

ANALYSIS OF HUMAN PERCEPTIONS AND ADAPTATIONS TO FLASH FLOODS IN KHYBER AGENCY, FATA

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ABSTRACT

The present study aims to analyse the human perceptions and adaptations to recurrent devastating flash floods in Khyber Agency, FATA. The study is mainly based on both primary data sources including field observations, structured questionnaire survey and focus group discussions supported by secondary data sources. Three hundred adult residents in five sample villages along Chora River and its tributaries were interviewed by using a structured questionnaire which covered approximately 20% of the total households. Respondents' perceptions were investigated about the occurrence of flash floods, flood damages, nature of affinity towards flood prone areas and adaptation strategies. Cartographic and statistical techniques were applied to process and analyze the data. As a result, the data were analytically discussed and presented in the form of tables, maps and plates. The analysis reveals that people of the area perceived about the recurrence of future flash floods during rainy season. Most of the people perceived the flash floods as it hit the study area with devastating impacts and the extent of flood damages. In spite of flood risk, the level of affinity towards living in the flood prone area was found high among the community as they have blood ties with the land, kith and kinship. In the study area, people had adopted various flood mitigation strategies to reduce the devastating impacts of flash floods. However, the resident had greater motivations and concern on socio-economic factors rather than adjustments to frequent flash flood.

KEYWORDS: Human perception, Flood damages, Adaptation to floods, Nature of affinity

INTRODUCTION

The present study attempts to evaluate human perceptions and subsequent adaptations to recurrent flash floods in Khyber Agency, FATA. Flash floods occur regularly in the study area especially during winter, spring and summer rainy seasons. This, in effect cause adverse impacts on life and property of the local community and triggers severe setback to the socio-economic and physical environment. It is, therefore, need of the hour to evaluate the human perceptions about floods and subsequent adjustments to flash floods in the community, to safeguard the precious human lives and other properties from the flooding. In the study area, the level of human perception plays a significant role in decision-making regarding the adoption of flood protective measures and adjustment to floods. Moreover, adjustment to floods also minimizes the adverse impacts of frequent flood disasters in Khyber agency, FATA.

Globally, the frequency and intensity of disasters are on rise. It is hydro-meteorological events, where an increasing trend has been recorded. Worldwide, floods claim approximately forty percent of the losses caused

by natural hazards (CRED, 2016). Pakistan has a long history of recurrent flood occurrences and its detrimental effects (Kurosaki *et al.*, 2012). Pakistan is among those five countries in South Asia where annually the highest average numbers of people are liable to suffer from floods (GoP, 2007). The country frequently has been suffered from riverine, flash and urban floods (Ahmad, *et al.*, 2011). The history of Pakistani territory reveals that since the Indus valley civilizations, the area had received and affected by flood events with devastating impacts on the socio-economic and physical environment.

Flash floods are fast upsurges of water along the rivers or low-lying areas. A flash flood arises in a short period of time when there is heavy downpour (Bonacci *et al.*, 2006) and gives very little lead time for early warning (Ahmad, *et al.*, 2011). It is very difficult to foretell when a river spill over its banks. A flood is caused by any process that puts more water into a river than its carrying capacity (Foster, 1983, Khan & Haq, 2010). Hasnain, *et al.*, (2011) stated that when heavy rain fall occurs in a short time, it increases the potential of flash floods. There are a number of factors which often cause a flash flood. For instance heavy rain falls, an abrupt

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up-shoot in temperature and consequent snow melting in the catchment area can cause a flash flood (Khan *et al.*, 2010, Rahman & Khan, 2012).

The level of perception affects decision-making of farmers regarding the use of flood-plains. It plays an important role in determining the degree of impending losses and could prove useful in reducing the various losses to a considerable extent. But unfortunately, the level of perception is not satisfactory and uniform throughout the flood environment. Therefore, it is quite useful to assess the level of perception of the people living in the area (Burton *et al.*, 1968). People of the floodplain definitely perceive the occurrence of future floods with their past knowledge and experience, but they are unable to say when exactly it will occur. This high degree of perception is mainly due to high flood frequency. Floodplain occupants suffer from various types and degree of losses in each severe flood year. Damages are primarily to crops, and to a lesser degree to animals and habitat, including life and other property. Most of the respondents perceive flood damages as being substantial (Pathak, 1991).

