



Farmers' Perceptions and Coping Strategies on Drought: Implications for Disaster Mitigation Programs in North-East Region, Nigeria

¹Umar, M. A., Medan, P. T.

¹Department of Vocational Education,
Modibbo Adama University of Technology, Yola.

²Department of Agricultural Education,
School of Vocational and Technical Education,
College of Education, Hong, Adamawa State.

ABSTRACT

Natural hazards cost farmers billions of dollars every year in the developing world, with drought emerging as the most damaging in a competitive landscape of challenges that often includes flooding, forest fires, plant pests and outbreaks of animal diseases. According to a report by the Food and Agriculture Organisation of the United Nations (FAO), natural disasters cost a whopping \$96 billion in destroyed or missing crops and livestock production to the agricultural sectors of developed countries between 2005 and 2015. Little is currently known about how farmers in the study area perceived and adapt to drought. This exploratory study assessed the perceptions and coping-up strategies of 360 randomly selected farmers in the northeast region of Nigeria. Results demonstrate that farmers in the study area are facing challenges to their resources as a consequence of drought rather than resource loss. Resource loss is related to more emotion-focused coping, whereas when farmers perceived threats they were inclined to use less emotion-focused coping. A relationship was found between perceptions and problem-seeking social support. Farmers from very high drought intense areas experience significantly more resource losses than farmers from medium or high drought intense regions. Farmers from high drought areas, on the other hand, faced more risks than farmers from medium and very high drought intensive areas. Farmers from very high areas with severe drought look for more social assistance than farmers from other areas. The paper discusses the implications of these findings for specialists who are serving farmers' needs during agricultural catastrophes.

ARTICLE INFO

Article History

Received: January, 2022

Received in revised form: March, 2022

Accepted: May, 2022

Published online: June, 2022

KEYWORDS

Farmers; Coping strategies; Drought;
Intensity; Vulnerability.

INTRODUCTION

Natural hazards cost farmers billions of dollars per year in the developing world, with drought emerging as the most damaging in a competitive landscape of challenges that often includes flooding, forest fires, hurricanes, plant pests, outbreaks of animal diseases, pesticide spills and blooms of toxic algae (Alcántara-Ayala, 2002; Montz, Tobin & Hagelman, 2017). According to a new report from the United Nations Food and Agriculture Organization (FAO), natural disasters have cost developing country

economies' agricultural sectors a staggering \$96 billion in damaged or lost crop and livestock production between 2005 and 2015. Half of the destruction – worth \$48 billion – happened in Asia, the study states, which was initiated today at a conference in Hanoi held by the government of Viet Nam in cooperation with the FAO. Drought is one of the leading culprits that has ravaged farmers in all corners of the globe lately. With a value worth of \$29 billion, eighty-three per cent of all drought-caused economic losses recorded by the FAO report were absorbed by agriculture. But



the study also details how many other risks impact food production, food safety and the livelihoods of individuals. Agriculture sectors which also include crop and livestock production as well as forestry, fisheries and aquaculture faced many threats, such as environment and demand instability, pests and pathogens, severe weather events, and an ever-increasing number of prolonged crises and conflicts, said FAO Director-General José Graziano da, Silva. "This has become the" current standard, "and these risks and problems will be further compounded by the effects of climate change," he stated.

Therefore, the mitigation and control of disaster risk must become an important part of modern agriculture. To ensure sustainable growth, which is a pillar of stability and the basis for adaptation to climate change, it is vital to create a more holistic and comprehensive disaster readiness system for agriculture," the FAO Director-General concluded.

Floods and hurricanes also had the greatest impacts in Asia, the world region where agriculture has been most impacted by disasters, but earthquakes, tsunamis and high temperatures also have a significant effect on Asian agricultural systems. Drought is the most costly form of catastrophe for both Africa, Latin America and the Caribbean causing grain and livestock losses of \$10.7 and \$13 billion, respectively, in those regions between 2005 and 2015. Also among the most costly disasters for African farmers were crop pests and animal diseases, resulting in losses of \$6 + billion in the same period. And Small Island Developing States (SIDS) around the globe are particularly vulnerable to natural disasters, especially tsunamis, earthquakes, storms and floods. The study reveals that economic damages in SIDS related to disasters have increased from \$8.8 billion between 2000 and 2007 to over \$14 billion between 2008 and 2015. On these marginal lands, drought affects food productivity, exacerbating hunger and weakening economic growth. As agriculture is the mainstream of the rural economy of Nigeria, low crop yields due to drought result in mass poverty and hunger.

Psychological research on the reactions of people to disasters has evolved significantly in the past 20 years (Belyea and Lobao, 1990;

Rausch, 1999; Walker and Walker, 2001). The focus, however, has been on unexpectedly occurring acute events, and the lack of awareness of the significance of slow-onset incidents has been an obstacle to a proper understanding of these phenomena and their far-reaching impacts (Dynes, 2004).

