Research Article

Farming Household Socio-Economic Influences on Land Degradation in District Mardan of Pakistan

Saeed Ullah[1], Muhammad Israr[1*], Shakeel Ahmad[2], Nafees Ahmad[3] and Asif Yaseen[4]

[1]Department of Rural Development, AMKC, Mardan, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; [2]School of Environment, Tsinghua University, Baijing 100084, PR China; [3]Deprtment Of Economics, University of Malakand, Pakistan; [4]University of Queens Land Australia, Brisbane, Australia.

Abstract | Land Degradation (LD) is an expanding universal problem influenced all areas of human prosperity. This research contributes to this end by analysing the perceptions of farmer and its socio-economic influences towards LD in four purposively selected union councils i.e. Toru, Ghari Kapoora, Lund Khwar, Katlang-1 of district Mardan. A total of 90 farmers were selected through proportionate simple random sampling from 857 register farmers. Primary data were collected through structured questionnaire from the heads of the farming households (HH) and analysed by descriptive statistics and Chi-square test. It was found that majority (62%) of the farmers were in the age groups of 41-60. HH size of the farmers was 6-9 members per HH. Farming experience of the HH heads was 21-31 and above years as reported by 63.33% of the respondents. Chi-square P-values pointed that age, HH size and farming experience have positive relationship with the LD. Land possession was 6-15 acre for the 53.33% of the farmers and growing both cash and food crops. In the area, the farmers perceived for the high level of LD and the causes for this was soil erosion, soil fertility loss, overgrazing, over population growth, soil salinization, tillage erosion, poor land management practices and water degradation. The effects of LD were difficulty in farming, drought, desertification, increased the necessity for fertilizers, loss in livestock production, migration, poverty and economic backwardness. High land degradation was perceived by the farmers and having positive association with the socio-economic influences. There is a need for awareness about the different land management and conservation practices coupled with different socio-economic sector-specific interventions in order to reduce the LD in the area for the future sustainability.

Received | February 15, 2018; **Accepted** | February 28, 2019; **Published** | April 12, 2019
***Correspondence** | Muhammad Israr, Department of Rural Development, AMKC, Mardan, The University of Agriculture, Peshawar, AMKC, Mardan, Pakistan; **Email:** misrar@aup.edu.pk
Citation | Ullah, S., M. Israr, S. Ahmad, N. Ahmad and A. Yaseen. 2019. Farming household socio-economic influences on land degradation in district Mardan of Pakistan. *Sarhad Journal of Agriculture*, 35(2): 449-458.
DOI | http://dx.doi.org/10.17582/journal.sja/2019/35.2.449.458
Keywords | Farming households, Land degradation, Farmer's socio-economic influences

Introduction

Land Degradation (LD) is a rising worldwide issue influenced all areas of human prosperity, however the most vital are agricultural resilience, new crop diseases, food security, climate change, increased poverty, drought tolerance and loss to biodiversity (Israr et al., 2017). Understanding farmer's perceptions on related issues to land, feasible supervision of land assets is thinkable in light of the fact that they have quiet knowledge of their property. Other than specialized answers for attain related issues, socio-economic examinations additionally assume an imperative part for answers different issues of the farmer's land. The degradation of natural ecosystems has rapidly increased, posing overwhelming challenges to achieving sustainable development goals (Nkonya, 2016). Hence, the focuses of this research are to ascertain farmer's perceptions towards land degradation and to look at the socio-economics determinants of LD.

LD is a composite term describes how one or more of the land resources has changed for the worse and generally signifies the temporary or permanent decline in the productive capacity of the land (Keesstra et al., 2016), and decrease the natural or monetary profitability and unpredictability of land, decline vegetation, driving the loss of biodiversity and accelerating climate change (IUCN, 2015). It incorporates over misuse for farming and over gathering of grasses and different species coupled by populace expansion and economic progress are drivers of LD (Geist and Lambin, 2004). It is the loss of beneficial goods and services derived from land-dwelling ecosystems and the ecological and hydro-logical processes that operate within these systems and the more visible forms of LD are desertification, deforestation, overgrazing, salinization and soil erosion (Nkonya et al., 2011).

LD is a worldwide phenomenon and happens in various lands in thoroughly different natural, financial and climatic settings. Estimations propose that 20-30% of the worldwide land surface is degraded (Stavi and Lal, 2015; Le et al., 2014) and it occurred on about 35% of global land area between 1982-2016, resulting in substantial economic impacts on agricultural livelihoods and national economies, especially in developing lower income countries (FAO, 2016).

The causes of LD include biophysical causes, determines soil erosion hazard, and climatic conditions, such as rainfall, wind and temperature and unsustainable land management practices i.e. deforestation, forest degradation, soil nutrient removal, and cultivation on steep slopes (IFPRI, 2011). A wide variety of individual causes such as the conversion of unsuitable, low potential land to agriculture, failure to undertake soil conserving measures in areas at risk of degradation and the removal of all crop residues resulting in soil nutrients loss coupled by social and economic conditions that encourage land users to overgraze, over-cultivate, deforest or pollute (Stocking and Murnaghan, 2013).