In flood scenario, the affected community needs immediate relief during and after the flooding events. It is the responsibility of the government to provide emergency relief to the flood affected people. Local people also usually provide relief to the affected people on humanitarian basis during emergency (Kurosaki *et al.*, 2011, Khan, 2007). Flood victims after recession or during flood usually ask for help from governments, friends, landlords and social groups (Pathak, 1991). The level of affinity towards the floodplain is very high among the people, except amongst those who are landless. As landless people and non-agricultural communities have less and indirect affinity towards the floodplain. Some people are so much attached to the floodplain that they prefer even if they are provided with the same amount of land in safe area (Ramchandran and Thakar, 1975). The farmers of the area have been living with floods for a long time. They know that floods can be beneficial as well as detrimental to agricultural productivity. In some areas, agricultural activities in the floodplain are seasonal and thus automatically adjusted to flood hazard (Islam, 1980; Ramchandran and Thakar, 1975).

THE STUDY AREA

Khyber Agency is an administrative unit of Federally Administered Tribal Areas (FATA) of Pakistan. It was declared as an Agency in 1879. Khyber Agency extends from 33°-44' to 34°-20' north latitudes and 70°-26' to 71°-30' east longitudes. It is bordered on the north-west by Afghanistan and on the north by Mohmand Agency. Peshawar district is situated in the east of Khyber Agency. Orakzai Agency and Frontier Region Kohat surrounded Khyber Agency in the south. It is bounded in the west by Kurram Agency and Afghanistan (Fig. 1). Its total area is 2,576 Km² and its population, according to the 2017 census is 986,973 persons. It has three subdivisions namely Bara, Jamrud and Landi Kotal.

In Khyber Agency the climate is of extreme nature. Both winter and summer seasons are severe (Dani, 1995; Hart, 1985). In May, June, July and August temperature remains high. In June the mean maximum and minimum temperature is approximately 40 °C and 26 °C respectively. December and January are the coldest months. In January the mean maximum and minimum temperature is almost 18 °C and 4 °C respectively. In Tirah the weather is pleasant in summer and very cold in winter.

There are two spells of rain fall yearly. The winter rains are brought by the western winds, whereas the summer rains are brought by monsoon winds (Rahman & Shaw, 2015). The winter rain falls are high in March and April due to western disturbances. Snowfall is common in winter on high mountains. The month of August shows the highest summer rains. The winter rains are greater than the summer rains. The average annual rain fall is very low which is about 400 mm (GoP, 2007). The topography of Khyber Agency consists of mountains and valleys. Different series of the Safaid-Koh ranges meet here. Because of excessive cutting of trees only shrubs and bushes are remained, which yield only firewood and pasture. Small patches of suitable forest also exist in Tirah. Due to scarcity of water a very small area of land is suitable for cultivation (Spain, 1985). Range land constitutes significant area.

METHODS AND MATERIALS

To realize objectives of the study both field observation and primary sources of data were used. Primary

