Awareness and Perception of the Hilly Tribes on the Issues of Climate Change

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ABSTRACT

The present study focuses on the awareness and perception of tribal farmers towards climatic issues and their contributing factors. The study was conducted in The Nilgiris district. Totally 60 tribal farmers were selected from two identified villages from Panthalur taluk considering the maximum area under tribal population. Ex-post facto research design was used. There were totally 5 major issues documented under this study. For each issue, possible contributing factors were identified and ranked by employing Garrett ranking method. The results shows that majority of the respondents were very much aware about the erratic variations in rainfall distribution, temperature and snowfall distribution. More than half of the respondents have strong perception that deforestation causes erratic variations in rainfall distribution and normal snowfall pattern is getting disturbed due to erratic variation in temperature and rainfall in the region. A considerable portion of the respondents were very much undecided about the extreme condition of relative humidity and unpleasant wind velocity which may be due to their lack of awareness. Extension functionaries should take necessary steps to sensitize local tribal farmers on these issues along with appropriate management strategies.

Introduction

The climate change at global level has attracted attention from all the fields and it is threatening to have far reaching impacts on our human society (Brar *et al.*, 2020). Global development debates have persistently paying attention on the climate issues and its undesirable brunt on lives of human and their livelihood (Raghuvanshi, 2020). Climate change is one of the most important challenges affecting the performance of agriculture and the livelihood of farmers (Dupdal *et al.*, 2021). Throughout the world, there is considerable concern about the effects of climate change and its variability on agricultural production (Arunachalam and Sasmitha, 2020). The impact of climate change is severe in tropical areas, which mainly consists of developing nations like India (Rao *et al.*, 2010). India's agriculture being dependent mostly on rainfall, its potential consequence on the economic security and livelihood security of rural people will be incapacitated and very severe (Raghuvanshi, 2020).

In India, tribal regions are mostly affected due to climatic changes and the communities are already experienced these changes in the form of irregular rainfall, variation in snowfall, decreasing moisture

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content and increasing temperature. Though climate change is affecting the farmers all over the world, tribal farmers are the most affected and vulnerable. This is because their entire life is dependent on natural resources. Tribal community that lives in the forestare more close to nature, are badly affected with today's changing environment and it has become clear that many of the causes of climate change are anthropogenic in nature (Rai *et al.,* 2018).

Erratic and unpredictable changes in climate are threatening the peoples' life of tribal regions. Nilgiri is one such region being affected by climatic issues for a longer period of time. The climate variability and future projections for the shola forest of the Nilgiris using statistical data shows that rainfall pattern was likely to reduce during southwest monsoon and increase towards northeast monsoon and the extreme rainfall events could further result in higher flooding and the overall temperature expected to increase more in 2050 and 2070 due to manmade pressures (Fathima *et al.,* 2019).

In order to assess the vulnerability of climate change, we need to analyze the awareness and perception of the tribal farmers on climatic issues and the factors responsible for those changes. Keeping this mind the present study was carried out with the following objectives

- Documentation of climatic issues and to assess the respondents' awareness level
- Exploring the factors responsible for each and every documented issue and studying the respondents' perception level

Materials and Methods

Locale of Research and Sample Selection

The study was conducted in The Nilgiri district of Tamil Nadu, India. Among the six taluks, Panthalur was purposefully selected considering the maximum tribal population and two villages viz., Erumad and Munnanad were selected considering maximum tribal household. Finally 30 tribal farmers per village were selected randomly. Thus the sample size was fixed as 60 tribal farmers.

Research Design

Ex-post facto research design was used in this study to suit the objectives and type of information needed.

