Transhumance Farmers' Perceptions of Climate Change in the Mediterranean Region, Turkey

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Abstract

The perception of climate change (i), observations on climate change (ii) and climate change adaptation strategies (iii) of 37 transhumance farmers were questioned. The study was carried out in Silifke, Aydıncık, Erdemli district of Mersin province in the Mediterranean Region, Turkey. The data analysis was done both using qualitative and quantitative methods. Likert-type scale was used to measure perception on climate changes and adaptation strategies. Majority of farmers have heard of climate change (71%). Almost all farmers observed both the frequency and severity of extreme climatic events such as drought (58%), heat and unreliable rainfall (86%), reflecting actual trends in rainfall and temperature in the study area and farmers focused mainly on selling livestock (100%) (mostly to cope with degraded natural grassland/feed deficiency) as an adaptive strategy. There is a massive gap on the adaptative strategies action plan in the regional administration. In light of the aforementioned findings and shortfalls, it is suggested that early warning policy systems be developed with the goal of making transhumance farmers aware of future climate variability and potential shocks so that they can take proactive steps to employ various approaches that best suit different agro-climatic conditions.

Keywords

Transhumance, climate change, Mediterranean, Turkey

1. Introduction

The frequency and severity of climate and weather extremes is increasing. These extremes range from unprecedented forest fires and heatwaves right above the Arctic Circle to devastating droughts in the Mediterranean region. Desertification, biodiversity loss, and land and ecological degradation are examples of slow-onset occurrences. So, climate change, which has wide-ranging effects, puts pressure on ecosystems. Climate change both affects and is affected by agriculture. Transhumance is one of the most vulnerable activities in livestock production systems, as it is the one that is most affected by climate change. Drought, water scarcity, and a decline in biodiversity as a result of rising temperatures force transhumance farmers to seek plateau/pasture, shift migration routes, reduce agricultural product yields, exacerbate existing socioeconomic disparities, and jeopardize cultural heritage. As a result, developing and implementing climate change adaptation plans and regulations is critical in order to forecast the effects of climate change and limit or prevent them. Scientific research on climate change that incorporate observations, data, information, forecasts, indicators, and evaluations are required. To benefit from the development of sectoral climate change strategies and action plans, transhumance farmers' perceptions of climate change (I) observations on climate change (ii), and climate change adaptation methods (iii) were questioned in this study.

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Many studies in the worldwide literature examine people's perceptions of climate change and the need of adaptation, disclose the consequences of climate change on them and how sensitive they are, and raise questions about transhumance farmers' viability in the context of climate change (Ayanda et al., 2013; Aryal et al., 2013; McGuirk and Nunn, 2014; Aryal et al., 2014a; Aryal et al., 2016; Aryal et al., 2014b; Lopez-Saez et al., 2016; Rayamajhi and Manandhar, 2020). Farmers' perceptions of climate change, as well as their contribution to and impact on it, were the topic of national studies in different production systems yet no tranhumance systems was considered (Çakmak and Gökalp, 2011; Başoglu and Telatar, 2013; Polat and Dellal, 2016a; Polat and Dellal, 2016b; Bayraç and Dogan, 2016; Akyüz and Atış, 2016; Akyüz, 2019). The study will also contribute to the literature in this regard.

2. Material and Methods

The study was carried out in Silifke, Aydıncık, Erdemli district of Mersin province in the Mediterranean Region, Turkey (Figure 1). Data collection was carried out in 2020 summer season. Complete count sampling method was used to select the respondents for transhumance farmers' face to face questionnaire-survey. Direct observation was done in potential site of Silifke and Aydıncık rural municipality to acquire in-depth information on biophysical changes, challenges, and local adaptation measures for the seasonal movement cycle. The data analysis was done both using qualitative and quantitative method. Likert-type scale was used to measure perception on climate changes and adaptation strategies.

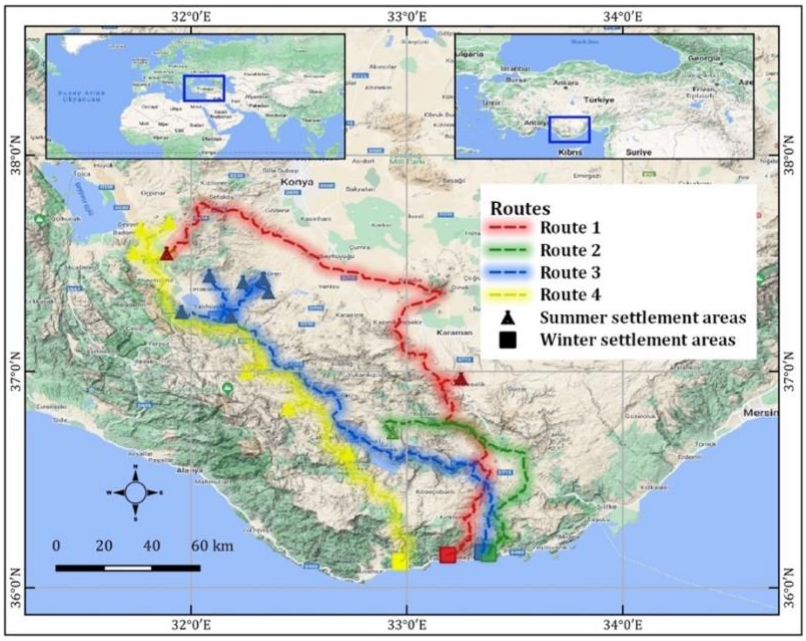

Figure 1: Location map of the study area

3. Results and Discussion

The average age of farmers was 60 (10.46), their education level was primary (4.89) school and 30% of the farmers were illiterate. 29% of the farmers made decisions alone, 57% with their families, and 14% with the influence of the social environment. Average household size was 8 (4.62). 29% of the farmers children were working for in other jobs besides transhumance. The average herd size of the farmers consisted of 318 (93.84) head/goats. Approximately 29% of the farmers were engaged in crop production besides goat farming. The average pasture areas where they grazed were 66 (15.05) da/household.