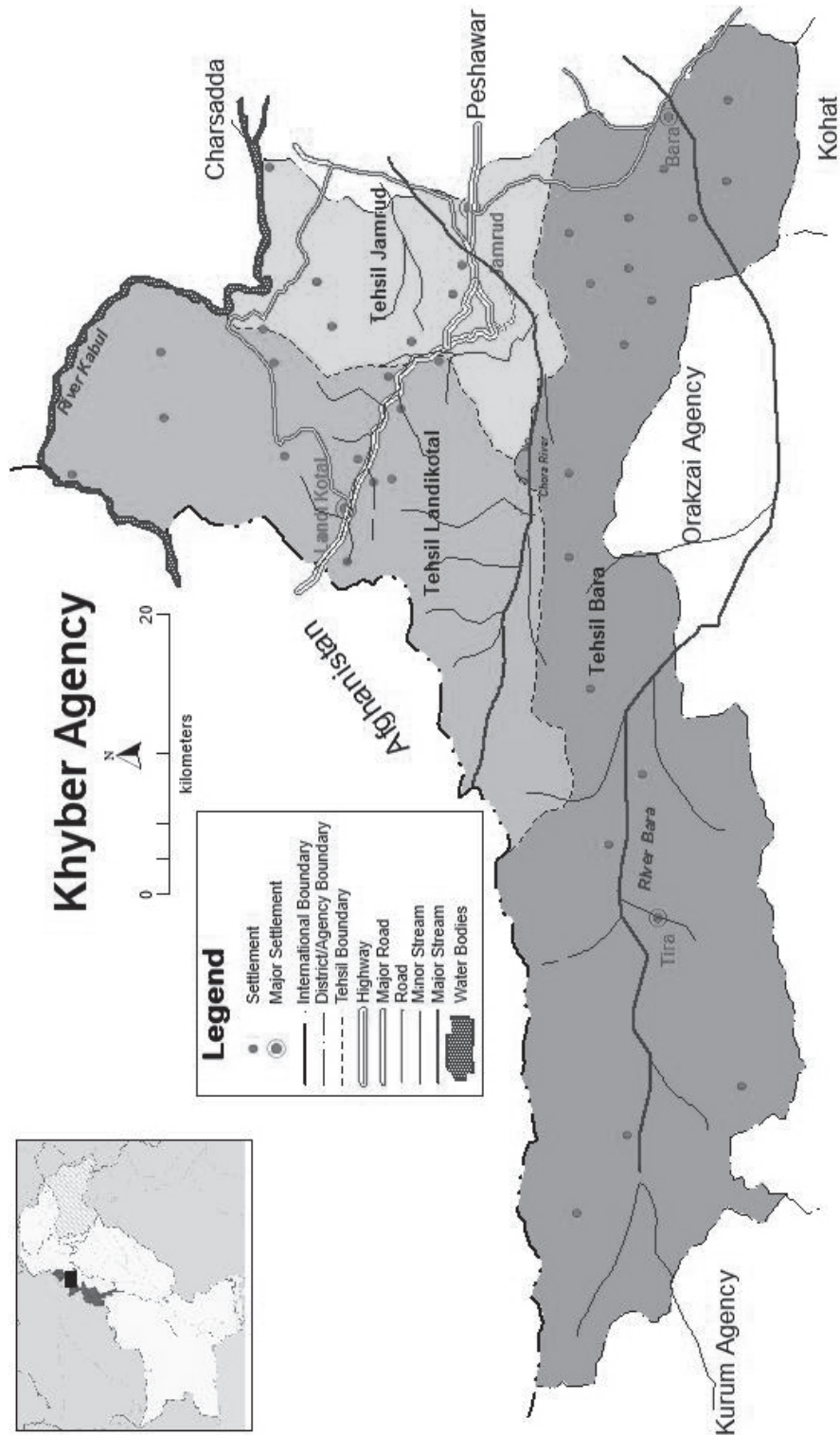


Fig. 1: Location of Khyber Agency, FATA

data were gathered directly from the study area. For comprehensive and thorough study five sample villages were chosen by purposive mean. For individual household a standard questionnaire was prepared to gather baseline information. The data were gathered through individual interviews and group discussions with the key stakeholder's survey procedure. From each sample village a total of sixty respondents were interviewed, which makes a cumulative of three hundred. It covers approximately 20% households in the study area. Various statistical tools and methods were used to analyze the

collected data. Finally, the results were presented in the form of tables, statistical diagrams, maps and plates.

