Drought and it's Environmental and Socio-Economic impacts in the viewpoint of farmers in south Khorasan province-East of Iran

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ABSTRACT

Drought management as an essential approach for regional development and maintaining employment in south Khorasan province farmers in their villages in east of Iran. Rainfall is the ultimate source of water, affecting production of crops and other biomass by direct falling on the fields as well as supporting surface and ground water irrigation. However, possibilities of drought occurrence in Iran vary from once in 20 years. The frequency and intensity of extreme weather events like droughts, floods, heat/cold waves, cyclones, delayed or early onset, long dry spells, early withdrawal, and floods in drought frequented areas and droughts in flood afflicted areas have increased during the last two decades due to global warming. Since drought is defined by deviation from the normal rainfall, it can happen in all regions. Assessment and management of drought is complex due to its gradual appearance and long lasting impact or recoveries. Characteristics and impact of drought vary from region to region and year to year. Drought affects human, livestock, wildlife, bio-diversity and degrades the quality of natural resource base. Drought management strategies in the past were adopted generally during or after the onset of drought and lacked pro-active preventive interventions during normal or excessive rainfall years. A comprehensive assessment of drought environmental and socio-economic impacts provides critical information to rational decisions supporting drought mitigation policies and programs. The purpose of this study was to survey environmental and socio-economic impacts of drought in south Khorasan province farmers-East of Iran and prioritized them according to the viewpoint of farmers

Keywords: *Drought management, environmental, Impact, socioeconomic, desert, south Khorasan province, Iran.*

Drought, Land degradation and desertification is one of the pressing challenges of the Islamic Republic of Iran. About 85% of the area (about 39.4 million ha out of 164.8 million ha) has been classified as arid and semi-arid which just receives between 30 to 250 mm of rainfall annually. Many of the semi-arid areas are degraded with a vegetative cover ranging from 5% to 50%. Yet if nothing is done in these low rainfall areas, the incidence of desert creep and rangeland degradation will increase with more adverse social and environmental consequences. Realizing the serious problems posed by Drought, land degradation and desertification for the nation building and prosperity of the people, the government has identified the rehabilitation of droughty and degraded lands as its one of the top development priorities.

Drought is universal phenomenon that can occur everywhere and can cause harmful impacts on human beings and natural ecosystems. Growing public awareness of the issue of global climate change has raised enormous concerns regarding its potential impacts and consequences. Although there are inconclusive findings on the specific impacts of climate change on regional water resources, many scientists have suggested that climate change is likely to increase the frequency and intensity of extreme climate events such as drought (IPCC 2007) & (Saadati et al. 2009). Drought based on frequency of occurrence, severity, affected area, economic damages, environmental and social affects and severe long term impacts is very important and dangerous phenomenon compared to other disasters (Nosrati & Kazemi 2011). Drought is one of the most important natural disasters which could be defined as: less than average annual rainfall and discordant distribution of rainfall in the region. With lack of rainfall for a long period of time; farms, gardens,

pastures, and forests which their required water resources are provided from the atmosphere rainfall are damaged directly. Particularly, agriculture which has an important role in national economy and is a set of activities that its aim is supplying food needs of community and produce raw materials for other sectors including industry (Karbassi 2001). Iran, with a rainfall average about 252 mm in year is among the dry regions in the world. Low rainfall, irregular distribution of rainfalls and climate warming, causes economic, environmental, political and social crisis in different areas (Alizade 2001). In recent years, impacts of drought were high on water sources, agriculture, livestock production, pastures, migration, rebellion of pests and disease. Drought can also reduce water quality, because lower water flows reduce dilution of pollutants and increase contamination of remaining water sources. Studies indicate that drought has priority to other natural disasters in the frequency of occurrence, duration, extent, loss of life, economic and social impacts and severe effects in the long run (Wilhite 2000). Damages of drought will affect economic, environmental and social status of communities (Wilhite & Glantz 1985). Drought includes a set of negative effects which not only affect economic and social activities of farmers and related industries, but also affect those who are not actually employed in agriculture but are living in agricultural regions (Edwards et al. 2008). Bimal (1998) in a study titled "coping mechanism practiced by drought victims (1994-95) in North Bengal, Bangladesh" surveyed the people who were damaged from drought. The results indicated that drought is a reversible phenomenon in Bangladesh, affecting plant growth and leading to loss of crop production, food shortage, and; for many people; starvation. Peter (2008) has studied the impacts of drought on the social well-being of rural communities and farm families. The results of his studies indicated that drought has significant impact on individuals in Victoria, particularly in rural and regional areas. The economic impacts of drought include reduced agricultural production and exports. In fact it decreases activities of each individual and provides base for them to immigrate. Horridge et al. (2005) in research as the impact of the 2002-2003 droughts in Australia concluded that the effects of drought on some statistical divisions are extreme, with 20% of decrease in income. Despite the relatively small share of agriculture in Australian GDP, the drought has reduced GDP by 1.6%, and has contributed to a decline in unemployment and to a worsening of the balance of trade. Shokri (2005) surveyed environmental, economic and social effects of drought and effect of solutions applied in order to reducing its effects in Sistan Province (Iran) and concluded that between the effects of drought (environmental, economic and socio- psychology) the economic effects are more than others, then environmental impacts and at last the least impacts were socio-psychology effects. Rezayi et al. (2011) surveyed economic, social, environmental, and ecological impacts of drought in Zanjan province and concluded that these impacts were economic, environmental, social and ecological respectively. Nuri and Bazrafshan (1996-2004) investigated direct and indirect effects of drought on rural economy of Sistan, and stated that direct effects include damage to crops, horticulture and animal husbandry and indirect effects include an increase in the population covered by the support relief organizations, an increase in migration from rural regions, reducing price of agricultural lands and orchards and also change rural economic structuring. South Khorasan province in -East of Iran is one of the Provinces that in recent years have caught with very strong drought and water shortage. This problem has created many limitations and negative impacts for farmers. drought and water shortage has more effect on this region. Reliable statistics indicate that south Khorasan province in -East of Iran will face with severe water shortage and drought in the future and these problems, more than anything, would affect rice production. The main purpose of this study was to survey environmental and socioeconomic impacts of drought in the viewpoint of farmers in south Khorasan province in -East of Iran, which follows the specific objectives below:

1. Describing personal-agricultural characteristics of farmers.
2 Studying environmental and socio-economic impacts of drought.
3 Prioritizing environmental, economic and social impacts of drought.
4 Studying relationship between farmers characteristics and impacts of drought.

METHODOLOGY

The present study was of the descriptive-correlation type in which its information gathered by using the survey method and designed questionnaire. To determine the validity of questionnaire used of comments of panel

of experts including faculty members of Rural Development Department of Birjand University and researchers in south Khorasan province in -East of Iran. To measure the reliability of questionnaire, 30 questionnaires implemented in selected rural areas by whose were randomly selected and lastly reliability of the questionnaire by using of Cronbach's alpha coefficient was 85%. The statistical population of this research was farmers whom their basic career were production of barberry and saffron and according to the information of Agricultural Organization (Jihad-e-Keshavarzi) in 2010 was caught by drought and water shortage. While in the previous year (2009) they had safe water for cultivation. This population contains 4000 barberry and saffron farmers' households. Sample size was 270 by using Cochrane formula and these individuals selected by using proportional stratified sample method. First, three cities of the province were selected. Then, from each city three villages and samples were randomly selected proportion to population of each village. Data analysis fulfilled in two descriptive and inferential parts by using SPSS software. Independent variables were age, literacy level and land ownership type and dependent variables were economic, social and environmental impacts. In order to prioritize the effects of drought, for each of the environmental, social and economic impacts, were identified 10 variables and then these variables with using mean and standard deviation were prioritized according to the viewpoint of barberry and saffron farmers. In descriptive section were used of frequency, percentage, minimum, maximum, mean and standard deviation. In inferential section were used of Spearman, Pearson and Eta correlation coefficient for evaluating relationship between independent and dependent variables. This article is part of a research project titled: (Investigating knowledge, attitude and skills of agricultural experts and elite farmers about of importance and effects of climate changes in agriculture in south khorasan province and extension education approaches and activities in confronting them) that by author has been done in the Islamic Azad University_ Birjand Branch – Birjand. IRAN.

RESULTS AND DISCUSSION

The results were analyzed in two parts, descriptive and inferential, by using the SPSS software. The average of barberry and saffron farmers agricultural experience was 35.8 years and average of theirs age was 52 years, so the community is going to get old. 61% of barberry and saffron farmers were illiterate or have elementary educations, which indicate low levels of literacy among the barberry and saffron farmers. The land ownership type indicated that most frequency related to personal ownership. Table 1 shows more information about personal-agricultural characteristics of barberry and saffron farmers include; age, literacy level and land ownership type.

Table 1: Personal characteristics of barberry and saffron farmers in south Khorasan province in -East of Iran

Item	No.	%
Age		
< 40	53	19.6
41-50	76	28.1
51-60	76	28.1
>60	65	24.2
Total	270	100.0
Literacy level		
illiterate	77	28.5
elementary	88	32.6
Pre-high school	55	20.4
diploma and upper	50	18.5
Total	270	100
Land ownership		
Personal	234	86.6
Rental	24	8.9
Partnership	12	4.5
Total	270	**100**

Mean=52
minimum=23
maximum=81

Table 2: prioritizing impacts of drought by barberry and saffron farmers in south Khorasan province in-East of Iran

Priority	Impacts	Mean
I	Economic	3.16
II	Environmental	2.95
III	Social	2.79

In the year of study, that barberry and saffron farmers faced with water shortage, their average area under cultivation reduced 1% rather than previous year; In other words, due to drought and water shortage, a number of the barberry and saffron farmers didn't cultivate part of their farms; also, results indicated that the average yield reduced significantly. So yield reduced, which directly reduces the income of barberry and saffron farmers.

