An assessment of drought status in Kermanshah Township and an investigation of livelihood capitals influencing farmers' resilience against drought in the region

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ABSTRACT

Climate change is one of the most important challenges that influence different parts of human life. An important consequence of climate change is its effects on water resources and the occurrence of drought. Since the agricultural sector is influenced by drought, the present research aimed to evaluate the livelihood resilience of farmers to drought in Kermanshah Township. The research used both primary and secondary data. First, the drought status of Kermanshah Township was evaluated with SPI and PNI and the DIC software package for a 51-year statistical period. Based on the results, the years 1973, 1978, 1979, 1995, 1999, 2001, 2008, 2013, and 2015 were dry. It is observed that as we approach 2020, the number of years with a negative SPI increases. Then, the dimensions of livelihood capital were studied with the focus group method in the form of three focus groups from the perspective of 19 key experts. Data in this phase were analyzed by the content analysis method. The output of this phase was the development of a questionnaire for the final phase. Finally, to check the livelihood capitals influencing the enhancement of farmers' resilience to drought in the region, 380 farmers were selected by the multistage sampling method. The potential of the independent variables in accounting for the variance in the farmers' livelihood resilience was checked by stepwise multivariate linear regression. Based on the results, the variables of financial capital, social capital, and human capital with beta values of 0.378, 0.324, and 0.152, respectively had the greatest role in capturing the variance in farmers' resilience to drought in Kermanshah Township.

Keywords: Climate Change, Farmers, Kermanshah, Livelihood Capitals, precipitation indices, Resilience.

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INTRODUCTION

Climate change is regarded as one of the key challenges in the 21st century with profound economic, social, and environmental consequences since the climate has extensive and interactive effects on all production sectors (IPCC, 2022; Umer Arshad, 2022; UN, 2022). This becomes more concerning when we consider that the Intergovernmental Panel on Climate Change (IPCC) predicted in its sixth report that the atmospheric temperature will alarmingly increase by 5.7°C by 2100 (Masson-Delmotte et al., 2021). On the other hand, a report by IPCC in 2013, which was based on the analysis of the reliable surveillance data collected by five meteorological stations in Iran for, at least, 100 years, revealed a significant rise in mean annual temperature in all stations. IPCC's (2013) predictions for Iran under Scenario A1 (balanced greenhouse gas (GHG) emissions) also show a mean temperature rise of 2°C by the next 50 years and a rise of 3.5-4°C by the next 100 years (Figure 1). Since most parts of Iran have an arid climate, the temperature rise reduces the resilience of water resource systems and affects water balance through increasing evapotranspiration (Yousefi et al., 2022). According to a report by United Nations Development Programme (UNDP), Iran will be one of the most critical countries in water acquisition by 2030 (Burchfield et al., 2018). So, given the climatic conditions, hydrological characteristics, and limitations of the agricultural sector in Iran, such a critical condition will be a serious challenge in the region (Yousefi et al., 2022).

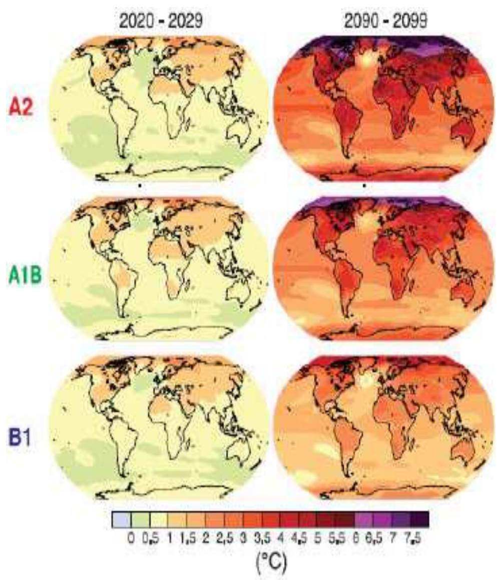

Fig. 1. The atmospheric-oceanic general circulation model's predictions of temperature variations by 2100 (IPCC, 2013)

Presently, adaptation to climate change seems to be unprecedentedly important. Climate change increases temperature, reduces precipitations, changes water balance, reduces production levels, and entails frequent droughts. So, studying the trend of climate change and predicting its future variations in Iran are imperative for planning adaptation measures (Ghobadi Aliabadi et al., 2022), especially in recent years when this country has been suffering from severe droughts (Karimi et al., 2021). This drought period has intensified since January 2020, sounding the alarm for the risk of drought in this country. The graph of the difference between the current water year's precipitation and its long-term value, which was reported by the National Drought Warning and Monitoring Center of Iran’s Meteorological Organization for the period ending on May 14, 2021 (Figure 2), shows that precipitation in the current water year has decreased by 37.3 percent versus its mean long-term value. Based on this report, Kermanshah province has the fourth rank after Hormozgan, Sistan and Baluchistan, and Kerman provinces in water shortage, showing a decrease of 50.4 percent in precipitation versus the mean long-term value (Meteorological Organization of Iran, 2022).

