WILLINGNESS TO PAY FOR SUSTAINABLE WATER USAGE IN HARRAN PLAIN-GAP REGION, TURKEY

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Abstract. The purpose of this study is to evaluate factors affecting farmers' willingness to pay (WTP) for sustainable water usage in terms of efficient irrigation training in the Harran Plain-Turkey and determine the coefficients, and affecting factors that contribute to it. The data used in this study come from a sample of 22,167 farmers in the Harran Plain, 675 of them were chosen via simple random sampling method and interviewed face to face by given questionnaires. Sampling was conducted in all water user associations' areas in 2014. The logistic regression and probit model were used for analysis. The results indicate that the average WTP was $170.6 and yearly amount was $3,781,690 for irrigation training in Harran plain. Farmers believe in the necessity of irrigation training for sustainable usage and accept for payment by 59% and WTP of the farmers' may further increase with good practices. Explanatory affecting factors, such as age, education level, land amount, ownership type, modern irrigation method and offered amount for training were significantly explained WTP and coefficients were determined. So, the probability of payment acceptance for irrigation training could be written for any farmers in Harran plain. This study is first of its type in GAP Region-Turkey.
Keywords: *sustainable water usage, irrigation training, willingness to pay, Harran Plain, Turkey*

Introduction

Water insufficiency is confronted with the problem in terms of quality and quantity based on many reasons such as mismanagement, unawareness, climate change and drought, growing population, urbanization, industrialization, agricultural irrigation and varying usage areas. The efforts for improving living standards of human beings are at the core of all problems related to ecology and environment. These actions also constitute the biggest threat of water resources. Water cannot be considered just as H_2O (Malt, 1994) and need more care, conservation and protection for today and future demands from all related parties in an integrated way. A reliable, adequate and sustainable water usage has become necessity for all nations at least for food safety. In this respect, water management has been one of the most important issues for decision makers to take into considerations for today and future needs.

Southeastern Anatolian Project (GAP, in its Turkish acronym) is a multi-sectorial regional sustainable development projects that is mainly based on soil and water resources. GAP is the largest investment for regional development in the history of Turkey and fourth largest irrigation project in the world (Miyata and Fujii, 2007; Yurekli, 2015). Sustainable development includes efficient multifunctional agriculture, using environment-friendly and saving technologies and attention to quality and a

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socially acceptable rural development, simultaneously and managed in harmony with the production and protection (Várallyay, 2010). The scope of the GAP is to eliminate regional disparities among the other regions and increase living standards of regions people. Within the GAP's scope, there are 22 dams, 19 hydroelectric power plants and irrigation of 1.822 million hectares (ha) of agricultural land (GAP, 2012). Harran Plain is the research field that has 150,000 ha of irrigation areas. Irrigation has begun first time in Harran plain within the scope of GAP at 1994. It is located at southeast part of Turkey at 375 meters of altitude that is the lowest altitude locations in the GAP. The average precipitation is between 300-365 mms and annual evaporation is 1,848 mms (State Meteorology Works, 2011).

The most water consumption in the world takes place in agricultural irrigation (Johansson et al., 2002) and consuming around 70% (Grafton and Hussey, 2011). The agricultural irrigation in Turkey is 72.27% among water usage by sectors (Aydogdu et al., 2015a). Water is the most important input in agriculture. Agricultural irrigations are important for sustainable farming and income for farmers who are aware that it is not possible to get a significant income from farming without irrigation. There is an increasing pressure on efficient use of water in irrigation. These pressures are based on the principles of efficiency and the use of modern saving techniques in irrigation. In this way, both water and land resources are taken into consideration for sustainability. Modern irrigation technology may cause increase in the production, while reducing the amount of water used. On the other hand the use of modern irrigation techniques are related to many factors such as age, education, number of households, experience, ability, knowledge, land size, income, and water fee. Modern irrigation has positive effects at reduction of payments to be made depending on the amount of used water and also to the problem of salinization which can occur in arid and semi-arid climate. There is a statistical significance between payment and used water amount to age, land amount, experience and education variables in Harran plain (Aydogdu et al., 2014a).

