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Climate change and its effect on crop and livestock productivity: farmers' perception of Rajanpur, Pakistan

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Abstract

Climate change is one of the major challenges for agriculture, food security and rural livelihoods for billions of poor people in the world. Agriculture is most vulnerable to climate change due to its high dependence on climate and weather. Asian agriculture sector is already facing many problems relating to sustainability. The present study was conducted to identify the impact of climate change on the socio-economic status and livelihood of farmers. A sample of 280 farmers' respondents was selected from tehsil Jampur of Rajanpur district. The data were obtained through well designed interview schedule and analyzed statistically. Most of the respondent (39.1%) use to identify climate change through personal experience. Rainfall, temperature and wind patterns are climate change s respectively as reported by all, 41.1 and 26.8% of the respondents. More than half (56.4%) were of the view that climate changes have no impact on fertilizer application. Furthermore, about one-fourth (21.4 and 24.3%) of the respondents reported that climatic change has positive impact on the crop production activities like sowing and land preparation. All the respondents were of the view that climate change has negative impact on harvesting and crop productivity. Majority (68.9 - 72.5%) reported that climate change has negative impact on sowing and pesticide application. Whereas, majority (71.1%) of the respondents reported that climate change has no impact on the fodder and its cultivation. All the respondents agreed that climate change have great effect on flood and crop/livestock productivity. While more than half (58.2 and 69.6%) of the respondents reported that climate change has great impact on crop yield and plants/animal species. All the respondents reported that climate change directly affected their annual income.

Keywords: Climate change, livelihood, livestock, Rajanpur.

Introduction

Climate change is one of the most complex challenges that humankind has to face in the next decades. As the change process seems to be irreversible, it become urgent to develop sound adaptation process to the current and future shift in the climate system. In particular, it is likely that biggest impact of change will be on agricultural and food system over the next few decades (Brown and Funk, 2008).

Climate change is defined as the changes in natural temperature of any state due to CO_2. It is also defined as human activities directly or indirectly effect through climate change and affects the livelihoods of small landholders. Greenhouse gases also decreases the crop production and soil erosion because changes in temperature affect the natural temperature for a long time. The warming in nearby scenario is basically due to human activities which cause an increase in green house. Natural gases, oil and coal produce CO_2 in high ratio that mix in atmosphere but the plants and trees also absorbed CO_2 that add in atmosphere (NAS, 2001).

The agrarian livelihoods mainly depend on income from livestock and agriculture raising. Droughts threaten the income with variety of immediate affects e.g. reduce milk production and crop failure as well as assets of the future income. Generally, livelihood security depends upon sufficient sustainable access resources and income so that meet essential needs for famers. Climate changes not only disturb the livelihoods of people but also reduced the national development of developing countries around the world. Heavy rain fall pattern at the time of mature crop destroy the whole crop and worst impact on livelihoods (Fafchamps, 2000).

The climate change is supposed to enhance poor quality of water that would increase water relevant diseases, decrease agriculture production and reduce economic development. Insufficient water supply system and poor infrastructure will also contribute extra pressure on water availability in the state. This is predicated that future water stress and scarily will have profound impact on the socio-economic development of the effected state and expected to have adverse effect on the food production (Davidson and Hachigonta, 2003).

Agriculture demands for good management because it fulfills the basic need of food security but climate has a harsh impact on agriculture. Natural climate and land plays an important role for food production but improper management could negatively impact on the food security, livelihood and their socio-economic condition of the farmers (Gunnelland Agmalian, 2005).

The mankind worldwide is facing serious environmental threats due to climate change. It impacts agriculture in a variety of ways that includes direct effect on food production. The climate change related to human activities and natural climate cycle has probably affected agriculture productivity in the developing world (Ziervogel, 2006).

Climate change not only effected supply of water resources, changes the regional distribution of fresh water resources but it also has impact on the demand for water. Changes in rainfall pattern and high temperature are likely to enhance irrigation water demand for crops (Fischer and Tubiello,2007).

