*J. Agr. Sci. Tech. (2022) Vol. 24(4): 811-823*

# Farmers' Perceptions of Climate Change Risk: Comparing the Accuracy of Farmers' Perceptions with Meteorological Data in Kermanshah Township

S. Ghobadi Aliabadi[1], H. Agahi[1]*, and H. Farhadian[2]

## ABSTRACT

**Farmers' perceptions of climate change risk is critically important if they plan to implement appropriate adaptation measures in their farming. This research was conducted to evaluate the accuracy of farmers' perceptions of climate variability and assess the factors influencing it. To evaluate the accuracy of farmers' perceptions, this study also explored the pattern and trend of climate variability in the study area, using historical meteorological data analysis. Research sample included 217 farmers of Kermanshah Township, who were selected using multistage sampling technique. The accuracy of the farmers' perceived patterns of local climatic changes was appraised based on graphical analyses of meteorological records during 1970 to 2018. Then, the accuracy of farmers' perceptions were categorized. Findings showed that the perceptions of 58.06% of farmers were consistent with the meteorological data, and there was a need to improve the accuracy of farmers' perceptions of climate variability. Sharing specific local weather information with the community would be one possible way of solving this issue. Also, this study investigated the factors influencing farmers' perceptions of climate change risk. The results showed that knowledge, personal emotions, social norms, and personal experience collectively accounted for 49.3% of the farmers' perceptions of climate change risk variance.**

**Keywords: C**limate variability, Kermanshah Township, Risk Perception.

## INTRODUCTION

Climate change poses a serious threat to livelihood security and enhances risk in climate sensitive sectors such as agriculture and forestry. Due to the increased frequency and intensity of extreme weather events and climate variability, declining crop yields and associated economic losses create vulnerability within the farming community. To reduce climate vulnerability and adapt to the changing climate of the world, awareness and understanding of current climate trends is one of the indispensable capacities of an agricultural farming community (Mahmoodi‐Momtaz *et al*., 2020; Van Eck *et al*., 2020; Van der Linden *et al*., 2019). This is because, if farmers do not believe that climate change is occurring and/or do not perceive it to be a threat to their livelihoods, they will not likely act to adopt to or mitigate climate change effects (Jamshidi *et al*., 2018).

With the changing climate conditions, farmers have to adjust their farming activities through adaptation strategies to those changes. Faced with climate change, adaptation and mitigation strategies are vital in agriculture. Adaptation strategies are difficult to implement, however, without an

[1] Department of Agricultural Extension and Education, Faculty of Agriculture and Natural Resources, Razi University, Kermanshah, Islamic Republic of Iran.
[2] Department of Agricultural Extension and Education, Faculty of Agriculture, Tarbiat Modares University, Tehran, Islamic Republic of Iran.
* Corresponding author; e-mail: hosseinagahi_raziuniversity@yahoo.com

accurate perception of climate change (Azizi-Khalkheili, and Zamani 2014; Bagheri and Shabanali Fami, 2016). Theoretically, a higher perception of climate change enhances the use of proper adaptation strategies, and builds more adaptive capacity (Spence *et al*., 2012). However, the ways that individuals perceive climate change are highly personal, place-based, and influenced by several factors (Van der Linden, 2015).

Raising public awareness of the real threat posed by climate change has been a common pledge in climate change response policies (United Nations Environment Programme, 2006). The policy strategies for climate change communication, however, face two interrelated challenges: uncertainty and scepticism (Whitmarsh, 2011). Unlike other natural hazards, the slow and gradual nature of climate change makes it difficult to be discerned from the natural variability of local climate (Hulme *et al*., 1999). The uncertainty in the climate change discourse is not only recognized in the scientific community, but also across various segments of the general public who perceive climate risk in different ways (Weber, 2010). Despite the inherent uncertainty, perception of climate risk among the general public is confounded by other characteristics of climate risk that downplay its urgency such as lack of immediacy, remoteness of impact, time lags, and threats to personal values and self-interest (Moser and Dilling, 2007; Pahl *et al*., 2015). In some cases, tendencies by policymakers to downplay the uncertainty (in order to justify their actions) and overlook the differences in public opinions have resulted in policy inertia, passive resistance, and even active opposition from those concerned with new regulations (Poortinga *et al*., 2011; United Nations Environment Programme, 2006; Whitmarsh, 2011).

Thus, while climate change is a complex global hazard that poses significant challenges to societies worldwide (Swim *et al*., 2011), the extent to which it is publicly viewed as a risk that requires urgent attention varies substantially (Kim and Wolinsky-Nahmias, 2014).

Effective climate change communication and policy, therefore, require a good understanding of public opinions and recognition of individual variations in perceptions (Whitmarsh, 2011; Budhathoki and Zander, 2020), especially since an increasing amount of studies indicate that risk perception is an important predictor of public willingness to help reduce climate change (e.g. Leiserowitz, 2006; O'Connor, *et al*,. 1999; Van der Linden, 2015; Spence *et al*., 2011; Spence *et al*., 2012; Tobler *et al*., 2012; Mahmoodi‐Momtaz *et al*., 2020).

While the accuracy of farmers' perceptions is critically important if farmers plan to implement appropriate adaptation measures, to our knowledge, there are very few research studies examining the extent to which farmers' perception of climate change tracks with observed changes, and no previous study of this kind has been done in Kermanshah. For this reason, the primary research question in this study was whether Kermanshah farmers perceived the trends of local climate variability accurately. Therefore, our two main research objectives were: (i) To evaluate the accuracy of farmers' perceptions of climate variability, and (ii) To assess the factors influencing farmers' perceptions of climate change. To evaluate the accuracy of farmers' perceptions, this study also explored the pattern and trend of climate variability in the study area, using historical meteorological data analysis.

