

The socio-economic impacts of drought and water crisis on local communities of Iran

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Abstract

This study was conducted with a descriptive method and as a review study of the economic and social consequences of drought and water crisis in Iran. Published key researches on the socio-economic impact of drought on the lives of local communities in different parts of Iran were reviewed and their results were described. Then, the economic and social consequences of the drought were described separately in the form of criteria and indicators. The results showed that in the economic section, the criteria of crops and horticulture, income and cost, livestock products, investment and employment have been considered, and indicators have been presented as consequences of drought for each of these criteria. The social consequences of drought are also described in aspect of quality of life and community, responsibility and participation, security and health, and work and activity. The most important economic and social consequences of drought in the country can be described in the form of reduced household income and the emergence of rural poverty, increased unemployment, reduced food security and prevalence of disease, reduced production and yield of agricultural and livestock products, land use change and creating fake and alternative jobs and increasing rural migration.

Key words: Drought, Socio-economic impact, Local communities, Iran.

1. Introduction

Drought is one of the natural disasters that causes great damage to human life and natural ecosystems and is different from other natural disasters such as floods, storms and earthquakes [1]. In recent decades, among the natural disasters that have affected human societies, the frequency and severity of drought has been more than other natural disasters [2]. Due to the occurrence of this phenomenon, surface and groundwater resources have been

severely reduced, and as a result, we can see numerous negative effects on all aspects of rural life, especially the economic dimension and the structure of agriculture. Today, drought and water shortages and, consequently, declining agricultural production are one of the major global concerns [3].

Drought is one of the inevitable and harmful features of Iran's climate and has occurred in our country consecutively. Meanwhile, the villages have suffered the most damage due to their dependence on natural resources such as water. The dependence of the rural economy in the country on the agricultural sector and on the other hand the connection of agricultural products directly with water resources and rainfall has caused the greatest damage to rural households [4].

A review of the statistics presented in International Decade for Natural Disaster Reduction shows that 22% of the economic damage caused by disasters is due to drought. Also, 33% of people are affected by this phenomenon [5]. Thus, drought overshadows more populations than other natural disasters and causes more economic damage to communities. Drought not only causes severe and sometimes prolonged fluctuations in water resources, but also causes extensive damage to the economic, social and environmental sectors [6]. Although, the frequent occurrence of drought has made this crisis not a new phenomenon for farmers, but due to the complexity of the underlying factors and the negative consequences of drought, this phenomenon has become one of the main concerns of local communities. Drought causes to vulnerability of beneficiaries and rural communities, and effort to survive in these conditions is a major challenge for rural households affected by this natural crisis [7].

Drought has various socio-economic effects such as reduced household income, reduced alternative sources of income, increased hours and workload, conflict over water use, food insecurity, food shortages and malnutrition, reduced health and access to health services, Reducing the possibility of continuing education, unequal access to financial support services, increased rural migration, feelings of powerlessness, reduced quality of life, and reduced social cohesion [8, 9, 10, 11].

Unfortunately, in recent decades and years, frequent droughts have occurred in Iran, and the rural sector, as a part that relies on water and rainfall, has always suffered a lot of damage in this regard. The economy and society of rural communities depend on the existence of water and is based on the existence of water. In the present study, the effects and consequences of drought on economic and social issues of rural communities and beneficiaries based on sustainable development have been studied.

2. Material and methods

Due to the type and framework of the present research and review of various studies, the research method in this study is descriptive and established based on collecting findings and citing to the reported information. In this study, in order to collect information about the economic and social impact of drought in the country, library studies and resource review were used. For this purpose, similar conducted researches in different database were collected,

reviewed and analyzed. Authentic articles, related books and national and international reports have formed the main foundation of the research. In this study, various studies conducted in Iran in the field of socio-economic consequences of drought are presented and their results are reviewed. In the results section, by summarizing their contents, the criteria and indicators of drought impact for rural community are briefly described in both economic and social sections.

2.1. Key research in Iran

Poureghbali et al. [12], evaluated the consequences of drought and their impact on the migration intention of rural youth in Hamadan. The statistical population of the present descriptive-correlational study were all rural youth with 15 to 29 years living in Hamadan city, of which, using Cochran formula, 237 people were selected as the sample size and selected through multi-stage random sampling method. The results showed that 53.2% of rural youth intend to migrate from the village in the next one or two years and 63.8% of young people intend to migrate in the next few years. Also, ninety percent of rural youth believe that the various consequences of drought have a moderate to high level.

Shafiei et al. [13] investigated the effects of drought on the economic, social and environmental condition of rural areas in Hassanabad district in West Islamabad. Data analysis was performed by structural equation modeling (SEM). Finally, drought had an effect of 0.97, 0.97 and 0.87 on economic, social and environmental index, respectively. Therefore, the occurred drought in rural areas had the greatest impact on economic and social indicators and, consequently, on environmental indicators.