In order to prioritize the impact of drought used of mean and standard deviation. The results indicated that

Table 3: Prioritizing the economic, environmental and social impacts of drought by barberry and saffron farmers in south Khorasan province in -East of Iran

Impacts	Priority	Variables	Mean	SD
Economic	I	Increase in costs labor and eradicating weeds	4.60	0.65
	II	Increase in costs for water supply	4.21	0.87
	III	Decrease in purchasing power	4.04	0.84
	IV	Decrease in savings	3.98	0.84
	V	Non-payment of bank loans and obligations	3.13	1.58
	VI	Increase in the false financial relationship	2.99	1.46
	VII	Decrease in Price of crops due to reduction of quality	2.94	1.02
	VIII	Decrease in income due to reduction of cultivation	2.13	1.65
	IX	Decrease in land price	1.92	1.03
	X	Decrease in income from side jobs, sericulture, fishing etc	1.69	1.17
Environmental	I	Decrease in seasonal rivers flow, groundwater levels	4.50	0.60
	II	Decrease in surface water reservoirs and ponds	3.77	0.80
	III	Increase in weeds growing in fields	3.63	0.79
	IV	Increase in mortality of fish and other aquatic in ponds	3.37	0.76
	V	Decrease in water quality	3.22	1.35
	VI	Increase in pest attack	3.08	1.06
	VII	Increase in plant diseases	2.95	1.50
	VIII	Increase in soil erosion	2.35	1.30
	IX	Increase in amount and intensity of fires	1.40	0.95
	X	Decrease in diversity of plant species	1.25	0.89
Social	I	Increase in frustration, anxiety and emotional problems	4.23	0.85
	II	Feeling of poverty and decrease in life level	3.57	1.05
	III	Decrease in recreational activities	3.52	1.11
	IV	Increase in local divisions to supply water	3.48	1.24
	V	Weakened position of institutions and cooperative unions	3.16	1.53
	VI	Weakened traditions of cooperation	2.91	1.16
	VII	Increase in tend to migrate	2.77	1.40
	VIII	Decrease in social ceremonies	1.77	1.30
	IX	Decrease in the level of education in children and juveniles	1.29	0.84
	X	Disintegrate of consistency and continuity in family system	1.27	0.45

Table 4: Results of correlation coefficients between variables in barberry and saffron farmers in south Khorasan province in -East of Iran

Independent variable	Dependent variable	Type of test	Correlation coefficient	Significant level	Significant relationship
Age	Economic impacts	Pearson	0.157**	0.001	Yes
Literacy level	Economic impact	Spearman	-0.147*	0.003	Yes
Land ownership	Economic impacts	Eta	0.132	0.035	No
Age	Social impacts	Pearson	0.104	0.088	No
Literacy level	Social impacts	Spearman	-0.131*	0.003	Yes
Land ownership	Social impacts	Eta	0.138	0.025	No
Age	Environmental impacts	Pearson	0.115	0.093	No
Literacy level	Environmental impacts	Spearman	-0.125*	0.004	Yes
Land ownership	Environmental impacts	Eta	0.102*	0.003	Yes

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

between the effects of drought (environmental, economic and social) the economic effects were more than others, then environmental impacts and at last the least impacts were social effects. Table 2 show the prioritizing of economic, environmental and social impacts of drought in south Khorasan province in -East of Iran.

For each of these effects (economic, environmental and social), 10 variables were identified and then investigated them with using of Likret scale in view point of paddy farmers. After that these effects was prioritized by using mean and standard deviation. Tables 3 shows prioritizing the economic, environmental and social impacts that caused by drought and water shortage in south Khorasan province in -East of Iran. So drought in addition decreasing the yield and barberry and saffron farmers' profit resulted in some direct and indirect impact in this province.

