

Resource Loss as Predictor of the Way Farmers Cope with Drought: A Structural Model Approach

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ABSTRACT

This survey-study carried out among 360 randomly selected farmers living in drought-prone areas of Fars Province, Iran, set out to investigate the perceptions and psychological coping strategies of farmers when facing drought. Results showed that farmers perceived drought as a threat to all of their resources (material, conditions, personal, social and energies) and used emotion-focused and reactive problem-focused coping strategies rather than problem-focused strategies that require planning and being innovative to counteract its psychological consequences. Using structural equations modeling (SEM), relationships between perceived resource loss and the way farmers cope with drought were tested. Problem-focused coping was predicted by a greater loss of objects (e.g., yield, work utilities, land) and personal resources (e.g. motivation, patience and self-efficacy), but a smaller loss of energies (e.g. time and money). Predictors of emotion-focused coping were a greater loss of objects and energies, but smaller losses of condition and personal resources. The implications for educational interventions are discussed.

Keywords: Coping strategies, Drought, Resources, Slow-onset disasters, Structural equation modeling.

INTRODUCTION

Farm stress surveys in the United States and Europe have shown that farming is among the more stressful occupations (Belyea and Lobao, 1990; Walker and Walker, 2000). In a recent review of the limited empirical literature on farm stressors, Walker and Walker (2000) categorized sources of stress to farm families as financial, weather, workload, social, hassle, and worry. Among weather stressors, drought is a slow-onset natural disaster in which climatic events interact with economic, environmental, political and social factors. Unlike sudden-onset disasters, drought is a chronic stressor that

can last longer and extend across larger areas than hurricanes, tornadoes, floods, and earthquakes (Kinsey, Burger, and Gunning, 1998). At its most severe, drought creates vast windblown dustbowls which cause erosion, wildfires, financial loss and even habitat loss.

Drought is one of several types of natural disasters with psychological distress. The stress symptoms most commonly reported include: depression and anxiety (Coelho, 2000), headaches and hypertension (Wiens, Evans, Tsao, and Liss, 2004), low self-esteem and nervousness (Ortega, Johnson, Beeson, and Craft, 1994), negative attitude and poor concentration (Bosch, 2002), isola-

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tion, and overworking (Fetsch, 2003). Although symptomatology studies are becoming more prevalent, no studies have focused on how farmers perceive and cope specifically with drought. A few studies addressed farm-related stress in general. These studies have identified four coping strategies. These factors are fatalism, positive thinking, discussion, and avoidance (Cheval, 2003; Husain, 1997; Kinsey *et al.*, 1998; Russell, Griffin, Flinchbaugh, Martin, and Atilano, 1985; Gillard and Paton, 1999).

Conservation of Resources (COR) Theory (Hobfoll, 1988, 1998, 2001) provides a useful framework to examine the consequences of drought, which often involve catastrophic depletion of resources. According to COR Theory (Hobfoll, 1988, 2001), people are motivated to retain, protect, and build their resources. Hobfoll (1988) defines stress as the loss of resources, the potential loss of resources, or the failure to gain resources in proportion to one's investment in a task. These resources can be objects (e.g. car, home and clothing); personal characteristics (e.g. occupational skills and sense of self-esteem); conditions (e.g. tenure or seniority at work and a good marriage); or energies (e.g. money, time and knowledge). Resources are important, not merely for their face value, but because they define who we are. It is the actual or potential loss of these resources that threatens our identity or that which we prize and in so doing initiates the stress process.

In the context of drought, COR Theory implies that natural disasters such as drought restrict coping options and produce psychological distress by producing losses within each resource category. All the kinds of resources identified in Hobfoll's Conservation of Resources Theory are affected. For example, farmers may lose their crops (object resources) and with them the feelings of predictability and mastery (personal resources). Farmers may stop farming and migrate to urban areas outside the drought area (thus losing condition resources). Relocation can be very stressful, chaotic, and threatening (Riad and Norris, 1996). People not only

leave behind most of their material resources and their familiar social environments, but it also costs them money and time (energy resources) and with them a chance for quick recovery. Increasing evidence suggests that such resources may be depleted over time as a function of the ways people deal with adversities (Bolger, Foster, Vinokur, and Ng, 1996; Smith and Wallston, 1992).