Merianji et al. [14] analyzed the effects of drought on wheat production and rural migration in Hamadan province. According to the SPI index, severe droughts have occurred in the northern and central plains of the province. In investigating the effects of droughts on rainfed wheat yield in eight cities of Hamadan province, autumn and spring drought has the most negative effect on rainfed wheat yield. The study of the effects of drought and wheat yield on rural migration shows that in 40% of rural migration between 2001-2006 drought had a main role. The results of regression analysis also indicate that the drought variable had the greatest effect (0.64) on migration (rural to urban) in this province.

Barghi and Memar Emamieh [2] investigate the effects of drought on sustainable economic development using the model of hierarchical analysis and factor analysis in Golab rural area of Kashan. 343 people from 5 villages participated in this research. The results showed that reducing agricultural production yield, reducing income, increasing water supply costs, reducing capital volume, reducing agricultural employment opportunities, reducing the price of agricultural and garden lands, reducing livestock production performance, increasing cultivation pattern change, reducing job diversity and increasing debts in the agricultural sector are the most important consequences and effects of drought on the economy of rural areas.

Jamshidi et al. [1] investigated the effects of drought on the economy of rural areas of Sirvan and Chardouel cities. The statistical population of their research was farmers who were

exposed to drought during the years 2006-2012. The results of factor analysis showed that drought in Sirvan city had a greater impact on agricultural economy in four important aspects of production recession, increasing farmers' debt, poverty and change in agriculture, respectively. In Chardaouel city the drought has the greatest impact on the creating a livelihood crisis, the emergence of poverty, change in agriculture and the debt crisis, respectively.

Adeli et al. [15] studied drought and its economic reflections in rural areas in Dodangeh rural district of Behbahan city. The results showed that the drought in the water year of 2008-2009 was the most severe drought in the region in recent decades. This phenomenon has reduced the yield of rainfed crops, the number of livestock, the amount of irrigated and rainfed land and household income. Also, financial ability, age, non-agricultural employment, ability to repay bank facilities and the amount of irrigated and rainfed land have been the most important factors determining farmers' economic vulnerability to drought.

Rezaei and Mohammadi Yeganeh [16] in an analysis on drought and its effects on agricultural economy and rural migration in Abarkoooh city showed that this city has drought for more than half of its years in the statistical period. The highest drought index is related to 1999. Also, the findings indicate that drought has reduced the instability of the rural economy in this city by reducing the yield of agricultural products and the drought variable has the greatest impact on migration in this city.

Riahi and Pashazadeh [17] investigated the economic and social impact of drought (2005-2009) on rural areas in Azadloo village of Garmi city. The statistical population of the study included 24 villages and 919 households that 270 questionnaires were completed in a randomized classification. The results showed that the damage caused by drought was observed in reducing income and savings, changing the job structure of the village, increasing the tendency to migrate from the village, reducing participation and social relations and reducing livestock and agricultural production.

Vorathi et al. [18] investigated the economic losses of agricultural drought in the years (1999 to 2003) in Isfahan province. The results of the analysis of this study showed that the damages caused by drought in the agricultural sector of the cities have a direct effect on increasing rural migration and turning to other jobs such as handicrafts and mines.

Ghanbarzadeh and Behniafar [19] in the study of the economic consequences of droughts in the period 1996-2006 on rural areas of Shandiz in Mashhad city found that in some years of severe to moderate droughts, especially in the downstream settlements of the village have irreparable economic consequences. So that 64.9% of the garden area has decreased during the drought decade compared to 1996 and three villages became uninhabited during this period.

Saleh and Mokhtari [20] studied the economic and social effects and consequences of drought on rural households in Sistan region. The results of the study showed that the impact of drought on the permanent outflow of labor from the agricultural sector has been very small. On the other hand, the income of most households from the agricultural sector has decreased significantly and the amount of investment has also decreased. The results of the study also

showed that there is a decreasing trend in the number of livestock. 95.5% of the studied households after the occurrence of drought had only the minimum food supply and their food consumption pattern did not follow quality standards.

3. Results

In the results of this study, the economic and social consequences of drought in rural areas of Iran are shown separately in criteria and indicators in both economic and social sections. In the economic section, the criteria of crop and horticultural products, income and expenses, livestock products, investment and employment have been considered, and for each of these criteria, indicators have been presented as consequences of drought. For example, in the criterion of income and expenses, decrease in household incomes and the emergence of rural poverty have been emphasized in most studies, although other indicators have also been mentioned. Also, in the criterion of agricultural and horticultural products, reduction of production and land use change has been more mentioned. In the criteria of livestock products and investment and employment, decrease in livestock performance and production and increase in the tendency to employment in other jobs have been more considered, respectively (Table 1).

