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Dr. N Narmatha

Professor and Head,
Department of Veterinary and
Animal Husbandry Extension
Education, Veterinary College
and Research Institute,
Namakkal, Tamil Nadu, India

Dr. V Uma

Professor and Head,
Department of Veterinary and
Animal Husbandry Extension
Education, Veterinary College
and Research Institute,
Udumalpet, Tamil Nadu, India

Factors influencing attitude and adaptation of the livestock farmers towards climate change in Namakkal district of Tamil Nadu

N Narmatha and V Uma

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Abstract

Climate change is one of the most serious threats for sustainable agriculture and livestock development, with adverse impacts expected on the environment, human health, food security, economic activity, natural resource management, and physical infrastructure. The aim of the study is to identify the factors influencing attitude and adaptation of the livestock farmers towards climate change. The study was carried out in the Namakkal district of Tamil Nadu and the data was collected through structured interview schedule, collected data was analysed using ordinal logistic regression model. The results revealed that status of indigenous flora, source of irrigation and risk orientation were the major factors and educational status and status of exotic flora were also noticeably influencing the attitude of farmers. Improved education, risk orientation and trainings would influenced the adaptation of farmers on climate change. Livestock farmers in irrigated areas show more positive attitudes and stronger adaptation compared to those in rainfed regions. Further, factors influencing livestock farmers' attitudes and adaptation measures to climate change would help to develop location-specific strategies that support sustainable livestock farming.

Keywords: Climate change, Livestock farmers, Factors influencing attitude and adaptation, Tamil Nadu

Introduction

Climate change is an emerging major dilemma being faced by the people in all over the world. India is one among the most vulnerable countries (Pandit *et al.* 2014) ^[10] with a geographic disadvantage as it is already in the warmer part of the world. The pace and extent of warming across India is wide spread and undisputed. Tamil Nadu is one of the water starved states in India. It experiences widespread, consecutive droughts (over two or three years) every two decades and in every second year there could be a drought in some part of the state. Climate change is further expected to decrease the number of rainy days and increase the temperature, leading to severe drought which will have more intense impacts on agriculture and allied sector (United Nations Development Programme, 2013) ^[12]. Agriculture is the major livelihood for 800 million people globally and the effect of climate change is multifaceted. Livestock is an asset of poor and it is highly vulnerable to climatic variability and extreme events (Calvosa *et al.* 2009) ^[1] and about 12% of the world population depends solely on livestock for their livelihood (FAO, 2006) and about 20.5 million people depend upon livestock for their livelihood in India (GOI, 2019). The adaptive capacity is ability of the system to adjust to climate variability and extremes and to cope with the consequences. Climate change is very complex issue and most of the people have difficulties in understanding the concept. Most of the farmers do not have clear cut understanding on causes and consequences of climate change. Effective adaptation is possible only when the farmers have knowledge and understanding on climate change. Adaptations can either be planned or autonomous, the autonomous being done without awareness of climate change predictions but based on experience and prevailing conditions. Adaptation is also influenced by socio-economical, cultural, geographical and institutional factors. Hence, this research was taken with the objectives to understand the factors influencing the attitude and adaptation of

Corresponding Author:

Dr. N Narmatha

Professor and Head,
Department of Veterinary and
Animal Husbandry Extension
Education, Veterinary College
and Research Institute,
Namakkal, Tamil Nadu, India

livestock farmers towards climate change in Namakkal district of Tamil Nadu.

Methodology

The study was carried out in Namakkal district of Tamil Nadu state which is located in 11.23°N latitude and 78.17°E longitude in the west centre of Tamil Nadu. It is a semi-arid region and hence agriculture normally depends on seasonal and monsoon characteristics of rainfall. The major soil types found in this district is black soil, brown soil, alluvial soil and mixed soil. The major crop found in this district is Groundnut, Paddy, Cotton, Cumbu, Tapioca, Ragi, Pulses and Millets. The Namakkal district has 1,70,508 cattle, 27,315 buffaloes, 2,98,029 goat, 36987 sheep and 7 crore poultry population as per 20th livestock census.

An ex-post facto research design was employed for this study. Four blocks each from irrigated and rainfed areas with highest livestock intensity were selected from Namakkal district. Village panchayats in each selected block were classified into high and low categories based on standard livestock units. Four village panchayats from each block were selected based on standard livestock units. From each village panchayat, 10 livestock farmers were randomly selected, thus 320 livestock farmers constituted the respondents for the study. The data were collected by personal interview method using pre-tested structured interview schedule to understand the factors influencing the attitude and adaptation of livestock farmers towards climate change in Namakkal district.