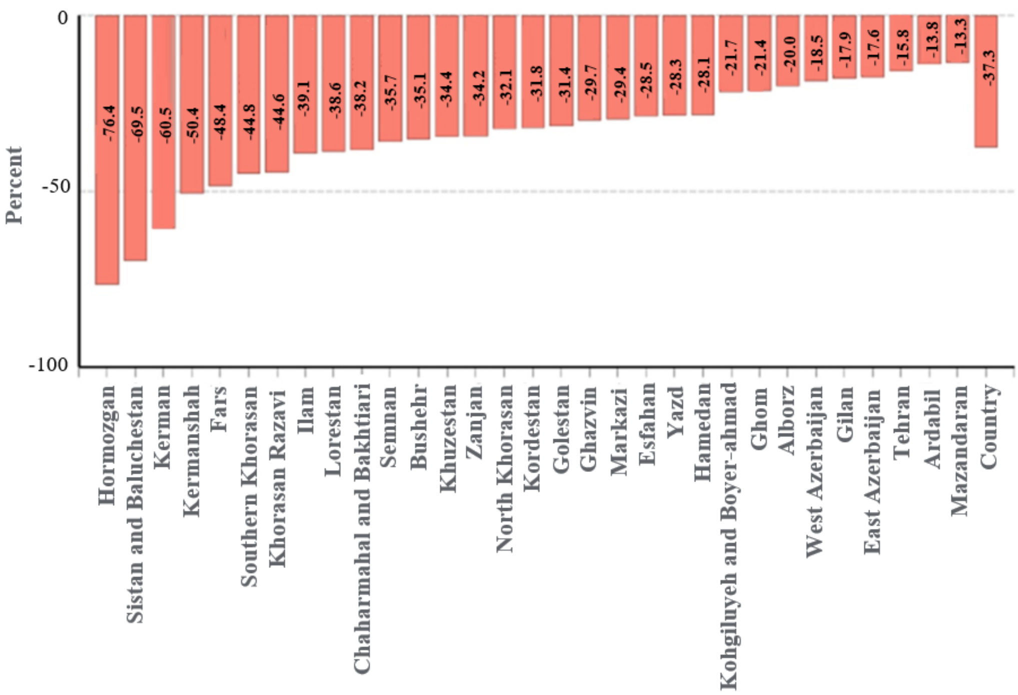

Fig. 2. The difference between the current water year’s precipitation and the mean long-term value for the period ending on May 14, 2021. Data source: Meteorological Organization of Iran, 2022.

Since climate change is one of the challenges that influence the performance of the agricultural sector and people's livelihood, farmers are subject to the greatest damage by the implications of climate change, so they have to continuously respond to climate change (Atube et al., 2021; Reddy et al., 2022; Kuntke et al., 2022). They attempt to use the livelihood capitals that are at their disposal to cope with the extensive risks threatening their career and life. In other words, rural people and farmers' resilience mainly depends on their preparedness, reaction, rehabilitation, and prevention against risks and crises caused by climate change (Aldrich et al., 2015; Ao et al., 2022). Resilience has been defined as dynamic adaptation (IPCC, 2022). Since farmers are vulnerable, it is imperative to assess their resilience against climate change (Mavhura, 2017). Generally, any action that reduces drought vulnerability increases resilience. Farmers can make small but meaningful improvements in their drought resilience through investments and actions that enhance soil moisture-holding capacity (Kuntke et al., 2022). A variety of management practices that increase soil organic matter while reducing soil-moisture loss—such as no-till or reduced tillage, use of cover crops, and conservation crop rotations—may help farms adapt to drought risk. Investment in irrigation efficiency may also improve drought resilience. High-efficiency irrigation technologies—such as drip irrigation systems and Low Energy Precision Application (LEPA) sprinklers, whose nozzles drop low to the ground—generally reduce water lost to evaporation or run-off. Such systems make a greater proportion of water withdrawals available for crop use and help stretch limited water supplies (de Moura et al., 2021).

