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Extent of the Use of Drought Management Practices by Farmers in Tafresh County

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Abstract

The extent of utilization of drought management practices by the farmers of Tafresh County was studied in a descriptive-correlational research. Statistical population consisted of all farmers in Tafresh County which summed up to around 9061 people out of which 300 farmers were taken as the sample in accordance with Cochran's formula. The main tool of the study was a questionnaire. The validity of the questionnaire was confirmed by a panel of expert consisting of some faculty members of Islamic Azad University, Garmsar Branch and the University of Tehran, and the reliability of the questionnaire was estimated as to be 0.848 using Cronbach Alpha. The results of correlation test indicated a direct, significant relationship between the extent of utilization of drought management practices and the variables of agricultural activities experience and the level of farmers' social capabilities at 0.01 level. Moreover, there was a negative significant relationship among age, farming experience and the application of drought management practices at 0.01 level. Finally, the results of multiple regression analysis showed that three variables, i.e. extent of farmers' social capabilities, experience of agricultural activities and the age of the farmers, had the greatest influence on the extent of utilization of drought management practices.

Keywords:
Drought, Drought management, Capability, Tafresh

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INTRODUCTION

Drought is a natural phenomenon that has happened in all eras. The vulnerability of the society to drought is increasing because of population growth, increased requirements and competition for limited water sources (Hejazizadeh and Joyzedeh, 2010). It is, also, projected that drought immigrant population will reach to one hundred million people in 2025, while the number of drought-related refugees was 23,5 million people in 2010 (David, 2011).

It is shown that drought has happened in almost all years in some parts of the country and even throughout the country (Fatehimarj, 2011) so that in total, out of the last 40 years, 15 years were wet, 5 years were normal and 20 years suffered from drought. In other words, at least 50% of the years were stricken by drought to varying degrees showing that this disaster has been a recurrent continental phenomenon in Iran (Seyfolahi and Shahabi, 2010).

This is while the recent droughts were so severe that their destructive results are still irreparable and has caused a lot of damage to rural societies. It has rung a warning alarm to farmer societies that experience maximum drought damages and become a vulnerable class (Sharifi and Zarafshani, 2010).

Since most people in these zones make living by farming, even a slight change in climate can immediately influence farming and cause more problems such as migration, dependence of country in supplying demanded foods and social, economic, cultural and even politic problems (Geravandi and Alibeigi, 2011; Panahi and Kheiri, 2009).

Accordingly, a new approach is proposed about disaster management especially drought and reducing vulnerability which is the study of farmers' characteristics and acclimation approaches in each region which needs the examination of farmers' capabilities from personal, social, … perspectives in applying appropriate management approaches to counteract the drought (Karpisheh, 2011).

Based on this, Rockstorm (2003) introduced management methods in small scales to decrease drought in homebred farming of semiarid zones and showed that water deficit of agricultural systems in semi-arid zones can be readily counteracted by managing systems that use water for supplementary irrigation helping the mitigation of drought losses.

In a study on approaches for the reduction of drought, Brown and Hansen (2008) concluded that crisis management should be replaced with pre-, during- and post-drought management integrated with farmers' local knowledge and modern knowledge in order for the destructive impacts of drought to be mitigated.

Rantakar and Govardahan's (2006) results about collaborative irrigation management in APWELL[1] project with the empowerment of human capacity theory showed that farmers' partnership in irrigation management during drought is very important and efficient.

According to what was said, we can summarize that drought management needs a special and comprehensive consideration to the effective variables in the management process although considering all the aspects is hard but not impossible. So the new approach for the management of natural disasters like drought and the reduction of their damages is oriented around local residents' capabilities for which farmers' capabilities including their personal and social abilities need to be assessed and appropriate management approaches for counteracting the drought need to be applied.

Accordingly, the present research was carried out to analyze personal and social capabilities of farmers in Tafresh County in order to facilitate the application of drought management practices and better management of drought.

