

Original Research Article

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Farmer's perception towards climate change in Odisha, India

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ABSTRACT

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Climate, climate change, perception, agriculture, Odisha

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The study was conducted in Odisha to study the perception of farmers towards climate change. Primary data was gathered from 160 farmers by personal interview technique utilizing organized pre-tested interview schedule. Most of the respondents perceived that there was change in timing of onset of monsoon (61.25 per cent), there were more dry spells (75.63 per cent), there were changes in rainfall during crop growth (85.00 per cent) and the rainfall received was deficient to carry out agricultural operations (86.38 per cent). About 78.75 per cent of the respondents agreed that summer was getting hotter. But, only 46.88 per cent of them agreed that winter was getting colder over the years. The most commonly followed strategies to adapt the changing climate are cultivating short duration crops (73.12 per cent), practicing crop diversification (68.12 per cent), going for off-farm employment options (58.12 per cent) and practicing intercropping (52.50 per cent). Creating awareness among the farmers about appropriate adaptation measures against climate change, supply of production inputs by the development department at appropriate time in the villages and provision of subsidies/ compensation for the crops to make up the cost of cultivation due to weather aberrations would help the farmers mitigate the ill effects of climate change. The overall perception on changes in precipitation was that the region was getting drier and that there were pronounced changes in the timing of rains and frequency of droughts.

Introduction

Climate is one of the main determinants of agricultural production. Throughout the world there is significant concern about the effects of climate change and its variability on agricultural production. Researchers and administrators are concerned with the potential damages and benefits that may arise in future from climate change impacts on agriculture, since these will affect domestic

and international policies, trading pattern, resource use and food security. The Climate change is any change in climate over time that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere in addition to natural climate variability observed over comparable time periods (IPCC, 2007).

Agriculture production has direct dependence on climate change and weather, is one of the

widely studied sector in the context of climate change. The possible changes in temperature, precipitation and CO₂ concentration are expected to significantly impact on crop growth. The impact of climate change is intensifying day by day. It needs to be addressed through policy perceptions at the earliest to avoid short term effects such as yield and income loss and long term effects such as quitting agricultural profession by the rain fed farmers (Ashalatha *et al.*, 2012). Odisha is one such vulnerable state where 2/3rd of cultivated area is under dry farming, and 32.6 per cent of the people are living below poverty line (Government of Odisha, 2014). And nearly 50 per cent of area is drought prone. Climate change can have serious impact on socio-economic condition of the people especially the farmers.

Assessing the impact of climate change faces a fundamental challenge of complexity. The set of mechanisms through which climate may influence economic outcomes whether positive or negative, are extremely large and difficult to investigate.

For example, a decrease in agricultural output or value added products may be induced by climate change. However, climate change is only one driver among many that will shape agriculture in future decades.

Climate change, as a real threat to agriculture, has not been perceived by majority of farmers due to various socio-cultural impediments in Odisha. A perception analysis was done to elucidate the farmers' perception towards climate change in the state of Odisha.

Materials and Methods

The primary data were collected from the sample farmers using a pre-tested structured interview schedule. Primary data was gathered from 160 farmers by personal interview

technique utilizing very much organized and pre-tested schedule. The primary data was used in evaluating the perception of farmers regarding climate change. The collected data were subject to following tools to arrive at meaningful results.

Tabular presentation

Data collected were presented in tabular form to facilitate easy comparison. The presentation was adopted to compile characteristics of the sample farmer's data. Statistical tools like averages and percentages were used to compare, contrast and interpret the results.

Garrett Ranking Technique

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 mitigates 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.

$$\text{Per cent position} = 100 (R_{ij} - 0.5) / N_j$$

Where,

R_{ij} stands for rank given for the ith factor by the jth individual.

N_j stands for number of factors ranked by jth 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

Perception towards changes in rainfall by sample respondents

The selected sample respondents were interviewed to know about their perception towards changes in rainfall in their locality in the last two decades (1998-2018). Farmers had wide variation in climate perceptions, from which seven specific statements were chosen for the analysis. The results on the perception of sample farmers regarding changes in rainfall are presented in Table 1.

Among 160 sample respondents, only twenty seven (16.88 per cent) agreed that the number of rainy days have increased in the last two decades. Very few respondents perceived an increase in the amount of rainfall (3.13 per cent) and stability in rainfall pattern in the state (6.88 per cent).

Most of the respondents perceived that there was change in timing of onset of monsoon (61.25 per cent), there were more dry spells (75.63 per cent), there were changes in rainfall during crop growth (85.00 per cent) and the rainfall received was deficient to carry out agricultural operations (86.38 per cent).

Perception towards changes in temperature by sample respondents

The results of the analysis on the perception of the sample respondents regarding changes in rainfall in their locality in the last two decades (1998-2018) are presented in Table 2.

Though the respondents had wide range of perceptions about changes in temperature, six changes were most commonly perceived by them. Most of the respondents perceived that there was experience of extreme high temperature (92.50 per cent), increase in temperature (89.38 per cent) and experience of scorching sun (85.63 per cent).