Table 1- Economic consequences of drought by criteria and indicators

index	Criterion			
	crop and horticultural products	income and expenses	livestock products	investment and employment
1	Decrease in the area of the cultivated lands	Reduce family savings	Reduction of livestock production	Capital reduction
2	Reduce product efficiency	Decrease in family income	Rising prices of livestock inputs	Reducing employment opportunities in the agricultural sector
3	Decrease in production	Rising food prices	Increase the cost of livestock care and maintenance	Reducing employment opportunities in the livestock sector
4	Sale of agricultural and garden lands	Increase in production costs	Decrease in performance of livestock production	Reducing job diversity per household
5	Cropping pattern change	Increase debt to banks and other people	Reduce forage production and livestock needs	Increasing the tendency to work in non-agricultural and animal husbandry occupations
6	Reducing the price of agricultural and garden lands	Increasing the cost of living		
7	Decrease in agricultural transactions	The rise of rural poverty		
8	land use change			

The social consequences of drought are described in Table 2 separated by quality of life and community, responsibility and participation, security and health, and work and activity. In quality of life and community and responsibility, rural migration and reduction of rural participation have been expressed as important consequences of drought, respectively. In the criterion of safety and health, indicators of decrease in food security and increase and prevalence of diseases are considered as important consequences of drought, and in the criterion of work and activity, increase in unemployment is described as an important consequence of drought (Table 2).

Table 2- social consequences of drought by criteria and indicators

Index	Criterion			
	quality of life and community	responsibility and participation	security and health	work and activity
1	Decrease in quality of living environment	Reduce rural participation	Increasing family conflicts	The exit of labor from agriculture to other sectors
2	Reduce quality of life	Reduce the sense of responsibility	Increase and prevalence of diseases	The exit of labor from animal husbandry to other sectors
3	Rural migration	Less attention to acquaintances and relatives	Expanding feelings of deprivation and inequality	Reducing job satisfaction
4	More dependence of local communities to support organizations	Reduce villagers' trust in executive agencies	Increased insecurity	Rising unemployment of agricultural and livestock producers
5	Creating stress		Decrease in food security	Losing hope for the career future
6	problems in education and dropouts of students		Reduce the power of medical referrals and health testing	Turning to fake and illegal jobs

4. Discussion and Conclusion

Iran is located in the dry belt of the earth and has a dry to semi-arid climate with an average rainfall of about 250 mm per year and it is one of the areas prone to water shortages and intermittent droughts. Drought is one of the inevitable and harmful features of Iran's climate and has occurred continuously. Meanwhile, the villages have suffered the most damage due to their dependence on natural resources such as water. According to the results, drought as a natural occurrence in recent years, especially during the years 1996 to 2006 has imposed irreparable economic and social damage to rural communities. According to the results, the most important economic and social consequences of drought in the Iran can be concluded as follows: decrease in household income and rural poverty, increase in unemployment, decrease in food security and increase and prevalence of diseases, decrease in production and yield of agricultural products and livestock, land use change and the creation of false and alternative jobs and increasing rural migration.

Due to the arid nature and successive droughts in the country, this phenomenon has taken a normal course, but in a creepy way it has affected the groundwater resources and consequently production costs have increased and crop yields and income have decreased. Numerous studies have shown the decrease of groundwater level as a result of drought and this issue shows its effect on the agricultural and animal husbandry sector and the reduction of their products and performance [1, 17, 19, and 20].

In mountainous areas, rainwater can be controlled and stored for exploitation in dry seasons and times of water shortage. Promotion and use of drip irrigation systems, canal cover, planting crops that require less water, play an important role in the development of rural agriculture. Also, by separating domestic drinking water from water used in agricultural and industrial sectors, water consumption can be reduced and the socio-economic development of rural areas can be provided. In the study of Adeli et al. [15] it was stated that with increasing age, the possibility of vulnerability to drought increases. Therefore, the necessary measures such as agricultural pension should be considered to support the elderly in rural areas.

Berry et al. [21] emphasized that drought endangers the mental health of farmers. Holden and Shiferaw [22] in their study concluded that the impact of drought on household welfare through the impact on livestock and crop prices was greater than the direct impact of drought. Kenny [23] focused on the social effects of drought and pointed to issues such as physical and psychological stress, anxiety and depression, family conflicts, reduced quality of life, increased migration, increased general poverty, as the most important social consequences of drought.

The sale of livestock and irrigated and rainfed land, as well as the reduction of normal living costs, are strategies of rural households to deal with the adverse consequences of drought. While the use of these strategies allows households to survive in the short term, but a study by Keshavarz and Karami [24] showed that these strategies increase the vulnerability of farming households to future droughts. Undoubtedly, research and planning in the process of combating and mitigating the effects of drought does not completed only by recognizing the causes and effects of drought. Thus, solutions and techniques must be adopted to eradicate or reduce the effectiveness of these causes and reduce the severity of these effects and consequences.

Therefore, in order to sustain rural development in drought conditions and reduce its negative economic and social consequences, the following solutions are proposed:

- 1- Use of modern irrigation systems such as drip and pressurized irrigation
- 2- Identification, cultivation and development of drought-resistant species in agricultural and rangeland lands
- 3- Creating job diversity and rural employment by recognizing the potential of villages
- 4- Establishment and strengthening of rural insurance fund and insurance of agricultural products, agricultural lands and livestock
- 5- Preparation of related organizations and planning in the face of drought conditions in villages
- 6- Implementing livestock and rangeland balance plans



7- Development of new methods of water storage and equipping villages with water recycling technology

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