With exception of sudden disasters, drought is a persistent stressor that can last longer than hurricanes, tornadoes, flooding, and earthquakes (Kinsey et al., 1998). Most rural community members are impacted by the natural, economic and social impacts. Drought produces massive windblown dust bowls at its most extreme, causing deforestation, loss of habitat, wildfires, and financial loss. Studies of symptomatology in victims of drought have found that the most frequently identified signs of stress include: depression and anxiety (Coelho et al., 2004), headaches and hypertension (Wiens et al., 2004), low self-esteem and nervousness (Ortega et al., 1994), depressive mood and impaired attention (Bosch, 2003), and alienation (Fetsch, 2003). While a few studies have established coping-up strategies used by farmers, in general, to manage farm-related tension (Cheval, 2003; Gillard and Paton, 1999; Hussain, 1997; Kinsey et al., 1998; Russell et al., 1985), much remains unclear about how farmers view drought and cope.

This study aims to examine how farmers of the North Eastern region in Nigeria perceived and adjusted to the 2015 - 2020 drought conditions, and how these perceptions and coping-up strategies differ across states with different drought intensities. The researchers used Hobfoll's Conservation of Resources (COR) theory (Hobfoll, 1988, 1998, 2001) as a conceptual framework for this study. COR-Theory is a motivational stress theory that provides a comprehensive framework for understanding farmers' responses to drought (Zamani et al., 2006). People are trying to preserve, sustain or acquire capital, according to COR Theory. To counteract these (potential) losses, people view the (potential) lack of capital as upsetting and may take action. This behavior to deal with stressors, though, come at a price since they require an allocation of other capital. This means that those with stronger opportunities are more able to cope



with stressors and counteract (possible) lack of capital. In addition, resource loss can result in more loss, as resource exhaustion can result from coping with stressors (Hobfoll, 1988). This research would emphasize active, problem-focused attempts to resolve or modify the issue, emotion-focused attempts to mitigate emotional issues responses to challenging conditions and successful pro-social coping mechanisms called social help searching.

Unlike other well-known stress theories (such as Lazarus and Folkman's transactional stress model, 1984), COR-theory stresses that individuals are rooted in ecological processes and that these processes should be noted to recognize the reactions of the people to a stressor well (Hobfoll, 2001). The process of creating and cycling energy, for example, does not only happen at an individual level but also within the groups or societies that surround the individual. Ecological changes in resources (e.g. the individual) cause changes in resources at other levels (e.g. the organization or the community). In the outcome of disasters, the victims of the stressors usually exhaust their coping ability of the person and can inflict casualties in the society for others. This is counteracted as collective understanding occurs and assistance projects are implemented, for example. In the case of slow-onset crises, however, population understanding does not occur, a significant and increasing number of people are affected, and the coping capabilities of the population may become exhausted. This will decrease the true capacity of the society to safeguard its members and human processes of destruction are intensified (Kaniasty and Norris, 1999). On the other hand, it has been seen that social networks benefit from a tradition of past efforts to cope with crises and establish unique community-level coping that has been described as a 'disaster subculture' (Granot, 1996). Subculture of disasters comprises creeds, awareness, the local community's technologies, standards, principles and recovery practices in the years before, during and after a disaster. For a typical catastrophe, as a society creates a catastrophe subculture, this group is best able to adapt to the next incident. An increasing experience with and the implications of the repeated case

The sense of the incident for the group shifts progressively at a psychological stage, which in turn affects the evaluation of the hazard by the participant. At the household, community and national level, planning, adaptation and adaptation methods for drought have been examined, illustrating that dealing with drought is still an integral part of everyday life (Subbiah, 2000). However, insight into differences in perception and coping on the individual level between people from drought-prone regions and people from less drought-prone regions is still largely lacking (Zamani et al., 2006).

Vulnerability to drought

IPCC (2014) defined vulnerability as the level to which a system (natural or social system) will resist damage from climate change, whereas Vicente-Serrano et al. (2012) defined vulnerability to drought as the ability of a region to withstand drought. Other research (e.g. Burke and Brown, 2007; Zarafshani et al., 2012) observed that instability is a function of a system's susceptibility to change and the degree to which a system, whether beneficial or adverse, reacts to climate change. How quickly systems respond to climate change is the potential to change. Individuals' susceptibility is dependent on their capacity to endure pressure, stress and their approach to coping (Perkins, 2001).

