

Iranian Farmers' Attitudes and Management Strategies Dealing with Drought: A Case Study in Fars Province

¹Leila Karpisheh, ¹Mehdi Mirdamadi, ¹Jamal F. Hosseini and ²Mohammad Chizari

¹Department of Agricultural Extension and Education,
Science and Research Branch, Islamic Azad University, Tehran, Iran

²Department of Agricultural Extension and Education,
Tarbiat Modares University, Tehran, Iran

Abstract: Farmers' perception of drought is very influential in their susceptibility and even determines the applied strategies to reduce side effects of drought. The purpose of this study was to investigate Farmers' attitude toward drought and their strategies to mitigate drought. A multistage, stratified random sample size of 320 farmers in Fars province, Iran who suffered drought was surveyed. Using survey research results reveal that although farmers consider drought as the source of much of their pains and sufferings, they think of it as something controllable and have devised strategies to reduce its side effects. Direct contact with information sources, access to support services in drought conditions, age, educational background, farm size, agricultural experiences have influenced farmers' attitude toward drought. By contrast, animal unit, irrigated farm, not irrigated farm and annual income average did not affect farmers' attitude. Moreover, this paper demonstrates the most frequently and useful strategies used by farmers to reduce the side effects of drought.

Key words: Attitude • Drought • Controlling strategies • Iranian farmer • Fars province

INTRODUCTION

Drought is a serious disaster and continuing problem all round the world [1], if it is badly managed can lead to loss of crop production, food shortages may also get to starvation stage [2, 3]. Each drought produces set of profound impacts on society; therefore it should not be viewed merely as a physical phenomenon [2, 4]. Drought is considered and analyzed by many research scientists as the most complex but least understood of all natural disasters, which are affecting on more people than any other hazard [5-8]. Absence of a precise and universally accepted definition of drought can lead to confusion as to whether a drought exists and into what extent one can determine its severity [9-11]. Furthermore, this uncertainty can lead to confusion on part of policy makers at all governmental level and also in private sectors, as well as within international organisations and non-governmental organisations [5]. This confusion often affects decision makers on whether or not to take necessary action. Many definitions of drought exist because of the characteristics of drought differs between

regions [8, 12]. Droughts impacts also vary significantly between locations because of the differences exist in economic, social and environmental characteristics at the micro and macro scales. Drought definitions may have certain impact on application of any strategies in the specific region or any specific localized area. Generally, all droughts originate from a deficiency of precipitation [6, 7].

Four types of drought are frequently noted by many research experts: meteorological, agricultural, hydrological and socioeconomic [1, 13, 14]. By definition, meteorological drought is principally defined by the deficiency of precipitation from expected or "normal" amount over an extended period of time. Agricultural drought is defined as deficiencies in soil moisture, the most critical factor in defining crop production potential. A hydrological drought is defined by the levels of surface and subsurface water in the system. In addition, socioeconomic drought refers to situations where the reduction precipitation has impact on the wellbeing of the affected community and affects on general public through an imbalance in supply and demand [7].

Farmers' Perception of Drought Risk: Based on Kates analogies [15] human environmental behaviour may be considered as a reliable indicator of human perception [14], even though an individual's behaviour may be influenced by values and interests [16]. For a farmer who considers erosion on his land as problematic, reaching short-term production goals may outweigh the long-term but delayed benefits of investments in soil and water conservation (SWC) measurements [5, 17]. According to Ajzen [17] the intention to act which is influenced by the belief of perceived behavioural control refers to people's expectations regarding to the degree which they are capable of performing a given behaviour. The behavioural expectations they have extended to which they have the requisite resources and also they have believed that they can overcome whatever obstacles they may encounter [17].

In previous studies on farmers' attitudes were all based on an informal and subjective method. In fact they had never examined farmers' actual behavior [18, 19]. Attitude surveys in agriculture to a large extent guide us to prediction of Farmers' behaviors. Therefore, though treatment which depends on a complicated set of elements, that is largely based on farmers' attitudes [20]. That is why studying the farmers' views at the time of drought and elaborating on the relation between their views and managing treatment is of prime importance.

The farmers' choice of controlling strategies depends on their personal understanding of the risk of drought. Such understanding is different which depends on factors like the place of living, geographical features of the region, type of the farming land, etc [16]. According to Ajzen [17], factors like age, gender, demographical features, social class and race do not directly affect people's treatment. However these factors are indirectly influencing through their effects on farmers' views, mental norms and subjective inclinations [21].

