



Research Article

PERCEPTION OF FARMERS REGARDING CLIMATE CHANGE

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Abstract- This study was aimed to assess perception of farmers regarding climate change. The study was conducted in Banaskantha of District of Gujarat State and random sampling procedure was followed in selection of respondents and total sample size was 150. Farmers' perceptions were assessed through a summative rating scale which consisted of five dimensions: scientific understanding of climate change in relation to agriculture, its causes, changes in climatic parameters, effects of climate change on agriculture and adaptation and mitigation to climate change in agriculture. The data collected were analyzed with descriptive statistics (frequencies, per cent, mean score and rank). The results from the study showed that The respondents perceived scientific understanding of major climate change items viz. climate change is really happening (MS 4.13), monsoon is becoming more irregular with long dry spell (MS 3.87) and incidence of heavy rainfall in one day (MS 3.84), further they perceived the important causes of climate change viz. indiscriminate tree cutting (MS 3.96), forced maturity of fruits due to climate change (MS 3.17) and increased use of chemical fertilizers leads global warming (MS 2.80). The respondents perceived the major changes in climatic parameters viz. summer is becoming more hotter (MS 4.15), there are changes in the timing of onset of monsoon (MS 4.09) and seasonal precipitation and distribution of rainfall patterns have drastically changed (MS 3.98). Moreover, the respondents perceived the major effects of climate change viz. reduction in area of cultivable land due to water erosion (MS 3.89), poor quality of product affects the market price (MS 3.65) and more incidence of pest-disease due to climate change (MS 3.64). The respondents perceived the important adaptation and mitigation measures of climate change viz., rain water harvesting of water in monsoon help farmers in the time of scarcity (MS 4.12), weed-control reduces nutrient losses (MS 3.85) and a forestation helps in maintaining ecological balance (MS 3.82).

Keywords- Perception, Climate change, Adaptation, Mitigation.

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Introduction

Food and Nutritional security of the nation is mainly dependent on agriculture sector. India has to ensure food security to her 1.3 billion populations which is 17.5 percent of world's population from its only 2.3 percent of the world's total geographical area. In present era, agriculture sector is affected by various reasons like fragmentation of land, fluctuations in market prices, depleting natural resources, erratic monsoon conditions, climate change etc. During succeeding era, global agriculture production is declining due to these reasons and climate change is one of the important factors. Climate is the primary determinant of agriculture production as it directly affects the crop yield and livestock productivity. Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. The trend of total rainfall in the month of July-August has reduced since 1951, but variability of rain during these months has surged. Flood is more severe and dry spells are more frequent. According to climatologists, an expected 2°C rise in world's average temperatures in the coming decades will make summer monsoon highly unpredictable [1-3].

Agriculture and climate are mutually dependent. There is a need to understand the effects of climate change on agricultural sector both at global and as well as at regional level, especially in context to providing food to vulnerable section of the population. Changing climatic conditions can have the unfavourable effect on our life and our environment. In fact, it is the greatest environmental threat faced by the planet earth. Melting of glaciers and sudden rise in sea level are the critical weather conditions are causing serious problems to human being and other

animal kingdom. It has become common knowledge that the poor are likely to be hit hardest by climate change and the capacity to respond to climate change is the lowest in peoples of developing countries. It seems clear that vulnerability to climate change is closely related to poverty, as the poor are least able to respond to climatic stimuli. Furthermore, certain regions of the world are more severely affected by the effects of climate change than others[4-6].

Generally speaking, vulnerability and adaptation to climate change are urgent issues among many developing countries. For this reason, the exist provisions in United Nations Framework Convention on Climate Change (UNFCCC) to assist those countries that are thought to be most vulnerable and least able to adopt. Within the context of Climate Change Knowledge Network (CKN), a project on the impacts of economic changes and climate change on Indian agricultural sector is being pursued jointly by International Institute for Sustainable Development (IISD), Centre for International Climate and Environmental Research Organization (CICERO), Tata Energy Research Institute (TERI) and recent initiative, National Innovations on Climate Resilient Agriculture (NICRA) by Indian Council of Agricultural Research (ICAR) to enhance the resilience of agriculture covering crops, livestock and fisheries to climatic variability and climate change through development and application of improved production and risk management technologies. Asha *et al.* (2012) stated that 65 to 70 percent of the staple foods are produce from 80 percent rainfed areas of the world. The people living in these areas are poor due to very less and uncertain production of the crops. In India rainfed agriculture is practiced in 66 percent of the total cropped area (162 million