Likes many other parts of the world, LD is a major challenge in the Asia in general and Pakistan in particular. Therefore, identification of the farmer's socio-economic and demographic influences on LD is crucial for national and international efforts to reduce, optimally prevent and promote land restoration/improvement. Based on the aforementioned discussion this study aims to investigate the farming household socio-economic and demographic influences on LD in district Mardan of Pakistan and finds answer to the questions; that how the farmers perceived the LD and how associated with the socio-economic and demographic status of the farmers.

Materials and Methods

Selection of study area

One district i.e. Mardan of the central Pakhtunkhwa was the research area, which was purposively selected as it is one of the famous area for its best fertile soil and suitability for growing of all food/cash crops and vegetables. The district comprises of three Tehsils i.e. Mardan, Takhtbai and Katlang and having 74 Union Councils (UCs). This study was conducted in the four purposively selected UCs (Figure 1) based on the maximum numbers of register farmers with the agriculture extension department of the district i.e. Toru (UC-I), Garhi Kapoora (UC-II), Lund Khwar (UC-III), Katlang-1 (UC-IV). Simple random sampling was done to obtain the desired sample from the list of register farmers. The total numbers of register farmers in the selected UCs were 857 and sample size was determined by the use of following Slovin's (1960) formula of sample size determination for the simple random sample.

$$n = \frac{N}{1 + Ne^2} \quad .....(1)$$

Where;

n= number of sampled registered farmers in all UCs, N= number of total register farmers, and "e"= standard confidence level is 90- 95% (This research used a confidence of 90% for a better accuracy, which give a margin error of 0.10.). Putting these values in equation 1, a total of 90 register farmers were calculated and considered representative of the 857 register farmers. To ensure that the number of sampled farmers in a particular UCs is proportional to the total number of register farmers, a proportionate stratified random sampling was applied (Table 1).

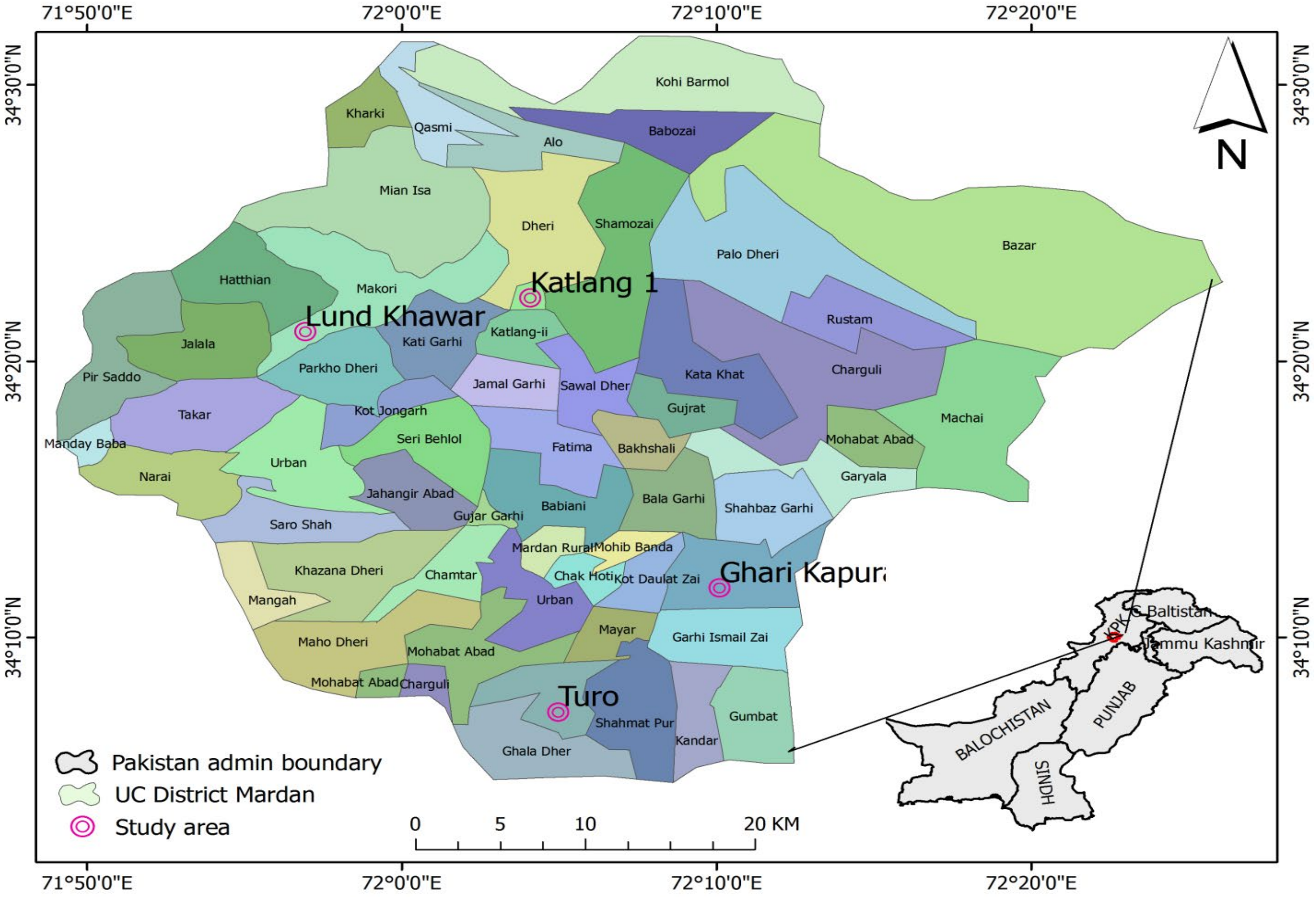

Figure 1: *Map of Pakistan and study district showing the selected union councils.*