Meze-Hausken [22] believes that experience is an important factor influencing an individual's perception of drought. Previous drought experiences shaped an individual's memory and are an important influence on how someone defines drought. One remembers as a drought depends on how an individual defines it. On the other hand, what an individual defines as drought depends on his remembrance about the droughts. The way drought is expectation of an individual about future droughts and on his personal behaviour. In addition the behaviour each individual can both be re-active and pro-active forms [14].

Human perception refers to a range of judgments, viewpoint and attitudes, from which it can be incidental that perception is neither universal nor static, but it is preferred to have dynamic concept [22]. What an individual has identified as a drought strongly depends on environment and its characteristics [21]. The perception of a climate is based on economical and social impacts of environment on personal lives [22]. People who depend on their natural environment have resilient and adaptive capacities to cope with natural hazards [23]. However, not most of people within a locality are evenly susceptible to drought. Based on given definition of vulnerability introduced by Watts and Bohle [24, 25], there are three coordinates of vulnerability to crises, risk and shocks known as *i.* risk of exposure; *ii.* risk of inadequate coping strategies; and *iii.* risk of and severe consequences of limited recovery.

Drought like any natural hazard cannot be predicted in advance. Based on past experiences, one can make a risk assessment, as a way to understand and deal with it. Attitudes towards risk depend on individual behaviours [14]. Kates and his coworkers [15] ascribes variation in personal expectations of future hazard occurrences and of personal hazard vulnerability to three factors. The first factor is the way one perceives hazard events mainly in terms of magnitude, duration and frequency. The second factor is the personal behavior encounters with previous events in terms of frequency and intensity of the hazard. Finally, the third identified factor is determined by the individual's point of view about nature. In fact it is directly somehow related to human level of tolerance and controlling the feelings and fates [14]. In semi-arid Africa, an often normal farmers reaction regarding drought is that it is an "act of God" on which humans have no influence [14]. Even in among Iranian traditional farmers may have quite similar believes as they blame nature [10]. Minnegal and Dwyer [26] argued that people have developed philosophical attitudes of having no control over their own future by attributing responsibility of future hazard to a higher power or authority.

Drought Controlling Strategies: The controlling strategies are a set of individual or social reactions to the environmental changes which are resulted from direct or indirect influences of the crisis. The methods and strategies people use in order to control the drought depend on the economic and social issues as well as the available data sources [6, 7, 27]. Studies conducted by Mortimore and Adames [21] discloses African farmers' responses to the drought crisis which were:

decreasing length of furrows, weeding, mixing crops, being occupied in jobs other than farming, migrating household members, as well as selling properties, livestock and lands. To beat these crucial situations at the time of drought, Indian farmers have developed strategies such as reconstructing the old dams using their financial support provided by non-governmental organizations. The controlled under-plastic cultivation has been developed in order to reduce the rate of water evaporation from the soil via a constructive method such as levelling the land [28]. Another independent studies carried out by Krannich *et al.* [16] indicate that three strategies have been generally useful in reducing the side effects of drought, namely, using the new water resources, presenting educational programs on how to preserve water, as well as devising proper watering strategies in order to consume water in the most efficient technique and correct way. Campbell [29] has referred to strategies used by Kenyan farmers for duration of 21 years (from 1977 to 1998), as they praying and supplicating for rain, also selling their properties including lands, asking the government and non-governmental organizations for any sort of financial aid and nutritional support, as well as seeking help from families and friends.

The purpose of present article is to investigate how farmers in Fars province in south west of Iran perceive drought and what are their personal behaviours to natural hazards. In addition Iranian farmers' responds to drought is evaluated.

MATERIAL AND METHODS

The present study was conducted in Fars province, south west of Iran. Fars province is one of the largest (121,000 km²; about 7.5% of Iran's land area) and most heavily populated (more than 4 millions) province. It is one of the leading regions in agricultural production (the leading province in wheat production), although recently has confronted with water scarcity [9, 10, 30]. The latest state division, the province now contains several counties (in Persian known as *Shahrestan*). Fars is one of the drought-prone areas of Iran and experienced a severe drought from 1998 to 2003. In 2008, when the data for

this study were collected, farmers were still suffering from the ongoing consequences of past drought. The drought severity classification of Fars counties was used in the sampling design of this study (Table 1). Counties with 30-45, 45-60 and over 60 percent reduction in precipitation were classified as experiencing moderate, severe and disastrous drought conditions, respectively.

