

The Perception of Local Community about the Effects of Climate Change in Upper Swat, Khyber Pakhtunkhwa, Pakistan

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Abstract

Purpose: This study is an attempt to identify the impacts of climate change on the lives of local people of the study area based on 30 years back data i.e. 1982-2012.

Methodology/Approach: The study was carried out through semi-structured interview.

Findings: The results showed that climate change has visibly occurred in the area during the last 30 years. The results also revealed that climate change is a reasonable risk affecting the lives of the local people more towards negatively than positively, as perceived by the residents of Swat valley.

Practical implications: The study recommends that the anthropogenic sources causing global warming and triggering climate change, should be reduced and government should restrict and implement the law regarding Green House Gases (GHG) emissions.

Originality/Value: The study is an attempt to examine the people's perception about risk of climate change and its possible effects on their lives in Swat Valley in 1982-2012. The work is different from pre-existing literature in Pakistan.

The authors investigated the perceptions of locals regarding the effects of climate change on their lives both qualitatively and quantitatively, which have not been studied previously. Moreover, this study included a set of recommendations for the control and reduction of causes of climate change which is a significant contribution to the existing literature and can guide the government agencies for policy making.

Keywords: Climate change; Perception; Anthropogenic; GHG (Green House Gases)

Introduction

Climate change refers to the variation in atmospheric temperature and seasonal rain fall. Climate change is mainly caused by air pollution, GHG emissions and deforestation. Like many other countries, Pakistan is experiencing climate change and the change in climate is leading to effects such as increase in temperature, decrease in rain fall and floods [1]. Climate change is global phenomena and like other countries the change has occurred in Canada as perceived by media and was described as a main problem on both national as well as international levels [2]. They labeled climate change as the main issue of destruction. Similarly, elders have felt climate change personally in Michigan [3]. Combest-Friedman [4] evidenced the climate changes and confirmed them through meteorological department data in Central Philippines. Bormann [5] explored in a study that irrigation pattern, agriculture practices, livestock activities and over all life style of people has been changed in the recent decades merely because of climate change. They also found that people have become adoptive to these changes without realizing the actual cause of such changes; hence their capability of risk management has been affected which has reduced their resilience to deal with any natural disaster [2,6].

Many distinct communities are identified during research having diverse perceptions of climate change, some of which think climate change to be a positive phenomenon of their daily business of normal life while others are taking climate change as an important problem regarding the side effects it is putting on the people as reported by Bardsley [7]. Climate change is a reasonable risk affecting temporally and geographically isolated places and people as perceived by Americans in a study carried out by Leiserowitz [8].

Pakistan, a country which has high mounts, arid plains and low-lying shoreline ranges, is particularly at risk to the overall climate change impacts and is included in the list of 12 highly exposed countries of the World Bank to address climate change [9]. Heavy rainfall, drought, Rising temperatures, and loss of agricultural production is expected in the country because of climate change and approximately 40% of the people of Pakistan are highly vulnerable to disasters multiple repeated with variations in rainfall patterns and storms, floods and droughts [1]. It was mentioned in the Fourth Assessment Report of IPCC [10] that rains would intensify in the northern region of Pakistan because of climate change. Patterns of precipitation have become unpredictable and unexpected in Pakistan, which makes it difficult for people to take measures for their safety, livestock and crops [11]. For example, on July 29, 2010, the country confronted a great flood, after the heavy seasonal rains hit Khyber Pakhtunkhwa and parts of Punjab, Sindh and Baluchistan. This is the worst flood in eighty years and an estimated 2,000 people died and more than 700,000 houses and other infrastructures were destroyed [11]. Climate change has endangered the

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Received January 23, 2014; **Accepted** February 04, 2014, 2013; **Published** February 06, 2014

Citation: Maryam A, Khan S, Khan K, Khan MA, Rabbi F, et al. (2014) The Perception of Local Community about the Effects of Climate Change in Upper Swat, Khyber Pakhtunkhwa, Pakistan. J Earth Sci Clim Change 5: 183. doi:10.4172/2157-7617.1000183

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Name of tehsil	Total number of union councils	Population as per Census Report 1998 [15]	Sample size selected for survey n_i N_i/N
Matta	13	101026	154
Khwazakhela	11	91518	140
Bahrain	10	58456	90

Table 1: Tehsil wise union councils list selected for data collection.

Call	Attempts	Number of people interviewed	Cumulative	Response rate (%)
1	450	230	230	51
2	220	110	340	75.5
3	110	44	384	85.3

Table 2: Response rate of the total interviews.

wild life, human health, fuel wood, water scarcity and food availability rather than towards initiation of a disaster or towards business in the area [6].