Table 1: *Sample size calculation from total registered farmers and its distribution.*

UCs name	Total registered farmers	Sample size	Percent of total
Turo (UC-I)	200	21	23
Gari Kapoora (UC-II	400	42	47
Katlang-1 (UC-III)	138	15	17
Lund Khwarr (UC-IV)	119	12	13
Total	857	90	100

Source: *Agriculture extension department Mardan (2017) and own calculations.*

Data were collected through a pretested semi-structured questionnaire from the farm household's head. For data analysis Statistical Package for Social Sciences (SPSS) software version 22 was used for descriptive statistics/percentages and Likert scale determination and the following Chi-square formula for checking the associations of the variables in the union councils.

$$x^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where;
x^2= Chi-square; f_o=Observed frequency, f_e=expected frequency.

Results and Discussion

The different socio-economic influences of the farmer on the land degradation were the farmers age, households size, literacy status, level of education, main occupations, farming experience, farmers farm size, types of crops grown, extent/causes and consequences of land degradation.

Extent of land degradation

The recognition of the extent of LD is very important in the perception of the farmers because it will threaten the livelihoods of rural people, whose dependence are mainly on the land resources. The findings of Waswa (2012) pointed that quantification of the extent of LD is very hard due to its complex nature and for this a multiple approach are use. This study used the Likert scale approach to identify the extent of the LD. On the Likert scale the LD was classified in to very low, low, medium, high and very high scale (Table 2).

Table 2: *Distribution of the farmers on the basis of extent of land degradation.*

Extent of land degradation	UC-I	UC-II	UC-III	UC-IV	Total
Very low	02(9.53)*	05(11.90)	01(8.33)	03(20)	11(12.22)
Low	04(19.04)	06(14.29)	02(16.67)	01(6.67)	13(14.44)
Medium	05(23.80)	13(30.96)	04(33.33)	04(26.67)	26(28.89)
High	07(33.34)	14(33.33)	04(33.33)	05(33.33)	30(33.34)
Very high	03(14.29)	04(9.52)	01(8.33)	02(13.33)	10(11.11)

Frequency (percentage);* **Source: *Field survey data, 2017.*

Data revealed that 33.34% of the farmers reported for the high LD. Also 28.89%, 14.44%, 12.22% and 11.11% of the farmers reported for the perceptions of medium, low, very low and very high respectively. Among the UCs, I and II having highest percentage of high LD because in these UCs land were degraded due to many reasons like soil erosion, soil fertility loss and the big reason is overpopulation growth and the land are utilizing for the housing contraction by different societies. This implies that extent of land degradation is at the alarming point of degradation and hence affect the farmer's socio-economic status.

Causes of land degradation

LD causes understanding and their interactions are essential for identifying relevant actions for addressing LD problem. Nkonya et al. (2011) revealed that the immediate causes of land degradation include biophysical causes (topography, soil erosion hazard, and climatic conditions, rainfall, wind, temperature and overgrazing) and unsustainable land management practices (deforestation, forest degradation, soil nutrient mining, and cultivation on steep slopes). This study used the literature identified causes of LD and the perception of the farmers were determined (Table 3). The literature identified causes of land degradation were soil erosion, soil fertility loss, overgrazing, over population growth, soil salinization, tillage erosion, poor land management practices and water degradation. Findings of the data in the revealed that all of the farmers reported one types of land degradation in the field in different percentages. The farmers distributed causes of land degradation in percent term in to soil erosion (11.11%), soil fertility loss (15.56%), over grazing (8.89%), over population growth (25.56%), soil salinization (4.44%), tillage erosion (12.22%), poor land management practices (5.56%), and water degradation (16.66%). This implies that all the literature identified causes of the land degradation were existed in the area in different percentages affecting the farmers soci-economic status in different dimensions.

Consequences of land degradation

Global impacts of LD can be classified in several ways, by the environmental system affected, by impact on ecosystem service, by type of LD process, by production system/eco-region impacted on or by type of management practice that causes the degradation. The data in Table 4, shows that approximately all (82.22%) of the farmers were aware of loss of agricultural production. LD effects on agricultural productivity are manifested through their impacts on both, the average and variance of yield, as well as the total factor productivity of agriculture production (FAO, 2001). The data also shows that majority (66.67%) of the farmers were aware of difficulty for farming while, (63.33%), (61.11%), (51.11%), (47.78%), (28.89%) and (25.56%) are aware of drought and famine, desertification, increase the necessity for fertilizers, loss in livestock production, migration and poverty and economic backwardness respectively as a consequence of land degradation. The results revealed that most of the farmers living condition are fading from time to time due to declining of crop production, resulting from land degradation. Due to declining of crop yields, and the resulting income reduction and the progressive price increment of fertilizer the farmer inability to afford it.

