The Impact of climate change on Paddy Production in Kuttanad Region Kerala

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***Abstract*— A significant rise in temperature is observed in the rice growing areas. Rainfall during the rice-growing period has increased annually over the years. Significant climate change will lower the rice yield in the future. To mitigate the effects of climate change, it is necessary to adopt climate-resilient crop choices and irrigation practices and technologies.**

***Index Terms:* Climate, Crop, Food security, agriculture, Paddy.**

INTRODUCTION

Climate change and global warming are burning issues, which significantly threaten agriculture and global food security. Changes in climate conditions and the frequency of natural disasters in recent times have made it difficult to find lasting adaptation solutions for the paddy sector. Given that almost 60 % of the country's population depends on this sector for its livelihood and that it contributes approximately 15.7% of India's GDP, this creates a chance of food insecurity. Climate change may cause a drop-in rice production in major growing regions, a decline that could jeopardize critical food supplies.

This is evident from the fact that the net irrigated area of the country is 60.9 million hectares from a total net sown area of 140.3 million hectares. Thus, a large part of the net sown area is rain-fed, thereby making the agriculture sector in India very sensitive to any changes in the pattern of rainfall

Global temperatures rose above pre-industrial levels by + 0.85 °C in the last century, and are predicted to exceed + 2 °C this century (RCP 8.5 scenario; IPCC, 2013).This creates food shortages, nutrient deficiencies in humans due to inadequate intake of healthy food makes humans vulnerable to health issues.

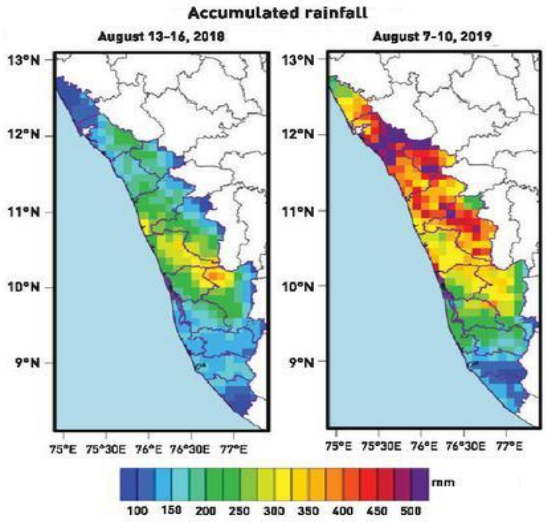
The climate change in Kuttanad is related to the increasing level of CO2 in the air as a bye product of various gas emissions, like SO2, NOX and even Methane from rice fields, apart from CO2 emission from fuel wood. The Kuttanad area is also marked by natural background radiation from the thorium rich coastline, and spilled over the entire wetland system,

The geographical peculiarities of Kuttanad meant the region was already more vulnerable to seasonal floods in the southwest monsoon season but with irregular rainfall, the local population is under the threat of constant flooding.The sowing for the first crop season usually ends by November, but due to rains in October 2021, the process got distended and in turn affected the harvest.

Table 1: The major agronomic zones of present Kuttanad

AgronomicZones of Kuttanad	Area in hectares
Upper Kuttanad	10576
Lower Kuttanad	16280
North Kuttanad	6556
Kayal Lands	9464
Vaikom Kari	7748
Purakkad	4313

The table 1 shows agronomic zones of present Kuttanad.In Upper Kuttanad 10576 hectares.In lower Kuttanad it include 16280 hectares. In North Kuttanad 6556 hectares. The Kayal lands 9464 hectares. Vaikom Kari it includes 7748 hectares. Purakkad area it includes 4313 hectares. The major agronomic zones are divided in to six agronomic zones.



Source: frontline.thehindu.com.

Division wise changes in paddy field wetlands in the Kuttanad delta

Division	1973	2014	Rate of change (%)
Vaikkom Kari	53.1	37.7	-28.9
North Kuttanad	50.2	42.2	-16.0
Kayal	80.6	66.0	-18.1
Upper Kuttanad	77.8	58.4	-24.9
Lower Kuttanad	98.6	59.0	-40.2Pura
Purakkad Kari	39.8	36.2	-9.0
Total	400.2	299.5	-25.2

Table : 2 Paddy Field area (sq.km)

The table-3 indicates that the paddy field area under vaikkom Kari 1973 was 53.1 it decreased to 37.7 in 2014.The rate of change percentage showing that -28.9.The North Kuttanad paddy field area in 1973 was 50.2 it decreased to 42.2. The rate of change percentage showing that -16.The table showing that large percentage change in paddy field area from 1973 to 2014.

Table : 3 Area, Production and productivity of Paddy in three districts covering Kuttanad Region in Kerala

Year	Area (Hectares)			Production (Tonnes)			Productivity (Kg/ha)		
	Pathanamthitta	Alappuzha	Kottayam	Pathanamthitta	Alappuzha	Kottayam	Pathanamthitta	Alappuzha	Kottayam
2015-16	2534	31724	16272	8396	89335	49506	3313	2816	3042
2016-17	2640	32453	17216	8837	102439	48030	3347	3157	2790
2017-18	3087	36325	17426	8843	105676	49509	2865	2909	2841
2018-19	3168.77	38623.02	22172.05	11675.81	128560.20	61917.15	3685	3329	2793

Source: Compiled from various Economic reviews, govt. of Kerala

The table-3 indicates that the area under paddy in the three districts of Kuttanad namely Pathanamthitta, Alappuzha and Kottayam during the year 2015-16 is 2534 ha, 31724 ha and 16272 ha respectively. In the year 2018-19, the three districts of Kuttanad region marked the highest level of area under paddy farming as 3168.77 ha, 38623.02 ha and 22172.05ha respectively. Pathanamthitta, Alappuzha and Kottayam account for 32.30 percent of the total area under paddy cultivation in Kerala, their individual shares being 1.60 percent, 19 percent and 11.20 percent respectively in 2018-19.

CLIMATE ADAPTATION

The government needs to develop early warning systems and adopt an effective crop insurance programme. The UN Sustainable Development Goals that farmers cultivate paddy crops in ways that are resilient against the effects of climate change, adopt organic carbon and manure management facilities, and avail agro-advisories. The crops need to be separated from the water.

The state needs to desilt canals to ensure water drains from fields without leading to water logging. The farmers of Kuttanad have pointed to a shortage of harvesting machines as the reason for the delayed harvest and consequent crop loss. So enough of these machines should be available so farmers can harvest their crops at the scheduled time.

Farmers should have access to good storage facilities, to protect the crops that have been harvested on time. Kerala's Department of Civil Supplies shouldn't delay its procurement of the harvested crop.

These changes are needed if we intend to reduce climate-induced distress in the rice bowl of Kerala.

CONCLUSION

The study, recommends that in the case of crop failure due to weather conditions, policymakers could implement a new pricing policy to mitigate the deterioration of the farmers' income. The government must implement an insurance scheme that compensates farmers for catastrophes induced by rainfall deficiency.

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