Although COR Theory has been applied in the context of fast-onset disasters, little attention has focused on its application in the context of slow-onset disasters such as drought. The purpose of this study therefore was to examine the role of farmers' resources as predictors of the way they cope with drought. It extends previous research on stress and coping, by focusing on the circumstances of farmers and by linking the psychological implications of drought to the educational interventions of extension professionals.

MATERIALS AND METHODS

This study analyzes data collected from drought-affected rural area of Fars Province in Southwest Iran. Participants were a representative sample taken from six townships in Fars Province (Abadeh, Fasa, Firouzabad, Marvdasht, Darab, and Larestan) that were selected using multistage cluster random sampling techniques. From these townships, 36 villages were selected. From each village, 10 farmers were chosen randomly. Because of the low literacy level in the sample population, structured questionnaires were administered face-to-face. For consistency of data collection all participants were interviewed orally, regardless of their ability to read or write. Completed instruments were collected from 360 farmers at a 100% response rate.

Farmers' perception toward drought was measured with 20 items developed by the authors. Each item asked respondents to indicate whether they had experienced either a threat to (0 = "no", 1 = "yes"), a loss of (0 = "no", 1 = "yes") or an opportunity to gain (0

= "no", 1 = "yes"): (1) Yield (crop, orchard, and livestock); (2) Material resources (land, house, work utilities and appliances); (3) Essential food; (4) Children's essentials; (5) Forage; (6) Job status; (7) Quality of relationships; (8) Mental welfare; (9) Opportunities to socialize; (10) Family health; (11) Motivation to work; (12) Hope; (13) Self-esteem; (14) Self-efficacy; (15) Patience; (16) Personal health; (17) Income; (18) Knowledge; (19) Instrumental social support; and (20) Loans.

Farmers' coping strategies were measured with 27 items using a Likert 4-point scale. Of the 27 items, fourteen items were taken from the *Ways of Coping Checklist* (Folkman and Lazarus, 1980), which measures coping strategies that are generally applicable in any situation. In addition, following Cooper, Dewe and O'Driscoll (2000) 13 items were developed specifically for the drought experience. A panel of experts from the Department of Agricultural Extension

and Education in the College of Agriculture and the Department of Psychology in the College of Human Sciences at Shiraz University confirmed the content face validity of the perception and coping instruments. The instruments were pilot- and field-tested using 40 farmers who were not targeted in the study. Reliabilities were and consequently received 0.73 for the perception scale and 0.78 for the coping scale.

The data were analyzed using (SPSS/Pc+) and structural equation modeling (SEM). SEM is a collection of statistical procedures that elucidate the foundations underlying relationships among observed variables (King and King, 1997). The methodology derives primarily from the work of psychometrician Karl Joreskog and his associates, who developed a representation for analyzing the structures governing matrices of covariances among observed variables, commonly referred to as the "LISREL (Linear Structural Relations) Model". This represen-

Table 1. Frequencies and percentages of Iranian farmers perceiving resource loss, threats and opportunities as a consequence of drought. n = 360 Farmers