It is essential to use efficient irrigation technologies such as pressurized systems for water and soil savings. There are drainage problems due to improper irrigation methods that is mainly furrow irrigation in Harran plain (Yenigun and Aydogdu, 2010) due to excessive water usage. The Imambakir water user association (WUA) is located in the lowest altitude of the Harran plain where groundwater level is high, intensive salinity is observed around Bozyazi and Tuzluca areas due to excessive irrigation and results to significant yield losses (Aydogdu et al., 2014b) and salt effected area is around 10% in the plain (Cullu et al., 2002). Salinity is one of the major problem of the world that affects 20% of total irrigated areas (Ghassemi et al., 1995), 23% of total cultivated land has been degraded by salinity (Tanji, 2002) and affecting an area of 800 million ha that is equal to 6% of the total land area globally (FAO, 2008). Salinity affects plant growth and causing yield losses, and also adversely affects soil structure, fertility and soil life (Howari et al., 2002; Mohammed et al., 2008). Salinity decreases cotton yield 29.6% in Harran Plain (Cullu, 2003) and has led to a 1,840,625 kg cotton yield losses in a year, the resulting income loss was $935,711 in 2009 in the Akcakale, within GAP-Harran Plain (Aydogdu et al., 2014c). On the other hand, climate change and droughts have increased the importance of water and its usage by farmers. There are already water shortages in some parts of the plain mainly because of misusage and mismanagement. According to the results of the two studies, farmers have willing to pay 71.69% more than the existing price under certain conditions for irrigation water (Aydogdu, 2016)

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and 2.23 fold of current price in case of water shortages (Aydogdu et al., 2016) in Harran plain.

In order to save soil and water resources, training is necessary. If a suitable combination of crop pattern and irrigation methods can be supported through training programs for farmers, water efficiency, productivity and effectiveness can be increased significantly in the field (Aydogdu et al., 2015b) and results to sustainable natural resources. In this study, it is intended to measure probability of acceptance and the impact of the selected parameters on irrigation training both, in terms of the, willingness to accept and WTP of farmers for sustainable soil and water resources.

Materials and methods

The main material of this research comes from a sample of 675 farmers among 22,167 in the Harran Plain who were chosen via a simple random sampling method. There are 22 WUAs in the plain. Sampling was conducted in irrigation season of 2014 and interviewed face to face by given questionnaires. Within this scope, all the WAUs were visited in the Harran Plain. To maximize the reliability of the results, villages that represent the every WUA were purposefully selected, and local interviewers were used.

A particular theoretical market was formed based on question that was asked for acceptance of given payment amount on a yearly basis, regarding irrigation training either from public or private sector for safe and sustainable water usage to farmers. The payment amount is randomly selected for each questionnaire, starting with 100 Turkish Liras (TL, 1$=2.19 TL and 1€=2.91 TL at surveyed time, Anonymous, 2014), changing the rate of multiple of 50 TL, increasing to 1000 TL. The answer will be either yes or no to this question. Thus, acceptances of farmers and coefficients of effective factors by means of analysis are determined. Then, probability of payment acceptance could be written according to the obtained coefficients of variables for any farmers. Lastly, the regression analysis was applied to the scenarios in order to see the effects of improvements to be made on selected parameters in probit model.

SPSS and limited dependent variables (LIMDEP) package programs were used in analysis. Logistic regression, Odds, Omnibus, Cox and Snell R Square, Nagelkerke R Square, Wald test, Hosmer-Lemeshow fit tests, probit model and regression analysis were conducted. Logistic regression uses maximum likelihood (ML) estimation in multiple regressions. The general form of the distribution is assumed. Starting values of the estimated parameters are used and the likelihood that the sample came from a population with those parameters is computed. The values of the estimated parameters are adjusted iteratively until the ML value for the estimated parameters is obtained. That is, ML approaches try to find estimates of parameters that make the data actually most likely observed. Odds ratios in logistic regression can be interpreted as the effect of a one unit of change in the predicted odds ratio with the other variables in the model held constant. An important property of odds ratios is that they are constant. It does not matter what values the other independent variables take on (O'Halloran, 2015). It is defined as division of the probability of an event to the probability of not being event.