A multistage stratified random sampling was used to select a sample of Farmers of Fars province who has suffered from past drought. According to division of Fars meteorological organization [30] the 16 counties were classified into three strata. A proportional sample was then randomly selected from each of the three drought strata. In each randomly select county, a proportional number of *Deh (s)* (villages) was randomly selected. All 5 counties and 40 villages were included in the sample. The final sample consisted of 320 farmers including 132, 123 and 65 farmers from counties with "disastrous", "severe" and "moderate" drought, respectively.

Data were collected during February and March 2008 using a structured questionnaire. Its "Face Validity" was confirmed by experts in Agricultural Extension and Education Department, Islamic Azad University. The reliability of the questionnaire was evaluated through a pilot study using Cronbach's alpha coefficient.

RESULTS AND DISCUSSION

The age of respondents in this study ranged from 22 to 74 years with a mean value of 45 years (Table 2). The range of family size was from 1 to 15 persons with a mean value of 6.5 persons. The range of educational backgrounds was from 0 to 18 years of schooling with an average value of 7.05 years. The majority of respondents (39.27%) had 1-5 years of education, while 28.05% were illiterate. The agricultural experienced farmers ranged from 3 to 62 years with a mean value of 23.84 years. Farmers had an average irrigated farm size of 8.05 ha, non-irrigated farm size of 2.96 ha and total farm size of 10.81 ha. The mean value of farmers' animal units was 22.6 heads. Animal heads were measured by the number of animals owned by a farmer (animal head = animal _ related animal coefficient, in this study animal coefficients were: sheep = 1, cow = 6.5 and poultry = 0.15).

Table 1: The drought severity classification of Fars counties [9-11]

Drought severity	Counties
Disastrous	Abade, Eghlid
Sever	Shiraz, Kazerun, Marvdasht, Mamasany, Arsanjan, Khorambid
Moderate	Jahrom, Fasa, Stahban, Ghirokazrin, Neiriz, Kharame, Firouzabad, Darab

Table 2: Demographic characteristics of respondents

Statement	N	Mean	S.D.
Age (years)	301	45.03	12.35
Family size (number)	317	6.45	3.26
Agricultural experience (years)	303	23.84	14.57
Educational background (years)	301	7.05	4.53
Irrigated farm (ha)	311	8.05	6.32
Not irrigated farm (ha)	315	2.96	3.27
Total farm size (ha)	308	10.81	11.59
Animal unit (number)	316	22.60	81.66

Farmers’ Attitudes Toward Drought

- Farmers’ Attitudes Toward Drought Controllability:

Attitude toward drought control was measured using a six-item, Likert-Type attitude scale (Table 3). All item means were above the median score of 3. These findings show that Farmers’ attitudes about their ability to control drought was positive.

A general review of the above table shows that though the methods applied by farmers might not be efficient. They believed that they have done their best to control the drought. They also maintain that drought is something manageable and its damages can be reduced with the government cooperation. Moreover, there are still other ways to control drought which can be learned and successfully applied as a strategy to control drought.

Table 3: Attitude toward controllability drought: n = 320

Statement	Strongly disagree		Neither agree nor disagree		Strongly agree		Missing data	Mean	S.D.
	Disagree	Disagree	Disagree	Disagree	Disagree	Disagree			
Drought is not a doomed fate and there are ways to control it	21	30	49	157	60	3	3.64	1.09	
More attempts must be made to control drought.	11	14	19	188	87	1	4.01	0.91	
Cooperation between farmers and the government can reduce the damages of drought.	13	17	22	177	91	-	4.03	0.86	
One can learn the drought controlling strategies.	18	25	45	164	63	5	3.72	1.05	
Utmost effort has been done to control drought	24	32	56	145	59	4	3.74	1.01	
There are better ways to control drought.	9	15	48	182	66	-	3.87	0.95	