Farmers age

Among others demographic characteristics farmers' age is one of the most important factors for the overcoming of LD problems. In the literature there is an association between the farmers age and the LD process, e.g. Imoke et al. (2010) finds a negative relationship between farmers age and the extent of LD in Nigeria, while the other researcher (Adimassu et al., 2013; Moges and Taye, 2017; Yusuf et al., 2017) reported for a positive relationship between farmers age and the LD in different parts of developing world. The data regarding the farmers age are presented in Table 5, shows that a total of 62% of the farmers were in the age groups of 41-60 and above years. This implies that majority of the farmers were in the productive age of their life and thus have a great potential to overcome the problems of LD, because during this age the farmers usually thinking about the use of diverse resources to increase their income by adopting multiple livelihood strategies and trying to enhanced

Table 3: *Distribution of the farmers on the causes of land degradation.*

Causes of land degradation	UC-I	UC-II	UC-III	UC-IV	Total
Soil erosion	02(9.5)*	05(11.9)	01(8.33)	02(13.33)	10(11.11)
Soil fertility loss	02(9.5)	07(16.7)	02(16.67)	03(20)	14(15.56)
Overgrazing	01(4.76)	05(11.9)	01(8.33)	01(6.67)	08(8.89)
Over population growth	05(23.80)	10(23.8)	04(26.67)	04(26.67)	23(25.56)
Soil salinization	01(4.76)	03(7.14)	00(00)	00(00)	04(4.44)
Tillage erosion	03(14.3)	04(9.52)	02(16.67)	02(13.33)	11(12.22)
Poor farming practices	01(4.8)	03(7.14)	01(8.33)	00(00)	05(5.56)
Water degradation	06(28.58)	05(11.9)	01(8.33)	03(20)	15(16.66)

Frequency (percentage);* **Source: *Field survey data, 2017.*

Table 4: *Distribution of farmers on the basis of awareness about consequences of land degradation.*

Consequences	UC-I	UC-II	UC-III	UC-IV	Total
Loss to agricultural production	18(85.71)	36(85.71)	9(75)	11(73.33)	74(82.22)
Increase the necessity for inorganic fertilizers	12(57.14)	21(50)	5(41.67)	8(53.33)	46(51.11)
Difficulty in farming	13(61.90)	28(66.67)	8(66.67)	11(73.33)	60(66.67)
Loss in livestock production	9(42.85)	22(52.23)	5(41.67)	7(46.67)	43(47.78)
Desertification	14(66.67)	27(64.28)	5(41.67)	9(60)	55(61.11)
Drought	10(47.61)	33(78.57)	6(50)	8(53.33)	57(63.33)
Migration	7(33.33)	14(33.33)	2(16.67)	3(20)	26(28.89)
Poverty and economic backwardness	5(23.80)	12(28.57)	2(16.67)	4(26.67)	23(25.56)

Frequency (percentage);* **Source: *Field survey data, 2017.*

the income generating activities. Among the different UCs, UC-I and IV having more percentage of farmers in the aforementioned age groups. The p-value of the chi-square test was used to check the association of different age group across the UCs and it was not significant.

Table 5: *Distribution of farmers on the basis of age.*

Age in years	UC-I	UC-II	UC-III	UC-IV	Total
20-30	02(9.52)*	06(14.29)	01(8.33)	00(0.00)	09(10.00)
31-40	04(19.05)	08(19.05)	01(8.33)	04(26.67)	17(18.88)
41-50	07(33.33)	14(33.33)	03(25.0)	05(33.33)	29(32.22)
51-60	07(33.33)	11(26.19)	04(33.3)	05(33.33)	27(30.00)
61 & above	01(4.76)	03(7.14)	03(25.0)	01(6.67)	08(8.88)
	Chi-square=6.2185, P-value=0.90467				

Frequency (percentage);* **Source: *Field survey data, 2017.*

Farmer's household size

Households (HHs) size of the farmers influenced land management practices and procedure in two ways; i.e. bigger family unit sizes might be related with higher work blessing, in this manner, in peak times such families are not constrained with work supply prerequisite (Belay and Bewket, 2013; Kassie et al., 2013) and also higher utilization weight occasioned by expanded family size may prompt preoccupation of work to off-farm activities (Fentie et al., 2013). Family size and dependence proportion are equally identified with the quantity of land management practices and the negative effect of larger family size estimate on reception is to some degree surprizing since bigger families could give all the more family work making the selection of work concentrated land management less demanding. The data in Table 6, present the farmer HHs size and was divided in to class interval of 1-5, 6-10, 11-15, 16-20 and 21 and above members, which shows that majority (65%) of the farmers have 6-15 members in the HH. Among this UC-II having more farmers HH members, while the rest having the same family members in their HH. This is in line with the finding of GoP (2017) census report that the average HHs size of district Mardan is 8.00, while it is slighter higher than the national level i.e. 6.8 people per HH. This implies that majority of farmers having large HH size and thus having a great potential to work for the better management of land to overcome LD problem by allocating more labour towards this livelihood earning activity. The association of the family size in different UCs was checked