Resistance means the ability to slow and reduce the impacts of drought, whereas resilience refers to the capacity of a system to recover from drought (Vicente-Serrano et al., 2012). Ansi-Agyei et al. (2012) described many variables, including low soil fertility, inadequate water conservation, poverty, rural insecurity, population development, shifting trends of use, climate instability and land use transition, as variables that may worsen the effects of drought. Natural resource over-exploitation is part of African drought adaptation and is a reaction to social and economic pressures on populations (Antwi-Agyei et al., 2012). Wilhite et al. (2007) and Vicente-Serrano et al. (2012) have shown that levels of insecurity within African populations have risen over the last decades. In addition, the reactions vary as the impacts of drought often differ spatially and temporally (Wilhite et al., 2007).



Impacts of drought in Nigeria

For several decades, drought has been an issue in West Africa but did not receive sufficient recognition until the 1970s Great Sahelian droughts (Abdullahi et al., 2016). In recent years, drought has not been well reported and the consequences are rising in severity and intensity. Drought and desertification in northeastern Nigeria are especially pronounced (Olagunju, 2015; Abdullahi et al., 2016; Elijah et al., 2017). Rain-fed agriculture is the primary cause of food production and means of subsistence for many poor rural farmers in sub-Saharan Africa, including Nigeria (Cooper et al., 2008). Peasant farmers in northeast Nigeria's Manga Grasslands are largely dependent on agriculture for their subsistence and have been affected by frequent droughts since the 1970s (Alhassan et al., 2003). Drought intensity has also threatened conventional irrigation structures in northeast Nigeria. People in the area are primarily subsistence farmers and nomadic herders, and hence the rural economy is based on agriculture (Alhassan et al., 2003).

In the 1970s the Sahel region was affected by extreme drought, leaving millions of people hungry (Mortimore, 1989). Drought incidents in the country, which threatened millions of people in northern Nigeria, lasted for around five to six years. The episodes induced malnutrition in the area and led to millions of environmental refugees (Mortimore, 1989). Much international recognition and funding have been provided to the Sahel countries, including Senegal, Mauritania, Mali and the Republic of Niger. In Northern Nigeria, the number of people affected is more than those affected in the other Sahelian countries combined (Mortimore, 1989). Nigeria's economic prosperity, which is due to domestic oil resources, can be traced to a lack of foreign press attention. The states of Northern Nigeria badly impacted by the droughts of the 1970s are those contiguous to the Republic of Niger. In Nigeria, the agriculture sector contributes 18.4 per cent of the national GDP, but crop production decreased to contribute just 7.3 percent of GDP after the droughts of the 1970s, leaving many Nigerians in extreme poverty and hunger in the north (Abubakar and Yamusa, 2013).

For this study, the specific research objectives were as follows:

- i. Determine farmers' perceptions of drought in terms of resource loss or threat.
- ii. Identify coping strategies farmers used to deal with drought;
- iii. Examine relationships between farmers' perceptions of coping strategies;
- iv. Determine if farmers' perceptions and coping strategies differ significantly across areas with different drought intensities

METHODOLOGY

This study analyzes data collected from a drought-affected rural area in the northeastern region of Nigeria. To represent the study area accurately, five local governments in each of the six states of the region were randomly selected using multi-stage cluster random sampling techniques. From these townships, 60 villages with varying drought intensities (medium, high, very high) were selected. From each village, 60 farmers were chosen randomly. A total of 360 farmers (response rate 100%) were interviewed using a structured questionnaire. Because of the low literacy level in the sample population, face-to-face interviews were conducted to complete the questionnaires. Respondents' age ranged from 20 to 85 years (M_/49.30, SD_/15.96). Concerning their educational level, 65% were illiterate, 20% had primary education, 11.5% had a diploma, and 3.5% had a university degree. In regards to farmers' professional characteristics, they were engaged in cereal crop farming, orchard farming, and animal husbandry.

With 20 items questionnaire developed by the researchers for the particular population on the resource loss was assessed. Each item asked respondents to indicate whether they had experienced either a threat to (0_'no', 1_'yes'), or a loss of (0_'no', 1_'yes'): 1) yield (crop, orchard, and livestock); 2) material resources (land, house, work utilities, appliances); 3) essential food; 4) children's essentials; 5) forage; 6) job status; 7) quality of relationships; 8) mental welfare; 9) opportunity 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-up



strategies were measured with 20 items using a Likert four-point scale, measuring ten active problem-oriented strategies, five emotion-oriented strategies and five seeking social support strategies. Ten items were adapted from the Ways of Coping Checklist (Folkman and Lazarus, 1980), which measures coping strategies that are generally applicable in any situation. Examples are: 'I thought before I acted' (active), 'I tried not to think about it' (avoidant), and 'I discussed it with my family' (seeking support). In addition, following Cooper et al. (2001) who advised measuring coping in a situation-specific way, 13 items were developed specifically to the drought experience. These were problem-oriented strategies, such as 'I dug a deep well', 'I cultivated drought-resistant plants, and 'I installed a trickle irrigation system'. Farmers were asked to indicate how often they used each type of coping strategy to deal with drought, 0 (not used), 2 (used somewhat), and 4 (used a great deal). Content validity was established by three experts from the Department of Vocational Education, Modibbo Adama University of Technology, Nigeria.