^a Responses weighted 1–5 from strongly disagree to strongly agree

Table 4: Farmers’ attitudes toward the social effects of drought, n = 320

Statement	Very low	Low	Average	High	Very high	Missing data	Mean	S.D.
Creating mental pressure for the farmer and the household.	6	10	33	126	145	–	4.23	1.21
Endangering the household’s health	8	19	45	116	132	–	4.07	1
Lack of proper nutrition	2	15	54	123	126	–	4.11	0.62
Migration of the household members	13	24	35	106	142	–	4.06	1.05
Reducing participation in the level of village’s social activities	28	19	26	140	107	–	3.87	1.42
Increase in tension and quarrel in the village	10	27	25	101	157	-	4.15	1.16
Reduction in the level of social relations.	6	17	36	163	98	-	4.03	0.79

^a Responses weighted 1–5 from very low to very high

Farmers’ Attitudes Toward the Social Effects of Drought:

The farmers’ social attitudes indicate some of the impacts and side effects of drought. The following table shows that they do not have a positive evaluation of drought and consider it as the source of much of their sufferings (Table 4).

Access to Support Services in Drought Conditions:

Descriptive statistics for drought-affected farmers’ access to support services of government (i.e. access to extension drought programs, use of drought-related loans, etc.) are presented in Table 4. This variable was measured using a five-item, Likert-Type attitude scale (Table 5). All mean values were well below the median score of 3; that would suggest farmers had poor access to support services offered by government. Therefore, support services to empower farmers to cope with drought, is strongly recommended.

Contact with Information Sources:

The methods for contact with information sources was measured by asking respondents to indicate their access and contact with nine information sources (Individual training, workshop, technical visits, TV, radio, publications, poster, contact with progressive farmers, SMS). Table 6 shows, all item mean values were well below the median score of 3. These findings showed that farmer access to information sources was low.

Table 5: Access to support services in drought conditions, n = 320

Statement	Very low	Low	Average	High	Very high	Missing data	Mean	S.D.
Access to extension drought programs	38	69	88	92	33	-	2.13	1.49
Use of drought-related loans	136	78	69	25	14	-	2.09	1.14
Support to construct check dams or canals or to dig wells	121	92	58	42	7	-	2.17	1.12
Crop insurance	103	54	82	57	24	-	2.51	1.37
Support from family and friends	61	71	110	65	13	-	2.49	1.13

^a Responses weighted 1–5 from very low to very high

Table 6: Farmers' contact with information source: n, N = 320

Statement	Very low	Low	Average	High	Very high	Missing data	Mean	S.D.
Individual training	38	69	88	92	33	-	2.13	1.49
Workshop	134	78	69	25	14	-	2.09	1.14
Technical visits	121	92	58	42	7	-	2.17	1.12
TV	103	54	82	57	24	-	2.51	1.37
Radio	61	71	110	65	13	-	2.49	1.13
Publications	82	85	48	16	19	-	1.73	1.14
Poster	119	106	61	24	10	-	2.06	1.11
Contact with progressive farmers	94	86	55	56	29	-	2.5	1.32
SMS	169	94	29	19	11	-	1.79	1.06

^a Responses weighted 1–5 from very low to very high

Table 7: Correlation between farmers' attitudes toward controllability drought and selected variables

Variables ^a	r	P
Family size	0.152	0.015
Educational background	0.088	0.159
Total farm size	0.242	0.000
Animal unit	0.082	0.191
Irrigated farm	0.080	0.201
Not irrigated farm	0.042*	0.505
Annual income average (million tomans)	0.158	0.011
Contact with information sources	0.167	0.007
Access to support services in drought conditions	0.222	0.000
Age	-0.154	0.014
Agricultural experience	-0.149	0.017

^a Pearson correlation.

Relationship Between Farmers' Attitudes Toward Controllability Drought and Selected Variables:

A Pearson correlation test was used to investigate the relationship between farmers' attitudes toward controllability drought and selected variables (Table 7). As Table 7 shows Pearson correlation further demonstrated that among the 11 scale (measurement level) variables selected as factors; five variables had a positive and significant relationship ($P < 0.05$) with Farmers' attitudes toward drought. Access to support services in drought conditions showed the highest correlation with farmers' attitudes toward drought. Contact with information sources had the next highest correlation with Farmers' attitudes.

There is a significant correlation between the size of the household and the farmers' views about the manageability of drought. The more the number of

the household, the more the farmers will be under mental pressure and need to hold more positive views regarding this issue so that they can do more effective activities.