Table 6: *Distribution of farmers on household size.*

Household size (numbers)	UC-I	UC-II	UC-III	UC-IV	Total
1-5	01(4.76)*	04(9.52)	01(8.33)	02(13.33)	08(8.89)
6-10	10(47.62)	16(38.10)	04(33.33)	05(33.33)	35(38.89)
11-15	04(19.05)	12(28.57)	04(33.33)	04(26.67)	24(26.66)
16-20	04(19.05)	06(14.29)	02(16.67)	02(13.33)	14(15.56)
21 & above	02(9.52)	04(9.52)	01(8.33)	02(13.33)	09(10.00)
	Chi-square=2.5855. p-value = 0.99783				

Frequency (percentage);* **Source: *Field survey data, 2017.*

by Chi-square and its value suggest that it was not significant at 95% level of significance but may be at 90%, implies for the existence of association of the family members across the different UCs.

Farmer's literacy status and education level

Literacy is embedded within some socio-cultural set of activities (Rogers and Street, 2012) and it is not only literate people who can participate in development and conservative of land management activities, but the researchers also found that how illiterate people also learn to negotiate written texts which termed as term 'hidden literacies' with special reference to Pakistan and efficiently manage their working activities by mutual cooperation and participation (Nabi et al., 2009). The data about the literacy status is presented in Table 7, in which farmers were divided in to two categories i.e. literate and illiterate. The data depicts that majority (60%) of the farmers were literate while 40% were illiterate. The area having both literate and illiterate farmers and thus contributing differently to the prevention of the LD problems according to their knowledge/capacities. This implies that both the literate and illiterate farmers are facing the problem of LD at the field, but to overcome through it by different adoptive and mitigate strategies the approach differences may be there. The UC-I and UC-II have the highest percentage of literate farmers because there are adequate education facilities at their door steps and also these UCs are near to city that's. This implies that in the UCs majority of the farmers are literate and able to understand the problem of LD easily. The p-value of the chi-test suggests that there no significant association at 95% confidence level in the farmer's opinion about the literacy status in the selected UCs.

Among the other socio-economic characteristics of the farmer's, level of education explains to understand the level of LD and associated problems (Belay and Bewket, 2013; Genius et al., 2014). Previous findings (Arslan et al., 2014; Teklewold et al., 2013) demonstrate a positive association between the education level of the HHs heads and the selection of enhanced advances and land management. Furthermore, a family unit with more education may have more prominent access to efficiency management contributions because of access to off-farm income and likewise be more attentive of the advantages of land management procedures (Kassie et al., 2011; Kirui and Njiraini, 2013). Thus, the farmer level of education having great importance in the land management and prevention of LD and the data regarding this is presented in Table 7 also, in which farmers were divided into four levels of education according the education levels (primary, middle, secondary and higher secondary) classification of government of Pakistan. The data shows that 15.55% of the farmers having primary level of education, while 24.44%, 11.11%, 8.89% having middle, secondary and higher secondary level of education respectively. This implies that in the selected research area there is less number of farmers having higher secondary education. The association in the farmer's opinion was not significant at 95% confidence level across the UCs as presented by the Chi-value i.e. 1.3114, but near to significant at 90% level of significant and signifies a relation and association among the UCs for the level of education of the respondents.

Farmer's main occupations

Major occupations clusters describe the idea of work as a rule involved by a person. In this study the Pakistan Standard Classification of Occupations 1994, is used to characterize occupational congregations and the farmers were divided in to five categories i.e. farming, business, self-employed, services and others (foreigner worker, daily wages i.e. agriculture and outside agriculture etc.) of occupations. The data regarding farmer's occupations are presented in Table 8, shows

Table 7: *Distribution of farmers on the basis of literacy status and level of education.*

Literacy status	UC-I	UC-II	UC-III	UC-IV	Total
Literate	12(57.14)*	25(59.52)	7(58.33)	10(66.67)	54(60.00)
Illiterate	9(42.86)	17(40.48)	5(41.67)	5(33.33)	36(40.00)
Chi-square =0.3671, p-value= 0.946959					
Level of Education					
Primary	3(25)*	7(28)	2(28.57)	2(20)	14(15.55)
Middle	5(41.66)	10(40)	3(42.85)	4(40)	22(24.44)
Secondary	2(16.67)	4(16)	1(14.29)	3(30)	10(11.11)
Higher secondary	2(16.67)	4(16)	1(14.29)	1(10)	8(8.89)
Chi-square=1.3114. P-value is 0.998319. $p < .05$.					