## MATERIALS AND METHODS

### Study Area

Figure 1 shows the study area, comprised of the Kermanshah Township, located between latitudes 33° 37′ N and 35° 17′ N and longitudes 45° 20′ E and 48° 1′ E. Agriculture is the primary source of livelihood and contributes significantly to

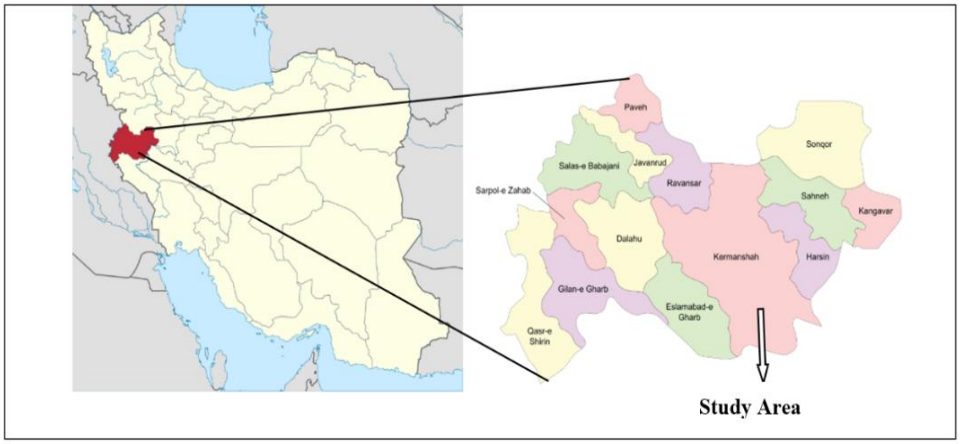



**Figure 1.** Geographic location of Kermanshah Township (study area).

the food production in Kermanshah Township. Due to the prevalence of rain-fed cultivation in the township, climate change has inflicted substantial damage to farmers over the past few years, in which, there has been 50.4% decrease in rainfall compared to the long-term average, and the province ranked the fourth in the country in terms of rainfall reduction.

## Methodology

In this study, both secondary data and primary data were utilized. For the analysis of local climate trends in the last two decades, the time series data of precipitation (rainy days, amount of rainfall), and temperature (maximum and minimum temperatures) during 1970 to 2018 was collected from the Iran Meteorological Organization database. In this section, Microsoft Excel was used for graphical analysis of data.

The primary data were collected by the farmers survey through a structured questionnaire that was made by reviewing previous studies (i.e. Van der Linden, 2015; Van Eck *et al*., 2020; Bagheri and Shabanali Fami, 2016; Van der Linden *et al*., 2019; Mahmoodi-Momtaz *et al*., 2020; Azizi-Khalkheili and Zamani, 2014; Budhathoki and Zander, 2020). The research questionnaire had three parts, including personal and professional characteristics, the accuracy of farmers' perceptions of the trends of local climate variability, and factors affecting farmers' perception of climate change risk. The content validation of the questionnaire by experts was considered as excellent. Also, the questionnaire was pilot tested. The pilot survey was completed by 35 farmers, and its reliability was confirmed through Cronbach's Alpha coefficient ($75 \geq \alpha \geq 88$). The study was carried out in Kermanshah Township. The statistical population consisted of Kermanshah farmers. A multistage sampling technique was used to collect a representative sample from the study areas. First, we used two-stage cluster sampling method for sample taking. Thus, one rural district was randomly selected from five regions of Kermanshah Township (Markazi, Mahidasht, Sarfiruzabad, Bilavar and Kuzaran), then, we randomly selected two villages from each rural district. Also, for the purpose of tapping the long-term memory of climate events and farming experience, the selected farmers were at least 38 years old and had at least 20 years of agricultural experience. The sample size was estimated based on the latest census carried out in 2011 (Statistical Yearbook of Kermanshah Province, 2011). By using the table of Krejcie and Morgan, the sample size was estimated at 250. Of all collected questionnaires, 217 were found to be proper for analysis. The primary data collected in this research were analyzed by descriptive

and inferential statistics using the SPSSwin21 software package. Independent variables included knowledge, emotions, personal experiences, social problems, value orientation, and social norms. Also, the dependent variable of this research was farmers' perception of climate change in Kermanshah Township.

## RESULTS AND DISCUSSION

In this research, the findings are reported in three main parts, including:

(1) Climate change and its trend in Kermanshah;

(2) Farmers' perceptions of climate change;

(3) Factors influencing farmers' perceptions on climate change.

Climate Change and Its Trend in Kermanshah (Overview of Actual Trends in Local Rainfall and Temperature):

In this study, for the analysis of local climate trends, the time series data of precipitation and temperature during 1970 to 2018 was investigated.

The patterns of long-term trends in rainfall and temperature are shown in Figures 2 and 3. The results showed that the annual rainfall ranged from 231.93 mm (1979 record) to 630.01 mm (2018 record), while temperatures ranged from 27.2 ˚C (summer maximum) to 4.25 ˚C (winter minimum). The figure indicates that the last five decades were marked with a decreasing intensity of

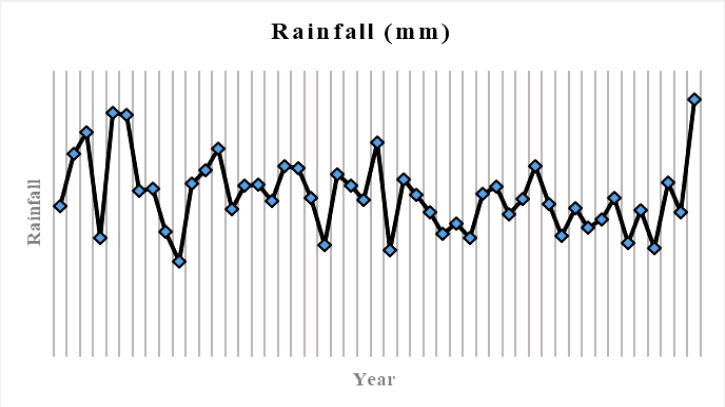



**Figure 2.** Historical annual rainfall (mm) at Kermanshah Station. Data source: Iran Meteorological Organization database: https://data.irimo.ir/. The average rainfall of the Kermanshah Township during 1970-2018 is about 394.8 mm.