hector) which share 40 percent of the food basket. It is facts that 91 percent of the coarse grain, as 85 percent of the oil seeds, 65 percent of the cotton and 55 percent of the rice are grown in rainfed areas hence, the importance of rainfed agriculture is valuable for us. The annual rainfall received in the areas ranges between 400 mm to 1000 mm which is highly uncertain, erratic and unevenly distributed. As a result of low and erratic rainfall, a significant fall in food production is often noticed. Therefore, the issue of climate change in Indian Agriculture is critical. One should consider the perception of farmers regarding effects of climate change effectively tackle his issue perception regarding climate change will bring resilience of farming community by developing new messages about climate change among the farmers.

Research Methodology

The study was conducted in Banaskantha district. Uneven erratic rainfall coupled with high temperature and high wind velocity due to arid and semi-arid region creates water shortage in soil of Banaskantha district. Hence, it was selected for the study to understand the perception of farmers about effect of climate change in the district. Among 14 talukas of Banaskantha district Vav, Tharad and Suigam

talukas are most affected by varying climatic conditions like lower rainfall and abbrent temperature comparing to other talukas of Banaskantha District. Therefore, these three talukas Vav, Tharad and Suigam were selected purposively. Taluka wise list of villages was obtained from the taluka panchayat office. Five villages from each taluka were selected randomly. A list of the respondents of villages was obtained from concerned Village Level Workers / Talati cum mantri and ten respondents were selected randomly from each village. Hence final sample was constituted with 150 respondents. Ex-post facto research design was adopted for this study. For measurement of selected characteristics, scales developed by past researchers with due modification as well as by developing appropriate schedules/tests were used. The data were collected by personal interview method with the help of structured interview schedule. The collected data were coded, classified, tabulated and analyzed in order to make the findings meaningful in light of objectives for drawing meaningful interpretation [7-11].

Table-1 Perception about scientific understanding of climate change in relation to agriculture

(n=150)

Sr. No.	Aspects	SA	A	UD	DA	SDA	Mean Score	Rank
		F (%)	F (%)	F (%)	F (%)	F (%)		
1	Climate change is really happening	35 (23.35)	101 (67.32)	14 (9.43)	0 (00.00)	0 (00.00)	4.13	I
2	Monsoon is becoming more irregular with long dry spell	24 (16.00)	85 (56.66)	40 (26.65)	1 (00.69)	0 (00.00)	3.87	II
3	Incidence of heavy rainfall in one day	17 (11.30)	99 (66.00)	29 (19.36)	5 (03.34)	0 (00.00)	3.84	III
4	Temperature is increasing due to climate change	15 (10.00)	45 (30.00)	70 (46.67)	12 (08.00)	8 (05.33)	3.31	V
5	Long dry spells reduce available water resources drastically	23 (15.34)	73 (48.67)	49 (32.69)	3 (02.00)	2 (01.30)	3.73	IV
6	Early/Late flowering in fruit crops	3 (02.00)	21 (14.00)	102 (68.00)	22 (14.68)	2 (01.30)	3.00	VI
7	Soil layer has been affected by climate change	2 (01.30)	10 (06.64)	100 (66.70)	35 (23.36)	3 (02.00)	2.80	VII

SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

Results and Discussion

The data presented in [Table-1] revealed that the respondents perceived scientific understanding of climate change in relation to agriculture as order of importance were; climate change is really happening (MS 4.13), followed by monsoon is becoming more irregular with long dry spell (MS 3.87) and incidence of heavy

rainfall in one day (MS 3.84) with first, second and third rank, respectively. Further, long dry spells reduces available water resources drastically (MS 3.73), temperature is increasing due to climate change (MS 3.31), early/late flowering in fruit crops (MS 3.00) and soil layer has been affected by climate change (MS 2.80) were ranked fourth, fifth, sixth and seventh, respectively.