The people of Pacific Island have major threat to their livelihood and food security due to climate change. The climate changes pose threat to those people who are already in difficult susceptible situation. Climate change can affect fishing, livestock, and agriculture especially in tropical and subtropical areas that also people's livelihood insecure (IPCC, 2008).

FAO (2010) also pointed out that people are at great risk from food security containing smallholder and subsistence farmers, traditional societies, pastoralists, coastal populations' indigenous people and artisanal fisher folk, will suffer from compound localized effect of climate change. People housing constrained adaptive capacity will force negative on yield of low crop production along with high vulnerability to extreme events.

Climate change has adverse effect on agriculture crops and livestock. The increasing in temperature is affecting the yield of crops very badly which will make it difficult to feed goring population. Climate change has impact on the livestock, crop production and food security but also harsh situation for the country food. The temperature increase also enhances pest and disease attack which results in low production (Oxfam, 2009).

It is expected that population of world will be 9 billion by 2050 that world would be providing high magnitude of challenges to sustain agriculture production. The climate change will further add to present challenges because agriculture, livestock and food production is directly associated with rains and local temperature (Naheed, 2009).

The other impact on climate change profound the negative impact on people's livelihood because that it is very difficult for the small landholder for adaption new practices and new technologies that prevent the effect of climate change (IFPRI, 2011).

The climate change puts harsh impact on livestock and agriculture. The food production and agriculture are directly affected by such agro-ecological change that poses a great treat to the yield of crops and it might be difficult to face fast growing population and maintain world food security system (Schmindhuber and Tubiello, 2007).

Pakistan economy is mainly agrarian and highly sensitive regarding climate change. From last few years, Pakistan is facing changes in floods and monsoon rains and prolonged drought sources. Because of change ability in floods, monsoon rains prolonged droughts are experienced (Ladd and Suvannunt,2010).

Pakistan is ranked among thickly population country that having less than 5% of area conversed with plants, tress and forests. It is comprises of the large areas with high temperature. While in Pakistan the high weather conditions will causes of droughts, water shortage resources and serve winter. The slight increase adverse in temperature can results in abnormal weather conditions and directly leading to flash flood (Ahmad, 2011).

Climate change also creates its negative impacts to food security of the country by making the crops livestock more vulnerable. The agriculture in mountainous areas is difficult because of high snow and lack of resources. The climatic extreme adds to these difficulties that causes push the farmers in poverty. The agriculture based social safety nets in areas of scarily of resources play crucial role to sustain their livelihood to obtain the state of food security (Tareen, 2011).

Materials and Methods

Sampling

The present study was conducted in Jampur district Rajanpur.There are 19 union councils in Jampur tehsil, out of which 14 are rural and 5 are urban union councils respectively. All the rural union councils were served as study area. Two villages from each union council were selected randomly and from each selected village, 10 farmer's respondents were selected conveniently. Therefore, total of 280 respondents were selected for the present study. In addition, case studies were conducted on ten (10) respondents.

Preparation of interview schedule

The data was collected through well design, structured, validated and pre-tested interview schedule. The interview schedule comprised of open ended and close ended questions. Researcher conducted face to face, interviews which primarily in English but was asked in local language.

Analysis of data

Data was analyzed through Statistical Package for Social Science (SPSS). Descriptive as well as inferential statistics were used to discuss the findings and to draw the conclusion.

Results and Discussion

Sources of information regarding climate change

Climate change is the burning issue of the world. The knowledge of farmers and their experience about the climate change have great importance which guides them to handle the harmful impact (Newsham and Thomas, 2011).There were various sources of information available to the respondents among them personal experience was one of important the source as disclosed by the most (39.1%) of the respondents followed by internet, local community, friend, and media (**Table 1**).The present findings are similar to those obtained by Capstick(2013).