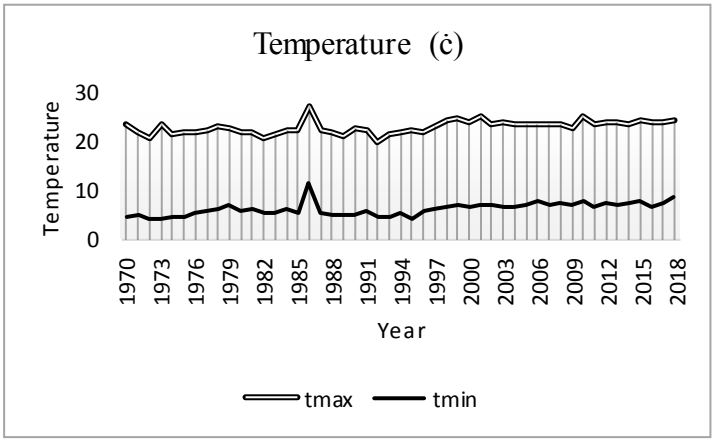



**Figure 3.** Historical annual minimum and maximum temperature (˚C) at Kermanshah Station. Data source: Iran meteorological organization database :https://data.irimo.ir/. The average temperature of the Kermanshah Township during 1970-2018 is about 15.3°C

rainfall and temperature anomaly. Such figures, however, mask enormous variation in the normal distribution of rainfall and temperature across various seasons. Monthly plots (see Appendix) show a growing length of the dry season, resulting from a trend towards lower rainfall during the winter months.

Also, Table 1 shows the changes in rainfall and temperature over two statistical periods for comparison with farmers' perceptions. According to this table, these changes are clearly visible.

Also, seasonal rainfall and temperature variabilities throughout the 49 year period (1970–2018) were appraised. As shown in Figures 4 and 5, in the last 20 years, the maximum and minimum temperatures in summer and winter have increased. Also, seasonal rainfall has decreased in the last 20 years compared to previous years.

## Accuracy of Farmers' Perceptions of the Trends of Local Climate Variability

In this section, the accuracy of perceived patterns of local climatic changes by farmers is appraised based on graphical analyses of meteorological records.

First, a summary of the descriptive statistics of the respondents is presented. The results showed that the mean age of the participants was 50.73 years with a standard deviation of 8.86. The survey of frequency distribution of agricultural work experience of respondents showed that, on average, they had 27.15 years of experience in farming with a standard deviation of 7.54. The frequency distribution of respondents based on annual income shows that the average annual income of farmers in Kermanshah is 800-1,000 million IRR. It was also found that 83.4% of farmers had an income of more than 800 million IRR per year.

In examining farmers' perceptions of specific climate variability, five options were given to each respondent (Increase Trend, Unchanged, Decrease Trend, Irregular Trend, or No response, within the time frame of the last two decades). Considering climate perceptions of farmers, this study revealed that farmers had a wide variation in climate perceptions (Table 2). According to the five perception indicators, [(rainfall (Department of Agricullture, Tarbiat Modares

**Table 1.** Variations in rainfall and temperature in two statistical periods. [a]

| Climatic parameters | 1970-1999 | 1999-2018 |
|---|---|---|
| Rainfall average (mm) | 411 | 369.15 |
| Average maximum temperature (°C) | 22.48 | 24 |
| Average minimum temperature (°C) | 5.64 | 7.2 |

[a] Data source: Iran Meteorological Organization database :https://data.irimo.ir/

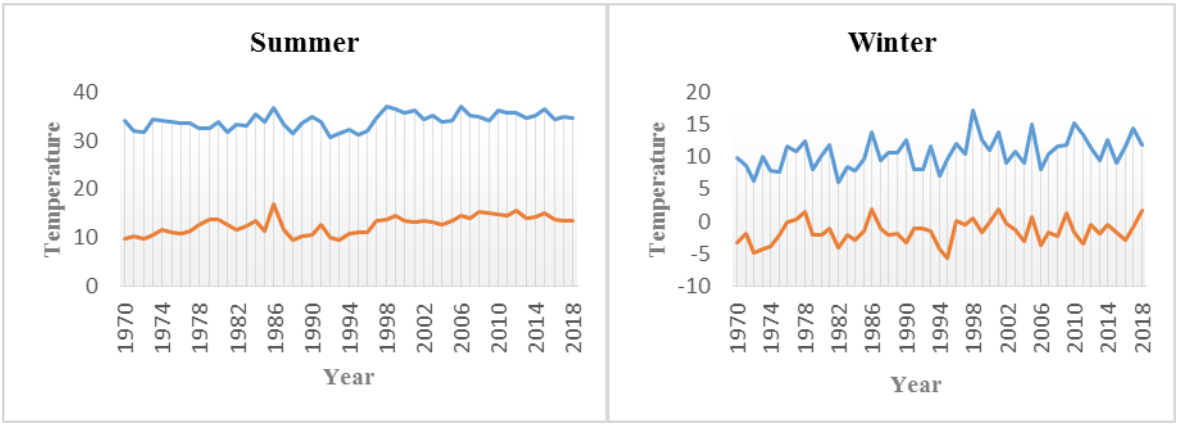



**Figure 4.** Historical seasonal minimum and maximum temperature (°C) at Kermanshah Station (1970-2018). Data source: Iran Meteorological Organization database :https://data.irimo.ir/