ANALYSIS, RESULTS AND DISCUSSIONS

Fluvial Morphology of Khyber Agency

The fluvial morphology of Khyber Agency includes Bara River Basin, Chora River Basin and Kabul River Basin. The Bara River System drains mostly the southern part of Khyber Agency. The Chora River Basin covers

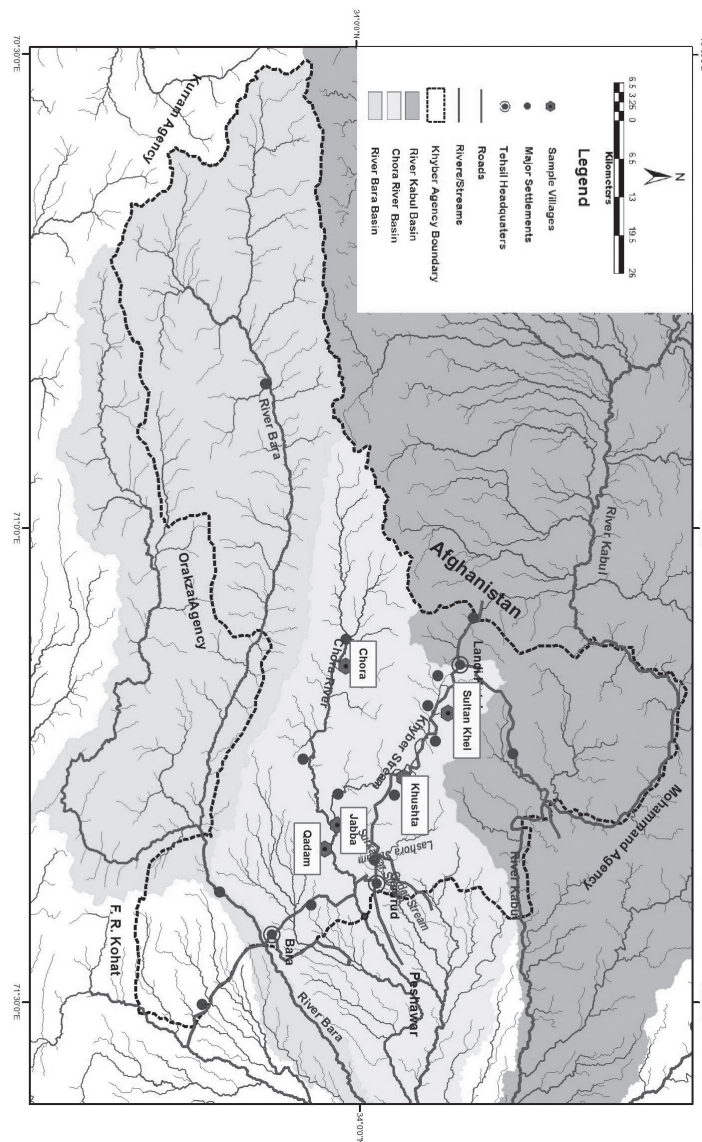


Fig. 2: Chora River Basin, Khyber agency

the central and interior part, whereas northern portion of Khyber Agency sheds its water in the Kabul River (Fig. 2).

The Chora River System drains its water from its basin which covers the central and interior part of Khyber Agency (Fig. 2). The Chora River originates in the area of Bazar Zakha Khel. The Khyber stream flows from Landi Kotal mostly along the Torkham highway in a zigzag way till Ali Masjid (Fig. 1&2). Beyond Ali Masjid it leaves the Torkham highway and turns towards south and joins Chora River at Jaba. Beyond Jaba the Chora River attains the north-east direction flowing through Takhta Baig near Jamrud Bazar, Regi and further it flows between Shahi Bala and Potwar Bala and eventually plummets in Budhnai Nala (drain) in Peshawar district.

Human Perception of Floods

Table 1: Flood as Disastrous Hazard

Respondents'	Flash floods	Landslide/Avalanches	Earthquake	other	Total
Frequency	277	11	09	03	300
Percentage	92.3	3.7	3	1	100

Source: Field Survey

havoc in their respective areas.