A Wald test can be used in a great variety of different models including models for dichotomous variables and models for continuous variables (Harrel, 2001). The test is used to determine whether a certain predictor variable is significant or not. Such

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as; constant term in the initial model, standard error for constant terms, degree of freedom, the level of significance and exponential logistic regression coefficient. The test consists of dividing the value of the coefficient by standard error. Omnibus test is implemented on an overall hypothesis that tends to find general significance between parameters' variance, while examining parameters of the same type. They test whether the explained variance in a set of data is significantly greater than the unexplained variance, overall.

There is not R-squared statistics in logistic regressions that is similar to the regression analysis. In SPSS, there are two modified R-squared values: one developed by Cox and Snell that never reaches 1 and the other developed by Nagelkerke. The correction increases the Cox and Snell version to make 1.0 a possible value for R-squared by modified it by Nagelkerke. These values indicate the amount of variance explained by the model. The Hosmer-Lemeshow fit test is designed to correct and use when there are discontinuous and continuous predictors, at the same time and not recommend the use of this test when sampling size less than 400 (Hosmer and Lemeshow, 2000). Sample size was 675 in this reserach. This test is performed by dividing the predicted probabilities into deciles and then computing a Pearson chi-square that compares the predicted to the observed frequencies. Lower values and insignificances indicate a good fit to the data and, therefore, good overall model fit.

These tests and analysis are explained more detailed at Maddala (1983), Takeshi (1985), Gujarati (1995; 2006), Hosmer-Lemeshow (2000), Harrell (2001), Thampapillai (2002), Greene (2003), Anonymous (2005), Stigler (2007), Kalaycı (2014), Anonymous (2015) and O'Halloran (2015).

Results and Discussion

Because of the region's patriarchal family structure, all survey respondents were male. The total amount of cultivated land, including second crop, was 10,294 ha in the surveyed area, and 52.1% of the farms are 10 ha or smaller. Of the producers, 64.7% farm only on their own land, and 35.3% own their farm land in addition to other rented lands and/or partnerships. 81.6% of lands are located in the gravity irrigation, and 18.4% are located in the pumping irrigation area. Cotton was the main crop by 51.9%, followed wheat by 30.4%, corn by 11.3% and other crops by 6.4%. The average income from agricultural activities was calculated as 32,925 TL/year and 2,159 TL/ha. The descriptive statistics of the model is given in *Table 1*.

Table 1. *Descriptive statistics of model*

Variables	Definition	Mean	Std. Deviation
AGE	Age of farmers (year)	46,13	10,635
EDUCTN	Education level: if literacy:1, primary school:2, secondary school:3, highschool:4, university graduated:4	2,66	1,134
EDYEAR	Years passed in education	6,84	3,916
MARITAL	Marital status: If married: 1, if not: 0	0,97	0,222
HOUSHLD	Number of households	7,15	3,838
AGWORK	Number of households working at agriculture	3,52	2,437
NONAGWRK	Number of households working at nonagricultural sector	0,46	0,848
EXPRNCE	Experienced years in farming	25,37	11,001

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LAND	Land amount (hectares)	15,25	22,759
OWNRSHP	Ownership status, if privately owned:1, if share holder:2, if renter:3, if at least two of them:4	1,93	1,249
INCOME	Yearly income based on agriculture (TL)	32924,52	54021,324
MDRNIRR	If modern irrigation user: 1, if not: 0	0,19	0,390
WTP	Offered amount for training (TL)	368,17	179,165
WTPANS	If the farmer accepts to pay for training: 1, if not: 0	0,59	0,493

