

## **Perception of farmers about impact of climate change on agriculture in Uttarakhand**

### **Abstract**

The development process is being threatened by climate change, which is also negatively affecting the Indian economy in a number of areas, most notably the agriculture sector. Farmers that are aware of these disruptive variables may be able to lessen the detrimental effects of climate change on agriculture. The aim of present study is to ascertain the perception of farmers about impact of climate change on agriculture in Uttarakhand. The study was carried out in the Almora district of Uttarakhand state. Purposive sampling technique and Random sampling was used to select the study area and samples. Total sample size was 120. Data on perception of farmers about impact of climate change reveals that 63 percent of respondents reported a decrease in overall food production. Results on change in availability of water for irrigation revealed that there was no change as reported by 43.33 percent of respondents in Almora district. Availability of drinking water decreased in Almora (54 %). The frequency of forest fire was reported to be increased as reported by respondents (65 %). When we talk about crop diversity and climate change, it was found that crop diversity decreases as reported by majority of respondents (82%) in Almora showing that crop rotation and other practices were not followed properly. The wild animal attack to the crop was increased in present time and causes serious damage to the crop. To effectively address these difficulties, policy measures and guidelines can be designed with more insight if location-specific farmers' perceptions and adaptive behaviors are understood.

**Keywords:** climate change, perception, crop diversity, crop rotation, adaptive behaviour

## **INTRODUCTION**

A serious threat that is impeding development and harming several areas of the Indian economy, particularly the agricultural sector, is climate change. Farmers may lessen the detrimental effects of climate change on agriculture by being aware of these disruptive elements. Thus, a deeper understanding of the perspectives and adaptation practices of farmers in particular locations might help establish appropriate policy measures and guidelines to effectively handle these difficulties.

The process of taking in information and stimuli from one's environment and turning them into psychological responsiveness is known as perception.

For farmers, the concept of climate change is extremely complicated because it has few bounds, while people's perceptions vary depending on their past and current circumstances. The traits of the individual, their experiences, and the information they are given, and the cultural and geographic setting in which they live all impact and affect perception.

It has long been acknowledged that implementing adaptation measures requires a perception of climatic changes. Farmers are more inclined to support policy actions to address climate change if they recognize its negative implications ( Alam *et al.*, 2017 ).

Farmers' livelihoods, food security, and agriculture are all under risk from climate change. Changes in temperature, rainfall amount, and dispersion are common indicators of climate change. Most farmers believe that summers are getting hotter, which is consistent with rising temperatures. In addition, many farmers believe that snowfall has decreased recently in comparison to a few decades before. A survey carried out in Uttarakhand revealed similar views regarding rising temperatures and falling snowfall (Anonymous, 2011).

Kiran (2018) conducted a study on “long term trends and variations in rainfall under present climatic scenarios at Pantnagar” found an increasing trend of rainfall over the period of time during rainy season but the number of rainy days observed a declining trend for this season.

According to meteorological statistics, the majority of Indian farmers have noticed an increase in temperature as well as irregular and less frequent rainfall. It appears that Indian farmers have implemented a variety of adaptation strategies, the majority of which are systemic and incremental. Farmers are also increasingly adopting transformational adjustments, which include significant changes in agricultural systems, occupational patterns, resource and labor allocations, and land usage. Adoption of adaptation strategies is often influenced by factors such as household income, farm size, gender, resource endowment, and lack of access to necessary credit and knowledge at the appropriate moment.

Since 85% of farmers in India lack financial resiliency, climate change and the sufferings it brings are a big issue ( Singh *et al.*, 2019 ).

Furthermore, it is said that farmers' debt load is made worse by climate stressors, and some of them take their own lives as a result ( Carleton, 2017 ).

## **METHODOLOGY**

The aim of present study is to ascertain the perception of farmers about impact of climate change on agriculture in Uttarakhand. The methods and procedures developed for conducting the study are presented as follow:

### **Universe of the Study**

The present study was conducted in Uttarakhand. Uttarakhand state is organised into two divisions – Kumaon and Garhwal- and 13 districts. viz., Almora, Bageshwar, Nainital, Udham Singh Nagar, Uttarkashi, Deharadun, Rudraprayag, Pithoragarh, Pauri, Tehri, Champawat, Haridwar and Chamoli.

### **Locale of the Study**

Mid hill region of Kumaun division in Uttarakhand was selected for the study.