MATERIALS AND METHODS

The study was carried out as a survey with regression method. Population of this research contains all farmers of Tafresh county (N=9061) out of which 300 people were chosen by simple randomization using Cochran Formula (n=300). In this kind of sample choosing number of chosen samples are specified by each rural district (Bazerjan, Roodbar, Koohpanah and

[1] *The Andhra Pradesh Ground Water Irrigation Schemes*

Table 1: Farmers frequency distribution based on social institution membership

Membership in Social institutions	Frequency	Valid percent
Islamic council	21	7.0
Village moot	4	1.4
Production cooperatives	89	30.2
None	181	61.4
Non-responses	5	
Total	300	100

Kharazan) and urban district farmers.

A questionnaire consisting of three sections was used for data collection. The first section with three questions includes personal traits of Tafresh county farmers. The second section was related to farmers' social capabilities in using drought management operations (includes membership in social institution, interaction and social relation of farmers and cooperation morale and desire to work with others) and the third section included statements about using drought management practices and 10 statements that were filled by interview. The validity was confirmed by a panel of experts composed of faculty members of Gramsar Branch of Islamic Azad University and the University of Tehran and the reliability was estimated to be 0.848 based on the coefficient of Cronbach's alpha..

Data were statistically analyzed and all calculations were done by SPSS version 19 software package. In descriptive statistics part, percent, median, minimum, maximum and standard deviation and in inferential statistics part the correlation coefficient and multiple regression were used.

RESULTS AND DISCUSSION

Farmers' personal characteristics

According to the results, farmers' age range was between 24-80 years with the average of 51.2. Also, more than half of farmers (59%) were older than 45 and their average farming background was 25.6 years. Most of respondents (75%) were men and most of them (20.3%) were literate.

The fact that the majority of the farmers were elderly and they were in a low educational level implies the importance of adult's education to recognize drought management practices. These results are in agreement with Taghavinia (2009).

Farmers' desire for membership in social institutions

According to Table 1, more than half of farmers (61.4%) did not have membership in any social institutions. It can be related to low awareness and weak relation of these social institutions with farmers and also the scant trust between farmers and institutions.

Farmers' social Interaction and relation

Table 2 shows the extent of farmers' social interaction and relation based on 6-30-point domain categorized at five 5 levels with equal intervals. Results show that the level of most farmers' social interaction and relation was 31.7% (95 people) that was moderate.

Table 3 presents frequency distribution of the statements about farmer's social interaction and

Table 2: Farmers frequency distribution based on social interaction and relation rate

Interaction and relation rate	Frequency	Valid percent	Cumulative percent
Very low(<10)	24	8.0	8.0
Low(10-15)	83	27.7	35.7
Middle(16-21)	95	31.7	67.3
High(22-27)	59	19.6	87.0
Very high(27>)	39	13.0	100
Total	300	100.0	

Median=20.20 Standard deviation=6.14 minimum=8 maximum=3

Table 3: Frequency distribution and prioritizing farmers based on extent of social relation and interaction

Interaction and relation	None		Very low		Low		Middle		High		Very high		Median	Priorities
	f	%	f	%	f	%	f	%	f	%	f	%		
Farmers in neighborhood and local	15	5.0	25	8.3	11	3.7	66	22.0	95	31.7	88	29.3	10.34	1
Jihad –e- agriculture	65	21.7	45	15.0	69	23.0	41	13.7	59	19.7	21	7.0	8.04	2
Agricultural experts	72	24.0	39	13.0	70	23.3	88	29.3	28	9.3	3	1.0	7.47	3
Rural cooperatives	117	39.0	39	13.0	49	16.3	46	15.3	35	11.7	14	4.7	7.16	4
Islamic council	173	57.7	39	13.0	35	11.7	28	9.3	15	5.0	10	3.3	6.91	5
Village moot	200	66.7	27	9.0	27	9.0	19	6.3	21	7.0	6	2.0	6.53	6

Scale: none=0, very low=1, low=2, middle=3, high=4, very high-5
(f = Frequency, % = Valid percent)

relation with mean of each statement. As is evident, a high percentage of respondents said that they had maximum interaction and relation with neighbor and local farmers.