Of the farmers who accept to pay (coded as WTPANS) for irrigation training was 59%, means 398 and who don't accept to pay was 41%, means 277. The classification table based on step 0 is given in *Table 2.*

Table 2. *Classification table of step 0*

Observed			Predicted		
			WTPANS		
			No	Yes	Percentage Correct
Step 0	WTPANS	No	0	277	0,0
		Yes	0	398	100,0
	Overall Percentage				59,0

According to first classification table all the respondents were classified in yes and percentage of verification in this case was 59%. The statistics of the variables are located in the initial model, step 0, and is given in *Table 3.*

Table 3. *Coefficients of variables in the equation*

		B	S.E.(Standard Error)	Wald	df	Significance	Exp(B)
Step 0	Constant	0,321	0,093	11,841	1	0,001	1,379

According to significance level in table 3, p<%5, all of the independent variables are making meaningful contribution. The Omnibus tests of model coefficients are given *Table 4.*

Table 4. *Omnibus tests of model coefficients*

		Chi-square	df	Significance
Step 1	Step	203,079	13	0,000
	Block	203,079	13	0,000
	Model	203,079	13	0,000

Chi-square test showed that it's statistically significant, p<%5. This significance shows that existing of a relationship between dependent variable that is acceptance of payment for irrigation training, and combination of independent variables. The model summary is given in *Table 5.*

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Table 5. *Model summary*

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	437,872	0,350	0,471

Cox and Snell and Nagelkerke R square values indicate the amount of variance explained by the model. The variance of acceptance of payment for irrigation training was explained 35% by Cox & Snell and 47.1% by Nagelkerke R square. The test result of Hosmer and Lemeshow is located in *Table 6.*

Table 6. *Hosmer and Lemeshow test results*

Step	Chi-square	df	Significance
1	4,264	8	0,833

The test was assessed the compliance of the logistic regression model as a whole and result indicated that it was insignificant ($p > 0.05$) means that existing of an adequate level of model-data fit. The classification table that was obtained from logistic regression result is given in *Table 7.*

Table 7. *Classification table at step1*

	Observed		Predicted		
			WTPANS		
			NO	YES	Percentage Correct
Step 1	WTPANS	NO	192	85	69,2
		YES	71	327	82,1
	Overall Percentage				76,6

The percentage of verification was increased from 58% to 76.6% that indicates that variables make meaningful contribution to the model. Initially more variables were used in model, given in descriptive statistics, and significant ones were selected in terms of contribution to the model after the first trial and run again. The most appropriate multivariable that are age, education, number of nonagricultural workmanship in farmers family, land, ownership, income, modern irrigation users and WTP were selected in logistic regression model as variables and second run result of model is given in *Table 8.*

One unit effects on numeric variables, such as age, land, nonagricultural workmanship, income and WTP were measured. Categorical, nominal, variables such as education levels, ownership and modern irrigation usage, were compared with the reference variable in order to observe the differences between them. In education level, university graduated selected as reference, education one indicates literacy, education two indicates primary school, education three indicates secondary school, education four indicates high school graduated farmers. In ownership level, few selected as reference means that farmer has either two of them, privately own land, share holder and renter in farming. The ownership

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one indicates privately own land, ownership two indicates share holders and ownership three indicates renter.