Table-2 Perception about causes of climate change (n=150)

Sr. No.	Aspects	SA	A	UD	DA	SDA	Mean score	Rank
		F (%)	F (%)	F (%)	F (%)	F (%)		
1	Indiscriminate use of chemical fertilizers leads global warming	8 (05.30)	24 (16.00)	62 (41.36)	44 (29.34)	12 (08.00)	2.80	III
2	Gases released from vehicles and industries cause climate change	3 (02.00)	19 (12.65)	76 (50.68)	49 (32.67)	3 (02.00)	2.79	IV
3	Ozone layer depletion causes climate change	0 (00.00)	15 (10.00)	73 (48.67)	55 (36.69)	7 (04.69)	2.64	V
4	Indiscriminate tree cutting causes climate change	28 (18.60)	94 (62.70)	24 (16.00)	4 (02.70)	0 (00.00)	3.96	I
5	Forced maturity of fruits due to climate change	4 (02.70)	34 (22.62)	97 (64.68)	15 (10.00)	0 (00.00)	3.17	II

SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

The results presented in [Table-2] indicated that the respondents perceived the causes of climate change as order of importance were; indiscriminate tree cutting (MS 3.96), forced maturity of fruits due to climate change (MS 3.17) and indiscriminate use of chemical fertilizers leads global warming (MS 2.80) were ranked first second and third, respectively. Further, gases released from vehicles and industries cause climate change (MS 2.79) and ozone layer depletion causes

climate change (MS 2.64) were ranked fourth and fifth, respectively.

Perception about change in climatic parameters

[Table-3] showed that the respondents perceived the changes in climatic parameters as order of importance were; summer is becoming more hotter (MS 4.15), there are changes in the timing of onset of monsoon (MS 4.09) and

seasonal precipitation and distribution of rainfall patterns have drastically changed (MS 3.98) were ranked first, second and third, respectively. Further, there are no changes in the rainfall and temperature (MS 3.69), the nature and intensity of rain

have become more unusual (MS 3.59), winter season is becoming shorter (MS 3.29) and late start of monsoon with heavy rainfall (MS 3.24) were ranked fourth, fifth, sixth and seventh, respectively.

Table-3 Perception about change in climatic parameters (n=150)

Sr. No.	Aspects	SA	A	UD	DA	SDA	Mean score	Rank
		F (%)	F (%)	F (%)	F (%)	F (%)		
1	Seasonal precipitation and distribution of rainfall patterns have drastically changed	28 (16.66)	97 (64.64)	21 (14.00)	4 (02.70)	0 (00.00)	3.98	III
2	The nature and intensity of rain have become more unusual	13 (08.68)	70 (46.68)	62 (41.30)	5 (03.34)	0 (00.00)	3.59	V
3	There are changes in the timing of onset of monsoon	35 (23.31)	96 (64.00)	18 (12.00)	1 (00.69)	0 (00.00)	4.09	II
4	Summer is becoming hotter	36 (24.00)	103 (68.71)	10 (06.60)	1 (00.69)	0 (00.00)	4.15	I
5	Winter season is becoming shorter	9 (06.00)	65 (43.30)	45 (30.00)	24 (16.00)	7 (04.70)	3.29	VI
6	There are no changes in the rainfall and temperature	00 (00.00)	12 (08.00)	47 (31.30)	66 (44.00)	25 (16.70)	3.69	IV
7	Late start of monsoon with heavy rainfall	4 (02.70)	35 (23.30)	105 (70.00)	6 (04.00)	0 (00.00)	3.24	VII

SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

Table-4 Perception about effects of climate change on agriculture (n=150)