Farmer's desire for teamwork and cooperation with others

In this section, respondents expressed their opinions about cooperation and their desire for teamwork with others. According to the results presented in Table 4, 32% of farmers had high level of desire for cooperation and team-work, 30% had very high level of desire, 1.4% had no desire, 6.9% had very low desire, 2.8% had low desire and 26.9% had moderate desire for cooperation and team-work. The results mentioned are in agreement with TavakoliPoor and Ajili (2009) and Shokri *et al*. (2007).

Farmers' social capability in applying drought management practices was assessed in comparison with others given the scale range of the variables of farmers' social interaction and their desire for team-working. Therefore, the minimum point for the studied farmers' social capability was considered as 0 and the maximum as 7. Table (5) shows farmers' social capability in applying drought management practices in a range of 0-7 at three levels with equal intervals. It was revealed that most farmers' social capability (74.5% or 216 people) was at a low level. So it

Table 4: Farmers frequency distribution based on cooperation morale and desire for teamwork

Cooperation morale and desire for teamwork	Frequency	Valid percent	Cumulative percent
None	4	1.4	1.4
Very low	20	6.9	8.3
Low	8	2.8	11.0
Middle	78	23.3	37.9
High	93	32.0	67.9
Very high	87	30.0	100
Non-responses	10	3.6	
Total	300	100.0	

Table 5: Frequency distribution based on farmer's social capabilities in utilization of drought management practices

Farmers social capabilities	Frequency	Valid percent	Cumulative percent
Low(<2)	216	74.5	88.3
Middle(2-6)	40	13.8	13.8
High(>6)	34	11.7	100
Non-responses	10	-	-
Total	300	100	

Median: 5.51 standard deviation: 1.02 minimum: 1 maximum: 7

Table 6: Farmers frequency distribution based on using drought management levels

Levels of using operations(score)	Frequency	Valid percent	Cumulative percent
Very low(<30)	74	24.7	24.7
Low(30-45)	127	42.3	67
Middle(46-61)	66	22.0	89
High(62-77)	18	6	95
Very high(>77)	15	5	100
Total	300	100	

could be because of the low membership of farmers in social institutions located in county and low social relations that by itself could be the reason of weak social capabilities of farmers, weak partnership and cooperation between them and finally weakness of drought management by farmers of region. These results echo the findings obtained by Folkman (1984).

Utilization of drought management practices

Results of the range of the use of drought management presented in Table 6 show that most farmers (42.3%) are weak in the use of drought management practices seemingly an evidence of the shortage of technology and facilities.

On the other hand, computation of degree median of the rate of using drought management operation as presented in Table 7 shows that method of using modified and drought-resistant seeds that need less water, regular dredging of main and minor streams and the adjustment of irrigation time in accordance with crop water requirement had the maximum usages among farmers while farm insurance against drought, the use of training courses for the extension of drought management and under-plastic cultivation method to maintain soil moisture were prioritized in the last ranks. This situation shows that the use of drought-resistant seeds can be more available to farmers. Also according to the farmers' high tendency for group work, regular dredging of the main and subsidiary water rivulets and the joint use of one water channel will be more possible. Therefore, the items with lower priorities are costly. It is worth noting that regular dredging of main and minor streams is in agreement with Beik Mohammadi *et al*. (2005) and the use of modified and drought-resistant seed that need less water and covering them to avoid the loss of water is consistent with (Darijani *et al*., 2011; Haddadi, 2002; Khabazzadeh, 2009; and Tavakolipoor and Ajili, 2009).

