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A study on constraints faced by the farmers adapting to climate change in the Krishna River basin of Karnataka

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Abstract
Farmers face numerous constraints due to climate change, which significantly impact agricultural productivity, sustainability, and livelihoods. Unpredictable weather patterns, such as irregular rainfall and extreme temperature fluctuations, disrupt planting and harvesting schedules. In this context, the present study was an attempt to constraints faced by the farmers adapting to climate change in the Krishna River basin of Karnataka. Primary data was gathered from 228 farmers by personal interview technique utilizing very much organized and pre-tested schedule. The primary data was used in evaluating the greatness, perception of climate change and extent of vulnerability for the nineteen districts of Krishna River basin of Karnataka. The Study concluded that a majority of the farmers reported that changes in rainfall had significantly affected crop cultivation. Farmers adapted techniques such as soil conservation, crop diversification, and crop rotation.

Keywords: Climate change, Krishna River basin, rainfall

Introduction

Farmers face numerous constraints due to climate change, which significantly impact agricultural productivity, sustainability, and livelihoods. Unpredictable weather patterns, such as irregular rainfall and extreme temperature fluctuations, disrupt planting and harvesting schedules. Water availability is a major issue, with prolonged droughts and altered water cycles affecting irrigation and livestock. Found that North Telangana's rainfall decreased over the recent 20 years compared to the previous year. September's consistent rainfall declined, while October's increased, aiding timely rabi crop sowing in black cotton soils. The study used 40 years of data (1963-2002) (Reddy *et al.* 2007) [6]. And also, research shows that found that climate change could reduce global maize, wheat, rice, and soybean production by 9 percent n the 2030s and 23 percent in the 2050s, with 1-3 percent higher annual variability. Addressing climate change is essential for maintaining global food security (Haile *et al*. 2017) [2].

Soil health is compromised by increased erosion and degradation, while the changing climate fosters the spread of new pests and diseases, further threatening crop health. These stressors lead to reduced crop yields and quality, affecting market value and food security. Livestock also suffer from heat stress and heightened disease vulnerability. Economic impacts are profound, with farmers facing higher costs for irrigation, pest control, and adaptation measures, coupled with market fluctuations that threaten financial stability. Infrastructure damage from extreme weather events, such as floods and storms, disrupts agricultural operations, while investment risks rise due to climate uncertainty. Social challenges, including forced migration and inadequate policy support, exacerbate the situation. Biodiversity loss, driven by habitat changes and pollinator decline, further undermines agricultural ecosystems. Addressing these constraints requires adopting climate-resilient practices, improving water management, investing in research and development, and implementing supportive policies. The study makes an attempt to study the constraints faced by the farmers adapting to climate change in Krishna River Basin.

Materials and Methods

A multistage sampling technique was used to select the study sample. First, the Krishna River basin in Karnataka was purposively chosen. Thus, the total sample included 228 farmers from the study region. Primary data was gathered from 228 farmers by personal interview technique utilizing very much organized and pre-tested schedule. The primary data was collected during 2022-23 and used in evaluating the greatness, perception of climate change and extent of vulnerability for the nineteen districts of Krishna River basin of Karnataka. Garrett ranking technique was adopted for documenting mitigates ill effects of climate change. As many as nine suggestions were identified and ranked using Garrett Ranking. In the first stage, ranking was given for suggestions to mitigate ill effects of climate change and it was analyzed. In the second stage, the ranks assigned by the individual respondents were converted into percent position value by using the following formula.

Per cent position = $100 (R_{ij} – 0.5) / N_j$

Where,
R_{ij} stands for rank given for the i^{th} factor by the j^{th} individual.
N_j stands for number of factors ranked by j^{th} individual.

In the third stage, for each per cent position, scores were obtained with reference to Garrett Ranking Conversion Table and each per cent position value was converted into scores by referring to Garrett's Table. In the fourth stage, summation of these scores for each factor was worked out for the number of respondents who ranked for each factor. In the fifth stage, mean scores were calculated by dividing the total score by the number of respondents. In the last stage, the overall ranking was obtained by assigning ranks I, II, III, VI, *etc.* in the ascending order of the mean score.

