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Impacts of Drought on Socio-Economic Conditions of Paddy Farmers in Guilan Province, North of Iran

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Abstract

The purpose of this study was to survey impacts of drought on Socio-economic conditions of Guilan Paddy farmers. Besides recognizing these impacts, it ranked them according to the viewpoint of the Paddy farmers. It was of the descriptive-correlation type. Questionnaire was the main tool of this study. To determine the validity of questionnaire used of comments of panel experts and reliability of the questionnaire by using of Cronbach's alpha coefficient was 89%. The information gathered by using the survey method. The statistical population was the farmers whom their basic career was production of rice and according to the information of Agricultural Organization (Jihad-e-Keshavarzi) in 2009 was caught by drought. By using the proportional stratified sample method, 270 of these individuals were chosen and filled in the questionnaires. In order to determine the scale of drought impacts, year 2008 (a year which paddy farmers had ensured water reservoir) compared to year 2009 (a year which paddy farmers were caught by drought and water shortage). The results indicated that drought caused decrease in white-rice production for 312 kg per hectare. This problem also caused increase in costs, decrease in income, decrease in saved money, and increase in anxiety, mental problems etc on Guilan paddy farmers. Other findings indicated that there hasn't been statistically significant relationship between age and farming experience of paddy farmers with the amount of damage. But, there was statistically significant relationship between literacy, type of water resource and taking extension advices with amount of damage.

Keywords:
Drought, Paddy farmer, Damage,Water resource.

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INTRODUCTION

Drought is one of the most important natural disasters which could be defined as: less-than-average annual rainfall and discordant distribution of rainfall in the region. With lack of rainfall for a long period of time; farms, gardens, pastures, and forests which their required water resources are provided from the atmosphere rainfall are damaged directly. Particularly, agriculture which has an important role in national economy and is a set of activities that its aim is supplying food needs of community and produce raw materials for other sectors including industry (Karbassi, 2001). Iran, with a rainfall average about 252 mm in year is among the dry regions in the world. Low rainfalls, irregular distribution of these rainfalls and climate warming, cause economic, political and social crisis in different areas. In recent years impacts of drought were high on water resources, agriculture, livestock production, pastures, migration, rebellion of pests and disease. Studies indicate that drought has priority to other natural disasters in the frequency of occurrence, duration, extent, loss of life, economic and social impacts and severe effects in the long run (Wilhite, 2000). Damages of drought will affect economic, environmental and social status of communities (Wilhite & Glantz, 1985). Drought includes a set of negative effects which not only affect economic and social activities of farmers and related industries, but also affect those who are not actually employed in agriculture but are living in agricultural regions (Edwards *et al*., 2008). Bimal (1998), in a study titled "coping mechanism practiced by drought victims (1994-95) in North Bengal, Bangladesh" surveyed the people who were damaged from drought. The results indicated that drought is a reversible phenomenon in Bangladesh, affecting plant growth and leading to loss of crop production, food shortage, and; for many people; starvation. Peter (2008) has studied the impacts of drought on the social well-being of rural communities and farm families. The results of his studies indicated that drought has significant impact on individuals in Victoria, particularly in rural and regional areas. The economic impacts of drought include reduced agricultural production and exports. In fact it decreases activities of each individual and provides base for them to immigrate. Horridge *et al.,* (2005) in research as the impact of the 2002-2003 droughts in Australia concluded that the effects of drought on some statistical divisions are extreme, with 20% of decrease in income. Despite the relatively small share of agriculture in Australian GDP, the drought has reduced GDP by 1.6%, and has contributed to a decline in unemployment and to a worsening of the balance of trade. Shokri (2005) surveyed environmental, economic and social effects of drought and effect of solutions applied in order to reducing its effects in Sistan Province (Iran) and concluded that between the effects of drought (environmental, economic and socio- psychology) the economic effects are more than others, then environmental impacts and at last the least impacts were socio-psychology effects. Yazdani & Haghshenas (2007) in their study surveyed the management of drought and have submitted solutions for it. Results indicated drought make irreparable losses on agricultural and animal products and use of non-efficient management and inappropriate strategies will cause more problems in future droughts. Nuri & Bazrafshan (1996-2004) investigated direct and indirect effects of drought on rural economy of Sistan, and stated that direct effects include damage to crops, horticulture and animal husbandry and indirect effects include an increase in the population covered by the support-relief organizations, an increase in migration from rural regions, reducing price of agricultural lands and orchards and also change rural economic structuring.

