for the fall in premium tea production and the financial hardships faced by estate agricultural communities.

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