Farmers' Resources	Perceiving a loss	Perceiving a threat	Perceiving opportunity to gain	Not applicable ^a
1. Yield (crop, orchards, and livestock)	290 (80.5%)	64 (17.8%)	5 (1.4%)	1 (0.3%)
2. Material resources	173 (48.0%)	181 (50.3%)	5 (1.4%)	1 (0.3%)
3. Essential food	141 (39.2%)	205 (56.9%)	13 (3.6%)	1 (0.3%)
4. Children's essentials	124 (34.4%)	217 (60.3%)	13 (3.6%)	6 (1.7%)
5. Forage	132 (36.7%)	219 (60.8%)	5 (1.4%)	4 (1.1%)
6. Job status	64 (17.8%)	225 (62.5%)	71 (19.7%)	0
7. Quality of relationships	86 (23.9%)	174 (48.3%)	99 (27.5%)	1 (0.3%)
8. Mental welfare	99 (27.5%)	210 (58.3%)	51 (14.2%)	0
9. Opportunities to socialize	60 (16.7%)	197 (54.7%)	99 (27.5%)	4 (1.1%)
10. Family health	86 (23.9%)	211 (58.6%)	62 (17.2%)	1 (0.3%)
11. Motivation to work	102 (28.3%)	162 (45%)	96 (26.7%)	0
12. Hope	51 (14.2%)	138 (38.3%)	171 (47.5%)	0
13. Self-esteem	36 (10%)	207 (57.5%)	116 (32.2%)	1 (0.3%)
14. Self efficacy	62 (17.2%)	185 (51.4%)	110 (30.6%)	3 (0.8%)
15. Patience	65 (18.1%)	192 (53.3%)	99 (27.5%)	4 (1.1%)
16. Personal health	85 (23.6%)	225 (62.5%)	48 (13.3%)	2 (0.6%)
17. Income	309 (85.8%)	45 (12.5%)	5 (1.4%)	1 (0.3%)
18. knowledge	41 (11.3%)	83 (23.1%)	207 (57.5%)	29 (8.1%)
19. Instrumental social support	114 (31.7%)	175 (48.6%)	66 (18.3%)	5 (1.4%)
20. Loans	72 (20%)	199 (55.2%)	87 (24.2%)	2 (0.6%)

^a Not applicable to respondents' conditions



tation has two components: a measurement component and a structural component. The measurement component reflects relationships between constructs (factors or latent variables) and their manifest indicators (observed variables). It has been dubbed "confirmatory factor analysis" since it allows for an evaluation of a hypothesized factor solution. The structural component reflects relationships among the constructs (factors or latent variables) themselves.

RESULTS

The first objective of the study was to de-

termine farmers' perceptions toward drought. For this purpose, the number of resources reported as lost, threatened or gained respectively were counted. Results indicated that farmers of Fars Province perceived drought mainly as a threat to their resources. They reported an average of 9.75 resources being threatened (SD = 4.38, minimum = 0, maximum = 20). Loss and opportunity perceptions had a mean score of 6.10 (SD = 4.02, minimum = 0, maximum = 19) and 3.97 (SD = 3.56, minimum = 0, maximum = 16) respectively. Threat, loss and opportunity perceptions are qualitatively different. The three resources most often perceived as being lost are yield, income and material re-

Table 2. Farmers' coping strategies during drought. n=360.