Documentation of the Issues and Contributing Factors

By having elaborate discussions and interactive meetings with different stakeholders, environmentalists, social workers and local residents, climatic issues affecting the hilly tribal ecosystem were documented. There were totally 5 major issues documented under this study. For each and every documented issue, possible contributing factors were identified by reviewing relevant literature and also by having elaborate discussion with environmentalists, social scientists and officials of the local environment based NGOs. Finally, these identified issues were ranked by thirty judges / scientists having vast expertise in environmental research and natural resource management. The results were analyzed using Garrett ranking method with the following formula and meaningful interpretations were made.

$$\text{Per cent position} = \frac{100*(\text{Rij} - 0.50)}{\text{Nj}}$$

Where,
Rij = Rank given for i[th] item in j[th] individual
Nj= Number of items ranked in j[th] individual

Operationalization of Variables

Awareness about environmental issues was operationalized as the extent to which the respondents were familiar with prevailing environmental issues. For the present study, the awareness level of the respondents was studied on documented environmental issues. There were two response categories as 'Aware' with the score of '2' and 'Not aware' with the score of '1'. Perception on the environmental issues has been operationalized as the respondents' opinion on the actual causatives or the factors responsible for the documented environmental issues. The responses of the respondents on the selected perception statements were analyzed in terms of 'strongly agree', 'agree', 'disagree' and 'undecided' with the score of '4', '3', '2' and '1' respectively. The scoring procedure developed by Arunachalam (2004) has been used in this study.

Instrument for data collection

The data were collected using well structured and pretested interview schedule. Percentage analysis was done to get meaningful item-wise interpretation of the results.

Results and Discussion

Climatic Issues and the Contributing Factors

Five climate related environmental issues were identified and issue wise contributing factors are ranked and presented in Table 1.

Erratic variation in rainfall distribution

From Table 1, it could be understood deforestation was ranked first among the seven expressed factors for the erratic variation in rainfall with the average Garrett score of 192.07. The respondents also opined that the change in wind movement (rank 2), changes in cropping pattern (rank 3), excessive use of synthetic fertilizers (rank 4) and loss of natural vegetation (rank 5) were the most other important basic causes for the erratic variation in rainfall.

Undesirable variation in temperature

There were 10 different causes identified for the

Table 1. Climatic issues and the contributing factors

S. No.	Climatic Issues and the Contributing Factors	Average Garrett Score	Rank
1.	Erratic variation in rainfall distribution		
	1. Deforestation	192.07	1
	2. Loss of natural vegetation	157.67	5
	3. Increasing greenhouse gas emissions	151.43	6
	4. Land use changes	107.77	7
	5. Excessive use of synthetic fertilizers	165.17	4
	6. Changes in cropping pattern (replacement of endemics with exotics)	179.17	3
	7. Changes in wind movement	179.20	2
2.	Undesirable variation in temperature		
	1. Carbon release from farmland by inappropriate farming and grazing	199.57	5
	2. Decreasing amount of vegetation	187.80	8
	3. Emission from factories	208.10	4
	4. Carbon dioxide emission	249.47	1
	5. Shift in vegetation patterns	116.40	9
	6. Fast urbanisation	208.10	4
	7. Inappropriate burning practices	191.10	6
	8. Deforestation	249.43	2
	9. Excess utilization of fertilizers containing nitrogen	188.40	7
	10. Loss of vegetation cover	230.50	3
3	Undesirable relative humidity		
	1. Mismanagement of natural resources	162.30	1
	2. Land use changes	148.97	6
	3. Erratic distribution of local rainfall	158.67	3
	4. Rise in local temperature	160.17	2
	5. Air pollutants	155.83	4
	6. Stubble burning	155.80	5
4	Undesirable wind speed / velocity		
	1. Erratic changes in atmospheric temperature	100.67	4
	2. Increased felling of trees	116.17	3
	3. Destruction of natural fences	129.33	1
	4. Deforestation	129.33	2
	5. Loss of vegetative cover	87.50	5
5	Undesirable variation in snowfall distribution		
	1. Decrease in forest cover (deforestation)	133.33	1
	2. Erratic changes in local atmospheric temperature	111.67	3
	3. Increased pollution	126.33	2
	4. Traffic based pollutants	107.67	4
	5. Loss of vegetative cover	90.67	5

undesirable variation in temperature. Among them, the carbon dioxide emission and deforestation stood first and second in their expressed order with the average Garrett score of 249.47 and 249.43 respectively. The respondents also expressed the loss of vegetative cover (rank 3), fast urbanization and emission from the factories (rank 4) as the other major causes behind the undesirable variation in temperature.

Undesirable relative humidity

For the issues related to the undesirable relative humidity, most of the respondents expressed the mismanagement of natural resources as the prime cause (rank 1 with average Garrett score of 162.30). Rise in local temperature, erratic distribution of local rainfall, more air pollutants, stubble burning and other undesirable land use changes were also the causes expressed by the respondents in subsequent rank orders.