So investigate the livelihood resilience of farmers to drought 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 livelihood resilience of farmers to drought, and no previous study of this kind has been done in Kermanshah. For that reason, this research aimed to investigate the livelihood resilience of farmers to drought in Kermanshah Township. The following three consecutive steps allowed for achieving this goal:

i. Assessing the drought status of Kermanshah Township over a 51-year period using the SPI and PNI indices and the DCI (Drought Indices Calculator) software;
ii. Exploring the dimensions of livelihood capitals from the perspective of experts;
iii. Exploring the livelihood resilience of the farmers in Kermanshah Township against drought.

MATERIALS AND METHODS

Study Area

Figure 3 shows the study area, comprised of the Kermanshah Township, that located between latitudes 33°37′N and 35°17′N and longitudes 45°20′E and 48°1′E (Figure 3). Agriculture is the primary source of livelihood and contributes significantly to the food production in Kermanshah Township.

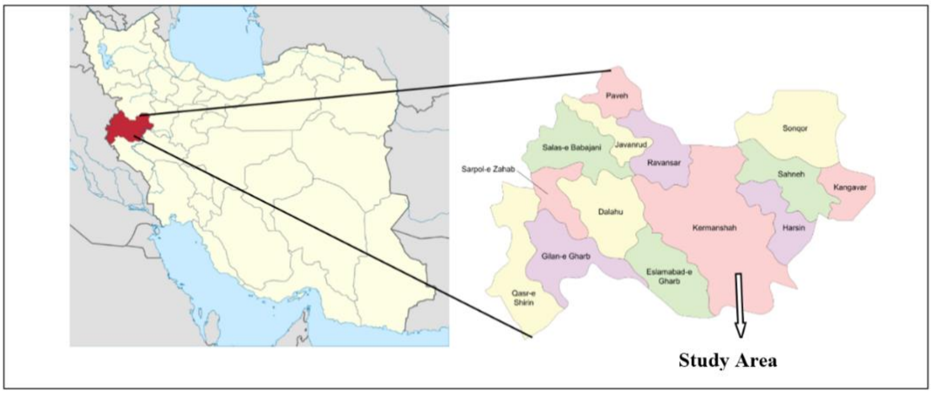

Fig. 3. Geographic location of Kermanshah Township (Study Area) (https://en.wikipedia.org/wiki/Sonqor_County#/media/File:Kermanshah.svg)

Methodology

To understand the drought status in the study site more precisely, the research evaluated the drought severity over a 51-year statistical period (1970-2020) using SPI and PNI. These practical indices can be calculated by involving the main factor of precipitation. After the 51-year data on precipitation recorded by the Synoptic Station of Kermanshah Township were categorized, the DIC software package was applied for which the monthly, annual, and seasonal patterns were investigated. The percent of normal precipitation index (PNPI, or simply PNI) is based on the measurement of the long-term precipitation data at each station and its variations versus the normal long-term monthly or annual precipitation. On the other hand, the standardized precipitation index (SPI) is calculated by the spatial moving average of precipitation data. This research considered the moving average for 51 years.

The research used the focus group technique to study the dimensions of livelihood capitals. The focus group technique was conducted in this research phase in four steps – designing the research, collecting the data, analyzing the data, and reporting. This process was, indeed, initiated by defining the main research goals based on which a list of questions was prepared as a guideline for each discussion session of the focus group. For data collection, in addition to field jotting, a voice recorder was used to record all discussion and later transcribe it. The mean session length was 75 minutes, and 6-8 people participated in each session. It should be noted that the focus group process continued until reaching theoretical saturation. So, 19 key experts including researchers, academic professors, water resources experts, and Agriculture Organization experts were interviewed within three focus groups. Data were analyzed in this phase with the content analysis method. The result was the development of a questionnaire for the third phase of the research. The reliability of the questionnaire was supported by Cronbach's alpha ($71 \leq \alpha \leq 82$). The statistical population in the third phase was composed of all farmers in Kermanshah Province. Based on Krejcie and Morgan's table, 380 farmers were sampled by the stratified sampling technique. First, Kermanshah Township, which is geographically composed of five districts, was considered the basis. Then, one rural district was randomly selected from each district (Baladarband, Jalalvand, Choghanarges, Haft-Ashian, and Razavar), two villages were randomly selected from each rural district, and finally, farmers were sampled from each village by simple randomization. A total of 371 questionnaires out of the distributed questionnaires were found to be proper for analysis. The collected data were analyzed in the descriptive and inferential sections using the SPSS (win 21) software package.