Climate change can't be overcome by introducing a 'one size fits all' tactic; instead each country should recognize their native environment and create a workable strategy for climate [12]. Considering that the challenges of climate change need effective response measures, focus of policymakers and researchers is on provision of measurable results as analyzed by Syed [13]. He also suggested adaptation strategies that could be adopted by policy makers to cope with this change. This process ultimately needs to be carried out at local level because it is the level at which responses will be put into effect. This study was conducted to assess the perception of the local population in Swat Valley, Khyber Pakhtunkhwa Pakistan. The purpose of this study was to assess the perception of the local population about climate change in Upper Swat, Khyber Pakhtunkhwa Pakistan. It identified both positive and negative effects of climate change on health, water, precipitation, temperature, food and livelihood as perceived by the Swatian community, and suggest policy recommendations that are contextual and aligned with the development preferences of the country. The paper is organized as follows: In section two the methodology of the study is discussed, while section three presents the results of the field survey. In the last section the conclusion of the study and few recommendations are given.

Methodology

The perception survey was carried in upper Swat valley of the province of Khyber Pakhtunkhwa. Upper District Swat comprises of 3 Tehsils i.e. Tehsil Matta, Tehsil Khwazakhela and Tehsil Bahrain. Stratified Random Sampling (SRS) technique (proportion allocation method) was used for the collection of data [14]. In the first stage, strata (Tehsils) were selected. The actual sample size (N) was calculated after the identification of the targeted Tehsils. The following formula was used where sample size N along margin of error E is given by:

$$X = Z(c/100)^2 r(100-r)$$

$$N = \frac{N_x}{((N-1)E + x)}$$

$$E = \text{Sqrt}[\frac{(N-n)x}{n(N-1)}]$$

Where N is the population size, r is the fraction of responses that authors were interested in, and Z(c/100) is the critical value for the confidence level c. The calculation is based on the normal distribution. The population of the 3 selected Tehsils is 251,000 [15]. Then by calculating the aforementioned formula the sample size is 384 with a

margin of 5% error and confidence level of 95 percent. The following formula [14] was used for sample selection from each Tehsil:

$$n_i = n \cdot N_i/N$$

Where,

n_i = Sample Size to be selected from each Tehsil

n = Total Sample size

N_i = Total population in each Tehsil

N = Population in 3 Tehsils.

Out of the total sample size selected three Tehsils; the sample size from each Tehsil is given in Table 1. A total of 154 respondents were interviewed in the Tehsil Matta, 140 respondents in Tehsil Khwazakhela and 90 respondents in Tehsil Bahrain. The sample size for each tehsil was selected by using the aforementioned formula. The details are given in Table 1 Furthermore, in each Union Council, 50% of the respondents selected for the interview were male and 50% were female. Male enumerators were hired for interviewing the male citizens, while female enumerators were hired for interviewing the female respondents.

Focused group meeting i.e. meetings of locals elder than 40 years of age, were arranged for both male and female community separately to get their view clearly regarding climate change and its effects. Semi structured interviews were conducted during the meetings in order to get the desired information [8].

Results and Discussion

Response rate of the community was identified according to the standard method suggested by the Council of American Research Organization (CASRO) [12] where the response rate came 85.3%. The same is elaborated in Table 2.

Respondents perception about change in climate in past three decades (1982-2012)

The people of Swat have more information about their surroundings and are fully aware of the changing atmospheric condition and have clearly felt the changes in the climate over the past few years. This conclusion is confirmed by the results of a question that asked respondents to indicate their perception about climate change (Table 3). The question asked: "Do you think there is any change in the climate in the past three decades (1) Yes; (2) No; (3) I don't know." A clear majority of respondents (94.8%) answered yes and said that climate has been changed in the past three decades. Only 5.3% acknowledged no change in the climate during the aforementioned period.

Respondents' perception about positive impacts of climate change on their lives

A narrow proportion of the Swatian community is considering climate change to be a positive addition to their lives apart from its negative consequences. These findings are confirmed by the results of a separate question that asked respondents to state their view about the

Response	Percent
Yes	94.8
No	5.2
Total	100
n= 384	

Source: Field survey, 2012

Table 3: Do you think there is any change in the climate in the past three decades?

Impact	Percent
There is no positive impact of climate change	79.2
Yes climate change has positive impacts	18.2
I don't know	2.6
Total	100
n= 384	

Source: Field survey, 2012

Table 4: In your perception, is there any positive impact of climate change on your life?

Response	Percent
There is no negative impact of climate change	19
Yes climate change has negative impacts	76.3
I don't know	4.7
n=384	

Source: Field survey, 2012

Table 5: In your perception, is there any negative impact of climate change on your life?

positive impacts of climate change if any (Table 4). The question asked: "In your perception, is there any positive impact of climate change on your life (1) There is no positive impact of climate change; (2) Yes climate change has positive impacts; (3) I don't know." A majority of respondents (79.2%) stated that there is no positive impact of the climate change on their lives. A very small proportion (2.6%) of the respondents was found to be unaware of any kind of impacts of the climate change. On the contrary, 18.2% of the respondents stated that the changing climate has produced some positive impacts. Those who thought climate change to be a positive change for their lives defended their view by saying that warmer temperature in winters because of climate change has increased crop yield and the winter season is pleasant now. They further added that warmer temperature in winter decreases different seasonal health disorders such as chest infection and hypothermia [16].