Sr. No.	Aspects	SA	A	UD	DA	SDA	Mean score	Rank
		F (%)	F (%)	F (%)	F (%)	F (%)		
1	Sowing time of crops could not be fixed	11 (07.30)	82 (54.70)	36 (24.00)	21 (14.00)	0 (00.00)	3.54	IV
2	It is difficult to decide when to plant and when to harvest	9 (06.00)	63 (42.00)	52 (34.66)	26 (17.34)	0 (00.00)	3.36	VI
3	More incidence of pest-disease due to climate change	3 (02.00)	95 (63.30)	48 (32.00)	4 (02.70)	0 (00.00)	3.64	III
4	Poor quality of product affects the market price	7 (04.67)	88 (58.67)	53 (35.36)	2 (01.30)	0 (00.00)	3.65	II
5	Reduction in area of cultivable land due to water erosion	19 (12.70)	105 (70.00)	22 (14.70)	2 (01.30)	2 (01.30)	3.89	I
6	The introduction of new pest has been increased due to climate change	1 (00.69)	84 (56.00)	55 (36.69)	8 (05.32)	2 (01.30)	3.48	V
7	Shortening of growing season	4 (02.70)	24 (16.00)	101 (71.30)	13 (08.70)	2 (01.30)	3.09	VII

SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

Table-5 Perception about adaptation and mitigation to climate change (n=150)

Sr. No.	Aspect	SA	A	UD	DA	SDA	Mean score	Rank
		F (%)	F (%)	F (%)	F (%)	F (%)		
1	Rain water harvesting in monsoon help farmers in the time of scarcity	35 (23.34)	102 (68.00)	11 (07.36)	1 (01.30)	0 (00.00)	4.12	I
2	Less productive but drought resistant varieties help farmers to cope up with the effects of climate change	9 (06.00)	63 (42.00)	57 (38.00)	20 (13.31)	1 (00.69)	3.39	VI
3	Use of micro irrigation system to reduce water use	17 (11.30)	68 (45.34)	64 (42.67)	1 (00.69)	1 (00.69)	3.66	IV
4	Change in sowing time helps farmers for better adaptation to climate change	16 (10.67)	41 (27.30)	49 (32.70)	44 (29.33)	0 (00.00)	3.18	VII
5	Application of irrigation water in Morning/Evening to prevent evaporation loss	5 (03.30)	35 (23.34)	76 (50.67)	33 (22.00)	1 (00.69)	3.06	VIII
6	Minimum tillage should be followed to reduce the effects of climate change	1 (00.69)	15 (10.00)	80 (53.31)	48 (32.00)	6 (04.00)	2.71	X
7	Growing of cover crops help in minimizing soil erosion	12 (08.00)	68 (45.31)	67 (44.70)	2 (01.30)	1 (00.69)	3.58	V
8	Reduce emission of greenhouse gases to mitigate effects of climate change	1 (00.69)	19 (12.61)	75 (50.00)	51 (34.00)	4 (2.70)	2.73	IX
9	Weed-control reduces nutrient losses	19 (12.70)	93 (62.00)	35 (23.30)	3 (02.00)	0 (00.00)	3.85	II
10	Afforestation helps in maintaining ecological balance	34 (22.70)	93 (62.00)	20 (13.30)	3 (02.00)	0 (00.00)	3.82	III

SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly Disagree

The data presented in [Table-4] showed that the respondents perceived the effects of climate change as order of importance were; reduction in area of cultivable land due to water erosion (MS 3.89), poor quality of product affects the market price (MS 3.65) and more incidence of pest-disease due to climate change (MS 3.64) were ranked first, second and third, respectively. Further, sowing time of crops could not be fixed (MS 3.54), the introduction of new pest has been increased due to climate change (MS 3.48), it is difficult to decide when to plant and when to harvest (MS 3.36) and shortening of growing season (MS 3.09) were ranked fourth, fifth, sixth and seventh, respectively.

The data presented in [Table-5] revealed that the respondents perceived the adaptation and mitigation measures as order of importance were; rain water harvesting in monsoon help farmers in time of scarcity (MS 4.12), weed-control reduces nutrient losses (MS 3.85) and afforestation helps in maintaining ecological balance (MS 3.82) were ranked first, second and third, respectively. Further, use of micro irrigation system reduce water use (MS 3.66), growing of cover crops help in minimizing soil erosion (MS 3.58), less productive but drought resistant varieties help farmers to cope with the effects of climate change (MS 3.39), change in sowing date and time would help farmers for better adaptation to climate change (MS 3.18), application of irrigation water in morning/evening to prevent evaporation loss (MS 3.06), reduce emission of greenhouse gases to mitigate effects of climate change (MS 2.73) and minimum tillage should be followed to reduce the effects of climate change (MS 2.71) were ranked fourth, fifth, sixth, seventh, eighth, ninth and tenth, respectively.