Table 8. *Logistic regression model's variables in the equation*

								95% C.I.for Exp(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step1	AGE	0,023	0,013	3,165	1	0,075	1,023	0,998	1,049
	EDUCTN			12,806	4	0,012			
	EDUCTN(1)	-1,920	0,665	8,338	1	0,004	0,147	0,040	0,540
	EDUCTN(2)	-1,516	0,569	7,092	1	0,008	0,220	0,072	0,670
	EDUCTN(3)	-0,726	0,613	1,401	1	0,237	0,484	0,145	1,610
	EDUCTN(4)	-1,403	0,601	5,445	1	0,020	0,246	0,076	0,799
	NONAGWRK	0,269	0,167	2,610	1	0,106	1,309	0,944	1,815
	LAND	0,005	0,002	7,319	1	0,007	1,005	1,001	1,008
	OWNRSHP			6,574	3	0,087			
	OWNRSHP(1)	0,058	0,355	0,026	1	0,871	1,059	0,528	2,124
	OWNRSHP(2)	-0,388	0,489	0,630	1	0,427	0,678	0,260	1,769
	OWNRSHP(3)	1,053	0,550	3,659	1	0,056	2,866	0,974	8,427
	INCOME	0,000	0,000	2,379	1	0,123	1,000	1,000	1,000
	MDRNIRR(1)	-0,711	0,324	4,827	1	0,028	0,491	0,260	0,926
	WTP	-0,007	0,001	92,916	1	0,000	0,993	0,992	0,995
	CONSTANT	2,559	0,849	9,091	1	0,003	12,927		

Significant variables in the model results will be interpreted. Age is an important factor on human behaviors and perceptions. Age increases payment acceptance of the farmers. A unit increases in age has an effect on acceptance of payment by 2.3% in a positive way. There is a relationship between attitudes to water management and age of farmers according to a survey conducted in Harran Plain (Aydogdu et al., 2015a). Education has an effect on payment acceptance ($p<5\%$). Literate farmers have 85.3%, primary school graduated farmers have 78%, secondary school farmers have 51.6% and high school graduated farmers have 75.4% less acceptance as compared to university graduated farmers. The results are statistically significant and meaningful. When education level is increasing, concerns about sustainable water usage thus payment acceptance is increasing, too. The vice versa is true, too. According to the studies that were conducted in Harran plain are also showed that there is a significant relationship between education levels and WTP of the farmers and attitudes to water management (Aydogdu, 2016; Aydogdu et al., 2016; Aydogdu et al., 2015a). People who are educated, they are more prone to learning and innovation (Değirmenci et al., 2012) and more sensitive about natural resources. Land amount has positive effect on payment acceptance ($p<5\%$). A unit increases in land amount increases the acceptance of payment by 1%. The ownership type has an effect on payment acceptance. Land amount and status of ownership have effect on attitudes of the farmers in Harran plain (Aydogdu et al., 2015a). Land owners have 5.9%, share holders have 2.87 fold more and renters have 32.2% less acceptance as compared to the farmers who have more than one type of ownership. Rent agreement is usually done on an annual basis. There

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is no guarantee for rental to next year. So, renters have less payment acceptance, this is an expected result. In this regard there is a correlation between rental period and acceptance. It was stated by farmers that in case of long-term rent agreements, acceptance for payment will increase.

Modern irrigation users have less payment amount as compared to furrow irrigation users by 49.1% and it is statistically significant (p<5%). These farmers are already using water saving technologies and have some skills about it. The WTP has negative effect on payment acceptance (p<5%), this is expected result too. Farmers are considered more payment as a welfare loss. A research conducted by Aydogdu (2016) is also proved that there was statistical significance between irrigation type and WTP in Harran plain. There was not significant relationship between the number of nonagricultural workmanship in farmers' family and income to payment acceptance, but there was proximity. The result of nonagricultural workmanship in farmers' family might be acceptable, because these people are already source of income for their family by working nonagricultural sectors. But the result based on income was unexpected. Income is the main factor of being ability to pay. The probability of payment acceptance for water saving irrigation training for sustainable farming can be written according to the coefficients of variables at table 8 for any farmers. For example: the payment acceptance probability of logistic regression equation of a high school graduated farmer who has privately own land and already using modern irrigation system can be written as follows:

Ln p/(1-p)=2.559+0.023(age)-1.403(education level)+0.005(land amount)+0.058 (ownership)-0.711 (modern irrigation)-0.007(offered WTP amount)

In order to see the effects on variables in case of positive improvements on some selected variables such as age, land and offered WTP amount; a scenario model is applied to probit by regression. Randomly five different proportions of 10%, 25%, 50%, 75% and 100% improvements were made and the effects on the acceptance for payment were observed. Age of farmers was increased in the first scenario and their impacts were observed in *Table 9.*