Correlation analysis

According to Table (8), as the results of Spearman correlation coefficient show, there is a negative, significant relationship between the rate of utilization of drought management practices and the age at the 1% level and there is a direct,

Table 7: Farmer's priority based on rate of using drought management operation

Operation	Mean	SD	Priority
Using modified and drought resistant seed that needs less water	4.48	1.302	1
Cleaning main-subsidiary sakes regularly between farms	4.00	1.214	2
Geminate usage of one transferor water channel	3.45	1.457	3
Controlling time of irrigation proportionate with water request of each harvest in different levels of improvement	3.08	1.408	4
Tubing and covering streams to avoid loss of water	2.80	1.338	5
Maintenance of chaff and stubble and herbal remains of the last farming year to keep moisture of the soil	2.83	1.47	6
Construct a water stockpile pool in the farm8-development of non-cultivated activities and shelter the crafts of county	2.74	1.282	7
Development of greenhouse cultivation	2.68	1.791	8
Changing the method of cultivation in the district proportionate	2.61	1.243	9
with drought strike	2.51	1.430	10

Table 8: Correlation between rate of using drought management operation and random chosen variable

Variables	r	p-value
Age	-0.222**	0.001
Agricultural experience	+0.217**	0.000
Level of farmers' capabilities of utilization of drought management practices	+0.248**	0.000

**p<0.01

significant relationship between farmers' farming experience and their social capabilities so that the higher the farmers' social capabilities, the higher the level of the utilization of drought management practices. These results are in agreement with Shokri *et al.* (2007) and Taghavinia (2009).

Regression analysis

Step-wise regression was used for measuring collective effects of independent variables on dependent variable whose results show that farmers' social capabilities only explains 36.5% of the variance of the rate of using drought management practices and it can be said that this variable is one of effective factors on the use of drought management practices by farmers. Then, social capabilities of farmers must be improved by partnership methods (Table 9), a point which was emphasized by Folkman (1998).

According to Table (9), linear equation from regression is as follows:

$Y=27.78+0.121X_1+0.182X_2-0.082X_3$

Where, Y= rate of using drought management operation, X_1= farmers' social capabilities, X_2= farming experience, X_3= farmers' age.

CONCLUSION AND RECOMMENDATION

According to the results, given the dependency of agricultural activities on farmers' physical health and that majority of them are in the middle age, the managers of agricultural sector should find mechanisms for rural youths' engagement in farming and their takeover of the elder farmers' responsibilities. Given the high level of farmers' farming experience, appropriate decisions should be taken to get their beneficial experience and indigenous knowledge to successfully implement drought management practices in the area of study. These findings are in conformity with the results of research conducted by Taghavinia (2009).

Since majority of the farmers in the area of study had low level of education, appropriate different extension methods with emphasis on visual and demonstrative media should be used. Taghavinia (2009) found similar results. It was revealed that farmers with low social participation need to be empowered through mechanisms of social capital formation such as trust building. Since farmers were interested to cooperate with other farmers through team working, this capacity should be taken into account in participatory drought management. Hence, their social capital needs to be enhanced through appropriate measures. The findings of researches carried out by Folkman (1984), Shokri *et al.* (2007) and Tavakolipoor and Ajili (2009) confirm these results.

According to farmers' perception, solutions

Table 9: Model summery and coefficients

Model	R^2	B	β	Statistic (t)	p-value
Constant	-	27.87	-	-	-
Level of farmers social capabilities	0.365	0.121	+0.368	+0.169**	0.000
Agricultural experience	0.489	0.182	+0.110	-1.068*	0.020
Farmers age	0.854	-0.082	-0.183	+1.382**	0.000

F=3.609 DF=13 R=0.432 R^2=0.854
**p<0.01, *p<0.05

such as the use of modified and drought-resistant seeds and the prevention of water wastes in canals are important for drought management. Darijani *et al*. (2011), Haddadi (2002), Khabazzadeh (2009) and Tavakolipoor and Ajili (2009) reported similar results. In addition, cleaning farm canals is also another drought management practice which was confirmed by Beik mohammadi *et al*. (2005). Given the results, it is necessary to provide suitable technologies, to establish infrastructures, to grant credits and to expand extension education for farmers in order to enable them to cope with the problems of drought management.

According to the regression analysis, social capability is a very important factor for drought management. Hence, this factors need to be enhanced. The finding is in conformity with Folkman (1998).

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