Table 1: Percentage distribution of the respondents according to the source of information about climate change (n = 280)

Source of information	Responses		%of cases
	N	%	
Newspaper	71	9.9	25.4
Media	90	12.6	32.1
Local community	100	13.9	35.7
Friend	76	11.5	27.1
Internet	100	13.0	35.7
Personal experience	280	39.1	100.0
Total	**717**	**100.0**	**256**

* Responses are not 100% due to multiple responses of the respondents.

What climate change is:farmers' perspective

Different people have different opinion about climate change due to their own personal experience, climate change is natural factor which affect the human, animals and global temperature. Opinions rarely change without new arguments being presented. It always changes if new arguments are presented (*Damer and Edward, 2008). All (100%) the respondents were of the view that rainfall is climatic change.Shakoor (2011) reported similar results in this regard. Most (41.1%) of the respondents were of theview that temperature is climatic change.* Similar, results less reported by Pidgeon, and Fischhoff, (2011). *About one forth (26.8%) and small numbers (15.7%) reported that wind pattern and cloud conditionsare climatic change (**Table 2**).*

Table 2: Distribution of the respondents regarding farmers' perception about climate change (n = 280)

Climate change	Responses		% of cases
	N	Percent	
Changes in rainfall	280	54.5	100.0
Changes in wind pattern	75	14.6	26.8
Changes in temperature	115	22.4	41.1
Changes in clouds condition	44	8.6	15.7
Total	**514**	**100.0**	**183.6**

Impact of climate change on crop related activities

The responses of the respondents were recorded about impact of climate change on various crop related activities. Which are less similar to the results of Oruonye, (2012) and Oruonye and Adebayo (2013).More than half (56.4%) were indicated that climate change has no impact on fertilizer application. Furthermore, about one-fourth (21.4 and 24.3%) of the respondents reported that climatic change has positive impact on the crop production activities like sowing and land preparation. One-third (34.6%) were of the view that climatic change positively affected on irrigation. However, all the respondents were of the view that climate change has negative impact on harvesting and crop productivity. Majority (68.9-72.5%) reported that climate change has negative impact on sowing and pesticide application. About than half (56.1%) were reported negative impact of climate change on land preparation. While Oruonye(2014) reported contradictory results of pesticide application.According to most (41.8-43.6%), climatic change has negative change on irrigation and fertilizer application (**Table 3**).

Table 3: Impact of climate change on various crop related activities (n = 280)

Activities	No Impact		Negative		Positive	
	F	%age	F	%age	F	%age
Sowing	27	9.6	193	68.9	60	21.4
Land preparation	55	19.6	157	56.1	68	24.3
Fertilizer application	158	56.4	122	43.6	_	_
Irrigation	66	23.6	117	41.8	97	34.6
Pesticide application	70	25.0	203	72.5	7	2.5
Harvesting	-	-	280	100	-	-
Crop productivity	-	-	280	100	-	-

Impact of climate change on livestock related activities

The responses of the respondents were recorded about impact of climate change on various livestock activities. Majority (71.1%) of the respondents reported that climate change has no impact on the fodder and its cultivation. While about half (47.9%) of the respondents reported that climate change has no impact on the cleaning shed, whereas, most (42.5 and 42.9%) were of the view that climate change has no impact on milking and watering and about one-third (30.7%)reported no impact of climate change on milking. Moreover, all (100%) the respondents reported that climate change has negative impact on the vaccination and animal health. SPORE, (2008) received similar results regarding climate change impact on milking and water.While about fifty (47.9 and 52.5%) were of the view that climate change has negative impact on the grazing and milking. furthermore, most (41.4%) were reported positive impact on cleaning shed and only one-fifth (21.4%)recorded positive impact of climate change on grazing (**Table 4**).