Coping Strategies	Used a great deal	Used somewhat	Not used	Not ^a applicable
I. Problem Oriented Coping				
1. Worked harder	310(86.1%)	42 (11.7%)	7 (1.9%)	1 (0.3%)
2.Thought before I acted	264(73.3%)	82 (22.8%)	9 (2.5%)	5 (1.4%)
3. Used my experience	230(63.9%)	109(30.3%)	16 (4.4%)	5 (1.4%)
4. Prepared for the worst	84 (23.3%)	116(32.2%)	157(43.7%)	3 (0.8%)
5. Borrowed money	185(51.4%)	101(28.1%)	67 (18.6%)	7 (1.9%)
6. Bought water	50 (13.9%)	57 (15.8%)	193(53.6%)	60 (16.7)
7. Sold my herd	96(26.6%)	72(20%)	37(10.3%)	155(43.1%)
8. Bought forage	106(29.4%)	41 (11.5%)	66 (18.3%)	147(40.8%)
9. Sowed less	168(46.6%)	100(27.8%)	74(20.6%)	18 (5%)
10. Did not sow in spring	94 (26.1%)	73 (20.3%)	147(40.8%)	46 (12.8%)
11. Planted tolerant species	39 (10.8%)	42 (11.7%)	238(66.1%)	41 (11.4%)
12. Used less water	67 (18.6%)	43 (11.9%)	60(16.7%)	190(52.8%)
13. Deepened my well	151(41.9%)	48 (13.3%)	98 (27.3%)	63 (17.5%)
14.Dug a shallow well	66 (18.3%)	15 (4.2%)	199(55.3%)	80 (22.2%)
15.Dug a deep well	53 (14.7%)	17 (4.7%)	205(56.9%)	85 (23.7%)
16..Installed an electric well	81 (22.4%)	10 (2.8%)	182(50.6%)	87 (24.2%)
17. Installed trickle irrigation	37 (10.2%)	5 (1.4%)	114(31.7%)	204(56.7%)
II. Emotion Oriented Coping				
1.Accepted it as my faith	220(61.1%)	115(31.9%)	22 (6.2%)	3 (0.8%)
2. Prayed for rain	220(61.1%)	113(31.4%)	23 (6.4%)	4 (1.1%)
3..Pretended it was not so bad	200(55.6%)	78 (21.7%)	79 (21.9%)	3 (0.8%)
4. Told myself not to worry	75 (20.9%)	115(31.9%)	165(45.8%)	5 (1.4%)
5. Tried not to think about it	66 (18.3%)	118(32.8%)	167(46.4%)	9 (2.5%)
6. Take it out on others	59 (16.4%)	59 (16.4%)	233(64.7%)	9 (2.5%)
7. Used drugs more often	30 (8.3%)	44 (12.2%)	276(76.7%)	10 (2.8%)
III. Seeking Social Support				
1. Discuss it with family	185(51.4%)	112(31.1%)	59 (16.4%)	4 (1.1%)
2. Discuss it with friends	173(48.1%)	114(31.7%)	68 (18.8%)	5 (1.4%)
3. Talk to a specialist	149(41.4%)	118(32.8%)	89 (24.7%)	4 (1.1%)

Note. 0 = "not at all used", 4 = "used often,

^a Not applicable to respondents' conditions.

sources. Almost all resources studied were perceived as being threatened by more than half of the farmers. Only knowledge was perceived by a large percentage of farmers as a resource that could be gained (see Table 1).

To complete the second objective, farmers' coping strategies were identified. Table 2 shows the descriptive statistics. Concerning problem-oriented coping, farmers reported they worked harder, planned their actions and used their experience to overcome the problems related to drought. Most farmers used reactive coping strategies, and stayed-within the boundaries of their current management. For example, about 50 percent of the farmers to a large extent borrowed money and sold their herd to get liquid financial means, bought forage for their herd, deepened their wells, or simply sowed less. More pro-active strategies that need some planning ahead, such as digging another well and installing an electric well, or innovative strategies such as planting resistant plants, or installing a trickle irrigation systems, were far less popular. Between 67 and 75 percent of farmers never used pro-active strategies. Concerning emotion-oriented coping, accepting the situation as inevitable and praying for rain were used to a large extent.

Avoidance coping strategies (trying not to think about it, pretending it is not so bad, or use of tranquilizers) were less common. Finally, about 40 to 50 percent of the farmers to a large extent used social support from family, friends, and professionals.

Next, we used SEM to investigate to what extent loss of material, conditions, personal and energy resources related to respectively problem-focused coping, emotion-focused coping and seeking social support. We first fit the measurement component of the model. To correct for error variance in our coping instrument, we split the scales that measure "problem-focused coping" and "emotion-focused coping" into two halves. For "seeking social support" we used the three items as the observed variables. Regression coefficients link these observed variables to the latent variables (see Figure 1). For this measurement model, the fit indices are good: χ^2 (11 df) = 10.72, $p = 0.47$, RMSEA < 0.01, CFI = 1.00, TLI = 1.00, and NFI = 1.00. However, the regression coefficients linking the latent coping variables to the observed variables were not very high (ranging between 0.40 and 0.88).