There was also a significant correlation between farm size and farmers' attitudes. Farmers with vaster lands were more inclined to use technical ways to beat drought and as a result have more positive views about its controllability.

Age and agricultural experience were negatively correlated with farmers' attitudes. Increasing age and experience in farmers will make them less certain about the manageability of drought. They believe that more than being controlled by man, drought depends on God's will. It should be noted that their former failures in controlling drought have significant role in creating such a positive point of view.

There is also a significant correlation between the farmers' annual income averages and their views about the controllability of drought. Farmers with more income viewed drought as a more controllable issue. They tried to use this privilege to choose more proper ways to control drought.

The obtained results indicate that the following variables: Total educational background, animal unit, irrigated farm, not irrigated farm did not show any significant correlation with attitudes toward controllability drought.

Farmers' Strategies to Mitigate Drought: As Table 8 demonstrates, most of the strategies applied by the farmers are not much effective. For example the use of rank for Praying (devotions), decreasing length of

Table 8: Strategies used by farmers to mitigate drought

Strategies	Utilization		Effectiveness	
	(%)	Rank	(%)	Rank
Devotions	89.6	1	38.8	25
Decreasing length of furrows	85.4	2	33.2	27
Deepening irrigation well	83.1	3	49.6	19
Reducing cultivation	80.2	4	20.5	31
Weeding	72.4	5	61.4	14
Migrating	70.3	6	54.3	17
Renting land	64.1	7	51.9	18
Practicing deficit irrigation	63.2	8	31.9	28
Practicing watershed	61.5	9	28.4	29
Reducing run-off	44.2	10	78.6	8
Avoiding second crop	42.1	11	40.7	24
Digging shallow well	40.1	12	47.5	20
Improving water conveyance system	39.6	13	65.3	13
Levelling land	31.8	14	86.5	3
Purchasing extra water	29.8	15	69.9	12
Constructing water reservoir	19.5	16	74.2	10
Using drought-resistant seeds	17	17	90.1	1
Selling land	14.2	18	73.8	9
Digging deeper well	13.7	19	45.3	21
Managing irrigation time	8.7	20	89.7	2
Changing crop pattern (drought-resistant)	7.9	21	55.8	16
Constructing new Canals	6.8	22	83.2	4
Lining canals	6.4	23	80.7	6
Using mulch	5.9	24	79.6	7
Changing irrigation system	5.5	25	81.4	5
Finding a second job	5.3	26	41.9	23
Producing a windbreak	2.8	27	59.8	15
Using a portable water supply	2.5	28	43.6	22
Minimizing tillage	2.1	29	22.4	30
Using conservation tillage	1.7	30	34.5	26
Mixing crops	1.4	31	71.8	11

furrows, Deepening irrigation well and reducing cultivation was 1 to 4 ranks and their effectiveness rank was 25, 26, 19 and 31, respectively. However, two of the practices appraised as most effective - Using drought-resistant seeds and managing irrigation time (ranked 1 and 2) were seldom used.

The most frequent strategies used by farmers are respectively as follows:

Devotions, decreasing length of furrows, deepening irrigation well, Reducing cultivation, Weeding, Migrating (household members, Renting land, practicing deficit irrigation, practicing watershed, reducing run-off.

However the most efficient strategies in view of the farmers are respectively as follow:

Using drought-resistant seeds, Managing irrigation time, Levelling land, Constructing new Canals , Lining canals, Changing irrigation system, Using mulch, Reducing run-off, Selling land, Constructing water reservoir.

CONCLUSION

It was concluded that farmers consider drought as painful source and suffering actions. However, they think of it as something controllable and have devised various strategies to reduce its side effects. Also the age may have negative impact on combating with drought; while education level and learning or have solid contact with information sources and also governmental financial support would highly assist all farmers in Fars province to have great resistance in combating drought. Access to supportive services in drought conditions and contact with information sources has the highest correlation with farmers' attitudes toward drought, but they seldom use support services, such as government aid and low-interest loans source of survival for farmers. I was noted that their access to drought- related agricultural extension programs is very limited. Therefore, support services to empower farmers to cope with drought, is recommended. In addition, advertisement and informative promotion are very thoughtful and useful strategies to create awareness which is strongly recommended for farmers to learn more about a novel method to retain sufficient strength to stand dynamic in duration of drought.

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