Results and Discussion

Factors influencing the attitude of livestock farmers towards climate change in irrigated and rain fed area

In irrigated area, the status of indigenous flora was significant at 1 per cent level; source of irrigation and risk orientation were significant at 5 per cent level; education status and status of exotic flora were significant at 10 per cent level (Table1). It

could be interpreted that when there is loss of indigenous flora; change in source of irrigation; increase in risk orientation, educational status and occurrence of exotic flora, the attitude towards climate change becomes unfavourable by 1.00 time, 1.00 time, 1.00 time, 1.13 times and 1.17 times respectively. The finding is in concurrence with the finding of Varadan and Kumar (2014) [13]. The indigenous flora which are present in the local area for decade together are lost due to climate change and the effects are noticed visibly by the respondents and this might be the reason for high significant difference. The respondents maintain livestock at their own risk during drought by altering the source of irrigation. Improved educational status would help to understand the importance of mitigation effects of climate change and occurrence of new invasive plant varieties that affects grazing land and agriculture. Furthermore, 54.10 per cent of variance in dependent variable was contributed by selected independent variables.

In rainfed area, status of exotic flora was significant at 1 per cent level; educational status and trainings attended were significant at 5 per cent level; risk orientation was significant at 10 per cent level (Table 1). It could be interpreted that when there is increase in: exotic flora, number of training, educational status and risk orientation improves, the attitude towards climate change becomes unfavourable by 1.00 time, 1.01 times, 1.01 times and 1.14 times respectively. The result is in concurrence with findings of Nhemachena and Hassan (2007) [8] and Varadan and Kumar (2014) [13]. Invasion of climate insensitive exotic plants like *Parthenium* sp. and *Prosopis juliflora* occupies the land more during drought in rainfed area and it affects agricultural production even when the drought is revived. Improved education, risk orientation and trainings of the respondents influenced the awareness on climate change. Also, 28.10 per cent of variance in dependent variable was contributed by the selected independent variables.

Table 1: Factors influencing the attitude of livestock farmers towards climate change in irrigated and rain fed area

Variables		Irrigated area				Rain fed area			
		B	SE	Sig	Exp (B)	B	SE	Sig	Exp (B)
Threshold	Attitude =1	10.468	3.600	0.004	5.743	3.668	4.035	0.363	1.79
	Attitude =2	13.836	3.701	0.000	0.010	5.743	4.047	0.156	1.29
Location	Age	0.028	0.033	0.401	0.112	0.010	0.029	0.740	3.29
	Gender	0.693	0.533	0.193	-0.728	0.112	0.422	0.790	3.57
	Marital status	0.196	0.800	0.806	0.701	-0.728	1.572	0.643	2.81
	Community	0.395	0.298	0.185	1.273	0.701	0.577	0.224	1.43
	Educational status	0.262	0.148	0.076	-0.141	1.273	0.562	0.024	1.04*
	Family type	-0.275	0.372	0.459	0.056	-0.141	0.373	0.705	3.11
	Occupation	0.308	0.285	0.280	-0.360	0.056	0.277	0.840	3.86
	Land holding	0.154	0.258	0.550	-0.078	-0.360	0.237	0.129	1.23
	Sources of irrigation	-0.501	0.188	0.008	0.009	-0.078	0.193	0.684	3.01
	Experience in livestock farming	-0.034	0.036	0.344	0.033	0.009	0.035	0.801	3.63
	Livestock possession	0.182	0.073	0.013	0.084	0.033	0.054	0.540	2.38
	Risk orientation	0.135	0.051	0.009	0.000	0.084	0.049	0.084	1.14 [#]
	Annual income	0.000	0.000	0.282	-0.146	0.000	0.000	0.345	1.74
	Organisational participation	0.078	0.249	0.754	-0.158	-0.146	0.343	0.670	2.94
	Labour involved	0.195	0.356	0.584	-0.055	-0.158	0.488	0.745	3.32
	Shift in enterprise	0.132	0.120	0.271	-0.383	-0.055	0.092	0.553	2.44
	Status of indigenous flora	1.535	0.477	0.001	1.417	-0.383	0.481	0.427	1.99
	Status of exotic flora	0.751	0.449	0.095	0.857	1.417	0.417	0.001	1.00**
	Trainings attended	0.027	0.405	0.948	-1.231	0.857	0.400	0.032	1.05*
	Awareness on climate change	0.868	1.150	0.450	3.668	-1.231	0.983	0.211	1.40
Nagelkerke R Square		0.541				0.281			

** - Significant at 1 per cent level * - Significant at 5 per cent level[#] - Significant at 10 per cent level

Factors influencing the adaptation of livestock farmers towards climate change in irrigated and rain fed area

In irrigated area, the independent variables such as occupational status and in sources of irrigation were significant at 1 per cent level; land holding and experience in livestock farming were significant at 10 per cent level (Table 2). It could be interpreted that the adaptation to mitigate the climate change in irrigated area becomes high by 1.00 time, 1.00 time, 1.12 times and by 1.09 times when the occupational status of respondents improves, shift in source of

irrigation, increase in land holding and increase in experience. The result is in concurrence with the findings of Okezie *et al.* (2011) [9], Sahu and Mishra (2013) [11] and Varadan and Kumar (2014) [13]. Most of the farmers are having agriculture and livestock as an occupation and water is a key component to sustain these enterprises and this might be the reasons for high significant contribution. Experienced farmers have better knowledge on climate change and adaptation measures to cope with the changes in climatic