Finally, we investigated to what extent resource loss predicted different coping strategies. Table 3 shows the correlations between

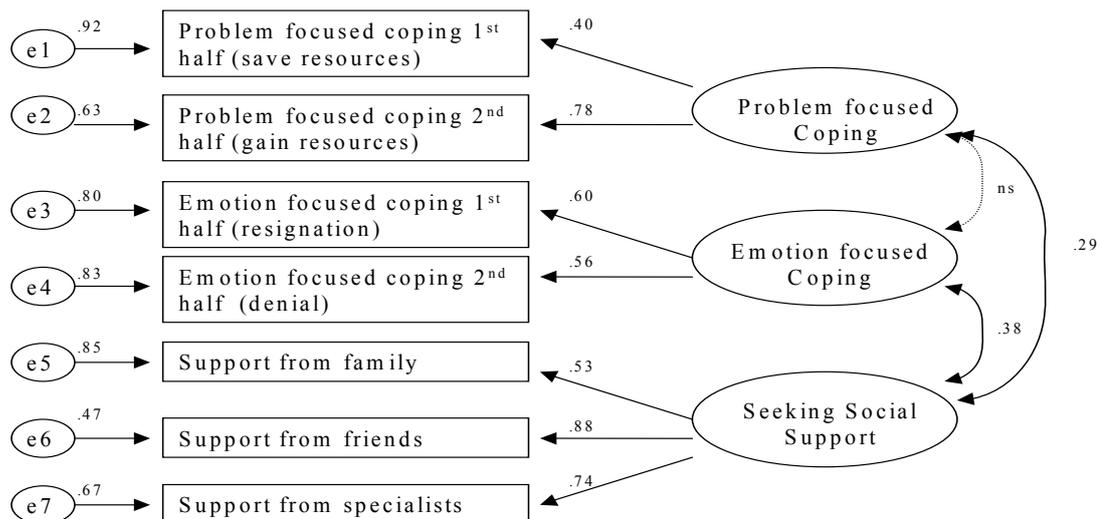


Figure 1. Measurement model of the coping scales. N=360 Iranian farmers, $\chi^2=10.72$, $df=11$, $p=.47$, RMSEA=.00, CFI=1.00, TLI (NNFI)=1.00, NFI=1.00

**Table 3.** Correlation coefficients between the resource loss variables and the latent coping variable

	Material loss	Loss of conditions	Loss of personal resources	Loss of energies	Problem-focused coping	Emotion-focused coping	Seeking social support
Material loss	-	.39	.17	.30	.27	.26	.05
Loss of conditions		-	.62	.42	.30	-.22	-.06
Loss of personal resources			-	.36	.29	-.35	-.05
Loss of energies				-	-.01	.06	.01
Problem-focused coping					-	.08	.29
Emotion-focused coping						-	.39

the (observed) resource loss variables and the (latent) coping variables in the model.

Figure 2 shows the results of the model we tested. This model can be interpreted as a regression analysis with multiple outcomes. The outcomes are problem-focused coping, emotion-focused coping and seeking social support. The predictors are loss of object resources, loss of energy resources, loss of condition resources, and loss of personal resources. These predictor variables were related to one another. For example, loss of personal resources correlated 0.62 with condition resources.

As Figure 2 shows, loss of object resources

(crop, orchards, life stock and means of production) predicts both problem-focused and emotion-focused coping strategies. Loss of energy resources predicts more emotion-focused coping. However, farmers experiencing loss of energy resources (time and money) engaged *less* in problem-focused coping strategies. In addition, farmers who reported more loss of condition resources, engaged *less* in emotion-focused coping strategies. Loss of personal resources positively predicted problem-focused coping (i.e., more loss and more problem-focused coping), but *less* emotion-focused coping.