RESULTS

Farmers' Perceptions of Drought in terms of Resource Loss and Threat

The first aim was to determine the perceptions of drought by the farmers. The amount of resources reported as lost or damaged has been calculated for this objective. Results suggested that Fars provincial farmers largely view drought as a threat to their resources. They reported an average of 9.75 resources being threatened (SD_ 4.38, minimum_ 0, maximum_ 20). Loss perceptions had a mean score of 6.10 (SD_ 4.02, minimum_ 0, maximum_ 19). Perceptions of danger and loss are qualitatively complex (see Table 2). Yield, income and material resources such as property, operating facilities, and appliances are the three services most commonly viewed as being lost. More than half the farmers viewed almost all the capital analyzed as being threatened.

Coping Strategies Farmers Used to Deal with Drought

The coping strategies of farmers were identified to complete the second objective. Descriptive statistics are displayed in table 3. Regarding problem-oriented coping, farmers reported working harder, planning their actions and using their experience to overcome the drought-related problems. The majority of the farmers used coping strategies which were reactive and mitigating. Around 50% of farmers, for instance, mostly lent money and sold their herd to get liquid financial capital, bought forage for their herd, their wells deepened, or merely sowed fewer. More proactive or innovative strategies that need some planning ahead, such as digging another well; installing an electric well; planting resistant plants; or installing a trickle installation, were far less popular. Between 67 and 75% of farmers never did any of these. Concerning emotion-oriented coping, accepting the situation as inevitable and praying for rain we're used to a large extent. Avoidance coping strategies (trying not to think about it, pretending it is not so bad, or using tranquilizers) were less common. Finally, about 40_50% of the farmers to a large extent used social support from family and friends and asked for advice from professionals.

Relationships between Farmers' Perceptions and Coping Strategies

We calculated Pearson correlation coefficients to investigate the relationship between farmers' perceptions and coping strategies. These indicated that the more losses farmers experienced, the more emotion-focused coping strategies they used (r^2 .25, pB .05). In contrast, perceiving threats related to less emotion-focused coping (r^2 .34, pB .001). No relationships were found between loss and threat perceptions and problem-oriented coping or seeking social support.



Table 1. Percentages (%) of farmers that perceived resource loss to their resources as a consequence of drought (N=360 farmers)

Resource	Perceiving a loss	Perceiving a threat
Yield (crop, orchards, and livestock)	21	79
Material resources	33	67
Essential food	59	41
Children's essentials	62	38
Forage	52	48
Job-status	48	52
Quality of relationships	27	73
Mental welfare	63	37
Opportunities to socialize	44	56
Family health	57	43
Motivation to work	22	78
Hope	68	32
Self-esteem	51	49
Self-efficacy	38	62
Patience	69	31
Personal health	61	39
Income	46	54
Knowledge	53	47
Instrumental social support	77	23
Loans	30	70

Farmers' Coping-up Strategies across six states with Different Drought Intensities

Multivariate variance analysis was performed to examine differences in perceptions of drought and coping strategies across regions of differing intensities of drought. Results revealed significant differences between groups: Wilks's $L_{.74}$, $F(26,684)$, 4.31, $pB .001$. Next, we looked at geographical variations in personal and business traits (see Table 4). Sub-samples from various drought regions ranged considerably in terms of age, family size, a number of children under the age of 18, herd size and acres of land and possession of cropland. Many of the less affected sub-samples from regions of medium drought intensity varied from the other two sub-samples. They were somewhat older than the other two sub-samples, and had smaller family sizes and had fewer children under 18 years of age. Concerning business characteristics, farms from medium drought intense areas had a larger herd size. In contrast, farms from areas with very high drought intensities had more hectares of crop farming.

To examine regional variations in understanding and coping mechanisms, the researchers counted the total amount of resources perceived by farmers as threatened, lost or acquired. The coping strategies were outlined in three categories: problem-focused coping, emotion-focused coping and social support seeking (see Table 3). Results showed a statistically significant difference between the perceptions of farmers across various intensities of drought, which means that farmers living in areas of high severity of drought had faced more risks to their resources than farmers from medium and very high severe areas of drought. In this respect, they were worse off than farmers in medium drought intense areas, but not farmers from very high drought intense areas because this latter group had experienced more resource losses. Concerning coping strategies, research only found a disparity concerning finding social support. The more serious the region's intensity of drought, the less likely the farmers were to find social support.