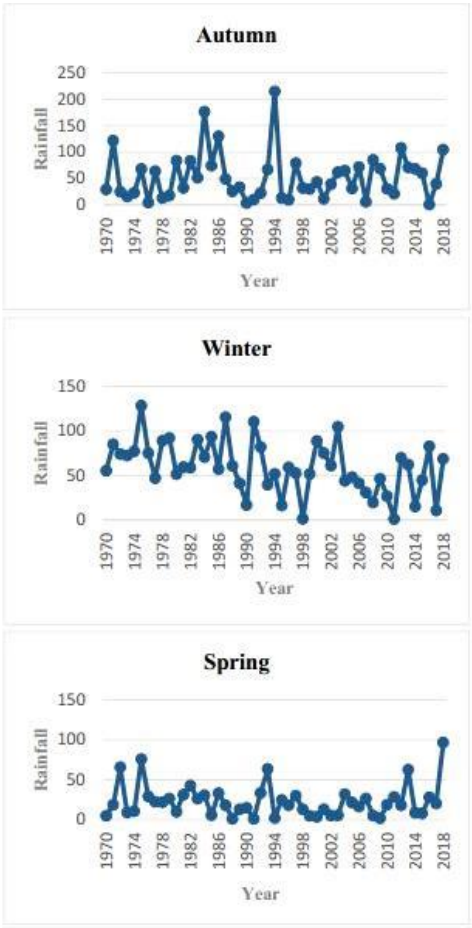



**Figure 5.** Historical seasonal rainfall (mm) at Kermanshah Station (1970-2018). Data source: Iran Meteorological organization database: https://data.irimo.ir/

University, Tehran, Islamic Republic of Iran.): in autumn, in winter, in spring; temperature: in summer, in winter)], the local farmers had more accurate perceptions of the changes in seasonal rainfall. In this study, the analysis of farmers' perception was, more than in the general trends of climate change, emphasized the seasonal nature of rainfall (autumn, winter and spring), and the seasonal nature of temperature (summer and winter).

Specifically, the study revealed that 58.34% of the farmers perceived a decreasing trend of rainfall during the autumn, 48.75% perceived a decreasing trend of rainfall during the winter, and 36.71% perceived a decreasing trend of rainfall during the spring. These results corresponded to the findings of the previous meteorological data analysis, showing that the majority of local farmers had an accurate perception of seasonal rainfall.

In terms of the perception of temperature, most of the farmers had an accurate perception in the summer period i.e. 63.21% perceived the increasing trend of temperature in that period, in line with the results of historical temperature analysis. While the meteorological observations corroborate the farmers' account of the drier summer season, they do not indicate any long-term reduction in winter temperature, which is consistent with the findings of previous studies (Aryal *et al*., 2014; Budhathoki *et al*., 2020; Macchi *et al*., 2015; Uprety *et al*., 2017).

After comparison of the farmers' perceptions with the historical data analysis, the accuracy of farmer's perceptions of the trends of local climate variability were categorized into three levels with the ISDM (Interval of Standard Deviation from the Mean) approach. These trends included: (a) Low consistency of farmers' perception, (b) Medium consistency, and (c) High consistency with the recorded climate trends using the followings:

a) Low consistency of farmers' perception: A≤ Mean–½ Sd

b) Medium consistency of farmers' perception: Mean–½ Sd≤ B≤ Mean+½ Sd

c) High consistency of farmers' perception: Mean+½ Sd≤ C

According to this brief appraisal, more than half of the farmers demonstrated a good ability to recollect the changes in their local climate.

Table 3 shows the farmer's perception consistency for the total sample in the study. It reveals that 58.06% of the farmers had high accuracy in perception of the trends of local climate variability, 31.34% of farmers had medium accuracy, and perception of 10.6% of them had low accuracy. Therefore, to some extent, Kermanshah farmers had accurate perceptions of how climate

**Table 2.** Accuracy of farmer's perception by meteorological data analysis.

| Perception Indicators | Percentage of the farmers who gave the response as: | | | | | Percentage of farmers who had a perception consistent with recorded data trends |
|---|---|---|---|---|---|---|
| | Increasing trend during last 20 years | Decreasing trend during last 20 years | Same trend during 20 years | Irregular | No response | |
| Rainfall | 25.41 | 58.34 | 4.21 | 8.24 | 3.74 | 58.34 |
| In autumn | 5.29 | 48.75 | 14.32 | 19.39 | 12.21 | 48.75 |
| In winter | 10.85 | 36.71 | 2.23 | 42.64 | 7.53 | 36.71 |
| In spring | | | | | | |
| Temperature | 63.21 | 7.63 | 9.51 | 18.78 | 0.84 | 63.21 |
| In summer | 10.13 | 55.24 | 5.52 | 21.56 | 7.59 | 10.13 |
| In winter | | | | | | |

Source: Research findings.

**Table 3.** Farmer's perception level about local climate variability.

| Variable | Farmer's perception levels | Frequency | Valid percent | Cumulative percent |
|---|---|---|---|---|
| Climate perception | Low consistency of perception | 23 | 10.6 | 10.6 |
| | Medium consistency of perception | 68 | 31.34 | 41.94 |
| | High consistency of perception | 126 | 58.06 | 100 |
| Total | | 217 | 100 | |

Source: Research findings.

parameters had changed over the last two decades.

Also, the findings show that farmers' knowledge of the past climate variability matches closely the empirical observations. Therefore, this research has shown the usefulness of both perception studies and empirical analysis. Combining both data sources strengthens the bridge between quantitative and qualitative approaches towards more inclusive climate change adaptation and informs debates on the need for more inclusive adaptation and development policies for climate change.

## Factors Influencing Farmers' Perceptions on Climate Change Risk

Based on past research, risk perceptions of climate change can be described as a function of knowledge about climate change, personal emotions, social norms, personal experiences, social problems, and environmental attitude (Van der Linden, 2015; Whitmarsh, 2011; Helgeson *et al*., 2012; Whitmarsh, 2011; Tun Oo *et al*., 2017; Van Eck *et al*., 2020). Therefore, in this research, we examined the effects of these variables on farmers' perceptions of climate change risk.

In this section, the collected data was analyzed. First, a Pearson correlation test was used to investigate the relationship between all variables (Table 4).

The results revealed a positive and significant relationship ($P< 0.001$) between climate change risk perception and other variables, including knowledge, emotions, social norms, personal experiences, social problems, and environmental attitude (Table 4).