Results and Discussion

Constraints expressed by the respondents

Table 1: Constraints expressed by the respondents (N=228)

Sl. No.	Constraints	Percentage of respondents
1	Poor Transport facility	55.70
2	Poor Supply of Electricity	53.10
3	High Labour wages	62.30
4	Non availability of labor	49.60
5	Difficult to work in the high Temperature	88.60
6	Poor Knowledge of Post harvest technology	49.60
7	Poor Knowledge in adaptation and risk mitigating measures	39.90
8	High costs of Agricultural Inputs	75.00
9	Lack of information about long term climate change	69.30

Table 1. indicates that the majority of the respondents 88.60 percentage were facing constraint of working under high temperature, followed by 75.00 percentage for High cost agricultural inputs, 69.30 percentage for Lack of information, 62.30 Percentage farmers were facing the problem was High Labour wages, 55.70 percentage farmers facing the constraints was poor transport facility, 53.10 percentage farmers were facing problem on Poor Supply of Electricity, 49.60 percentage farmer facing the problem on Non availability of labor, And The least constraint was found to be Poor Knowledge in adaptation and risk mitigating measures with 39.90 percentage.
In this table showed that the Majority of the farmer's 88.60 percentage constraints was Difficult to work in the high temperature. And the only 39 percentage farmers said that poor Knowledge in adaptation and risk mitigating measures.

Suggestions to mitigate ill effects of climate change

Table 2: Suggestions to mitigate ill effects of Climate change (N=228)

Sl. No.	Suggestions	Rank	Average Score
1	Early warning has to be given to the farmers about environmental changes	I	54.01
2	Creating awareness to the farmers about appropriate adaptation measures against climate change	II	53.50
3	Development department should ensure supplying of production inputs at appropriate time in the villages	III	52.10
4	Subsidies / compensation has to be given for the crops to make up the cost of cultivation due to weather aberrations	IV	52.00
5	Green coverage has to be increased	V	51.50
6	Insurance has to be extended to all crops	VI	51.41
7	Support price has to be given to all the crop produce based on cost of cultivation	VII	51.22
8	Providing financial support for soil nutrient enrichment	VIII	50.50
9	Creating awareness /support for adoption of organic farming technologies	IX	50.25

Table 2 opined that the suggestions to mitigate ill effects of Climate change was recorded for the participants. It indicated that the majority of the respondents valuable suggestion towards early warning has to be given to the farmers about environmental changes with an average score of 54.01 percentage, the 53.50 percentage farmers suggestions was followed by creating awareness to the farmers about appropriate adaptation measures against climate change, 52.10 percentage former suggestion was development department should ensure supplying of production inputs at appropriate time in the villages, 52 percentage farmers suggestion was Subsidies / compensation has to be given for the crops to make up the cost of cultivation due to weather aberrations, 51.50 percentage farmers suggestion was green coverage has to be increased, 51.41 farmers suggestion was insurance has to be extended to all crops, 51.22 percentage farmers suggestion was Support price has to be given to all the crop produce based on cost of cultivation, 50.55 percentage farmers suggested that providing financial support for soil nutrient enrichment development department need to ensure supplying of production inputs at appropriate time in the villages, 50.25 percentage farmers suggestion was creating awareness /support for adoption of organic farming technologies.

Conclusion

The research was conducted among farmers who preferred to obtain credit as part of their cropping mechanism. They believe that this provides them with safety during adverse climatic conditions such as famine or floods. Most farmers employed nearly four implements in their fields to increase crop productivity. The distance to the market had a more negative impact on small and marginal farmers compared to larger ones. Farmers did not seek information about farmland extension from the extension officer; instead, they preferred consulting veterinary personnel.

A majority of the farmers reported that changes in rainfall had significantly affected crop cultivation. They also noted that summer temperatures had risen while winters had become cooler. In response to climate variations, farmers adapted techniques such as soil conservation, crop diversification, and crop rotation. Additionally, many farmers chose dairy and poultry as subsidiary activities to mitigate potential losses in cropping. The study suggested that improving information access on climate risk management, access of institutional credit on soil and water conservation practices and capacity building programme strengthens the farmers adaptation strategies under changing climate.

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