Corresponding author: Umar, M. A. ✉ musaumarabba@yahoo.com ✉ Department of Vocational Education, Modibbo Adama University of Technology, Yola. © 2022. Faculty of Technology Education. ATBU Bauchi. All rights reserved



Table 2. Farmers' coping strategies during drought (N=360)

	% Used a great deal	% Used somewhat	% Not used
Problem-oriented coping			
Worked harder	69	61	30
Thought before I acted	82	38	10
Used my experience	49	22	29
Prepared for the worst	72	14	14
Borrowed money	16	28	58
Bought water	23	61	16
Sold my herd	17	59	24
Bought forage	18	37	45
Sowed less	53	13	34
Did not sow in spring	69	44	3
Planted resistant plants	35	40	25
Used less water	82	16	2
Deepened my well	51	63	14
Dug a shallow well	62	35	3
Dug a deep well	33	49	18
Installed an electric well	63	11	26
Installed a trickle installation	17	22	61
Emotion oriented coping			
Accepted with good faith	61	58	19
Prayed for rain	49	31	38
Pretended it was not so bad	47	10	43
Told me not to worry	72	15	13
Tried not to think about it	14	51	35
Take it out on others	29	69	2
Used drugs more often	25	34	41
Seeking social support			
Discuss it with family	33	56	11
Discuss it with friends	68	17	15
Talk to a specialist	42	50	8

Note: 0_ 'not at all used', 4_ 'used often'.

Table 3. Comparison of demographic variables, drought perceptions and coping strategies of farmers from different drought intensities (valid N_/360 farmers)

	Medium drought intensity N=120 M (SD)	High drought intensity N=120 M (SD)	Very High drought intensity N=120 M (SD)	df	f value	f prob.
Variables in the analyses						
Farmer's age	63.27 (18.10)	51.47 (17.20)	57.08 (18.00)	2	2.29	</.05
Family size	6.33 (2.93)	6.43 (2.86)	4.83 (3.77)	2	17.53	<.001
Number of children B/18 years	2.17 (2.03)	3.19 (2.05)	2.92 (2.66)	2	14.22	<.001
Hectares of crop land	8.37 (12.12)	7.13 (6.94)	7.52 (11.83)	2	2.72	<.05

Corresponding author: Umar, M. A. ✉ musaumarabba@yahoo.com ✉ Department of Vocational Education, Modibbo Adama University of Technology, Yola. © 2022. Faculty of Technology Education. ATBU Bauchi. All rights reserved



	Medium drought intensity N=120 M (SD)	High drought intensity N=120 M (SD)	Very High drought intensity N=120 M (SD)	df	f value	f prob.
Hectares of orchard land	4.68 (9.73)	2.66 (3.81)	1.92 (2.71)	2	.41	<.001
Herd size	44.84 (73.25)	27.55 (28.76)	28.62 (53.42)	2	4.00	<.05
Farmers' income per annum	327.59 (739.33)	281.52 (771.39)	212.63 (117.73)	2	3.52	<.05
Number of resources lost	7.88 (4.39)	4.37 (2.59)	6.22 (3.98)	2	8.00	<.001
Number of resources threatened	26.32 (7.28)	15.37 (4.11)	5.72 (5.11)	2	3.73	<.001
Problem-focused coping	3.33 (.94)	2.64 (.88)	2.61 (.63)	2	.23	<.001
Emotion-focused coping	3.66 (.71)	1.83 (.91)	1.39 (.22)	2	.40	<.001
Seeking social support	6.12 (2.44)	3.27 (2.11)	4.27 (2.82)	2	1.55	<.001

DISCUSSION AND CONCLUSION

This research examined variations in perception and coping-up strategies of farmers with various drought intensities across the northeast region of Nigeria. It is one of a few psychological studies that offer insight into the individual-level impacts of slow-onset disasters. Unlike the consequences of fast-onset disasters that are usually accompanied by (perceived) property depletion, the findings of this study showed that drought was perceived by the majority of farmers as a threat to their resources. This finding is consistent with Bjorck and Cohen (1993) and McCrae (1984) observations that persistent stressors like drought are generally viewed as a threat. This can be explained by the incremental, unpredictable and unclear impact of slow-onset disasters such as drought, while the consequences of sudden-onset disasters are typically instant, strong and evident. The study's results found that farmers in high-drought-intensive areas suffer more resource losses than farmers in other areas, stressing that the effect of drought is more pronounced in areas experiencing more extreme episodes of drought. The overall, farmers used a combination of coping-up strategies that are both psychological and problem-focused, a finding that is consistent with the literature from Folkman and Lazarus (1980). Considering problem-focused handling, the most widely mentioned was prepared for the worst and using less water during drought, which mitigates behaviours rather than preparatory acts to help

farmers cope better with the next episode of drought. Moreover, among far-off regional farmers, emotion-focused coping strategies (acceptance and hoping for rain) appeared to prevail. These latter interventions are likely to be largely palliative in the sense that they do not directly change the threatening or adverse situations but rather make the individual feel better. To a large degree, farmers can use emotion-focused tactics when they believe the drought is uncontrollable and something that can only be experienced.