Shortage of Water is the main reason for the decrease in rice yield in more than 40 million hectares land in Asia (Venuprasad *et al*., 2007). About 75% of the total rice in the world is produced in land under irrigation, and for production 1 kilogram grain of rice farmers use water two to three times more than other cereals (Toung *et al*., 2005). In northern provinces of Iran the time mismatch of rainfalls with the cultivation season, has caused waste of water of rivers and their flowing into the sea which results in a tremendous amount of problems that has overshadowed the

agricultural of these areas (Dargahi, 2007). Guilan is one of the Northern Provinces that in recent years have caught with drought and water shortage. This problem has created many limitations for growth and yield of rice in this province. According to available statistics, the area under rice cultivation in Iran is 587 thousand hectares, which is about 4% of the total land under cultivation of rice in the world. And more than 214 thousand hectares of them are located in Guilan Province (Pilevar, 2009). Reliable statistics indicate that Guilan Province will face with severe water shortage in the future and this shortage, more than anything, would affect rice production (Abrshahr, 2008).

The main purpose of this study was to survey Impacts of Drought on Socio-Economic Conditions of Paddy farmers in Guilan Province which follows the specific objectives below:

1- Describing personal and agricultural characteristics of paddy farmers

2- Studying socio-economic impacts of drought in Guilan province, based on viewpoint of paddy farmers

3- Studying relationship between individual characteristics of paddy farmers and rate economic impacts of drought

4- Studying amount of usage of extension education courses to deal with drought and investigating amount of impact of these educations in reducing these impacts.

5- Prioritizing economic and social impacts of drought.

MATERIALS AND METHODS

The present study was of the descriptive-correlation type and ex-post facto in which its information gathered by using the survey method and designed questionnaire. To determine the validity of questionnaire used of comments of panel of experts including faculty members of Rural Development Department of Guilan University and researchers in Rice Research Center. To measure the reliability of questionnaire, 30 questionnaires implemented in selected rural areas by whose were randomly selected and lastly reliability of the questionnaire by using of Cronbach's alpha coefficient was 89%. The statistical population of this research was farmers whom their basic career were production of rice and according to the information of Agricultural Organization (Jihad-e-Keshavarzi) in 2009 was caught by drought and water shortage. While in the previous year (2008) they had safe water for cultivation. This population contains 100,000 paddy farmers' households. Sample size was 270 by using Cochrane formula and these individuals selected by using proportional stratified sample method. First, three cities of the province were selected. Then, from each city three villages and samples were randomly selected proportional to population of each village.

Data analysis fulfilled through descriptive and inferential statistics by using SPSS software. Independent variables include personal-agricultural characteristics of paddy farmers (age, literacy level, farming experience, and water source), applying extension recommends and socio-economic impacts. Dependent variable was amount of damage (Rice yield).

Research hypotheses

1- There is relationship between personal-agricultural characteristics of paddy farmers and economic impacts of drought.

2- There is relationship between using extension recommendations and adjustment of economic impacts of drought.

3- Drought has affected economic and social condition of paddy farmers.

RESULTS

The results were analyzed in two parts, descriptive and inferential, by using the SPSS software. In descriptive section were used of frequency, percentage, Cumulative Percentage and mean; and in inferential section were used of Spearman, Pearson, Eta and Biserial correlation coefficient for evaluating relationship between independent and dependent variables.