RESULTS AND DISCUSSION

Assessment of drought status in Kermanshah Township over the 51-year statistical period using SPI and PNI and the DIC software

In this section, PNI and SPI are calculated by the DIC software based on the 51-year statistics. The categorization of SPI and PNI as used in the research is presented in Tables 1 and 2.

Table 1. Standardized precipitation index (SPI) drought categories

Classification	SPI Values
Extremely wet	≥2.00
Severely wet	1.50–1.99
Moderately wet	1.00–1.49
Mildly wet	0–0.99
Mild drought	–0.99–0
Moderate drought	–1.49– –1.00
Severe drought	–1.99– –1.50

Extreme drought	≤–2.00

Table 2. Standardized precipitation index (PNI) drought categories

Classification	PNI Values
Normal and above	>90
Near normal	80-90
Slight drought	70-80
Moderate drought	55-70
Severe drought	40-55
Extreme drought	<40

Table 3 presents the results of PNI and SPI for the studied statistical period.

Table 3. The PIN and SPI values for the Synoptic Station of Kermanshah for the 51-year statistical period (1970-2020)

Year	PNI Values	Drought Classification	SPI Values	Drought Classification
1970	91.22	Normal and Above	-0.31	Mild drought
1971	124.55	Normal and Above	1.05	Moderately wet
1972	135.49	Normal and Above	1.44	Moderately wet
1973	73.92	Slightly Drought	-1.15	Moderate drought
1974	149.98	Normal and Above	1.93	Severely wet
1975	148.69	Normal and Above	1.89	Severely wet
1976	101.04	Normal and Above	0.12	Mildly wet
1977	101.69	Normal and Above	0.15	Mildly wet
1978	75.96	Slightly Drought	-1.04	Moderate drought
1979	60.32	Moderately Drought	-1.91	Severe drought
1980	102.79	Normal and Above	0.20	Mildly wet
1981	117.22	Normal and Above	0.77	Mildly wet
1982	127.02	Normal and Above	1.14	Moderately wet
1983	90.14	Normal and Above	-0.36	Mild drought
1984	104.33	Normal and Above	0.26	Mildly wet
1985	104.40	Normal and Above	0.26	Mildly wet
1986	110.18	Normal and Above	0.50	Mildly wet
1987	115.62	Normal and Above	0.71	Mildly wet
1988	123.40	Normal and Above	1.01	Moderately wet
1989	94.39	Normal and Above	-0.17	Mild drought
1990	81.28	Near Normal	-0.78	Mild drought
1991	117.92	Normal and Above	0.80	Mildly wet
1992	117.56	Normal and Above	0.79	Mildly wet
1993	135.68	Normal and Above	1.45	Moderately wet
1994	155.09	Normal and Above	2.10	Extremely wet
1995	53.42	Severely Drought	-2.34	Extreme drought
1996	129.32	Normal and Above	1.22	Moderately wet
1997	98.51	Normal and Above	0.01	Mildly wet
1998	87.47	Near Normal	-0.48	Mild drought
1999	75.53	Slightly Drought	-1.06	Moderate drought
2000	80.55	Near Normal	-0.81	Mild drought
2001	70.63	Slightly Drought	-1.32	Moderate drought
2002	100.52	Normal and Above	0.10	Mildly wet
2003	103.94	Normal and Above	0.24	Mildly wet
2004	87/10	Near Normal	-0.50	Mild drought
2005	95.75	Normal and Above	-0.11	Mild drought
2006	115.95	Normal and Above	0.72	Mildly wet
2007	94.21	Normal and Above	-0.17	Mild drought

2008	76.36	Slightly Drought	-1.02	Moderate drought
2009	87.69	Near Normal	-0.47	Mild drought
2010	84.57	Near Normal	-0.62	Mild drought
2011	83.29	Near Normal	-0.68	Mild drought
2012	97.50	Normal and Above	-0.03	Mild drought
2013	67.50	Moderately Drought	-1.49	Moderate drought
2014	91.16	Normal and Above	-0.31	Mild drought
2015	65.35	Moderately Drought	-1.62	Severe drought
2016	105.88	Normal and Above	0.32	Mildly wet
2017	87.93	Near Normal	-0.46	Mild drought
2018	165.06	Normal and Above	2.6	Extremely wet
2019	75.07	Near normal	-0.63	Mild drought
2020	59.4	Moderately Drought	-1.72	Severe drought

Data source: Iran's Meteorological Organization's database: https://data.irimo.ir/

Livelihood capital dimensions from the perspective of experts

As was already mentioned, the focus group technique was used to study livelihood capital dimensions. A list of concepts was identified in the context of five components of livelihood capital.