Results from this study found that farmers who recorded more losses were more likely to use coping strategies based on emotion, such as encouragement and meditation. This is consistent with other authors' observations that failure expectations narrow the spectrum of coping methods and determine dependency on fewer coping strategies. Specifically, more palliative, emotion-focused approaches, such as acknowledgement, will be facilitated by loss perception (Fetsch, 2003). Authors have often suggested that fears of failure will inhibit mitigation interventions (problem-focused). No support however was found in the findings of this study. Furthermore, the findings of this research showed that evaluating an incident as a threat (i.e. possible damage or loss) leads to less emotion-focused coping. By resisting the perception of high-risk active coping strategies, threat perceptions have been argued to have a defensive role (Bjorck and Klewicki, 1997). Threat

Corresponding author: Umar, M. A. ✉ musaumarabba@yahoo.com ✉ Department of Vocational Education, Modibbo Adama University of Technology, Yola. © 2022. Faculty of Technology Education. ATBU Bauchi. All rights reserved



perceptions are also anticipated to provide the extension specialists with better opportunities to teach farmers a larger selection of competencies in coping. On this basis, farmers with medium and mild drought intensities may be predicted to benefit from their activities more than farmers with very mild drought severity regions.

Previous research on drought showed that people in areas vulnerable to drought will be best prepared for drought. For instance, a study of psychological reactions to drought in Brazil compared 102 people living in a town in a drought-prone region

Responses from 102 people living in a drought-free monitoring region (Coelho et al., 2004) found that people living in a drought-prone environment had substantially lower levels of understanding of the vulnerability to drought than those from less drought-prone participants. The present research did not equate individuals from areas vulnerable to drought to individuals from areas free of drought. However, based on our observations, we would assume that this applies mostly to individuals from areas that are less seriously vulnerable to drought and not to individuals from very extreme drought regions that, in addition to risks, have sustained losses. The finding that farmers in the northeast region suffering from very high levels of drought are pursuing fewer social assistance and guidance from specialists may also mean that special care is required. This may be representative of social capital erosion in these regions. This will line up with reports from previous drought research and found that local and indigenous coping mechanisms are inefficient during repeated drought episodes (Davies, 2000).

IMPLICATIONS

For extension practitioners active in disaster management projects, this research has significant implications. Such projects may be aimed at different levels. Preferably, interventions should be targeted at the level of the group first. Enhancing solidarity and mutual support, for example by setting up cooperatives, may be advisable, particularly in areas vulnerable to very high droughts. Such cooperatives might enable farmers to learn more about particular methods. To enable them to grow more resistant crops and

make better use of their water supplies, they may be used to motivate farmers. Farmers' cooperatives have an edge in pooling money from government agencies or non-governmental agencies, or even from private donors or farm leaders. For rural locations that suffer from drought more often than the rest of the world, this may be of special significance. Creating community preparedness in easier days, before community services are under direct pressure, seems more successful.

At the specific level, extension professionals can, before the beginning of a drought crisis, introduce preparatory communications and associated training procedures to improve farmers' drought tolerance. Preparatory messages that will induce farmers to re-envision drought as a daunting situation that you can plan for can benefit them. Extension practitioners may provide practical alerts, advice, and reassurance during such stress inoculation training to enable farmers to cope with the imminent drought losses. Extension officers, for example, may serve in municipal disaster management committees or create community members' web-based and written informational resources to help people brace for drought.

Educating farmers to work more effectively seems justified. Such attempts, however, can fail if they lack the resources to participate in such coping-up strategies. People need resources which they can rely on to participate in successful coping-up strategies. Thus, interventions will benefit from a need appraisal and an estimation of the real coping ability of the victims of the drought.

To reduce the expenditure of energy, resource-drained victims have been shown to use more protective tactics, such as evasion and distancing themselves from the situation, but which have also been linked to increased anxiety and tension. Extension specialists may therefore provide seminars on stress management and teach the farmers more supportive, emotion-oriented coping-up strategies which could make farmers feel more effective in managing stressful case.