**Table 4.** The results of Pearson's coefficient of correlation between independent variables and farmers' perception of climate change risk.

| Independent variable | Sig | Correlation (r) |
|---|---|---|
| Knowledge | 0.001** | 0.339 |
| Emotions | 0.001** | 0.222 |
| Social norms | 0.001** | 0.354 |
| Personal experiences | 0.001** | 0.237 |
| Social problems | 0.001** | 0.183 |
| Environmental attitude | 0.001** | 0.912 |

** Significant at the P< 0.001 level; Source: Research Findings.

Also, in order to determine the ability of independent variables in predicting the dependent variable of the research (farmers' perception of climate change risk), multivariate linear regression test was used by step-by-step method. Among the variables included in the regression equation, the variables of knowledge, emotions, social norms, and personal experience could account for 49.3**%** of farmer's perception of climate change risk variance ($R^2$ Adjust= 49.3, F= 28.22, Sig= 0.001).

The beta values show that the variables of knowledge, personal emotion and social norms had the greatest impact on farmers' perception of climate change risk, respectively. Therefore, considering the importance of knowledge in explaining the variance of farmers' perceptions of climate change risk, it is suggested that accurate knowledge about the causes, effects, and adaptation to climate change be provided to farmers.

## CONCLUSIONS

The ways that individuals perceive climate change is highly personal, place-based, and influenced by a number of factors. In this paper, we assessed how farmers' perceptions of climate change are related to historical trends in climate, and how climate perceptions are related to knowledge, emotions, social norms and personal experiences.

According to the results of the research, the majority of local farmers had an accurate perception of seasonal rainfall and increasing temperature trends in summer, but had much less accurate perceptions of the winter temperature. It can be concluded there was a certain degree of accuracy of farmers' perceptions of climate variability, however, it should be improved by the

**Table 5.** Results of regression analysis of farmer's perception of climate change risk. [a]

| Independent variables | t | Beta | B | Adjusted $R^2$ | $R^2$ | R | Sig |
|---|---|---|---|---|---|---|---|
| Constant coefficient (b) | 4.11 | - | 6.02 | - | - | - | 0.001 |
| Knowledge | 6.04 | 0.545 | 0.821 | 0.293 | 0.294 | 0.215 | 0.001 |
| Emotions | 3.92 | 0.351 | 0.642 | 0.278 | 0.277 | 0.231 | 0.001 |
| Social norms | 2.46 | 0.252 | 0.511 | 0.355 | 0.359 | 0.317 | 0.001 |
| Personal experiences | 2.04 | 0.176 | 0.675 | 0.369 | 0.367 | 0.321 | 0.001 |
| Social problems | 0.09 | 0.134 | 0.008 | 0.467 | 0.469 | 0.422 | 0.743 |
| Environmental attitude | 0.74 | 0.045 | 0.069 | 0.493 | 0.489 | 0.479 | 0.26 |

[a] Durbin Watson= 1.15, F= 28.22, Sig= 0.001; Source: Research Findings.

improved sharing of specific local weather information with the respective farming community.

To provide information on climate change to farmers, we suggest that information packages should frame climate change as a risk about which to be concerned. However, a ‘‘fear-based” approach (i.e. framing climate change as a risk about which to fear) should be avoided, as it can lead to denial, apathy, paralysis or maladaptation.

Moreover, the dominantly experience-based perceptions in Kermanshah indicate how important it is for the regional climate change information communication and engagement strategy to relate to local farming realities (e.g. local changes in rainfall variability, local pest and disease outbreaks, and local soil erosion) rather than abstract and distant impacts (such as sea level rise, melting glaciers, etc.). In this regard, awareness campaigns should involve affected farmers sharing their real-life stories in the form of farmer-to-farmer agricultural extension (e.g. farmer field schools).

In order to take effective actions to address climate related problems, availability and dissemination of appropriate and up-to-date information on climate change is essential for promoting public awareness and perceptions of climate change.

During awareness campaigns, descriptive information should be communicated by locally trusted sources (e.g. local extension workers, locally elected officials and other role models) rather than scientists external to the system.

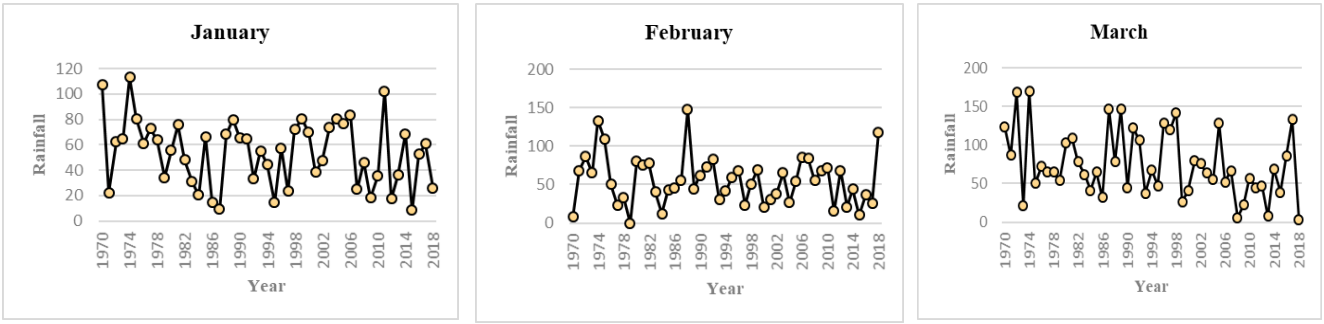
Also, information shared should be prepared in such a format and way that farmers can effectively understand with minimum cognitive efforts. For example, communicators could use intuitive scenarios, narratives, and captivating visualizations to render regional climate processes something easily comprehensible by farmers.

Results suggest that risk perceptions of climate change are complex and multidimensional and that risk communicators should take an integrative approach by appealing to multiple aspects of human judgment and behavior.

The findings of this study suggest the following important policy implications to promote the accuracy of farmers’ perceptions of climate change. Agricultural training programs enhance the accurate perceptions of farmers. Therefore, the context of agricultural training should include local weather information utilization whenever the training program is performed. This information should include knowledge of local rainfall distribution patterns for the local crop calendars, and the farmers should have knowledge of the application of weather information for their farming activities.

## Appendix

Monthly plots of rainfall and temperature in Kermanshah Township.