Most of transhumance farmers (71 %) did hear and were aware of climate change over the last 20 years. And 29 % of transhumance farmers were using smart phone and radio as primary information source for weather forecast.

The transhumance system, which relies entirely on natural resources, is more affected by the impacts of climate change. Most of the farmers acknowledged that there is a severe rise in temperature and extreme weather events. All farmers perceived an increase in temperature and a decrease in rainfall. Transhumance farmers perceived droughts (58%), a decrease in water resources (72%). Also, farmers perceived a decrease in biodiversity. 57% of farmers perceived decrease in the number of predator attracts and 71% of them perceived decrease in the number of bees and insects population. The rate of farmers who observed and did not observe the decrease in natural rangeland/grassland was equal. Despite these alterations, the migration path, duration, and time have remained same (Table 1). (Table 1). Although the farmers did not perceive the incidence of natural disasters as the effect of climate change, great fire disasters occurred in the Mediterranean region very soon after the data were collected.

Table 1

Perceived impact of climate change by farmers*

	Frequency (%)					Mean
	1	2	3	4	5	
Decrease in productivity	14	57	14	15	-	2,29
Increase in labor cost	29	57	14	-	-	1,86
Change in rainfall	-	-	-	29	71	4,71
Change in temperature	-	-	-	43	57	4,57
Change in water resources	-	-	29	29	43	4,14
Drought	-	-	43	29	29	2,86
Change in the number of predator	-	29	14	43	14	3,43
Change in the number of bees and insects	-	-	29	57	14	3,86
Incidence of natural disasters	29	57	14	-	-	1,86
Change of migration route	86	-	14	-	-	1,29
Change in migration time and duration	14	57	14	14	-	2,29
Increase in use of drugs and chemicals	-	-	57	29	14	3,57
Increase in water consumption	14	72	-	14	-	2,14
Difficulties in paying loans	57	29	14	-	-	1,57
Decrease in natural rangeland/grassland	-	14	72	14	-	3,00

*not agree at all: 1, not agree: 2, undecided: 3, agree: 4, fully agree: 5

All farmers noted that there has been a decrease in annual rainfall. Also, they noted that there has been an increase in amount of rainfall in summer and a decrease in amount of rainfall in winter. Many farmers reported changes in duration of drought, hot days and cold days (Table 1). Knowing that most of the farmers observing the impacts of climate change, we explored those perceived risks to their production system varies a lot.

Table 2
Observations on climate change impacts*

	Frequency (%)			
	1	2	3	4
Amount of rainfall/annual	-	-	100	-
Amount of rainfall/winter	-	43	57	-
Amount of rainfall/summer	100	-	-	-
Duration of drought	100	-	-	-
Flooding	-	43	29	29
Temperature/winter	-	29	71	-
Temperature/summer	86	-	14	-
Duration of hot days	86	-	14	-
Duration of cold days	57	43	-	-
Wind speed/drought season	14	43	43	-
Wind speed/rainy season	14	57	28	-
Number of new diseases in goats	-	71	-	29

*increased: 1, no change: 2, decreased: 3, undecided: 4

We asked the farmers who stated that they had observed changes in the climate in the last 20 years, to indicate the adjustments they made in their farming activities (Table 3). Adaptation strategies of transhumance farmers mostly involved changes in feed operation practices and selling livestock. Most had adjusted their management of farming resources to climate change with biophysical and farm operational adaptation measures, they optimized feed storage (47%), added supplement to their ratio (46%), stored water (29%) and sell livestock (100%).

The research findings are in line with the studies of Rayamajhi and Manandhar in northern Nepal (2020) and Aryal et al., (2016) in the Himalayas. In both studies, transhumance farmers perceived change in railfall, temprerature, water resources, drought, incidence of natural disasters. And the farmers reported change in amount of annual rainfall, winter rainfall, muson rainfall, duration of drought, winter temperature and summer temperature.

Table 3
Adaptation strategies of farmers

	Yes (%)	No (%)
Change in feed/ratio	-	100
Supplement use	46	54
Improved water storage	29	61
Better feed storage	47	53
Diverse feed use	100	-
Sell livestock	100	-
Rainwater harvesting	-	100
Considering crop feed production	42	58

4. Conclusions

This study highlighted the transhumance farmers' perceptions of climate change and which adaptation strategies they are considering. Almost all farmers observed both the frequency and severity of extreme climatic events such as drought, heat and unreliable rainfall, reflecting actual trends in

rainfall and temperature in the study area. Although most transhumant farmers (who are active observers of changes in climate and ecosystem) recognized the risks associated with climate change, they were not diligent to consider adaptation strategies other than selling livestock to sustain their farming which further contributes to their low adaptive capacity. While selling livestock seems a quick return subsidy, the risk of decreased livestock production and food security is disregarded. The major issue with this inattentive approach is the risk of sustainability of the transhumance production system in the future.

Regional adaptation actions could be established as first step by identifying water and pasture availability for future migration routes. The decision-making process of politicians will be supported by using remote sensing, smart weather stations, artificial intelligence and high-performance computing technologies in water and rangeland management. Against forest fires that directly affect transhumance farmers, climate change adaptation should be integrated into biodiversity friendly afforestation and reforestation guidelines and future forest strategy. Data measuring disaster losses as a result of climate change are insufficient.

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