This change has also put a good impact on their activities. They further stated that climate change has also increased their social, agricultural, economic, political, business and educational activities especially in winters [17]. They were of the view that new ecosystems have been established due to normalization of the temperature which leads to the survival of many new wild species [18]. Some people said that because of warmer weather now the people don't stay around bone fire all the time as they used to do in the past but easily do their jobs. Some admitted that food production is now increased as new varieties of warmer areas can now be cultivated in our region as well e.g. mangoes, sugar cane. Some said that life cycle of plants is reduced so fruits quickly ripen and crops become ready to harvest in less duration now as compared to past. Some said that rainfall is reduced because of climate change which has put a positive impact on their life styles. Some were of the view that climate change has caused rise in water level because of which water is frequently available for irrigation. Hence, crop yield is increased which leads to economic growth of farmers [19]. Some other said that snow fall is decreased now which is a good factor as many crops and vegetables were spoiled because of snow fall. They said that lighter clothes are used in winter now which is a good sign. A few shepherds said that it was hard to take care of their herds in winters during past but now winters are mild so they can easily graze their cattle now [13].

Respondents perception about positive impacts of climate change on their lives

Many of the respondents were worried about the negative impacts

of climate change and disclosed the fact that climate change has resulted in floods in the area during the recent past [10]. This was concluded from the results of another query which asked the respondents to share their perception regarding any negative impacts of climate change. The question asked: "In your perception, is there any negative impact of climate change on your life (1) There is no negative impact of climate change; (2) Yes climate change has negative impacts; (3) I don't know." The results revealed that majority of the respondents (76.3%) were experiencing negative impact because of changed climate. A small portion of the respondents (19%) were not considering any negative impact of climate change and a few respondents i.e. 4.7% said they are unaware of any kind of changes caused by climate change (Table 5) Some of the respondents stated that, they like cold weather while it is becoming warmer and warmer now. They added that heavy rain fall, warmer temperature and more humidity of changed climate not only causes more diseases but also triggers other hazards like glaciers melt, floods and removal of fertile soil layer from the fields because of floods. Diseases also spread out after floods [13].

Some old people said that due to hotter seasons more diseases are spread. This also has made them allergic and also causes skin diseases, pigmentation and many respiratory disorders. Some said that greenery is lesser and trees are becoming short in heath now. The locals also pointed that climate change has caused scarcity of drinking water by lowering the ground water table and this leads to other disasters like drought on one hand and soil erosion on other [1]. They added that warmer climate is suitable for insect reproduction [20]. Mosquitoes and bats have increased in number. The earlier is causing more threats while the later reduces corn production by eating the grains. Rain fall is decreased in the irrigation season which has reduced crop production in arid zones [1]. Some said that greenhouse effect and global warming are all related to climate change [13]. Few other perceived that electricity demand has been increased because of climate change which has created a tremendous gap between demand and supply thus energy crises is emerging which is affecting our lives from all fronts. Some said that they are unable to focus on their jobs and face trouble during summers because of extreme heat caused by changed climate [19].

Some were of the view that many medicinal plants have been disappeared because of climate change [21]. Many plant's diseases are caused while a lot of wild plants and animals have vanished from our area. Warmer climate has reduced our immunity as well. Some of the respondents said that natural springs have been dried because of less rain fall. Some elders commented "we are weaker now and needs more heat in severe cold". They further commented that we need more fuel wood for bonfire in chilling winters whereas cold water and ventilated rooms in hotter summers, which are both caused by changes in climate. They further added that climate change has increased diseases of different fruits in our area thus the use of sprays on fruits is increased which causes economic loss as found by Nafees [22] in a study conducted on pesticide use in Swat Valley. Animals are also getting more diseases due to climate change as identified by Sayed [13]. Some said that warmer temperature has caused depression whereas the fear of floods in monsoon has made them psychopathic [23]. It's becoming hard for shepherds to keep huge herds now because of hotness and less greenery. The farmers added that the sowing season of many plants is also changed now [24]. Shopkeepers said that their business is very affected during extreme weathers [5].

Conclusion

Climate change is a global environmental issue and it is thought to have potential impacts on the people in the future. The findings of the

study showed that as per the perception of the people, the Upper Swat area of the Khyber Pakhtunkhwa, Pakistan was having extreme cold weather in the past which has been changed over time to a warmer and mild weather in the recent past. The people of the area are witness to such changes themselves. The study concluded that climate change has been occurred in Upper Swat like many other regions across the globe. The residents of the upper Swat area have observed this change and are fully aware of the different aspects of climate change. The people in the area have realized the causes of the climate change. The locals have adopted new techniques in order to utilize the changed climatic factors in a better way. For example, as the winter temperature is warmer now so they grow such fruits and vegetables during winters which need warmer temperature. On one side, people are utilizing the changed climate positively while it is a terrifying phenomenon for many others because of the potential hazards it is having. Climate change has negatively affected locals in the form of flooding which has severely damaged their crops, houses and other infrastructure. The study recommends that the anthropogenic sources causing global warming and triggering climate change needs to be reduced. There are no proper tackling techniques with the people to cope with the negative impacts of climate change, so government should introduce some policies and practical measures for enhancing such techniques. Rising of awareness campaigns regarding climate change and its harmful effects is highly needed. Capacity building trainings are recommended for the Swatian community.

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