In connection with relationship between independent variables (age, literacy level and land ownership type) and dependent variables (economic, social and environmental impacts) used of Spearman, Pearson and Eta correlation coefficients. The results of Pearson correlation indicated that there was positive and significant relationship between the age of barberry and saffron farmers and economic impacts of drought (P =0.157, r = 0.001) with 99% level of confidence. In other word, with increasing the age of barberry and saffron farmers, the economic impacts of drought increase. Also the result of this test indicated that there was no significant relationship between age with social impacts (P = 0.104, r = 0.088) and age with environmental impacts of drought (P = 0.115, r = 0.093) and these two variables have no effect on each other. The results of Spearman correlation indicated that there was negative and significant relationship between the literacy levels of barberry and saffron farmers with economic impacts (S= -0.147, r = 0.003), literacy level with social impacts (S= -0.131, r = 0.003), and literacy level with environmental impacts of drought(S= -0.125, r = 0.004) with 99% level of confidence. In other word, with increasing the literacy level of barberry and saffron farmers, the economic, social and economic impacts of drought reduce. The results of Eta correlation indicated that there was no significant relationship between land ownership type of barberry and saffron farmers with economic impacts (Eta= 0.132, r = 0.035) and land ownership type with social impacts of drought (Eta= 0.138, r = 0.025), but there was statistically significant relationship between land ownership type with environmental impacts (Eta= 0.102, r = 0.003) with 95% level of confidence.

In connection with this test, results of compare mean indicated that, barberry and saffron farmers who own their lands stated the environmental impacts of drought were more than barberry and saffron farmers who had partnership lands and barberry and saffron farmers who had rental lands stated the environmental impacts of drought less than others. Table 4 shows the results of correlation coefficients between independents and dependents variables.

Drought is one of the most important natural disasters which affect on economic, environmental and social conditions of communities. Also it might occur even in all humid and semi-humid areas, although the details and rates can be different from one region to another. south Khorasan province in -East of Iran is one of the high deserted provinces of Iran that in recent years caught with drought and water shortage. This problem, in addition reduce yield of barberry and saffron in this province, leaded to other direct and indirect environmental and socio-economical problems for barberry and saffron farmers. The results of this research indicated that between environmental, economic and social impacts of drought, the economic effects were more than others, then environmental impacts and at last were social effects. This result is consistent with the finding of shokri (2005) and Rezayi et al (2011).

In viewpoint of barberry and saffron farmers, in economic part, drought leaded to; increase in costs labor and eradicating weeds, increase in costs for water supply, decrease in purchasing power, decrease in savings, non-payment of bank loans and obligations, increase in the false financial relationship, decrease in price of crops due to reduction of quality, decrease in income due to reduction of cultivation, decrease in land price, decrease in income from side jobs, respectively.

In environmental part, drought resulted in; Decrease in rivers flow, groundwater levels, Decrease in surface water reservoirs and ponds, Increase in weeds growing in fields, Increase in mortality of fish and other aquatic in ponds, Decrease in water quality, Increase in pest attack, Increase in plant diseases, Increase in soil erosion, Increase in amount and intensity of fires, Decrease in diversity of plant species respectively.

In social part, it resulted in increase in frustration, anxiety and emotional problems, feeling of poverty and decrease in life level, decrease in recreational activities , increase in local divisions to supply water, weakened position of institutions and cooperative unions, weakened traditions of cooperation, increase in tend to migrate, decrease in social ceremonies, decrease in the level of education in children and juveniles, disintegrate of consistency and continuity in family system respectively.

So survey of drought impacts indicated that drought had negative impacts on environmental, economic and social factors in south Khorasan province in -East of Iran. This result is consistent with the finding of Wilhite & Glantz (1985), Bimal (1998), Horidg et al (2005), Peter (2008), Rezayi et al (2011). That stated drought has several environmental and socio-economic impacts.

CONCLUSION

What is noteworthy is that these dimensions (environmental, economic and social impacts) cannot be considered separately from each other, but drought is a set of complex and intertwined of this dimensions. That this problem leads to synergistic drought impacts in the area. Due to the nature of economic and environmental impacts, the farmers feel these impacts quickly. While because of nature of social impacts, the risk of social impacts of drought in long-time is more. Other findings of this study indicated that, with increasing the literacy level of farmers in south Khorasan province in -East of Iran, due to the high awareness and knowledge and using of new methods to deal with natural disasters the economic, environmental and social impacts of drought reduce. Also with increasing the age of farmers, due to reduce the ability and low education level of farmers, the economic impacts of drought increase. In the part of result of land ownership, farmers who had rental ownership, due to indifference to environmental factors of land stated the environmental impacts less than other farmers. According to results of this research it is recommended that; first, to reduce the negative economic impacts of drought in the region, strategies such as low-interest loans, attention to crop insurance, support of diversity and development of employment take in priority of programs and actions in related organization, creating new job positions based on capacities of each region. Second, to reduce the environmental impacts of the drought: identification and extension of resistant cultivars and appropriate with region environmental conditions, Providing infrastructure of sustainable development of water resources, creation of reservoir dams, dredging of water channels and helping farmers to deal with especial pests and diseases of drought period, be considered. Third, in order to prevent social impacts, judicial and legal organizations to resolve internal disputes and conflicts in the use of water and pasture, counseling program for reducing stress and concern, sustainable solutions to support families from drought damages, be considered. Also training courses should be hold in order to increasing farmers' knowledge and awareness to deal with drought.

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