REFERENCES

- Abdullahi, H. G., Fullen, M. A., Oloke, D., (2016). Socio-economic effects of drought in the semi-arid Sahel: a review. *International Journal of Advances in Science Engineering and Technology* 1, 95–99.
- Abubakar, I. U., Yamusa, M. A., (2013). Recurrence of drought in Nigeria: causes, effects and mitigation. *Int. J. Agric. Food Sci. Technol.* 4 (3), 169–180.
- Alcántara-Ayala, I. (2002). Geomorphology, natural hazards, vulnerability and prevention of natural disasters in developing countries. *Geomorphology*, 47(2-4), 107-124.
- Alhassan, A. B., Carter, R. C., Audu, I., (2003). Agriculture in the oasis of the Manga Grasslands of semi-arid north-east Nigeria: how sustainable is it? *Outlook Agric.* 32 (3), 191–195.
- Antwi-Agyei, P., Fraser, E. D. G., Dougill, A. J., Stringer, L. C., Simelton, E., (2012). Mapping the vulnerability of crop production to drought in Ghana using rainfall, yield and socioeconomic data. *Appl. Geogr.* 32, 324–334.
- Belyea, M. J. & Lobo, L. M. (1990) Psychosocial Consequences of Agricultural Transformation: The Farm Crisis and Depression. *Rural Sociology*, 55, pp. 58_75.
- Bjorck, J. P. & Cohen, L. H. (1993) Coping with Threats, Losses, and Challenges. *Journal of Social and Clinical Psychology*, 12, pp. 56_72.
- Bjorck, J. P. & Klewicki, L. L. (1997) The Effect of Stressor Type on Projected Coping. *Journal of Traumatic Stress*, 10, pp. 321_331.
- Bosch, A. (2003) Older People in Disaster: A Comparison of Black and White Victims. *International Journal of Aging and Human Development*, 26, pp. 29_43.
- Burke, E. J., Brown, S. J., (2007). Evaluating uncertainties in the projection of future drought. *J. Hydrometeorol.* 9, 292–299.
- Cheval, S. (2003) Natural Hazard Perception: The Results of a Survey Performed in Romania between October 2001 and December 2002. Available online at [B/http://www.hazarderohome.ro/articol/e/perceptia-hazardeior-ingleza.pdf._/](http://www.hazarderohome.ro/articol/e/perceptia-hazardeior-ingleza.pdf._/), accessed 2 April 2004.
- Coelho, A. E. L., Adair, J. G. & Mocellin, J. S. P. (2004) Psychological Responses to Drought in Northeastern Brazil. *Revista Interamericana de Psicologia*, 38(4), pp. 95_103.
- Cooper, P. J. M., Dimes, J., Rao, K. P. C., Shapiro, B., Twolmlow, S., (2008). Coping better with current climatic variability in the rain-fed farming systems of sub-Saharan Africa: an essential first step in adapting to future climate change? *Agric. Ecosyst. Environ.* 126 (1–2), 24–35.
- Cooper, C. L., Dewe, P. J. & O'Driscoll, M. P. (2001) *Organizational Stress: A Review and Critique of Theory, Research, and Applications*. London: Sage.
- Davies, S. (2000) Effective Drought Mitigation: Linking Micro and Macro Levels. In: Wilhite, D.A. (Ed.), *Drought: A Global Assessment*. (Vol. 2). London: Routledge.
- Dynes, R. (2004) Expanding the Horizons of Disaster Research. *Natural Hazards Observer*, 28(4).
- Elijah, E., Ikusemoran, M., Nyanganji, K.J., Mshelia, H.U., (2017). Detecting and monitoring desertification indicators in Yobe State, Nigeria. *Journal of Environmental issues and Agriculture in Developing Countries* 9 (1), 22–34.
- Fetsch, R. J. (2003) *Managing Stress during Tough Times*, Colorado State University Cooperative Extension. Available online at [B/http://www.ext.colostate.edu/pubs/consuner/10255.pdf._/](http://www.ext.colostate.edu/pubs/consuner/10255.pdf._/), accessed 7 June 2004.
- Folkman, S. C. & Lazarus, R. S. (1980) An Analysis of Coping in a Middle-aged Community Sample.