Table 4: Impact of climate change on livestock related activities (n = 280)

Livestock	No Impact		Negative		Positive	
	F	%age	F	%age	F	%age
Grazing	86	30.7	134	47.9	60	21.4
Fodder	199	71.1	81	28.9	0	0
Watering	120	42.9	105	37.5	55	19.6
Cleaning shed	134	47.9	30	10.7	116	41.4
Milking	119	42.5	147	52.5	14	5.4
Vaccination	-	-	280	100	-	-
Animal health	-	-	280	100	-	-

Climate change effect on

Rarieya and Fortun (2010) analyzed that Kenya is facing high weather condition as compare to the African countries more than 70% natural disasters occurs due to climate change. Large amount of rains and various floods had shocking effect on food security and agriculture. They also suggested that people, farmers, scientists and Agric. Extension Officers should create awareness about climate change. Climate change has significant effect on natural resources; floods, heat, stress and drought reduce the production of livestock and crop production. It is therefore, the respondents were asked and their responses are presented in **Table 5**. The responses of the respondents were noted about the perception about the extent of climate change. All the respondents agreed that climate change have great extent effect on flood and crop/livestock productivity. While more than half (58.2 and 69.6%) of the respondents reported that climate change has great impact crop yield and plants/animal species. Furthermore, more than one-fifth (25.7 and 32.5%) of the respondents told that climate change has some extenteffect on drying up of water sources and diseases and human livestock.Moreover, all the respondents also told that climate change not at all cause droughts.More than half (51.8 and 61.1%) were of the view climate change not at all cause for human/livestock diseases and drying up of water sources.

Table 5: Percentage distribution of the respondents according to the impact of climate change (n = 280)

Climate impact	To great extent		To some extend		Not at all	
	F	%age	F	%age	F	%age
Flooding	280	100	-	-	-	-
Changes in crop yield	163	58.2	88	31.4	29	10.4
Drying of water sources	37	13.2	72	25.7	171	61.1
Drought	-	-	-	-	280	100
Plant and animal species	195	69.6	31	11.1	54	19.3
Any other (disease of human and livestock)	44	15.7	91	32.5	145	51.8

Effect of climate change on income

Livestock and crop productivity are major source of income in rural areas. Changing in temperature affected the crop and livestock production and it's directly effect on the annual income of the rural farmers. But if crop fails and livestock are serve as the buffer in hard time animals (livestock) can be sold or eaten for the sustain of their families. Climate change directly affects the crops and livestock of the farmer so their annual income decreases. Floods, high temperature, changes in crop yield due to climate change directly impact on the annual income. Respondents were inquired about effect of climate change on their income, in response all the respondents reported that climate change directly affected their annual income (Table 6).

Conclusion

This study was conducted to examine to study the effect of climatic change on livestock and crop productivity. Farmers mostly rely on personal experiences to identify the climate and do not believe on other authentic sources of information regarding climate change. They were of the view that climate is only heavy rains and flood that damages the crops and their livestock and related activates. Climate changes affect negatively livestock's health and their vaccination. As a result, their annual income is also affected due to climate change.

Recommendation

- There is need to inform farmers about the climate change and its effects on their crops/livestock through newspaper, and mass media at appropriate time.
- Training of farmers must be conducted to enable them regarding changing pattern of climate as a result they will be able to mitigate adverse effects of climate change.

References

Ahmad, M. 2011. Climate change induced vulnerability on living standard-a study on south western coastal region of Bangladesh. J. Innov. Dev. Strategy.

Capstick, B. S. 2013. Public perceptions of climate change in Britain following the winter 2013/2014 flooding. Understanding Risk Research Group Working Paper 15-01, Cardiff University, Cardiff, UK.

Brown, M. E. and Funk, C. C.2008. "Food Security Under Climate Change" National Aeronautics and Space Administration.University of Nebraska - Lincoln Paper 131. http://digitalcommons.unl.edu.

Oruonye, D., E. 2014. An Assessment of the level of Farmers Awareness and Adaptation to Climate Change in Northern Taraba State, Nigeria. Department of Geography, Taraba State University, Jalingo, Taraba State, Nigeria. Int. J.Sust. Agric. Res., 1(3): 70-84.