Frequency (percentage);* **Source: *Field survey data, 2017.*

Table 8: *Distribution of farmers on the basis of occupation.*

Occupations	UC-I	UC-II	UC-III	UC-IV	Total
Farming	12(57.14)*	24(57.14)	05(41.67)	07(46.67)	48(53.33)
Business	01(4.76)	04(9.52)	02(16.67)	03(20)	10(11.11)
Services	03(14.29)	05(11.90)	01(8.33)	02(13.33)	11(12.22)
Self Employed	02(9.52)	03(7.14)	02(16.67)	01(6.67)	8(8.89)
Others	03(14.28)	06(14.28)	02(16.67)	02(13.33)	13(14.45)
	Chi-square=4.2086, p-value=0.979371				

Frequency (percentage);* **Source: *Field survey data, 2017.*

that 53.33% of the farmers were associated with the farming profession. Also 8.89%, 11.11%, 12.22% and 14.45% were associated with the occupation of self-employment, business, services and others respectively. The value of chi-square was not significant at 95% confidence level of significant results for no association in the farmer's perception on occupations across the UCs. There is high percentage of farmers associated with the farming profession and also some were associated with more than one occupation for earning the livelihoods. Among the different UCs, UC-I and UC-II having more percentage of farmers associated with the farming occupation. Thus, the farming occupation is a good attribute towards the phenomena of land degradation and the multiple occupations farmers will effective handle the problem of land degradation.

Farmers farming experience

In the literature different researcher (Akinnagbe and Umukoro, 2011) found direct and indirect relation between the farmer's experience and LD issue, but majority of them agreed that there is a positive relation between the farmer's experience and LD because with the increase of years of experience the knowledge of LD acquired by farmers also increased. Thus, farming experience contributed to the farmer's perception of the fertility status of the land and the intensity and the impacts of land erosion on agriculture production. Farming experience of the farmers were divided in to 1-30 years of class intervals and presented in Table 9. The data shows that 41.11% of the farmers having 21-30 years of experience in farming, while 22.22% having more than 30 years' experience. The data also depicts that 24.45% of the farmers having 11-20 years of farming experience and also 12.22% of the farmers having 1-10 years of experience. This clearly indicates that the farmers are of upper age and are in farming enterprise for non-appreciable years. This also agrees with the findings that farming experience of farmers determined adoption of technology and innovation and also serve as a source of information to another farmer. This implies that in the research area the farmers having sufficient experience of farming and hence understands the issue of LD in one form or the others. These findings are in line with the findings of Arthur et al. (2006) stated that the people have been living on the land for centuries and hence having sufficient experience of farming, and their livelihood has been dependent on the cultivation of crops and livestock rearing and bitterly understand the problem of LD. The value of the Chi-square pointed that there

Table 9: *Distribution of farmers on the basis of farming experience.*

Farming experience (years)	UC-I	UC-II	UC-III	UC-IV	Total
1 -10	02(9.52)*	06(14.28)	01(8.33)	2(13.33)	11(12.22)
11-20	06(28.58)	10(23.80)	02(16.67)	4(26.67)	22(24.45)
21-30	08(38.10)	18(42.85)	05(41.67)	06(40)	37(41.11)
31 & above	05(23.80)	08(19.07)	04(33.33)	03(20)	20(22.22)
	Chi-square = 1.9129, p-value =0.992771				

Frequency (percentage);* **Source: *Field survey data, 2017.*

Table 10: *Distribution of farmers on basis of farm size.*

Land size(acre)	UC-I	UC-II	UC-III	UC-IV	Total
1-5	02(9.52)*	12(28.6)	01(8.3)	03(20)	18(20.00)
6-10	08(38.1)	08(19)	05(41.7)	02(13.33)	23(25.55)
11-15	04(19.04)	12(28.6)	04(33.3)	05(33.34)	25(27.78)
16-20	04(19.04)	06(14.3)	02(16.7)	03(20)	15(16.67)
21 and above	03(14.3)	04(9.5)	00(00)	02(13.33)	09(10.00)

Frequency (percentage);* **Source: *Field survey data, 2017.*

Table 11: *Distribution of farmers on the basis of types of crop growing in field.*

Types of Crops	UC-I	UC-II	UC-III	UC-IV	Total
Cash	04(19.05)*	06(14.3)	03(25)	03(20)	16(17.78)
Food	04(19.05)	04(9.5)	01(8.3)	02(13.3)	11(12.22)
Both	13(61.9)	32(76.2)	08(66.7)	10(66.7)	63(70.00)

Frequency (percentage);* **Source: *Field survey data, 2017.*

is significant association in the respondent's opinion across the different UCs in farming experience at the 90% level of significant. Thus, the farming experience of the farmers having a positive association with the LD process, as the experience of the farmers leads them to overcome the LD problem in the area.

Farmers farm size

Farm size is usually considered the physical size of land held in operation (Sampath, 1992). Generally, farm size of the farmers is negatively associated with the LD, if the land is degraded by any one reasons then the size of land decreases coupled by its productivity. The data about farmer's farm size is presented in Table 10, which explain that farmer's farm size were divided into five categories i.e. 1-5, 6-10, 11-15, 16-20, 21 and above. The data shows that 54% of the farmers having 6-15 acre of land, while 10% of farmers having greater than 21 acres of land. The data also indicates that 17%, 20% of farmers having 16-20 and 1-5 acre of land respectively. Land size having positive association with the LD in the area as the land of the farmers are small and it is degraded then the productivity will be reduced and hence affect the farmer's livelihood, while in the case of large land size the farmers have the option of multiple crops and crops rotation for overcoming the livelihoods issues and prevention of the land degradation problem.