The average of paddy farmers agricultural experience was 35.8 years and average of theirs age was 52 years, so the community is going to get old. 61% of paddy farmers were illiterate or have elementary educations, which indicate low levels of literacy among the paddy farmers. Paddy farmers used different sources of water

Table 1: Personal-agricultural characteristics of paddy farmers

		Frequency	Percent	
Agricultural experience	5-15	22	8	Mean=35/8
	16-25	38	14	minimum=5
	26-35	76	28	maximum=60
	36-45	65	24	
	>46	69	26	
	Total	270	100	
Age	< 40	53	19/6	Mean=52
	41-50	76	28/1	minimum=23
	51-60	76	28/1	maximum=81
	>60	65	24/2	
	Total	270	100	
Water sources	well	31	11/5	
	Channel	7	2/6	
	river	125	46/3	
	pond	7	2/6	-
	Well & river	84	31/1	
	Pond &river	16	5/9	
	Total	270	100	
Literacy level	illiterate	77	28/5	
	elementary	88	32/6	
	Pre-high school	55	20/4	-
	diploma and upper	50	18/5	
	Total	270	100	

for irrigating their rice farms. The most important water sources of paddy farmers for rice farms were: river, well, water channel, pond, well and river, pond and river. Table 1, shows more information about personal-agricultural characteristics of paddy farmers include; agricultural experience, age, water sources, and literacy level.

Regarding the Training-extension classes about solutions against drought in Guilan province, only 37% of farmers attended in these classes and 63% not attended. Most of them stated that they were unaware of such classes.

In the year of study, that paddy farmers faced with water shortage, their average area under cultivation reduced 1% rather than previous year (average area under cultivation in 2008 was 1.5 hectares and in 2009 was1.4 hectares); In other words, due to drought and water shortage, a number of the paddy farmers didn't cultivate part of their farms; regarding proceeding in these two years compared, results indicated that the average yield reduced of 2623 kg/hec in 2008 to 2311 kg/hec in 2009. So yield reduced 312 kg/hec, which directly reduces the income of rice farmers.

Hypothesis 1: there is relationship between personal-agricultural characteristics of paddy farmers and economic impacts (amount of damage) of drought. In connection with this hypothesis some variables were considered such as age, literacy level, agricultural experience and kind of water source.

1-1-The relationship between the age of paddy farmers and economic impacts:

The results of Pearson correlation indicated that there was no significant relationship between the age of paddy farmers and economic impacts of drought, and these two variables were independent and had no effects on each other (P =0.118, r = 0.52).

1-2- The relationship between literacy level of paddy farmers and economic impacts:

The results of Spearman correlation indicated that there was negative and significant relationship between the literacy levels of paddy farmers and economic impacts of drought with 99% level of confidence. In other words, with increasing the literacy level of paddy farmers, the economic impacts of drought reduce (S= -0.177, r = 0.004).

1-3-The relationship between agricultural experience of paddy farmers and economic impacts:

The results of Pearson correlation indicated that there was no significant relationship between agricultural experience and economic impacts of drought and these two variables have no

Table 2: Comparison of rice damage according to water sources

Water source	Pool & river	Well & river	Well	River	Pool	Channel
Number	16	84	31	125	7	7
Average of damage (Kg/hec)	135/6	136/3	201/3	361/7	368/5	458/5

effect on each other (P = 0.102 , r = 0.096).

1-4- The relationship between water resources and economic impacts:

The results of Eta correlation indicated that there was significant relationship between water source of paddy farmers and economic impacts of drought with 99% level of confidence (Eta= 0.264, r = 0.003).

Table 2, shows there was statistically significant difference between the averages of loss in yield due to drought among paddy farmers that used various sources of water to irrigate their farms. Paddy farmers who used two sources of water during the crop year confronted less damages rather than paddy farmers who used only one source. The most damage was also related to paddy farmers that only used water channel, because these paddy farmers were at the bottom of the cannel network and had less access to water resources after that most damage was related to whom that have only one resource of water.

Hypothesis 2: There is relationship between using of extension recommendations and economic impacts (amount of damage) of drought:

The results of Biserrial correlation (two string-test) indicated that there was relationship between using extension recommendations and economic impacts of drought (B = -0.228, r = 0.003).

Also the results of T test indicated that there was significant different between the average damage of those who participated in extension classes compared to those who did not participate in 99% level of confidence. It means with 1 percent error we can say whose has participated in the classes, confronted less damages than others. Table 3, shows difference of amount damage between these two groups.