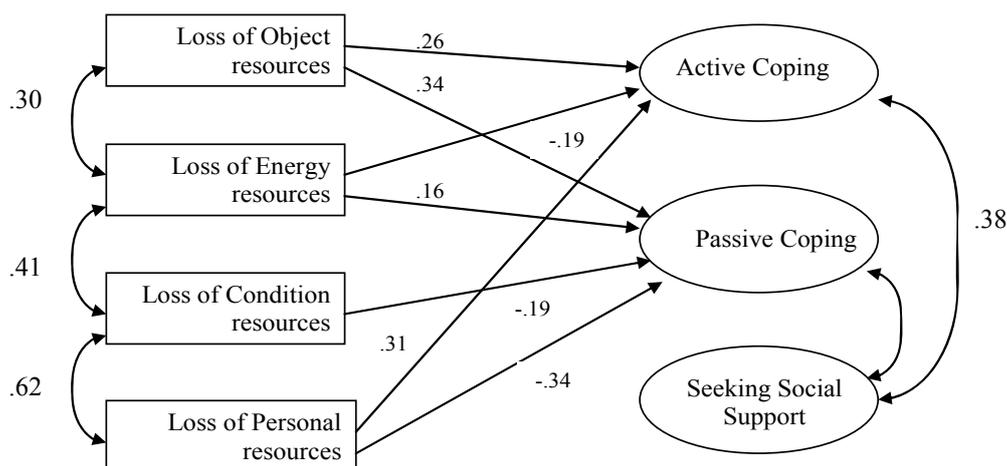


Figure 2. Structural Equation Model of Farmers' Resources as predictors of their Coping Strategies. N=360 Iranian farmers. $\chi^2=40.26$, $df=33$, $p=.18$, $RMSEA=.03$, $CFI=1.00$, $TLI(NNFI)=1.00$, $NFI=1.00$

DISCUSSION AND CONCLUSIONS

In summary, this study provides a conceptual model of how drought influences the perceptions and coping strategies of farmers in Southwest Iran. It is one of few studies focusing on drought, a slow-onset disaster, as compared to most previous research that has focused on fast-onset disasters. The results indicate that the majority of farmers perceive drought as a threat to many of their resources, either material or immaterial. This result is consistent with the findings of McCrae (1984) and Bjorck and Klewicki (1997) who suggest that slow-onset disasters such as drought are usually perceived as a threat, whereas sudden-onset disasters lead to loss perceptions. This can be explained, in that sudden-onset disasters are usually immediate, direct, and clearly visible. In contrast, the impact of a slow-onset disaster like drought is gradual, uncertain, and ambiguous. Slow-onset disasters only eventually lead to loss perceptions. The losses as a consequence of drought pertained mainly to yield, finances and material resources. Farmers also see opportunities related to drought, most importantly the opportunity to gain knowledge.

Overall, farmers used a mixture of both emotion-focused and problem-focused coping strategies, a finding that is consistent with the literature (e.g. Folkman and Lazarus, 1980). Accepting drought as inevitable and praying for rain tended to predominate among Fars Province farmers, as well as reactive problem-focused strategies, such as working harder, buying water and forage for the herd, selling the herd and sowing less. These strategies of coping are apt to be mainly palliative in the sense that they do not actually alter the threatening or damaging conditions for the better, but help the person endure the situation and make him or her feel better.

Innovative strategies that may be more effective to deal with drought (planting resistant cultivars and installing trickle irrigation) were not implemented by most farmers. This

is in line with the threat rigidity hypothesis (Straw, Sandelands and Dutton, 1981) according to which managers under stress would stick to safe old solutions to their problems.

In contrast to earlier findings showing that loss perceptions led to more passive coping (Fetsch, 2003), this study investigating what resources are perceived as lost in more detail shows that the results are more complex. Farmers who reported the loss of object resources engaged both in more active and more passive coping strategies. In turn, those who reported loss of energy resources used more passive coping strategies but less active coping ones. Smaller losses of both condition and personal resources predicted more passive coping strategies. In addition, farmers who reported more loss of personal resources, engaged more in active coping strategies.

This study shares the methodological limitations of much of the research on stress and coping. Most importantly, it was cross-sectional and based on self-reported data. However, it is one of few studies on the psychological reactions to slow-onset disasters and it has interesting implications to extension professionals involved in disaster mitigation programs. The following suggestions are offered.

First, the results indicate that extension professionals need to teach farmers that they should not only work harder, but also smarter. Farmers who face drought are struggling to survive by using all kinds of active and passive coping strategies, but they are not searching for new solutions. Threats and losses may cause them to become entrenched in their situation, unable to consider new solutions. Therefore it is wise for extension professionals to implement preparatory communications and related training procedures before the onset of drought. Furthermore, they may need to reach out actively to farmers most severely hit by the disaster.