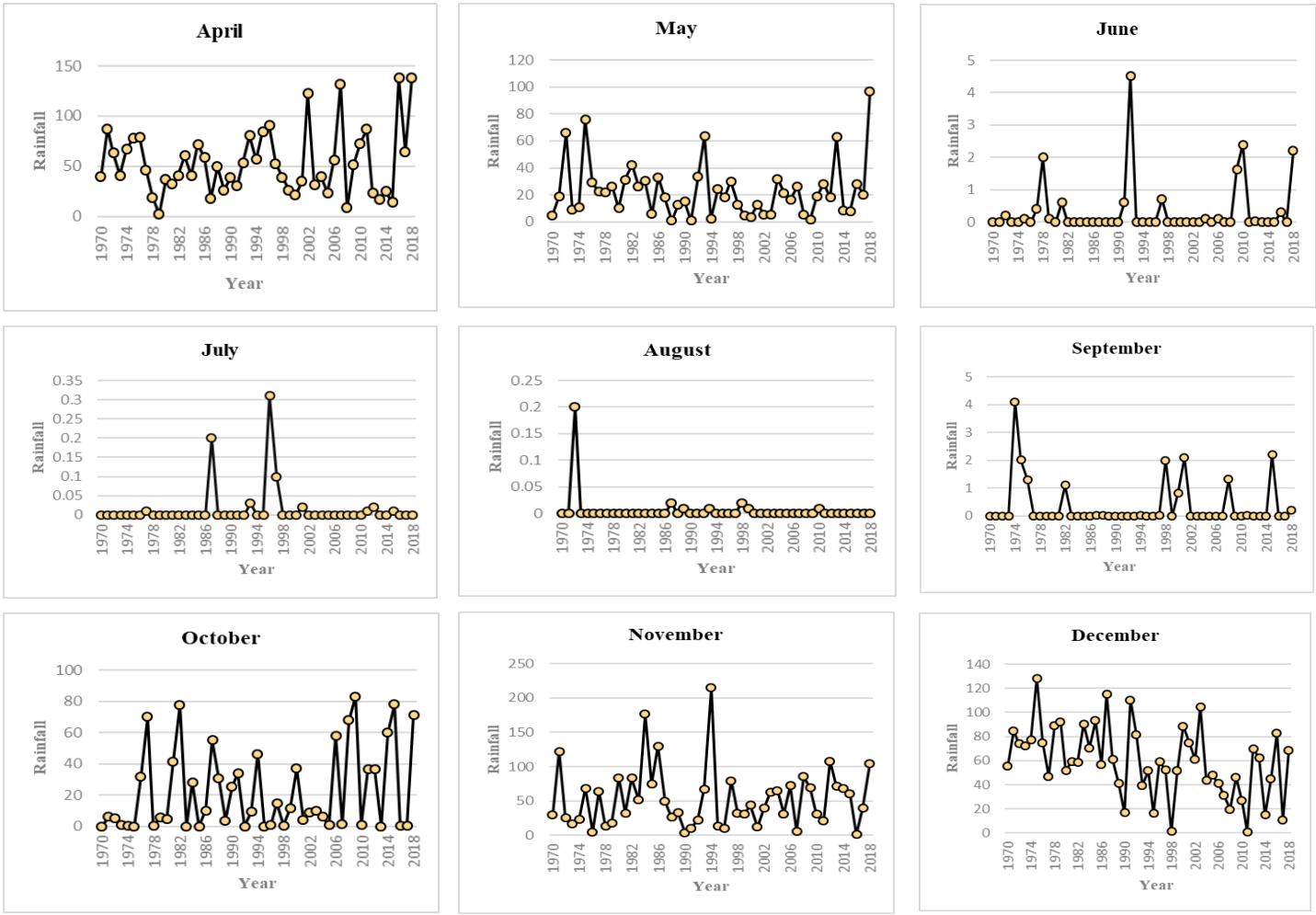
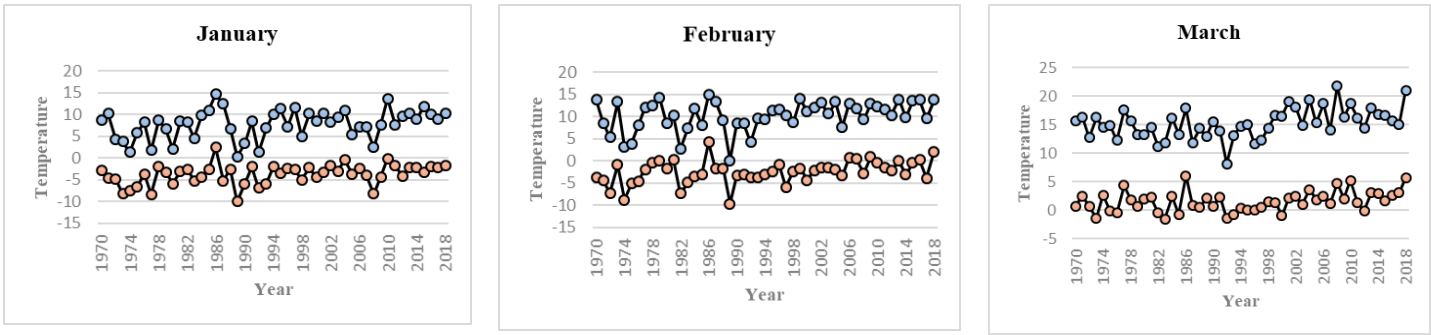



**Figure 6.** Historical monthly rainfall (mm) at Kermanshah Station. Data source: Iran Meteorological Organization database: https://data.irimo.ir