Undesirable wind speed / velocity

Destruction of natural fences and deforestation stood first causing undesirable wind speed / velocity with the average Garrett score of 129.33. The other causes such as increased felling of trees, erratic changes in atmospheric temperature and loss of vegetative cover were also expressed in the subsequent rank orders.

Undesirable variation in snowfall distribution

For undesirable variation in snowfall distribution, deforestation (average Garrett score 133.33) stood first as expressed by the respondents. Increased pollution, erratic changes in local atmospheric temperature, traffic based pollution and loss of vegetative cover were also mentioned as the causes for this basic issue in the order of importance.

Awareness of the respondents on the present climatic issues

Five climate based major issues were identified viz., erratic variation in rainfall, undesirable variation in temperature, undesirable relative humidity, undesirable wind speed / velocity and extreme variations in snowfall. The respondents' awareness was studied and the results are presented in the Table 2.

It is obvious from the Table 2 that all the respondents (100.00 %) were aware of the fact that the study area is witnessing erratic variations in rainfall

Table 2. Distribution of the respondents according to their awareness on climatic issues

(n=60)

S. No	Climatic issues	Aware		Not aware	
		Number	Percentage	Number	Percentage
1.	Erratic variation in rainfall distribution	60	100.00	-	-
2.	Undesirable variation in temperature	60	100.00	-	-
3.	Undesirable relative humidity	37	61.67	23	38.33
4.	Undesirable Wind speed/velocity	45	75.00	15	25.00
5.	Snowfall variation	51	85.00	09	15.00

Table 3. Distribution of the respondents based on their perception on the climatic issues

(n=60)

S. No	Climatic issues	Strongly agree		Agree		Disagree		Undecided	
		N	%	N	%	N	%	N	%
1.	The erratic variation in rainfall distribution is due to deforestation	120	56.10	94	43.90	-	-	-	-
2.	The area witness extreme conditions of temperature due to deforestation and more carbon emission	98	45.80	115	53.70	1	00.50	-	-
3.	The extreme conditions of relative humidity is caused by deforestation and destruction of natural vegetation	52	24.30	70	32.70	16	7.50	76	31.50
4.	The present unpleasant wind velocity is caused by the destruction of natural fences and deforestation.	103	48.13	50	23.36	2	00.93	59	27.57
5.	Erratic variations in temperature and rainfall distribution disturbs the normal snowfall pattern of the region	108	50.47	64	29.91	16	07.48	26	12.14

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distribution and alarming temperature variations. Most of the respondents (85.00 %) were aware that there is undesirable variation in snowfall distribution and three fourth of respondents (75.00 %) had awareness about the fact that the wind velocity is erratic in the study area. It is also observed that little more than three fifth of the respondents (61.67%) were aware of the undesirable variations of relative humidity in the study area.

From the above findings, it could be comprehended that the major portion of the respondents were very much aware about the erratic variations in rainfall distribution, temperature and snowfall distribution. A considerable percentage of the respondents were not aware about the prevalence of undesirable rainfall and erratic variations in wind velocity / speed.

The variations in the rainfall favour the outbreak of certain pest and diseases which are to be identified and proper control measures to be taken. Similarly, the higher levels of wind velocity facilitate higher transpiration rate and early wilting of the crops and plants. Hence, the consequence of undesirable relative humidity and wind velocity will promote higher yield reduction. Extension functionaries should take necessary steps to sensitize local tribal farmers on these issues along with appropriate management strategies.

Perception of the Respondents on the Prevailing Climatic Issues

Results pertinent to the perception of the respondents are given in Table 3. There were five statements on which the respondents' perception on the prevailing climatic issues was studied.

Majority of the respondents (56.10 %) strongly agreed that the erratic variations in rainfall distribution are due to deforestation and rest of the respondents agreed for it. Slightly more than half of the respondents (50.50 %) were of the strong perception that the erratic variation in the temperature and rainfall distribution disturbs the normal snowfall pattern of the region whereas, about thirty percentage of the respondents have just agreed with this statement.