About 78.75 per cent of the respondents agreed that summer was getting hotter. But, only 46.88 per cent of them agreed that winter was getting colder over the years.

Out of 160 respondents, fifty four (33.75 per cent) agreed that they experienced extreme low temperature during last two decades.

Adaptation strategies followed by sample respondents

The sample respondents were asked regarding adaptation strategies followed by them to address the scenario of changing climate in the state.

Many strategies are being followed by the farmers of which, nine were practiced by majority of the respondents; hence, are listed along with their percentage of followers in Table 3.

As revealed by the sample respondents, the most commonly followed strategies to adapt the changing climate are cultivating short duration crops (73.12 per cent), practicing crop diversification (68.12 per cent), going for off-farm employment options (58.12 per cent) and practicing intercropping (52.50 per cent).

Among the other strategies to the rescue of the respondents are the use of drought tolerant varieties, use of flood tolerant varieties, practicing crop rotation, integrated farming system and crop insurance.

Table.1 Farmers' perception towards changes in rainfall

(n=160)

Sl No	Statements	Response from Farmers (n=160)			
		Agree	Percentage	Disagree	percentage
1	No of rainy days (More than 2.5 mm) were more	27	16.88	133	83.13
2	Amount of Rainfall was more	5	3.13	155	96.88
3	There was change in the onset of timing of monsoon	98	61.25	62	38.75
4	More dry spells	121	75.63	39	24.38
5	There was changes in the rainfall during crop growth	136	85.00	24	15.00
6	There was no changes in the rainfall pattern	11	6.88	149	93.13
7	There was deficit rainfall	139	86.88	21	13.13

Table.2 Perception of changes in temperature by the sample respondents

(n=160)

SL No	Statements	Response from Farmers (n=160)			
		Agree	Percentage	Disagree	Percentage
1	There was increase in temperature	143	89.38	17	10.63
2	Experienced extreme high temperature	148	92.50	12	7.50
3	Experienced extreme low temperature	54	33.75	106	66.25
4	Experienced scorching sunshine	137	85.63	23	14.38
5	Summer was getting hotter	126	78.75	34	21.25
6	Winter getting colder	75	46.88	85	53.13

Table.3 Adaptation strategies followed by the sample respondents

(n=160)

SL No	Statements	Response from Farmers			
		Agree	Percentage	Disagree	Percentage
1	Use of drought tolerant varieties	42	26.25	118	73.75
2	Use of flood tolerant varieties	40	25.00	80	75.00
3	Practicing crop diversification	109	68.12	51	31.88
4	Cultivating short duration crops	117	73.12	43	26.88
5	Integrated farming system	37	23.12	123	76.88
6	Practicing crop rotation	39	24.38	121	72.62
7	Crop insurance	28	17.50	132	82.50
8	Off farm employment	93	58.12	67	41.88
9	Practicing inter cropping	84	52.50	76	47.50

Table.4 Suggestions to mitigate ill effects of Climate change

(n=160)

SI No	Suggestions	Rank	Mean Score	Garrett
1	Early warning to be given to the farmers about environmental changes	I	80.63	
2	Creating awareness among the farmers about appropriate adaptation measures against climate change	II	70.88	
3	Assured supply of production inputs by development department at appropriate time in the villages	III	63.88	
4	Subsidies / compensation for the crops to make up the cost of cultivation due to weather aberrations	IV	60.13	
5	Extension of insurance to all crops	V	53.75	
6	Support price for all the crop produce based on cost of cultivation	VI	48.63	
7	Provision of financial support for soil nutrient enrichment	VII	41.25	
8	Awareness creation for adoption of organic farming technologies	VIII	31.88	
9	Increasing green coverage	IX	14.38	

Suggestions for mitigating climate change

The sample respondents were interviewed using personal interview technique and asked to suggest ways to mitigate the ill effects of climate change.

The suggestions of the sample respondents have been ranked by generating Garrett score and the results are depicted in Table 4. The suggestion that has been ranked I, is to provide early warning to the farmers about environmental changes (Garrett score = 80.63).

Creating awareness among the farmers about appropriate adaptation measures against climate change, supply of production inputs by the development department at appropriate time in the villages and provision of subsidies/ compensation for the crops to make up the

cost of cultivation due to weather aberrations have been ranked second, third and fourth with mean Garrett scores of 70.88, 63.88 and 60.13, respectively.

Other suggestions given by the sample respondents include extension of insurance to all crops (Garrett score=53.75), provision of support price to all the crop produce based on cost of cultivation (Garrett score=48.63), financial support for soil nutrient enrichment (Garrett score=41.25), awareness creation for adoption of organic farming technologies (Garrett score=31.88) and increasing green coverage (Garrett score=14.38).

The overall perception on changes in precipitation was that the region was getting drier and that there were pronounced changes in the timing of rains and frequency of droughts. Creating awareness among the

farmers about appropriate adaptation measures against climate change, supply of production inputs by the development department at appropriate time in the villages and provision of subsidies/ compensation for the crops to make up the cost of cultivation due to weather aberrations would help the farmers mitigate the ill effects of climate change.

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