### **Sampling Procedure**

Almora district was selected purposively for the study. Takula and Dwarahat block were randomly selected from Almora district. Two villages were selected randomly from each of the selected block. Thus, a total of four villages were included in the study sample. Total 120 farm women were selected from four villages, in which thirty farm women were selected from each village.

### **Data Collection Tools and Techniques**

Descriptive data was collected for the selected samples through survey method. Appropriate statistics such as frequency, percentage, etc. were used to analyse the data.

## **RESULTS AND DISCUSSION**

**Table 1 : Perception of farmers about impact of climate change**

**N=120**

<b>Sr. No</b>	<b>Perception of farmers on climate change impact</b>	<b>%</b>
<b>1</b>	<b>Overall food production</b>	
	Increased	25.83
	No change	21.67
	Decreased	52.5
<b>2</b>	<b>Source of food</b>	
	Agricultural	43.33
	Forest	20.83
	Others	35.83
<b>3</b>	<b>Food sufficiency across the year</b>	

<b>Sr. No</b>	<b>Perception of farmers on climate change impact</b>	<b>%</b>
	0-4 month	32.5
	4-8 month	61.67
	8-12 month	5.83
<b>4</b>	<b>Change in availability of water for irrigation</b>	
	Increased	15
	No change	43.33
	Decreased	41.67
<b>5</b>	<b>Water for drinking</b>	
	Increased	13.33
	No change	32.5
	Decreased	54.17
<b>6</b>	<b>Natural source of water</b>	
	Increased	23.33
	No change	42.5
	Decreased	34.17
<b>7</b>	<b>Frequency of forest fire</b>	
	Increased	65
	No change	29.17
	Decreased	5.83
<b>8</b>	<b>Human health</b>	
	Decrease in waterborne diseases	28.33
	No change	42.5
	Increase in waterborne diseases	29.17
<b>9</b>	<b>Community Assets (Primary, Middle school, Panchayat Ghar, Bank, Roads, PHC, Post office and others)</b>	
	No impact	25
	Yes but only up to 4 asset categories affected	13.33
	Yes- 5 and above number of asset categories affected	61.67
<b>10</b>	<b>Crop Diversity</b>	
	Decreased	81.67
	No change	13.33
	Increased	5
<b>11</b>	<b>Livestock Diversity</b>	
	Decreased	69.17
	No change	12.5

<b>Sr. No</b>	<b>Perception of farmers on climate change impact</b>	<b>%</b>
	Increased	18.33
<b>12</b>	<b>Social conflicts (water related)</b>	
	Increased	41.67
	No change	50.83
	Decreased	7.5
<b>13</b>	<b>Wild life attack</b>	
	Increased	89.17
	No change	10
	Decreased	0.83

Data on perception of farmers about impact of climate change reveals that nearly 52 percent of respondents reported a decrease in overall food production. Food sufficiency across the year was for 8-12 months as reported by only 6 percent of respondents.

Results on change in availability of water for irrigation revealed that there was no change as reported by 43.33 percent of respondents in Almora district. Availability of drinking water decreased in Almora (54 %). The frequency of forest fire was reported to be increased as reported by respondents (65 %).

As far as the incidence of water borne diseases and human health concern, results showed that there was no change in the outbreak of disease as reported by nearly 42 percent respondents whereas about 29 percent of the respondent of the Almora reported an increase in incidences of water borne diseases.

When we talk about crop diversity and climate change, it was found that crop diversity decreases as reported by majority of respondents (82%) in Almora showing that crop rotation and other practices were not followed properly. A decrease in livestock diversity was also observed. Results also indicated that there were no change in social conflicts related to water (50 %). The wild animal attack to the crop was increased in present time and causes serious damage to the crop.

## **CONCLUSION**

Climate change is endangering the process of growth and has a severe impact on the Indian economy in many areas, particularly the agricultural sector. The negative impacts of climate change on agriculture might be mitigated by farmers who are aware of these disruptive factors.

According to data on farmers' perceptions on the effects of climate change, 63 percent of those surveyed said that overall food production had decreased. According to 43.33 percent of respondents in the Almora district, there has been no change in the availability of water for irrigation. Almora's drinking water availability dropped to 54%. Sixty-five percent of respondents said that the frequency of forest fires has increased. The majority of respondents (82%) in Almora reported a reduction in crop diversity when discussing climate change, indicating improper implementation of crop rotation and other activities. The wild animal attack to the crop was increased in present time and causes serious damage to the crop. To effectively address these difficulties, policy measures and guidelines can be designed with more insight if location-specific farmers' perceptions and adaptive behaviors are understood.

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