Table 4 presents these concepts and the frequency of their derivation from the content analysis of the focus group process.

Table 4. The livelihood capital dimensions

Categories	Concepts	Frequency of concepts
Human capital	The extent of individual awareness of the consequences of crises and risks	8
	Awareness of ways to deal with natural hazards	7
	Having mental and emotional conditions in crisis situations	7
	Physical ability to deal with risks	5
	Participation in classes to increase general knowledge about risks	5
	Knowledge of risk reduction programs and projects	4
Financial capital	Income status	16
	Job satisfaction	15
	Ability to create new jobs due to crisis	14
	The economic status of the household in crisis conditions	10
	Government financial support	10
	Crop insurance	8
	Status of crop markets	8
Physical capital	Access to necessary agricultural infrastructures and facilities in crisis conditions	10
	Access to information networks in crisis conditions	6
	Implementation of alternative methods in crisis conditions	6
Natural capital	Available water sources	17

	Suitable land availability	13
	Access to water resources in crisis conditions	13
	Crop diversity in crisis conditions	11
	Production of resistant plants in the region in crisis conditions	9
	Action to reduce water consumption	7
	Control of surface water resulting from floods	6
Social capital	Social coherence and participation	19
	Social trust	15
	Group work and social cooperation	15
	Adherence to traditions and custom	11
	Religious values and beliefs	10
	Social status	9
	Having a positive mindset	4
	Ability to communicate effectively	5

Data source: Research findings.

Figure 4 presents livelihood capitals and their most important components from the content analysis of the focus group process.

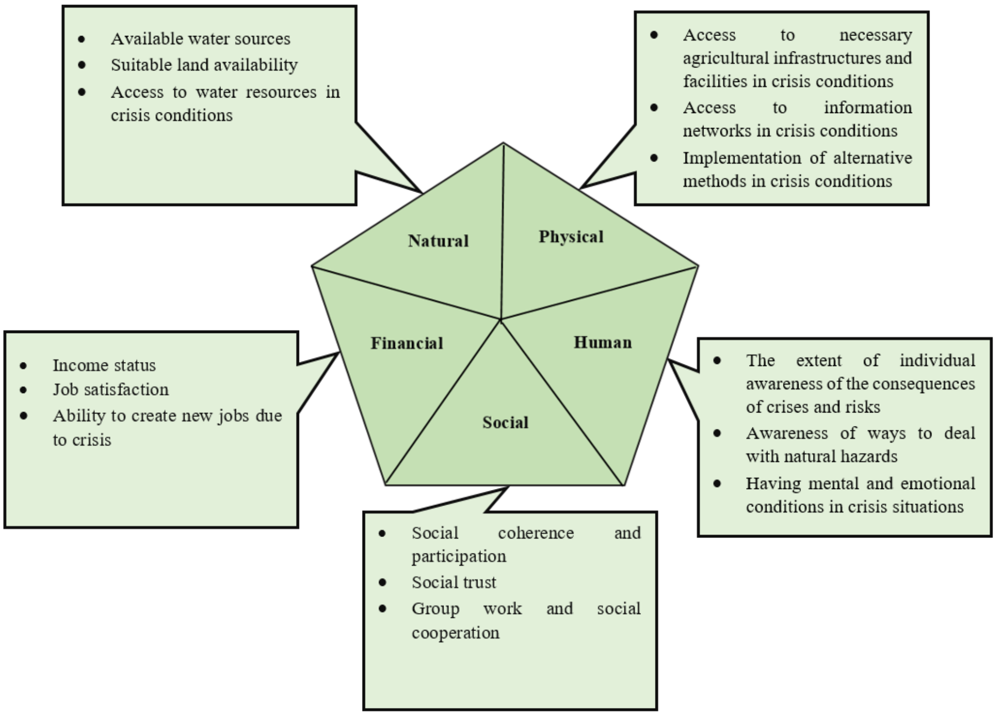

Fig. 4. livelihood capitals and their most important components

The results of this section (Localization of livelihood capital dimensions), were used to develop the research questionnaire. Also, the dependent variable of farmers' resilience was described and analyzed in the context of the components constituting livelihood resilience (preparedness, response, prevention and rehabilitation, and recovery) (Queensland Reconstruction Authority, 2011; Aldrich et al., 2015; Ao et al., 2022). The components were measured by the relevant items by Likert's scale (very low, low, moderate, high, and very high).