Table 2: Factors influencing the adaptation of livestock farmers towards climate change in irrigated and rain fed area

Variable		Irrigated area				Rainfed area			
		B	SE	Sig	Exp (B)	B	SE	Sig	Exp (B)
Threshold	Adaptation =1	3.754	3.448	0.276	1.56	-3.003	4.360	0.491	2.20
	Adaptation =2	8.171	3.534	0.021	1.03	1.788	4.356	0.681	2.99
Location	Age	-0.019	0.035	0.578	2.54	0.019	0.034	0.574	2.52
	Gender	-0.438	0.542	0.419	1.96	0.006	0.503	0.990	4.92
	Marital status	0.077	0.808	0.924	4.42	-3.353	1.688	0.047	1.08
	Community	-0.418	0.299	0.161	1.30	1.812	0.611	0.139	1.25
	Educational status	0.130	0.149	0.383	1.85	0.971	0.657	0.003	1.00*
	Family type	0.369	0.382	0.333	1.71	-0.239	0.444	0.590	2.58
	Occupational status	0.952	0.322	0.003	1.00**	-0.509	0.337	0.093	1.23 [#]
	Land holding	0.484	0.268	0.071	1.12 [#]	-0.198	0.277	0.475	2.15
	Sources of irrigation	-1.085	0.214	0.000	1.00**	-0.122	0.218	0.576	2.53
	Experience in livestock farming	0.074	0.038	0.051	1.09 [#]	-0.003	0.042	0.945	4.58
	Livestock possession	-0.038	0.070	0.591	2.59	0.055	0.061	0.360	1.78
	Risk orientation	0.067	0.052	0.202	1.38	0.078	0.058	0.182	1.34
	Annual income	0.000	0.000	0.542	2.39	0.000	0.000	0.446	2.05
	Organisational participation	0.142	0.254	0.576	2.53	-0.146	0.415	0.726	3.22
	Labour involved	0.125	0.331	0.706	3.12	0.573	0.596	0.337	1.72
	Shift in enterprise	0.023	0.118	0.846	3.90	0.060	0.109	0.581	2.55
	Status of indigenous flora	0.505	0.451	0.263	1.53	-0.849	0.544	0.119	1.21
	Status of exotic flora	0.009	0.465	0.984	4.87	1.635	0.512	0.001	1.00**
	Trainings attended	0.155	0.389	0.691	3.04	-0.685	0.492	0.164	1.30
	Awareness on climate change	-1.075	1.140	0.346	1.75	0.585	1.294	0.651	2.85
Nagelkerke R Square		0.472				0.239			

** - Significant at 1 per cent level * - Significant at 5 per cent level # - Significant at 10 per cent level

conditions. Farmers with more farming experience were more likely to notice the changes in climatic conditions (Maddison, 2006) [6]. Also, 47.20 per cent of variance in dependent variable was contributed by independent variables.

In rainfed area, the independent variables such as status of exotic flora was significant at 1 per cent level; educational status was significant at 5 per cent level and occupational status was significant at 10 per cent level. It could be interpreted that in rainfed area, the adaptation of practices to mitigate climate change becomes high by 1.00 time, 1.25 times and 1.23 times when the occurrence of exotic flora increases, educational status increases and occupation improves. Deterioration of soil quality, water scarcity and increase in temperature would favour the occurrence of exotic plants. Adaptability is the key tool to improve sustainability of livestock production system under the pressure of climate and weather factors (Nardone *et al.* 2010) [7] and the capacity to adapt for the climate change is unequal across and within societies and different systems have different sensitivities (Gautier *et al.* 2016) [3]. Thus, strenuous efforts in providing better educational efforts in their occupation would have motivated them to adapt the practices to mitigate the effects of climate change. In this, selected independent variables had contributed 23.90 per cent of variance in dependent variable (Table 2).

Livestock farmers in irrigated areas show more positive attitudes and stronger adaptation compared to those in rainfed

regions. This difference is likely due to better resource access, reliable irrigation facilities, and greater livelihood stability, which encourage proactive climate-resilient behaviour. Conversely, rainfed farmers experience higher production uncertainties and fewer support mechanisms, limiting their ability to adapt effectively

Conclusion

Adaptation has the potential to reduce the negative impact due to changes in climatic conditions as well as other changes in socio-economic conditions. A better understanding of climatic change in the local areas is essential to develop appropriate adaptation measures that can mitigate the adverse impact of climate change. Thus, the adaptation measures practiced at farm level are very much crucial. Further, the results of this study would help to identify the factors influencing the attitude and adaptation measures followed by the livestock farmers to combat climate change which would be helpful in designing suitable location specific adaptation policies for sustainable livestock farming.

Conflict of Interest

Not available

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Not available

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