Damer, T. 2008. Attacking Faulty Reasoning: A Practical Guide to Fallacy-free Arguments. Cengage Learning. India.

Davison, J. and Hachigonta,C. 2003. Inter-annual variability in rainy season characteristics over the Limpopo region of Southern Africa. Int. J. Clim., 25: 1835-1853.

Fafchamps, C. 2000. Drought and saving in West Africa: Are livestock a buffer stock. J. Dev. Econ., 55(2):273–305.

FAO. 2010. Managing forests for climate change. Brochure of forestry. Rome, Italy.

Fischer, G, and Tubiello,F. N. 2007. Climate change impacts on irrigation water requirements: Effects of mitigation, 1990-2080. Tech. Fore. Soc. Chan., 74: 1083-1107.

Fortun. K. and Rarieya,M. 2010. Food security and seasonal climate information: Kenyan challenge. Integrated research system for sustainability science, United Nations University and Springer.

Gunnell, A. N. and Agmalian, G. 2005. Agriculture land available for production in 2030.Roots of the Change Fund Report. San Francisco, USA.

IFPRI. 2011. International Food Policy Research Institute (IFPRI) Annual Report 2010.

Iglesias, A., Avis, K. Benzie,M.Fisher P. M.and Webb,J. 2007. Adaptation to climate change in the agricultural sector. Report to European Commission, Directorate General for Agriculture and Rural Development, ED05334, Issue Number 1. Prepared by AEA Energy and Environment and Universidad de Politécnica de Madrid, Spain.

IPCC. 2008. Climate Change 2007: Impacts, adaptation and vulnerability. Contribution to Working Group fourth assessment. Inter-governmental Panel on Climate Change. Cambridge University Press. Cambridge, UK.

Ladd, G. and Suvannunt,V. 2010. A model for consumer demand for good characteristics. American J. Agri. Eco., (58): 504-510.

Naheed, G and Rasul,G. 2009. Projections of crop water requirement in Pakistan under global warming. Pak. J. Metero., 7(13): 51-55.

NAS, 2001. Climate change science. An analysis of some key questions. National Academy Press. Rome, Italy.

Newsham, A. J. and Thomas.D. S. G. 2011. Knowing, farming and climate change in adaptation in North Central Namibia. Global Environ Chang. 21:71-77.

Oruonye, E. D. and Adebayo, A.A. 2013. An assessment of the effects of the 2012 flooding in Taraba State. A Paper Accepted for Presentation at the 5th Annual National Conference Nigerian Association of Hydrological Sciences (NAHS), Held at University of Nigeria Nsukka.

Oruonye, E.D. 2012. Socio-economic impact assessment of flash flood in Jalingo Metropolis, Taraba State, Nigeria. Int. J. Environ. Sci., 1(3): 135 –140.

OXFAM, 2009. Even the Himalayas have stopped smiling. Climate change, poverty and adaptation in Nepal. OXFAM International. August 2009, Nepal.

Pidgeon, N.F. and Fischhoff, B. 2011. The role of social and decision sciences in communicating uncertain climate risks. Nature Clim.Chan.,1,35-41.

Shakoor, U, S. and Saboor,A. 2011. Impact of climate change on agriculture: Empirical evidence from arid region. Pak. J. Agri. Sci., 48(4):327-333.

Schmindhuber, J. and Tubiello, F. N. 2007. Global food security under climate change. Proceedings of the National Academy of Science. 104(50): 19703-19708.

Spore, 2008. Climate change, spore Special Issue-August 2008.

Tareen, W. U. H. 2011. An exploratory study of social safety nets (SSN) in Battagram district of Khyber Pakhtunkhwa Province: Implications for food security of small farmers.M. Sc. (Hons.),Thesis, Agri. Ext., Dept. Agric. Ext., Univ. Agric., Faisalabad Pakistan.

Ziervogel, G. 2006. Climate variability and change: Implications for household food security. Assessments of impacts and adaptations to climate change. The AIACC Project Office, International START Secretariat, Washington DC, USA.

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