Farmers' livelihood resilience against drought in Kermanshah Township

This section explores the farmers' livelihood resilience to drought in Kermanshah Township. First, we provide a summary of the descriptive statistics. Based on the results, the participants were, on average, 49.72 years with a standard deviation (SD) of 7.75. In terms of experience in agricultural work, the results showed a mean experience of 26.44 years (SD = 6.41). The mean educational level of the studied farmers was at the diploma level and the main job of over 83 percent was farming. The results showed that most farmers did animal farming in addition to crop farming. The annual income of the farmers was, on average, low, making their life difficult considering the expenditure.

The relationship between the participants' personal and professional characteristics with the studied variables was checked by Pearson's correlation test. The results revealed the participants' age had a negative and significant ($P < 0.001$) relationship with natural capital and physical capital with correlation coefficients of -0.174 and -0.181, respectively. There was also a positive and significant ($P < 0.001$) relationship between age and resilience. The farmers' job experience exhibited a negative and significant relationship with natural capital, physical capital, and financial capital with correlation coefficients of -0.154, -0.162, and -0.113, respectively. Also, a positive and significant relationship was observed between job experience and farmers' resilience. The results showed that the participants' revenue had a positive and significant relationship with natural capital, physical capital, financial capital, and resilience with correlation coefficients of 0.112, 0.159, 0.147, and 0.119, respectively (Table 5).

Table 5. The relationship between the participants' demographic and professional characteristics and the other studied variables

Variable	Human capital	Natural capital	Physical capital	Social capital	Financial capital	Resilience
Gender	0.033	-0.051	-0.027	0.076	-0.084	-0.036
Age	-0.004	-0.174**	-0.181**	-0.049	-0.039	0.114**
Farming experience	0.023	-0.154*	-0.162*	0.036	-0.133*	0.121*

Educational level	-0.011	-0.073	-0.109	-0.027	-0.053	-0.066
Type of agricultural activity	0.074	-0.054	-0.080	0.048	-0.017	-0.073
Farming type	-0.021	-0.046	-0.063	-0.093	-0.034	-0.024
Revenue	0.063	0.112*	0.159*	0.31	0.147*	0.119**

* Significant at the P< 0.01 level; ** Significant at the P< 0.001 level; Source: Research Findings.

The relationships with the main variables were also determined by Pearson's correlation test, which revealed a positive and significant relationship of resilience with human capital, natural capital, physical capital, social capital, and financial capital at the 0.001 level. The results also showed that human capital had a positive and significant relationship with physical capital, social capital, and financial capital at the 0.001 level. On the other hand, physical capital had a positive and significant relationship with social and financial capital at the 0.001 level (Table 6).

Table 6. The results of the correlation test between the main components of the research

Variables	Resilience	Human capital	Natural capital	Physical capital	Social capital	Financial capital
Resilience	1					
Human capital	0.342**	1				
Natural capital	0.028**	0.041	1			
Physical capital	0.426**	0.34**	-0.074	1		
Social capital	0.327**	0.378**	-0.029	0.501**	1	
Financial capital	0.367**	0.296**	-0.0741	0.478**	-0.016	1

* Significant at the P< 0.01 level; ** Significant at the P< 0.001 level; Source: Research Findings.

Farmers' resilience to drought

The potential of the independent variables in predicting the farmers' resilience to drought was determined by the stepwise multivariate linear regression test. To find out the effectiveness of the independent variables in the farmers' resilience, the variables of age, work experience, revenue, human capital, natural capital, physical capital, social capital, and financial capital were included in the regression equation among which the variables of financial capital, social capital, human capital, work experience, and revenue altogether accounted for 0.641 of the variance in the farmers' resilience in Kermanshah Township. The share of the individual components and their importance in the variance of the farmers’ resilience to drought can be determined by checking the beta values in Table 7. Also, it can be concluded from the significance of the F test at the error level of < 0.01 that the regression model of the research composed of five independent variables and one dependent variable is a good model and the independent variables can predict farmers’ resilience in drought conditions.