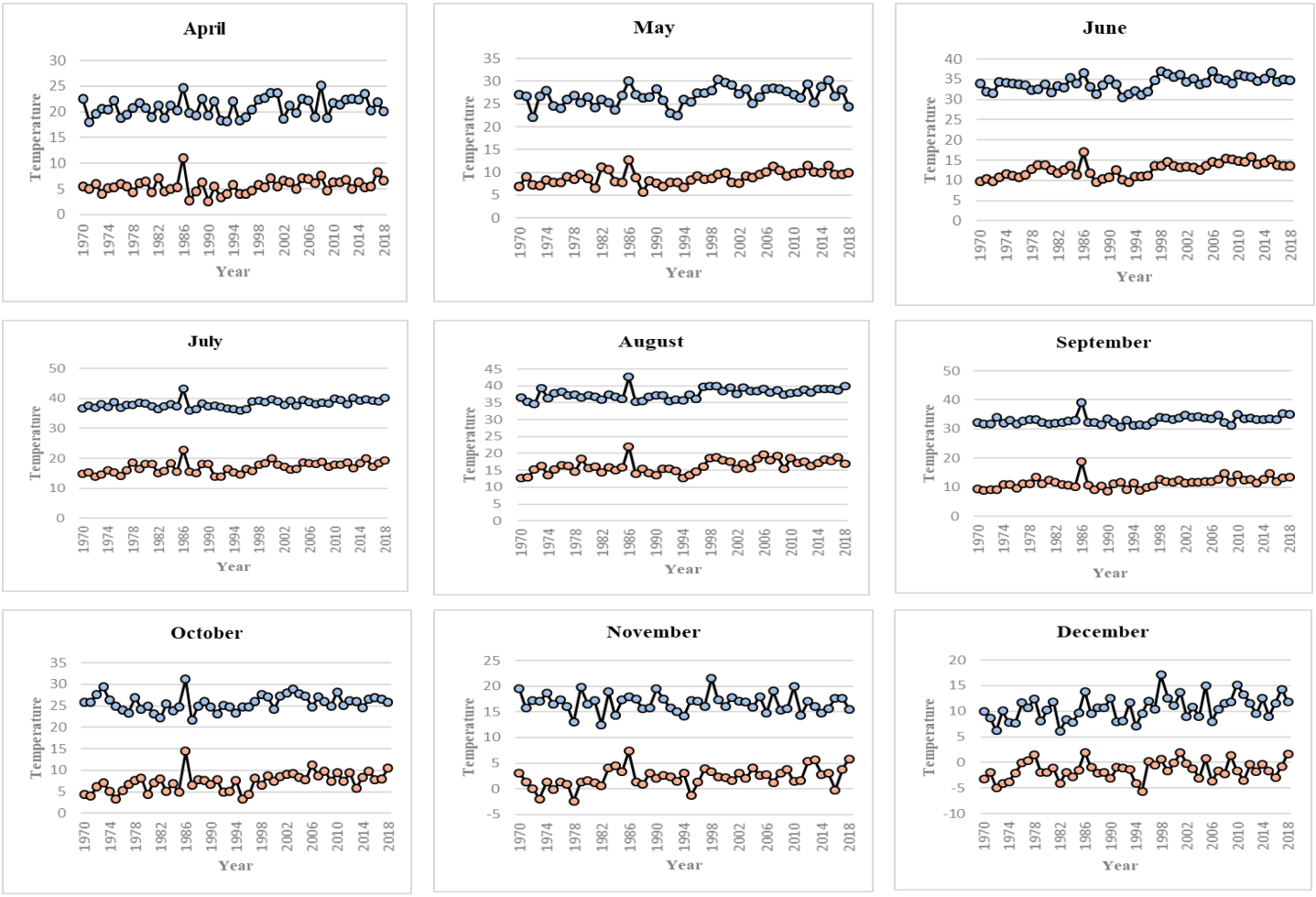



**Figure 7.** Historical monthly minimum and maximum temperature (˚C) at Kermanshah Station. Data source: Iran meteorological organization database :https://data.irimo.ir/

## REFERENCES


1. Azizi-Khalkheili, T. and Zamani, G. H. 2014. Farmer's Agricultural Risk Perception in Facing the Climate Change: The Case of Marvdasht Township, Fars Province. *Iran Agricultural Extension and Education Journal*, **9(2):** 41-53.
2. Aryal, S., Maraseni, T. N. and Cockfield, G. 2014. Climate Change and ndigenous People: Perceptions of Transhumant Herders and Implications to the Transhumance System in the Himalayas. *Geol. Geosci.*, **3(4):** 1–5.
3. Bagheri, A. and Shabanali Fami, H. 2016. Potato Growers' Risk Perception: A Case Study in Ardabil Province of Iran. *J. Agr. Sci. Tech.*, **18(1):** 55-65.
4. Budhathoki, K. N. and Zander, K. K. 2020. Nepalese Farmers' Climate Change Perceptions, Reality and Farming Strategies. *Clim. Dev.*, **12(3):** 204-215,
5. FAO. 2016. *Climate Change and Food Security: Risks and Responses.* Food and Agriculture Organization of the United Nations.
6. Hulme, M., Barrow, E. M., Arnell, N.W., Harrison, P. A., Johns, T. C. and Downing, T. E. 1999. Relative Impacts of Human-Induced Climate Change and Natural Climate Variability. *Nature*, **397(6721):** 688–691.
7. Helgeson, J., van der Linden, S. and Chabay, I. 2012. The Role of Knowledge,

Learning and Mental Models in Public Perceptions of Climate Change Related Risks. In: "*Learning for Sustainability in Times of Accelerating Change*", (Eds.): Wals, A. and Corcoran, P. B. Wageningen Academic Publisher, NL, Wageningen, PP. 329-346.