Table 3: Comparison of rice damage according to attend and non-attend in extension classes

Attend in the classes	Number	Average of damage (kg/hec)
Yes	100	165/2
No	170	319/6

Table 4: Results of research hypothesis

Row	Independent variable	Dependent variable	Type of test	Correlation coefficient	Significant level	Significant relationship
1	Age	Economic impacts	Pearson	0/118	0/052	No
2	Literacy level	Economic impacts	Spearman	-0/180	0/003	Yes
3	Background of rice farming	Economic impacts	Pearson	0/102	0/096	No
4	Type of water resource	Economic impacts	Eta	0/264	0/003	Yes
5	Extension recommendations	Economic impacts	Biserial	-0/228	0/003	Yes

Table 5: Prioritizing the economic impacts of drought

Priority	Economic impacts	Mean	SD
1	Increase in costs labor and eradicating weeds	4.60	0.65
2	Increase in costs for water supply	4.21	0.87
3	Decrease in purchasing power	4.04	0.84
4	Decrease in savings	3.98	0.84
5	Non-payment of bank loans and obligations	3.13	1.58
6	Increase in the false financial relationship	2.99	1.46
7	Decrease in Price of crops due to reduction of quality	2.94	1.02
8	Decrease in income due to reduction of cultivation	2.13	1.65
9	Decrease in land price	1.92	1.03
10	Decrease in income from side jobs, such as sericulture, fishing etc	1.69	1.17
- - - -	Average of economic impacts	3.16	- - - -

Table 6: Prioritizing the social impacts of drought

Priority	Social impacts	Mean	SD
1	Increase in frustration, anxiety, insecurity and emotional problems	4.23	0.85
2	Feeling of poverty and decrease in life level	3.57	1.05
3	Decrease in recreational activities caused by income reduction	3.52	1.11
4	Increase in local divisions to supply water	3.48	1.24
5	Weakened position of institutions and cooperative unions	3.16	1.53
6	Weakened traditions of cooperation	2.91	1.16
7	Tend to migrate	2.77	1.40
8	Decrease in social ceremonies	1.77	1.30
9	Decrease in the level of education in children and juveniles	1.29	0.84
10	Disintegrate of consistency and continuity in family system	1.27	0.45
- - - -	Average of social impacts	2.79	- - - -

Hypothesis 3: drought has affected on socio-economic condition of paddy farmers.

In the light of this first identified 10 economic impacts and also 10 social impacts, and then investigated them with using of Likret scale in view point of paddy farmers. After that these effects was prioritized by using mean. The results showed that incidence of economic impacts of drought have been more than social impacts. This result is consistent with the finging of shokri (2005). Tables 5 and 6 shows economic and social impacts that caused by drought.

So on one hand, drought decreased the yield, and on the other hand, it increased some costs (labor, eradicating weeds and water supply) which, resulted in decrease of profit of paddy farmers and following that, resulted in other social and economic impacts. So survey of economic and social impacts indicated that drought had negative impacts on both factors. In economic section reduction of yield (312 kg/ha) and also area under cultivation that directly leads to income reduction of farmers etc. In social section, drought leaded to increase in frustration, anxiety, insecurity, emotional problems, sense of poverty, reduce living standards etc that ultimately reduced Farmers incentive to farming. This result is consistent with the finding of Horidg *et al.,* (2005), Bimal and (1998) Peter (2008). That stated drought has several socio-economic impacts. In other part of the research specified that high literate level, attend in extension classes and using of two water sources caused reducing of economic impacts of drought.

DISCUSSION AND CONCLUSION

Drought is one of the most important natural disasters which affect on economic, environmental and social conditions of communities. Guilan is one of the Northern Provinces of Iran that in recent years caught with drought. This problem caused to reduce yield of rice in this province, and follow that leaded to other direct and indirect socio-economical problems for paddy farmers. According to results of this research it is recommended that first, besides using main source of water for irrigation in areas that there is possibility of drought crisis, farmers plan using a lateral source such as well, pool etc. Also some arrangements come into work for division water between paddy farmers. Second, Extension training courses should be hold in connection with the solutions to deal with drought before cultivating season and paddy farmers should be informed through mass medias. Third, creating new job positions based on capacities of each region for preventing drought problems.

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