Conclusion and Recommendations

India is likely to suffer with its agriculture, food and water security, human and cattle population due to climate change that has challenged national livelihood security. Based on above discussion the results leads to conclude that the respondents perceived scientific understanding of major climate change items viz. climate change is really happening (MS 4.13), monsoon is becoming more irregular with long dry spell (MS 3.87) and incidence of heavy rainfall in one day (MS 3.84) important causes of climate change viz. indiscriminate tree cutting (MS 3.96), forced maturity of fruits due to climate change (MS 3.17) and increased use of chemical fertilizers leads global warming (MS 2.80) major changes in climatic parameters viz. summer is becoming more hotter (MS 4.15), there are changes in the timing of onset of monsoon (MS 4.09) and seasonal precipitation and distribution of rainfall patterns have drastically changed (MS 3.98). The respondents perceived the major effects of climate change viz. reduction in area of cultivable land due to water erosion (MS 3.89), poor quality of product affects the market price (MS 3.65) and more incidence of pest-disease due to climate change (MS 3.64) important adaptation and mitigation measures of climate change viz., rain water harvesting of water in monsoon help farmers in the time of scarcity (MS 4.12), weed-control reduces nutrient losses (MS 3.85) and afforestation helps in maintaining ecological balance (MS 3.82).

Application of research:

Based on the findings of the study be useful to the subject matter specialists of KVKs, Agricultural Extension Officers of line department should visit the farmer's field and collect on adaptation and mitigation measures taken by farmers and were lacking observed and guide them to solve the field problem of the farmers in accordance with resources availed with farmers to sustain their credibility.

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Abbreviations:

UNFCCC: United Nations Framework Convention on Climate Change

CCKN: Climate Change Knowledge Network

IISD: International Institute for Sustainable Development

CICERO: Centre for International Climate and Environmental Research

Organization

TERI: Tata Energy Research Institute

NICRA: National Innovations on Climate Resilient Agriculture

ICAR: Indian Council of Agricultural Research

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References

- [1] Aggarwal P. K. (2008) *Indian Journal of Agricultural Sciences*, 78(10), 911-919.
- [2] Pathak H., Aggarwal P. K. and Singh S. D. (2012) Climate change impact, adaptation and mitigation in agriculture: methodology for assessment and application, Division of Environmental Sciences. Indian Agricultural Research Institute, New Delhi. pp xix + 302.
- [3] Dhadwad M. B., Vijayragavan K. and Singh P. (2013) *International Journal of Agricultural Science*, 9(2), 653-658.
- [4] Sarkar S. and Padaria R. N. (2015) *Indian Research Journal of Extension Education*, 15(1), 107-111.
- [5] Asha K. V., Munisamy G. and Bhat A. R. S. (2012) *International Journal of Environmental Science and Development*, 3(4), 368-371.
- [6] Ayanwuyi, Kuponiyi E., Ogunlade F. A. and Oyetero J. O. (2010) *Global Journal of Human Social Science*, 10 (7), 33-39.
- [7] Babatolu J. S. and Akinnubi R. T. (2016) *Journal of Petroleum and Environmental Biotechnology*, 7(3), 279.
- [8] Barman S. and Lotha P. (2016) *Indian Research Journal of Extension Education*, 16(3), 53-59.
- [9] Edwards A. L. (1957) *Techniques of attitude scale construction*. New York: Appleton-Century-Crofts, INC.
- [10] Falaki A. A., Akanbge J. A., and Ayinde O. E. (2013) *Journal of Human Ecology*, 43(2), 133-140.
- [11] Faratua B. K., Egbule C. L., Idrisa Y. L. and Agu C. (2011) Farmers perception of climate change and adaptation strategies in Northern Nigeria: An empirical assessment. *Published by the African Technology Policy Studies Network*, ISBN: 978-6699-030-20-7, pp- 1-30.