8. Jamshidi, O., Asadi A., Kalantari K. and Azadi H. 2018. Perception, Knowledge, and Behavior towards Climate Change: A Survey among Agricultural Professionals in Hamadan Province, Iran. *J. Agr. Sci. Tech.*, **20(7):** 1369-1382.
9. Kim, S. Y. and Wolinsky-Nahmias, Y. 2014. Cross-National Public Opinion on Climate Change: The Effects of Affluence and Vulnerability. *Glob. Environ. Polit.,* **14(1):** 79-106.
10. Leiserowitz, A. 2006. Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery and Values. *Clim. Change*, **77(12):** 45-72.
11. Macchi, M., Gurung, A. M. and Hoermann, B. 2015. Community Perceptions and Responses to Climate Variability and Change in the Himalayas. *Clim. Dev.*, **7(5):** 414–425.
12. Mahmoodi Momtaz, A, Choobchian, S. and Farhadian, H. 2020. Factors Affecting Farmers' Perception and Adaptation Behavior in Response to Climate Change in Hamedan Province, Iran. *J. Agr. Sci. Tech.*, **22(4):** 905-917.
13. Moser, S. C. and Dilling, L. 2007. Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change. Cambridge University Press, New York, NY
14. O'Connor, R. E., Bord, R. J. and Fisher, A. 1999. Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. *Risk Anal.,* **19(3):** 461-471.
15. Pahl, S., Sheppard, S., Boomsma, C. and Groves, C. 2015. Perceptions of Time in Relation to Climate Change. *Wiley Interdiscip. Rev. Clim. Change*, **6(3):** 359.
16. Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S. and Pidgeon, N. F. 2011. Uncertain Climate: An Investigation into Public Scepticism about Anthropogenic Climate Change. *Glob. Environ. Change*, **21(3):** 1015–1024.
17. Slovic, P., Fischhoff, B. and Lichtenstein, S. 1982. Why Study Risk Perception?. *Risk Anal.,* **2(2):** 83-93.
18. Statistical Yearbook of Kermanshah Province, 2011. Statistical Center of Iran. available on https://www.amar.org.ir.
19. Swim, J., Clayton, S., Doherty, T., Gifford, R., Howard, G. and Reser, J. 2011. *Psychology and Global Climate Change: Addressing a Multi-Faceted Phenomenon and Set of Challenges*. A Report by the American Psychological Association's Task Force on the Interface between Psychology and Global Climate Change. APA, Washington, DC.
20. Spence, A., Poortinga, W., Butler, C. and Pidgeon, N. F. 2011. Perceptions of Climate Change and Willingness to Save Energy Related to Flood Experience. *Nat. Clim. Change*, **1(1):** 46-49.
21. Spence, A., Poortinga, W. and Pidgeon, N. F. 2012. The Psychological Distance of Climate Change. *Risk Anal.,* **32(6):** 957-972.
22. Tobler, C., Visschers, V. H. M. and Siegrist, M. 2012. Addressing Climate Change: Determinants of Consumers' Willingness to Act and to Support Policy Measures. *J. Environ. Psychol.,* **32(3):** 197-207.
23. Tun Oo, A., Van Huylenbroeck, G. and Speelman, S. 2017. Determining Factors for the Application of Climate Change Adaptation Strategies among Farmers in Magwe District, Dry Zone Region of Myanmar. *Climat. Chang*. **9 (7):** 36–55.
24. United Nations Environment Programme. 2006. *Raising Awareness of Climate Change: A Handbook for Government Focal Points.* United Nations Environment Programme, Nairobi, Kenya.
25. Uprety, Y., Shrestha, U. B., Rokaya, M. B., Shrestha, S., Chaudhary, R. P., Thakali, A. and Asselin, H. 2017. Perceptions of Climate Change by Highland Communities in the Nepal Himalaya. *Clim. Dev.*, **9(7):** 1–13.
26. Van der Linden, S. 2015. The Social-Psychological Determinants of Climate Change Risk Perceptions: Towards a Comprehensive Model. *J. Environ. Psychol.,* **41:** 112–124.
27. Van der Linden, S., Leiserowitz, A. and Maibach, E. 2019. The Gateway Belief Model: A Large-Scale Replication. *J. Environ. Psychol.,* **62:** 49–58.

28. Van Eck, W., Mulder, B. and Van der Linden, S. 2020. Climate Change Risk Perceptions of Audiences in the Climate Change Blogosphere. *Sustainability*, **12(19):** 7990.
29. Weber, E. U. 2010. What Shapes Perceptions of Climate Change? *Wiley Interdiscip. Rev. Clim. Change*, **1(3):** 332–342.
30. Whitmarsh, L. 2011. Scepticism and Uncertainty about Climate Change: Dimensions, Determinants and Change over Time. *Glob. Environ. Change*, **21(2):** 690–700.

## ادراک کشاورزان از ریسک تغییر اقلیم: مقایسه دقت ادراک کشاورزان با داده‌های هواشناسی شهرستان کرمانشاه

**س. قبادی علی‌آبادی، ح. آگهی، و ه. فرهادیان**

### چکیده

در صورتیکه کشاورزان بخواهند اقدامات مناسب سازگاری را در کشاورزی خود به کار گیرند ادراک آن‌ها از ریسک تغییر اقلیم بسیار مهم است. این تحقیق به‌منظور ارزیابی دقت ادراک کشاورزان از تغییر اقلیم و ارزیابی عوامل تأثیرگذار بر ادراک کشاورزان از ریسک تغییرات اقلیمی انجام شد. همچنین برای ارزیابی دقت ادراک کشاورزان، این مطالعه الگو و روند تغییر آب‌وهوا را با استفاده از تجزیه‌وتحلیل داده‌های هواشناسی در منطقه مورد مطالعه بررسی کرد. نمونه تحقیق شامل 217 نفر از کشاورزان شهرستان کرمانشاه است که با استفاده از روش نمونه‌گیری چند مرحله‌ای انتخاب شدند. دقت الگوهای درک شده از تغییرات آب‌وهوای محلی توسط کشاورزان براساس تجزیه‌وتحلیل گرافیکی داده‌های هواشناسی طی سال‌های 1970 تا 2018 ارزیابی شد. سپس دقت ادراک کشاورزان در سه سطح طبقه‌بندی شد. یافته‌ها نشان داد که ادراک 58/06 درصد از کشاورزان با داده‌های هواشناسی مطابقت داشت. همچنین این مطالعه عوامل تأثیرگذار بر ادراک کشاورزان از ریسک تغییر اقلیم را بررسی کرد، نتایج نشان داد که متغیرهای دانش، احساسات شخصی، هنجارهای اجتماعی و تجربه شخصی کشاورز، در مجموع قادر به تبیین 49/3 درصد از واریانس ادراک کشاورزان از ریسک تغییر اقلیم هستند.