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Climate Change Adaptation Constraints among Paddy Growing Farmers in Kalyana-Karnataka Region of Karnataka State

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ABSTRACT

To mitigate and cope with changing climate, adaptation strategies are essential. However, farmers are facing several constraints while adapting to the changing climate. The study was conducted during 2018-19 in three major paddy growing districts of Kalyana-Karnataka region of Karnataka state with 90 respondents. The Rank Based Quotient (RBQ) approach was used to assemble, tabulate, and evaluate the data. The farmers expressed the absence of a location-specific climate forecast and they couldn't able to rely on available climate forecasts. In addition, farmers opined about the non-availability of critical inputs and fair prices for their produce. It suggested the farmers of the study region should be provided with updated and reliable information on climate change as this could help in improving their awareness on changing climate. The improvement of field extension connectivity and timely assistance to the farmers are required for better utilization of resources and adoption of climate-related strategic innovations.

INTRODUCTION

Climate is changing negatively and rapidly as a development issue at global level affecting many areas and as a potential threat to sustainable development. Thus, agriculture and food security has influenced the impact of temperature change and livelihoods of huge sections of the urban and rural populations globally. India being a developing country with diverse agro-climatic regions, challenging geographies, growing economies, diverse agricultural cultivation systems and farm typologies is more prone to the consequence of temperature change because of more dependence on agriculture for livelihood (Ashoka et al., 2022). Adaptation, a complex, multidimensional, and multi–scale process, and defined as adjustments to behaviour or economic structures that reduce vulnerability of society within the face of scarcity or threatening environmental change (Adger et al., 2003). Adaptations is defined as adjustments in human or natural systems with response to real or await climatic stimuli, which moderates harm or exploits beneficial opportunities (IPCC, 2007). It also refers to actions that individual countries and societies go for balance to the change in climate that has occurred.

The impact of changing climate on agriculture might be highlighted at regional level and created vulnerability to food security (Ravikumar et al., 2015 & Sujith et al., 2021). The potential impact is changing cultivation practices, management techniques of the critical inputs and to some extent adjustment of production system itself (Rai et al., 2018 & Shanabhoga et al., 2019). Hence, to sustain the crop productivity several efforts are made by adopting resilient management practices. Extreme events like floods, heat waved etc., will negatively impact on agriculture crops, livestock health and productivity and thereby threatening the food security like never before (Kumar & Shivamurthy, 2021). Increased rainfall intensity in some regions would cause more wearing away resulting in land degradation. Water requirement of

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crops is additionally likely to travel up with projected warming. Extreme events like floods, cyclones, wave and wave are likely to extend (Meena et al., 2022).

The ample of studies (Shanabhoga et al., 2020; Brar et al., 2020; Boda Mahesh Naik et al., 2022 & Vijayabhinandana et al., 2022) advocated the adaptation strategies like modification in cultivation practices like shifting planting dates, water-saving techniques, judicious nutrient management, etc. Meanwhile, we have failed to think of the ground reality that most of the farmers are unfamiliar with climate-resilient production technologies. Constraints hampers the potential to find out, to approach and to handle the risk that decreases the adverse effect related to climatic event and also affects the development and application of adaptation into use. Farmers are facing number of constraints while adapting to the changing climate. With the help of proper planning, suitable strategies and efficient utilization of available resources it is possible to overcome the constraints. Hence, the present study was attempted to document the climate change adaptation constraints among paddy growing farmers in Kalyana-Karnataka region of Karnataka state through a primary survey.

METHODOLOGY

The study was conducted during 2018-19 in three major paddy growing districts of Kalyana-Karnataka region (earlier known as Hyderabad-Karnataka region) of Karnataka state. The cropping pattern of this region varies from district to district. Kharif and Rabi's crops are the 2 seasons during which crops are grown. Summer cultivation is completed only within the small area with assured irrigation. The paddy is cultivated predominantly within the command area of the Tungabhadra project which includes Ballary, Koppal and parts of Raichur districts. Based on the area and productivity of the paddy, Ballari, Koppal and Raichur districts were selected for the sampling process. From each of the chosen districts, one taluk representing the highest area under paddy cultivation viz., Siruguppa taluk from Ballari district, Sindhanur taluk of Raichur district and Gangavathi taluk from Koppal district was selected. A general rule of thumb for the large enough sample condition (Cohen, 1990) (i.e, n $\geq$30, where n is your sample size) thirty farmers from each taluk comprising of total 90 major paddy growing farmers were opted as respondents for the study. A structured questionnaire was developed by consulting the academicians in the local settings. The questions were grouped into constraints faced by farmers in adopting mitigating strategies and suggestions from them to cope with changing climate. The farmers were asked to point their responses to every question as 'More Severe' 'Severe' and "Less Severe". The Rank-Based Quotient (RBQ) approach was used to assemble, tabulate, and evaluate the data that had been obtained. By rating the limitations based on the replies from the respondents and establishing the Rank Based Quotient, the data were quantified (RBQ) (Sabarathanam, 1988). The constraint with the highest RBQ score was considered the most serious one based on the rankings they gave to each constraint. Rank Based Quotient (RBQ) was calculated as follows:

$$RBQ = \frac{\sum_{i=1}^{n} fi(n+1-i) * 100}{N * n}$$

Where fi = frequency of the respondent for the i^{th} rank of the problem

N = total number of the respondent

n = Number of ranks

RESULTS AND DISCUSSION

Constraints faced by the Paddy growing farmers

The perceived constraints expressed by the paddy farmers while following adaptation strategies in response to the climate crisis are presented with RBQ scores and ranks in Table 1. The constraints were classified into six categories. Among technical constraints, paddy farmers expressed the absence of a location-specific climate forecast (I) and they couldn't rely on available climate forecast from KVKs and other mass media due to irregularities in getting the information (II). Further, they also expressed that, traditional forecast methods like some devotional and ritual places provide climatic predictions based on which farmers take-up cultivation practices in the study area are also failing (III). In addition, farmers opined the lack of water management techniques in the study area and lack of knowledge regarding adaptation strategies. This indicates that the weather forecasts for the local area are not a reliable source of information and for this, the development departments should make farmers aware of the available reliable sources for climatic information. Since paddy is a water-intensive crop, technological interventions on scientific water management need to be provided by concerned KVKs and other line departments. The paddy farmers are facing economic constraints like not getting timely credit/loans from the bank and not getting a proper price for their produce. Besides this, the high cost of inputs, no subsidies and timely availability of critical inputs like seeds, fertilizers, pesticides etc were the major challenges faced by the farmers. Despite the difficulty in getting the inputs, the farmers are facing challenges like the non-availability of labour and higher wages rate for labours. The timely availability of credit and critical inputs are essential for the access and adaptation of climate-induced strategies. This affects the farmer's capacity to harness the full potential production in the field. Similar findings can be seen in the studies by Dupdal & Patil (2019) & Pabba et al., (2021). The respondents expressed that, administratively the government had given less or poor attention to climate-related problems and there was no proper extension service given at the field level concerning climate prediction. Some personal constraints are also expressed by the farmers that, they are having cultural influence in their farming and due to this they are unable to give up their traditional cultivation. Further, their lack of awareness of technological advancement in adaptation strategies and inability to access available information were major setbacks in adopting climate-smart agricultural practices.

Suggestions expressed by the paddy growing farmers

The suggestions were asked from paddy growers to overcome the challenges in adopting adaptation strategies for changing climate is depicted in Table 2. Majority of the farmers opined that forecasting of weather needs to be more accurate, reliable and

Table 1. Constraints expressed by paddy farmers in adoption of adaptation strategies

S.No.	Constraints	Mean RBQ Value	Rank
1	Technical Constraints		
a	Absence of location specific climate forecasts	96.52	I
b	Poor reliability of climate forecasts	96.27	II
c	Traditional climate forecast methods failing	94.56	III
e	Absence of water management techniques	92.23	IV
f	Lack of knowledge regarding appropriate adaptations	92.13	V
2	Economic Constraints		
a	Lack of credit/ loan from the bank	86.27	I
b	Low price for the produce in the market	85.36	II
3	Inputs Constraints		
a	Higher cost of the agricultural inputs	96.35	I
b	No subsidies on planting materials	94.24	II
c	Non availability of timely inputs (seeds, pp chemicals, fertilizers etc)	93.15	III
d	Poor supply of uniform electricity	87.25	IV
4	Labour Constraints		
a	Non availability of labours	93.44	I
b	Higher labour wage rate	91.56	II
c	Labours facing difficult to work in the field due to severe temperature	63.56	III
5	Administrative Constraints		
a	Poor government attention to climate problems	88.24	I
b	No proper extension service in climate prediction	86.25	II
c	Absence of government policy on climate crisis	85.26	III
6	Personal Constraints		
a	Cultural influence	86.24	I
b	Inability to give up traditional values	85.63	II
c	Low awareness level	84.25	III
d	Inability to access available information	82.13	IV

Table 2. Suggestions expressed by Paddy growers to mitigate the ill effect of the climate change

S.No.	Suggestions	Mean RBQ Value	Rank
1	Forecasting of weather needs to be more accurate, reliable and timely	86.63	I
2	Necessary and timely support during natural calamities needs to be given by Government.	86.63	I
3	Crop insurance and timely credit facilities need to be given	85.25	II
4	Assurance of timely and subsidized farm inputs	83.61	III
5	Create awareness for farmers on effect of climate change consequences	82.12	IV
6	Field level extension services should be provided to the farmers	80.32	V
7	Timely irrigation has to be ensured by the concerned departments	75.23	VI

timely and necessary support during natural calamities needs to be given by Government. In addition, crop insurance and timely credit facility need to be ensured. As these were the major constraints faced by the farmers, the suggestions were expressed in line with the constraints (Shelar et al., 2021). Assurance of timely and subsidized farm inputs is crucial for better production and productivity by reducing the adverse effect of climate variability in the region. Creating awareness among farmers about the effect of climate change consequences has to go a long way.

CONCLUSION

Farmers are adopting different strategies to cope with changing climate on agriculture. However, during process farmers experience numerous constraints. The major constraints faced by sample farmers in the region were the absence of a location-specific climate forecast and they couldn't able to rely on available climate. Forecasting of weather needs to be more accurate, reliable and timelier and necessary support during natural calamities needs to be given by Government. The farmers of the study region should be provided with updated and reliable information on changing climate as this could help in improving their awareness and adaptive capability to changing climate. The improvement of field extension connectivity and timely assistance to the farmers are required for better utilization of resources and adoption of climate-related strategic innovations. Hence the appropriate strategic policies need to be framed for the timely supply of inputs and stable communication facilities.

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