Table 9. *The change in the age scenario of farmers*

Age is increased by 10%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	268 (39.7%)	-9
1	398 (58.96%)	407 (60.3%)	9
Total	675 (100%)	675 (%100)	0
Age is increased by 25%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	261 (38.67%)	-16
1	398 (58.96%)	414 (61.33%)	16
Total	675 (100%)	675 (%100)	0
Age is increased by 50%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	207 (30.67%)	-70
1	398 (58.96%)	468 (69.33%)	70
Total	675 (100%)	675 (%100)	0
Age is increased by 75%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	203 (30.07%)	-74
1	398 (58.96%)	472 (69.93%)	74
Total	675 (100%)	675 (%100)	0

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Age is increased by 100%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	195 (28.89%)	-82
1	398 (58.96%)	480 (71.11%)	82
Total	675 (100%)	675 (%100)	0

The positive correlation between age of farmers and acceptance was observed. The WTP increases with increasing age of farmers. The graph of the changes that occur with age is likely to take place in *Figure 1*.

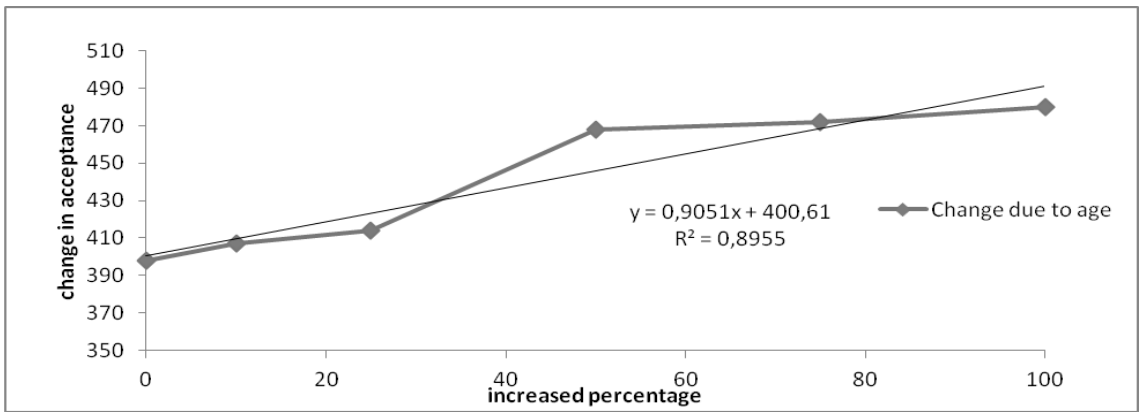

Figure 1. *The changes that occur due to age is likely to take place*

Responsibilities of older aged farmers are increasing. In order to fulfill the growing responsibilities it is needed more revenue. The main source of income for farmers is agriculture. Therefore, the farmer wants to get sustainable income from agriculture and look favorably at training to improve productivity of resources. Land of farmers was increased in the second scenario and their impacts were observed in *Table 10.*

Table 10. *The change in land scenario of farmers*

Land is increased by 10%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	272 (40.3%)	-5
1	398 (58.96%)	403 (59.7%)	5
Total	675 (100%)	675 (%100)	0
Land is increased by 25%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	261 (38.67%)	-16
1	398 (58.96%)	414 (61.33%)	16
Total	675 (100%)	675 (%100)	0
Land is increased by 50%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	197 (29.19%)	-80
1	398 (58.96%)	478 (70.81%)	80
Total	675 (100%)	675 (%100)	0
Land is increased by 75%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	185 (27.41%)	-92

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1	398 (58.96%)	490 (72.59%)	92
Total	675 (100%)	675 (%100)	0
Land is increased by 100%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	178 (26.37%)	-99
1	398 (58.96%)	497 (73.63%)	99
Total	675 (100%)	675 (%100)	0