Second, preparatory communications and procedures should not just focus on teaching new farming methods, but extension profes-



sionals also need to find out what problems farmers may be facing when trying to implement these new techniques. Such problems may relate to a lack of material resources, such as money. However, they can also relate to farmers' lack of self efficacy, or the beliefs held by close friends and relatives. People living in areas that are often struck by disasters are likely to have formed a "disaster subculture" (Hussain, 1997). A disaster subculture includes previously held beliefs, knowledge, experience, norms, values and survival activities of the local community regarding a shared disaster such as drought. These may include negative attitudes toward new techniques.

Third, passive coping can be very helpful when dealing with a situation that is beyond peoples' power. Fars Province farmers mostly used acceptance and praying. However, more useful passive coping strategies exist. Extension professionals can play a role in teaching farmers these techniques. Most important are preparatory communication interventions that enable farmers to increase their tolerance for drought, known as stress inoculation. During stress inoculation training, extension professionals can provide realistic warnings, recommendations, and reassurance to prepare farmers to cope with impending losses. Extension professionals can also encourage an optimistic reappraisal of drought among farmers. Positive thinking is most instrumental in counteracting initial feelings of helplessness and may facilitate learning and applying new knowledge during drought.

Several techniques can be employed by extension agents to help people prepare for drought. They can participate in local emergency planning councils, or develop Web-based and written educational materials for community members. Extension professionals can provide opportunities for discussion and the expression of frustrations among drought victims, in order to encourage cognitive coping strategies to replace self-defeating thoughts with reassuring and optimistic self-talk. Finally, conducting stress management workshops to teach farmers

stress management techniques will make farmers feel more competent in controlling their affective, cognitive and physical stress reactions during stressful events.

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منابع کشاورزان پیش بینی کننده راهکارهای مقابله با خشکسالی: "رهیافت الگوی ساختاری"

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چکیده

این مطالعه که به روش پیمایشی انجام شد، به مطالعه دیدگاه و راه های مقابله روانی کشاورزان استان فارس با خشکسالی پرداخته است. از میان جامعه آماری، تعداد ۳۶۰ کشاورز که در معرض خشکسالی بوده اند، به روش تصادفی انتخاب و به عنوان نمونه، مورد مطالعه قرار گرفتند. نتایج حاصل حاکی از آن است که کشاورزان، خشکسالی را به عنوان یک «تهدید» نسبت به منابع چهارگانه (فیزیکی، محیطی، درونی و انرژی) خویش پنداشته و برای مقابله با آن ترکیبی از راهبردهای «احساسی - مدار» و «مشکل - مدار» را بیش از راهبردهای برنامه ریزی شده و یا راهبردهای بدیع، مورد استفاده قرار می دهند. به منظور سنجش توانایی پیش بینی «منابع چهارگانه کشاورزان» از «الگوی معادلات ساختاری» استفاده گردید. با توجه به نتایج شاخص های نیکویی برازش فرضیه مورد بررسی با مدل تطبیق یافت که از برازش مناسبی برخوردار



بود. بنابراین می توان گفت که هر قدر کشاورزان هنگام مواجهه با پدیده خشکسالی منابع فیزیکی (عملکرد محصول، زمین، ...) و منابع شخصی (انگیزه، صبر و شکیبایی، خودکارآمدی) خود را از دست دهند، بیشتر از راهبردهای مشکل - مدار استفاده می کنند. این در حالی است که بین از دست دادن منابع انرژی زا (وقت، پول) و بکارگیری چنین راهبردی ارتباط منفی و معنی داری وجود دارد. از جمله عواملی که راهبردهای احساسی - مدار را پیشگویی می کرد، اتلاف منابع فیزیکی و انرژی زای کشاورزان بود. در عین حال اتلاف منابع محیطی و شخصی آنان ارتباط منفی و معنی داری با بکارگیری چنین راهبردی نشان داد.