Types of crops grown by the farmers

Mainly two types of crops are grown by the farmers i.e. food (grains, seeds and nuts, vegetables, fruit,) and non-food or cash crops (cotton, rice, tobacco, fruit and vegetables and seeds oils). Crop rotation is a key principle of agricultural sustainability and reduces LD, as pointed by Nkonya (2016) that the high cost of LD for the production of the major food crops of the world than the cash crop. Data in Table 11, shows the farmers perception regarding growing crop at their field and pointed that majority (70%) of the farmers growing both cash, and food crops, while 18% and 12% growing cash and food crops respectively. It is clear from the findings that farmers growing food and cash crop collectively, depending upon the size of the land. Mostly the food crop was utilised for the domestic consumption while the cash crops were used to fulfil the other livelihood needs of the households. This also have a great implication for the LD by analysing it with the context of the aforementioned report of Nkonya (2016), pointed that the while getting the food crops the farmers have less care for the land and the factors associated with the LD, while in case of cash crop the farmers looks more to the productivity and thus care for the LD.

Conclusions and Recommendations

It was concluded that among the socio-economics and demographic characteristic age and household's size of the farmers having positive and significant association with the LD. Farming experience having a strong association with the land management practices of the farmers and land possession. Farmers perceived for the high level of LD and the causes were soil erosion, soil fertility loss, overgrazing, over population growth, poor land management practices. Effects of LD on the farmers were difficult farming, desertification, and loss in livestock production, migration, poverty and economic backwardness. The study as a whole concludes that the farmer's socio-economic influences positive and negatively associated. The study recommends that there is a need for awareness about the different land management strategies and the interventions of different conservation practices coupled by different socio-economic sector specific interventions for the LD preventions.

Author's Contribution

Muhammad Israr: Designed/supervised the overall research.
Saeed Ullah: Collect data and design the contents.
Shakeel Ahmad: Helped in designing and formatting the map
Asif Yaseen: Helped in the proof reading.
Nafees Ahmad: Helped in the data analysis, technical writing.

References

Adimassu, Z., A. Kessler, C. Yirga and L. Stroosnijder. 2013. Farmers perceptions of land degradation and their Investments in land management: A case study in the central Rift Valley of Ethiopia. Environ. Manage. 51(5): 989-998. https://doi.org/10.1007/s00267-013-0030-z

Arslan, A., N. McCarthy, L. Lipper, S. Asfaw and A. Cattaneo. 2014. Adoption and intensity of adoption of conservation farming practices in Zambia. Agric. Ecosyst. Environ. 187: 72-86. https://doi.org/10.1016/j.agee.2013.08.017

Akinnagbe, O.M. and E. Umukoro. 2011. Farmers' perception of the effects of land degradation on agricultural activities in Ethiope east local Government area of Delta State, Nigeria. Agric. Conspectus Sci. 76(2): 135-141.

Arslan, A., N. McCarthy, L, Lipper, S, Asfaw, S., and A. Cattaneo. 2014. Adoption and intensity of adoption of conservation farming practices in Zambia. Agric. Ecosyst. Environ. 187: 72-86.

Arthur, J.L. 2006. Family size and quality of life nexus- case of the Sunyani Municipality, Ghana. Presented in the Fifth African Population Conference, Arusha, Tanzania: 10-14 December 2007.

Belay, M. and W. Bewket. 2013. Farmers' livelihood assets and adoption of sustainable land management practices in north-western highlands of Ethiopia. Int. J. Environ. Stud. 70(2): 284-301. https://doi.org/10.1080/00207233.2013.774773

FAO. 2016. Forests and agriculture: Land-use challenges and opportunities, Rome. ISBN 978-92-5-109208-8. Retrieved from; http://www.fao.org/3/a-i5588e.pdf, Dated; Apr. 12, 2017.

Fentie, D., B. Fufa and W. Bekele. 2013. Determinants of the use of soil conservation technologies by smallholder farmers: The Case of Hulet Eju Enesie District, East Gojjam Zone, Ethiopia. Asian J. Agric. Food Sci. 1(4): 2321–1571.

FAO. 2001. The economics of soil productivity in sub-Saharan Africa. Rome.

GoP. 2016-17. Economic survey of Pakistan. Ministry of finance. Islamabad.

Geist, H.J. and E.F. Lambin. 2004. Dynamic causal patterns of desertification. J. *Bio. Sci.* 54(9): 817–829. Oxf. Publ. https://doi.org/10.1641/0006-3568(2004)054[0817:DCPOD]2.0.CO;2

Genius, M., P. Koundouri, C. Nauges and V. Tzouvelekas. 2014. Information transmission in irrigation technology adoption and diffusion: Social learning, extension services, and spatial effects. Am. J. Agric. Econ. 96(1): 328–344. https://doi.org/10.1093/ajae/aat054

Israr, M.A., Yaseen and S. Ahmad. 2017. Land degradation a threat to sustainable rural development in northern highlands of Pakistan. Conf. Proce. pp. 124-136. Rural Dev. Conf. 2017 9-11 JULY 2017 Bangkok Thailand, Tomorrow people organization Dusana vukasovica 73, Belgrade, Serbia www.tomorrowpeople.org.