Table 7. The results of regression analysis of the farmers’ resilience to drought

Independent variables	R	R^2	Adjusted R^2	B	Beta	t	Sig.
Constant coefficient (b)	-	-	-	-23.369	-	-6.51	0.001
Financial capital	0.362	0.229	0.221	0.204	0.378	5.97	0.001
Social capital	0.412	0.371	0.370	0.361	0.324	4.12	0.001
Human capital	0.438	0.387	0.384	0.278	0.152	5.32	0.001
Work experience	0.483	0.396	0.394	0.101	0.089	3.96	0.003
Revenue	0.574	0.427	0.421	0.124	0.056	3.74	0.01
Physical capital	0.588	0.492	0.478	0.096	0.179	2.36	0.367
Age	0.607	0.529	0.516	-0.086	-0.025	-4.79	0.126
Natural capital	0.635	0.652	0.641	0.177	0.104	3.21	0.841

Durbin Watson = 1.55; F = 64.22; Sig. = 0.001; Source: Research Findings.

According to the obtained information (Table 7), the following formula can be proposed to estimate the resilience of Kermanshah farmers against drought:

$$Y = -23.369 + 0.204 (X_1) + 0.361 (X_2) + 0.278 (X_3) + 0.101 (X_4) + 0.124 (X_5) + 0.096 (X_6) - 0.086 (X_7) + 0.177 (X_8)$$

Farmers’ resilience strategies to drought

In this part, the dependent variable of farmers' resilience was described and analyzed in the framework of the constituent components of livelihood resilience (preparedness, response, prevention and rehabilitation and recovery). The results showed that drought preparedness strategies are more effective than other strategies in the opinion of farmers (Table 8).

Table 8. Frequency distribution of resilience strategies

Component	Subcomponents	Frequency	Percent	Cumulative percent
	Prevention	49	12.9	12.9
Resilience	Response	78	20.53	33.43
	Preparedness	179	47.1	80.53
	Rehabilitation	35	9.21	89.74
	Recovery	39	10.26	100

CONCLUSIONS

PNI and SPI show the severity of drought in the studied site over the 51-year statistical period. Based on the results, the years 1973, 1978, 1979, 1995, 1999, 2001, 2008, 2013, and 2015 were dry. It is observed that as we approach 2020, the number of years with a negative SPI increases, especially in the last 15 years during which only two years had positive SPIs. In addition to confirming the necessity of this research, it shows that the study site is affected by gradual climate change, not just seasonal and periodic climate variations. This finding shows the necessity of changing the policy focus from short-run drought response towards building more long-run drought resilience against drought.

In the second phase of the research, a list of concepts was identified in the context of five livelihood capitals. It should be noted that among the concepts derived, "social coherence and participation" had the highest frequency from the perspective of the experts, reflecting its significance among all factors that influence farmers' resilience in critical climatic conditions. Wang et al. (2021), also, emphasized the role of social coherence in farmers' resilience and reported that climate change adaptation strategies selected for farmers were influenced by society. The results for the components underpinning the farmers' livelihood resilience revealed that the variable of financial capital alone could capture 0.378 of the variance in the farmers' resilience in Kermanshah Township. On the other hand, the results show that farmers in Kermanshah Township do not have good revenues. Since farmers' ability to cope with and/or adapt to drought depends on their assets and since supplementary incomes are a good alternative for the climate-caused decline in farm revenues, it is recommended to increase their more stable assets and provide them with more diverse income sources, in addition to preserving farmers' current assets, in order to prepare them for responding to climate change and drought. Mixed farming and diversification are particularly crucial in building resilience and enhancing household dietary diversity of smallholder farmers. This finding is consistent with the report of Shikwambana and Malaza (2022) , Hendratmi et al. (2022) and Nkonya et al. (2023). On the other hand, given the significance of social capital in accounting for the resilience of farmers in the region, it is recommended to focus on fostering a sense of mutual trust and social solidarity in order to encourage participation in development projects that are recently implemented in rural areas and will ensure a sustainable livelihood. This finding agrees with Wang et al. (2021). Since human capital was involved in accounting for the farmers' resilience to drought in Kermanshah Township, it is necessary to put effort into empowering farmers. Farmers' awareness of the impedance of climatic events should be raised. More knowledgeable farmers can reduce risks before the occurrence of climatic events and respond properly after their occurrence. Also, by providing extension agents with more precise and up-to-date information on climate change and adaptation methods, educating farmers about climate change and sharing findings with them, increasing consultation services, building model and research farms, and so on, farmers' resilience to climate change can be enhanced and it can be hoped that farmers' behaviors will be substituted with sustainable and drought-adapted behaviors. This is consistent with Slijper et al. (2022) and Ghobadi Aliabadi et al. (2022) who emphasized the key role of knowledge in increasing resilience and adopting sustainable behaviors by farmers. Also, the results reflected the farmers' trust in experts and the information and approaches provided by them in critical climatic conditions. So, this component can be reinforced in order to further empower the farmers. The results also reveal that farmers in the study site perceive insurance services to be inefficient based on their previous experience, so the insurance services that are provided to farmers need to be evaluated and revised. This corroborates the findings of Adzawla et al. (2019). The results also showed that drought preparedness strategies are more effective than other strategies in the opinion of farmers (Table 8). Therefore, it is imperative in these conditions to develop a comprehensive climatic risk management plan to investigate the effects of climate change, develop an operational preparedness plan for extreme climatic conditions, and provide solutions to minimize its effects, which should be pursued at the national and regional levels.