A positive correlation between land amount of farmers and acceptance was observed. WTP is increasing with increasing land amount of farmers. The graph of the changes that occur due to land amount increasing is likely to take place in *Figure 2.*

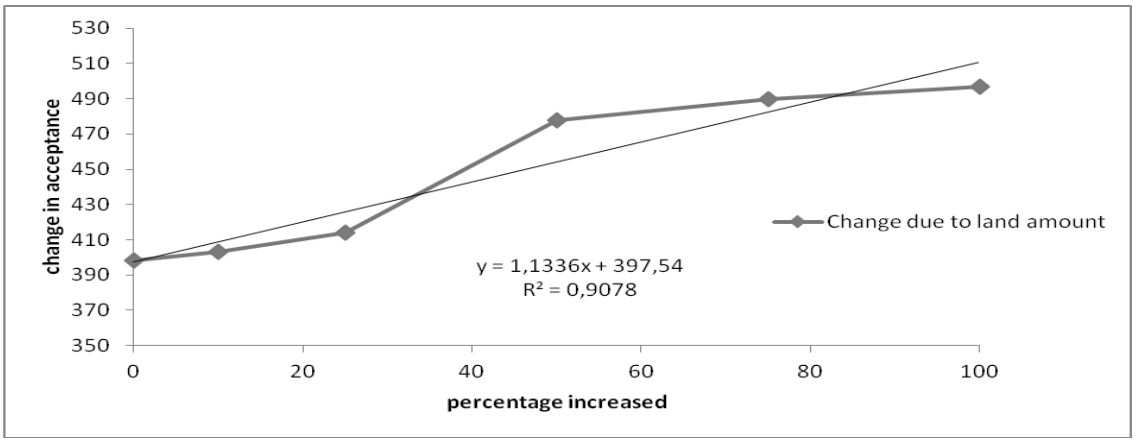

Figure 2. *The changes that occur due to land is likely to take place*

Depending on the increase in the amount of land, it will increase revenues to be derived from irrigated agriculture. When irrigation efficiency is achieved by training, both it will increase the revenues obtained from unit area and reduce the amount of water used. Both results will make positive contribution to farmers' welfare by means of additional income from land and reduce payment amount of water fee. The offered amount was increased in the third scenario and their impacts on WTP were observed in *Table 11.*

Table 11. *The change in WTP based on increased offered amount scenario of farmers*

Payment amount is increased by 10%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	285 (42.22%)	8
1	398 (58.96%)	390 (57.78%)	-8
Total	675 (100%)	675 (%100)	0
Payment amount is increased by 25%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	299 (44.3%)	22
1	398 (58.96%)	376 (55.7%)	-22
Total	675 (100%)	675 (%100)	0
Payment amount is increased by 50%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	374 (55.41%)	97
1	398 (58.96%)	302 (44.59%)	-97
Total	675 (100%)	675 (%100)	0

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Payment amount is increased by 75%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	464 (68.74%)	187
1	398 (58.96%)	211 (31.26%)	-187
Total	675 (100%)	675 (%100)	0
Payment amount is increased by 100%			
Result	Main Case	In Scenario Case	Change
0	277 (41.04%)	476 (70.52%)	199
1	398 (58.96%)	199 (29.48%)	-199
Total	675 (100%)	675 (%100)	0

A negative correlation between increased offered amount and acceptance of the farmers were observed. The acceptance decreases with increasing offered amount for training. The graph of the changes that occur due to increased offered amount in WTP is likely to take place in *Figure 3.*