IUCN. 2015. Land degradation neutrality: implications and opportunities for conservation; Nature based solutions to desertification, land degradation and drought, technical brief 2nd edn., Nairobi, p. 19.

IFPRI. 2011a. Economics of land degradation: The cost of action versus inaction. Issue brief 68, USA.

IFPRI. 2011b. Joint estimation of farmers stated willingness to pay for agricultural services: IFPRI Discussion Paper 01070.

Imoke, D.E., J.U. Ibu, O.C. Omonya, J.O. Nwabueze and G.N. Njar. 2010. Effects of land degradation on soil productivity in Calabar South local Government area, Nigeria. Eur. J. Soc. Sci. 18(1): 166-171.

Kirui, O.K. and G.W. Njiraini. 2013. Determinants of agricultural commercialization among the rural poor: The role of ICT and collective action initiatives and gender perspective in Kenya. In GI-Jahrestagung, Center Dev. Res. Univ. Bonn, Germany. pp. 1747-1754.

Kassie, M., M. Jaleta, B. Shiferaw, F. Mmbando and M. Mekuria. 2013. Adoption of interrelated sustainable agricultural practices in smallholder systems: Evidence from rural Tanzania. Technol. Forecasting Soc. Change. 80(3): 525-540. https://doi.org/10.1016/j.techfore.2012.08.007

Kassie, M., B. Shiferaw and G. Muricho. 2011. Agricultural technology, crop income, and poverty alleviation in Uganda. World Dev. 39(10): 1784-1795. https://doi.org/10.1016/j.worlddev.2011.04.023

Keesstra, S.D., J. Bouma, J. Wallinga, P. Tittonell, P. Smith, A. Cerda and R.D. Bardgett. 2016. The significance of soils and soil science towards realization of the UN Sustainable Dev. Goals. Soil. 2(2): 111. https://doi.org/10.5194/soil-2-111-2016

Le, Q.B., E. Nkonya and A. Mirzabaev. 2014. Biomass productivity-based mapping of global land degradation hotspots, ZEF—discussion papers on Development Policy No. 193. Center Dev. Res. Bonn. 57. https://doi.org/10.2139/ssrn.2465799

Moges, D.M and A.A. Taye. 2017. Determinants of farmers' perception to invest in soil and water conservation technologies in the North-Western Highlands of Ethiopia. Int. Soil Water Conserv. Res. 5(1): 56-61. https://doi.org/10.1016/j.iswcr.2017.02.003

Nkonya, E., A. Mirzabaev and J. Von Braun. 2016. Economics of land degradation and improvement: a global assessment for sustainable development. Springer Open. ISBN 978-3-319-19167-6, eISBN 978-3-319-19168-3. https://doi.org/10.1007/978-3-319-19168-3

Nkonya, E., N. Gerber and P. Baumgartner. 2011(a). The economics of land degradation toward an integrated global assessment. Development economics and policy. Vol. 66, Frankfurt am Main, Berlin, Bern, Bruxelles, New York.

Nkonya, E., G. Nicolas, V.B. Joachin and D.P. Alex. 2011(b). Economics of land degradation in South Asia. International Food Policy Research Institute (IFPRI), Working paper. 68: 56-72.

Nabi, R., A. Rogers and B.V. Street. 2009. Hidden literacies: Ethnographic studies of literacy and numeracy practices in Pakistan, Uppingham Press.

Rogers, A. and B. Street. 2012. Adult literacy and development: Stories from the field, National institute of adult continuing education (England and Wales), Leicester.

Stavi, I. and R. Lal. 2015. Achieving zero net land degradation: challenges and opportunities. J. Arid. Envi. 112: 44-51. https://doi.org/10.1016/j.jaridenv.2014.01.016

Stocking, M.A. and N. Murnaghan. 2013. A handbook for the field assessment of land degradation. Routledge. https://www.taylorfrancis.com/, eBook, ISBN; 9781136533693, Pages, 169.

Sampath, R.K. 1992. Farm size and land use intensity in Indian agriculture. Oxf. Econ. Pap. 44(3): 494–501. https://doi.org/10.1093/oxfordjournals.oep.a042060

Teklewold, H., M. Kassie and B. Shiferaw. 2013. Adoption of multiple sustainable agricultural practices in rural Ethiopia. J. Agric. Econ. 64(3): 597-623. https://doi.org/10.1111/1477-9552.12011

Waswa, B.S. 2012. Assessment of land degradation patterns in Western Kenya: Implications for restoration and rehabilitation. ZEF. Ph.D, Dissertation, Univ. Bonn, Germany.

Yusuf, M.B., F.B. Mustafa and K.O. Salleh. 2017. Farmer perception of soil erosion and investment in soil conservation measures: Emerging evidence from northern Taraba State, Nigeria. Soil Use Manage. 33(1): 163-173. https://doi.org/10.1111/sum.12332