ACKNOWLEDGEMENTS

Special thanks to the Meteorological Organizations of Iran for providing the researchers with the data and reports required for the research.

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ارزیابی وضعیت خشکسالی در شهرستان کرمانشاه و بررسی سرمایه‌های معیشتی مؤثر بر ارتقاء تاب‌آوری کشاورزان این منطقه در برابر خشکسالی

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چکیده

تغییر اقلیم یکی از مهم‌ترین چالش‌هایی است که بخش‌های مختلف زندگی انسان را تحت تأثیر قرار می‌دهد. از مهّم‌ترین پیامدهای تغییر اقلیم می‌توان به تأثیر بر منابع آب و وقوع خشکسالی‌ها اشاره کرد. با توجه به متأثر بودن بخش کشاورزی از خشکسالی، تحقیق حاضر با هدف ارزیابی تاب‌آوری معیشتی کشاورزان شهرستان کرمانشاه در برابر خشکسالی انجام گرفت. در این پژوهش از هر دو نوع داده‌های اولیه و ثانویه استفاده شد. در ابتدا وضعیت خشکسالی شهرستان کرمانشاه در یک دوره آماری 51 ساله با استفاده از شاخص‌های SPI و PNI و با بهره‌گیری از نرم‌افزار DIC ارزیابی گردید. طبق نتایج سال‌های 1973، 1978،

1979، 1995، 1999، 2001، 2008، 2013، 2015، جز سال‌های خشک گزارش شده‌اند. براساس یافته‌های گزارش شده در این بخش از مطالعه، هر چه به سال 2020 نزدیک می‌شویم تعداد سال‌های با SPI منفی بیشتر می‌شود. در ادامه ابعاد سرمایه‌های معیشتی از دیدگاه 19 متخصص کلیدی این حوزه با استفاده از روش گروه متمرکز در قالب 3 گروه کانونی بررسی شد، تجزیه و تحلیل داده‌های این بخش با استفاده از روش تحلیل محتوا انجام شد؛ خروجی این مرحله طراحی پرسشنامه برای مرحله پایانی بود. درنهایت به‌منظور بررسی سرمایه‌های معیشتی مؤثر بر ارتقاء تاب‌آوری کشاورزان این منطقه در برابر خشکسالی 380 کشاورز با استفاده از روش نمونه‌گیری چند مرحله‌ای انتخاب و مورد مطالعه قرار گرفتند. به‌منظور بررسی قدرت پیشگویی متغیرهای مستقل تحقیق در تبیین واریانس تاب‌آوری معیشتی کشاورزان، رگرسیون خطی چندمتغیره به روش گام‌به‌گام استفاده گردید. طبق نتایج متغیرهای سرمایه مالی، سرمایه اجتماعی و سرمایه انسانی به‌ترتیب با ضرایب بتای 0/378، 0/324 و 0/152 بیشترین سهم را در تبیین واریانس تاب‌آوری کشاورزان شهرستان کرمانشاه در برابر خشکسالی داشتند.