- Journal of Health and Social Behavior*, 21, pp. 219_239.
- Gillard, M. & Paton, D. (1999) Disaster Stress Following a Hurricane: The Role of Religious Differences in the Fijian Islands. *The Australian Journal of Disaster and Trauma Studies*, 1, pp. 43_55.
- Granot, H. (1996) Disaster Subcultures. *Disaster Prevention and Management*, 5(4), pp. 36_40.
- Hobfoll, S. E. (1988). *The Ecology of Stress*. New York: Hemisphere Publishing.
- Hobfoll, S. E. (1998) *Stress, Culture, and Community: The Psychology and Philosophy of Stress*. New York: Plenum.
- Hobfoll, S. E. (2001) The Influence of Culture, Community, and the Nested-self in the Stress Process: Advancing Conservation of Resources Theory. *Applied Psychology: An International Review*, 50(3), pp. 337_421.
- Hussain, A. (1997) Disaster Subculture: A Study in an Island Village in Bangladesh. Available online at: <http://www.histanth.tsukuba.ac.jp/fet/put/b/>, accessed 5 May 2004.
- Intergovernmental Panel on Climate Change (IPCC), (2014). *Climate Change 2001—Impacts, Adaptation, and Vulnerability: Summary for Policymakers and Technical Summary of the Working Group II Report*. IPCC, Geneva, pp. 89.
- Kaniasty, K. & Norris, F.H. (1999). The Experience of Disaster: Individuals and Communities Sharing Trauma. In: Gist, R. and Lubin, B. (Eds), *Response to Disaster: Psychosocial, Community, and Ecological Approaches*. New York: Brunner/Mazel.
- Kinsey, B., Burger, K. & Gunning, J.W. (1998) Coping with Drought in Zimbabwe: Survey Evidence on Responses of Rural Households to Risk. *World Development*, 26, pp. 89_110.
- Lazarus, R. S. & Folkman, S. (1984) *Stress, Appraisal and Coping*. New York: Springer.
- McCrae, R. R. (1984) Situational Determinants of Coping Responses: Loss, Threat, and Challenge. *Journal of Personality and Social Psychology*, 46, pp. 919_928.
- Montz, B. E., Tobin, G. A., & Hagelman, R. R. (2017). *Natural hazards: explanation and integration*. Guilford Publications.
- Mortimore, M., (1989). *Adapting to Drought: Farmers, Famine and Desertification in West Africa*. Cambridge University Press.
- Olagunju, T. E., (2015). Drought, desertification and the Nigerian environment: a review. *J. Ecol. Nat. Environ.* 7 (7), 196–209.
- Ortega, S. T., Johnson, D. R., Beeson, P.G. & Craft, B.J. (1994). The Farm Crisis and Mental Health: A Longitudinal Study of the 1980s. *Rural Sociology*, 59, pp. 598_619.
- Perkins, G., (2001). *Research and Assessment Systems for Sustainability: Framework for Vulnerability*. The George Perkins Marsh Institute at Clark University and the Stockholm Environment Institute.
- Rausch, A. (1999) Recognizing and Coping with Stress. *Indiana Agriculture in Transition*. Available online at: <http://www.agriculture.purdue.edu/agtransition/pubs/ff-26.html>, accessed 5 May 2004.
- Russell, C. S., Griffin, C. L., Flinchbaugh, C. S., Martin, M.J. & Atilano, R.B. (1985) Coping Strategies Associated with Intergenerational Transfer of the Family Farm. *Rural Sociology*, 50, pp. 361_376.
- Subbiah, A. R. (2000) Response Strategies of Local Farmers in India. In: Wilhite, D.A. (Ed.), *Drought: A Global Assessment*. (Vol. 2). London: Routledge.
- Vicente-Serrano, S. M., Beguería, S., Gimeno, L., Eklundh, L., Giuliani, G., Weston, D., El Kenawy, A., López-Moreno, J.I., Nieto, R., Ayenew, T., Konte, D., (2012). Challenges for drought



- mitigation in Africa: the potential use of geospatial data and drought
- Walker, J. & Walker, L. J. S. (2001) Self-Reported Stress Symptoms in Farmers. *Journal of Clinical Psychology*, 44(1), pp. 10_16.
- Walter, J. (Ed.) (2004) World Disasters Report 2004: Focus on Community Resilience. Bloomfield, CT: Kumarian.
- Wiens, B. A., Evans, G.D., Tsao, J.C.I. & Liss, H.J. (2004) Triumph over Tragedy: A Curriculum for Extension Professionals Responding to Disasters and Terrorism. [Electronic version]. *Journal of Extension*, 42, pp. 75_80.
- Wilhite, D. A. & Glantz, M.H. (1985) Understanding the Drought Phenomenon: The Role of Definitions. *Water International*, 10, pp. 111_120.
- Wilhite, D. A., Svoboda, M.D., Hayes, M.J., (2007). Understanding the complex impacts of drought: a key to enhancing drought mitigation and preparedness. *Water Resour. Manag.* 21 (5), 763–774.
- Zamani, G. H. H., Gorgievski-Duijvesteijn, M.J. & Zarafshani, K. (2006) Coping with Drought: Towards a Multilevel Understanding Based on Conservation of Resources Theory [electronic version]. *Human Ecology* [DOI 10.1007/s10745-006-9034-0].
- Zarafshani, K., Lida, S., Hossein, A., Gholamhossein, H., Philippe, D.M., Frank, W., 2012. Drought vulnerability assessment: the case of wheat farmers in Western Iran. *Glob. Planet. Chang.* 99, 122–130.