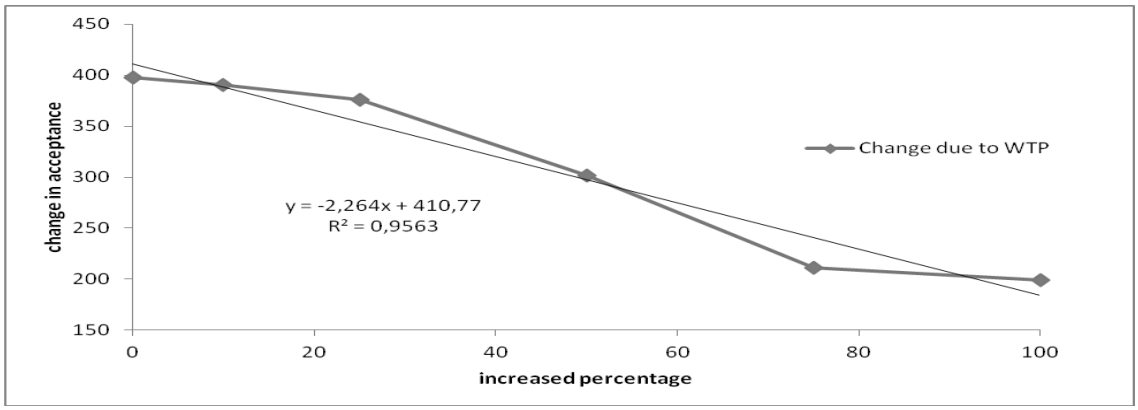

Figure 3. *The changes in WTP due to increased offered amount is likely to take place*

When the offered training fee is increasing, WTP is declining. Increased fee means to pay more for training, which will affect negatively the welfare of the farmers. The farmers do not want to pay more than their stated amount. More payment has negative effect on the farmers' budget. This is an expected result. Another research also concluded that increased price for payment, results to decrease in WTP of the farmers in Harran plain (Aydogdu, 2016).

Conclusions

The soil and water resources are not unlimited resources. The reduction and deterioration has begun in terms of the quality and quantity in natural resources. They need protection and conservation for sustainable environment. Sustainability of natural resources can be achieved with awareness, training and education. Agricultural extension and training activities have been implemented by the State in the form of public extensions in Turkey and still has major role in these services. Private sector has been involved to these services in recent times with a limited areas and staffs in Turkey. There is a trend to privatization of public services because of many reasons such as

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social, economic and political aspects; budget deficit, reducing public expenditures, inefficiency of public services and optimum use of resources in Turkey.

The average offered amount to pay was $240. The average accepted payment amount of farmers' is calculated as $170.6, which was 1.2% of their yearly income and means that farmers have ability to pay. The unaccepted average amount was calculated as $318. There were 22,167 farmers in Harran plain irrigation areas at surveyed time. Accepted payment amount of farmers' was calculated as $3,781,690 per year for irrigation training for efficient, effective and sustainable water usage for agriculture. According to the scenarios, age of the farmers has an effect by 12.15% and land amount by 14.67% on acceptance in a positive way. On the other hand, increased offered amount for training has an affect by 29.48% on acceptance in a negative way. There are already water shortages in some parts of the plain mainly because of drought, misusage and mismanagements. Water scarcity increases payment acceptance of the farmers for safe water. In this sense, locations of the farmers are important to receive safe water for sustainable usage and farming. If their fields located towards to donwstream of the plain, water constraints are likely to occur. So, such a training program will be accepted more in these areas. Aydogdu (2016) showed that location has an effect on WTP for the farmers in Harran plain. Training is necessary and should be given in the field by experienced and patient staffs before the irrigation season. It should not be expected from the farmers to understand everything which has been described and shown to them immediately. The education level of the farmers are not high in general and they use local languages, too. Therefore, the language, materials and contents of this training should be in a manner that would be acceptable, understandable and easily applicable by the farmers in the field. Farmers adopt innovations more quickly that coinciding with their experience. They prefer to see and try rather than listening. In this case, willingness to pay of the farmers' may further increase with good practices.

These results are meaningful and could be considered as guidelines for the public and private sectors' decision and policy makers for training of farmers about sustainable water usage. In this way, both natural resources will be protected as well as service provider could generate revenue that is simply win-win theory for all related parties. This study is the first of its type in GAP-Harran plain, Turkey.

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