A little more than half of the respondents (53.70 %) who have agreed the fact that the present condition of extreme temperature is due to deforestation and more carbon emission. Here 45.90 % of the respondents have strongly agreed this fact.

The fact that 'the extreme condition of relative humidity is caused due to deforestation and destruction of local natural vegetation' was agreed by about one-third of the respondents (32.70 %) whereas about one-fourth of the respondents (22.30 %) have strongly agreed with this. Only a meagre percentage of the respondents (07.50 %) have given their disagreement on this. Further, it is seen that 35.50 % of the respondents were undecided about this fact and this may be due to the lack of awareness about the basic cause of this issue.

Nearly half of the respondents (48.10 %) have strongly agreed to the fact that the present unpleasant wind velocity is caused due to destruction of natural fences and here 23.40 % have agreed for this statement. There were about thirty percentage of the respondents (27.57 %) who were very much undecided about this fact which may be due to their lack of awareness on the basic issue.

Conclusion

From the study, it could be concluded that deforestation, carbon dioxide emission, mismanagement of natural resources, destruction of natural fences and reduction in forest cover were major reasons for the identified climatic issues in the study area. While studying the awareness of the respondents, major portion of them were very much aware about the erratic variations in rainfall distribution, temperature and snowfall distribution. But a considerable percentage of the respondents were not aware about the prevalence of undesirable rainfall and erratic variations in wind velocity/speed. More than half of the respondents were of strong perception on the issues of erratic variations in rainfall distribution, snowfall pattern. A considerable portion of the respondents were undecided about the reason for extreme condition of relative humidity and unpleasant wind velocity which may be due to lack of awareness. Extension functionaries should take necessary steps to sensitize local tribal farmers on these issues along with appropriate management strategies.

Acknowledgement

References

Arunachalam, R. and Sasmitha, R. 2020. Awareness and Perception on the Issues Arising out of Undesirable Pattern of Rainfall of the Rice Farmers. *Indian Journal of Extension Education.* 56(2): 16–20. Retrieved from https://epubs.icar.org.in/index.php/ijee/article/view/107301

Arunachalam, R. and Nethaji Seetharaman, 2004. Sustainable Agriculture: Indigenous Practices for Natural Resource Management. Jodhpur: Agrobio (India).

Bharat, Chapke, R.R. and Kammar, S. 2021. Farmers' Perception about Climate Change and Response Strategies. *Indian Journal of Extension Education.* 58(1): 7–11. https://doi.org/10.48165/IJEE.2022.58102

Brar, H.S., Sharma, A. and Gill, J.S. 2020. Adaptation Strategies being followed by Paddy Growers towards Climate Change in Punjab State. *Indian Journal of Extension Education.* 56(3): 107–110. Retrieved from https://epubs.icar.org.in/index.php/ijee/article/view/106996

Dupdal, R., Patil, B. and Naik, B.S. 2021. Perceptions and Adaptation Strategies to Changing Climate: Evidence from Farmers of Northern Dry Zone of Karnataka. *Indian Journal of Extension Education.* 57(3): 60–64. Retrieved from https://epubs.icar.org.in/index.php/ijee/article/view/112500

Fathima, Tabassum Ishrath, R.K. Somashekar and J. Mohammed Ahmed, 2019. Projecting Climate Variability in the Purview of Future Climate Projections for Shola Forest of Nilgiris, Westernghat in South India. *International Journal of Advanced Research.* 7 (1): 876-883. doi: 10.21474/IJAR01/8396

Raghuvashi, R. and Ansari, M.A. 2020. Farmers' Vulnerability to Climate Change: A Study in North Himalayan Region of Uttarakhand, India. *Indian Journal of Extension Education.* 56 (4): 1–8. Retrieved from https://epubs.icar.org.in/index.php/ijee/article/view/108399

Rai, C.K., Singh, K. and Bhakat, M. 2018. Approach to quantify tribal dairy farmer's awareness towards climate change: A study of Himachal Pradesh. *Research Journal of Agricultural Sciences.* 9 : 130-135.

Rao, A.V.M.S., Chowdary, P.S.B., Manikandan, N., Rao, G.G.S.N., Rao, V.U.M. and Ramakrishna, Y.S. 2010. Temperature trends in different regions of India. *Journal of Agrometeorology.* 12(2): 187–190.