Occurrence of Future Floods

People of the area definitely perceived the occurrence of floods and flood season based on their past knowledge

This study is mainly based on the floods of the year 2001, 2007 and 2008 in Chora River and its main tributary Khyber Stream. Human perceptions about flood were investigated with respect to occurrence of floods, flood disaster, frequency of floods occurrence, flood damages and affinity towards staying on floodplains. They perceived floods from different aspects as below:

Flood as Disastrous Hazard

Flash flooding, earthquake and land sliding & avalanching are the main natural calamities which have been posing serious threats to the life and property in the study area but flash flooding has been most catastrophic in the study area. More than 92% people perceived the flash floods as disastrous hazard in the area (Table 1). Flash flood in July 2007 in Khyber Stream and flash flood in August 2008 in Main Channel of Chora River caused

and experience, but they were unable to say when exactly it will occur. When asked about the probability of flood occurrence in the future, most of the people, from all sample villages of the area, replied in the affirmative. Hence, flood hazard was considered as a routine and recurrent phenomenon in the study area. Moreover, they

Table 2: Occurrence of Future Flood

Respondents'	Don't know	Once in decade	Once in five years	Less than five years	Once a year	Two times a year	Total
Frequency	17	07	192	62	15	07	300
Percentage	5.7	2.3	64	20.7	05	2.7	100

Source: Field Survey

perceived that flood occurs once in three to five years (Table 1).

Trend in frequency of floods

Knowledge of trend in frequency of floods play significant role in flood management related decision making. A number of factors are responsible for increase or decrease in flood frequency. The decision makers at either level can manage the floods well considering these factors keeping in mind the current trend in frequency of

Table 3: Trend in frequency of floods

Respondents'	Not Known	Increased	Decreased	Constant	Total
Frequency	09	205	08	78	300
Percentage	03	68.3	2.7	26	100

Source: Field Survey

floods. In the study area 68% people perceived that the floods frequency had increased with the course of time (Table 3) and a number of factors were responsible for increase in frequency of floods in this area.

Flood Damages

Occupants of the area suffer from flood damages of various nature and degrees in each devastating flood. Damages are primarily caused to settlements, infrastructure and crops. In the study area, Khyber Stream runs in a zigzag way through the settlements and infrastructure in Landi Kotal - Ali Masjid the section. Settlements and infrastructure are very close to the stream and highly vulnerable to floods. Whereas the agricultural lands are

Table 4: Flood Damages

Flood Damages perception (% age)	Respondents' Frequency				
	Sultan Khel	Kata Khushta	Chora	Jaba	Qadam
Total (80-100)	42	39	12	17	8
Substantial (21-79)	13	17	28	23	12
Slight (1-20)	05	04	10	15	23
No existence (0)	0	0	7	4	13
Don't know	0	0	3	1	4
Total	60	60	60	60	60

Source: Field Survey

located very close to the main channel of Chora River and most often hit by the floods (Plate 1 and 2). Hence, most of the people perceived the flood damages as being total and substantial along Khyber Stream and main channel of Chora River respectively (Table 4).

Affinity Towards Native Land

In Landi Kotal – Ali Masjid section along Khyber Stream most of the households are highly vulnerable to floods but still majority of the people had high degree of affinity towards living in their native area. They didn't prefer to leave their native land and tribe and felt themselves safe and comfortable living in their own community regardless of flood risk. Moreover, most of

Table 5: Affinity towards Floodplains/ Native Land

Preference	No. of Respondents				
	Sultan Khel	Kata Khushta	Chora	Jaba	Qadam
Prefer Floodplain	48	51	55	19	53
Don't Prefer Flood Plains	7	5	2	33	3
Don't Express	5	4	3	8	4
Total	60	60	60	60	60

Source: Field Survey



Plate 1: Proximity of settlements to Khyber Stream

the people are economically poor and cannot manage accommodation somewhere else in safe area. Jaba village is located at the confluence of Chora River and Khyber Stream, the people have been asked by the government to vacate the site for the construction of a proposed dam. Hence, in Jaba the people have no option other than to leave the area and shift to other localities. In Chora and Qadam most of the settlements are distant from river and streams and are not highly vulnerable to floods. The agriculture lands are very close to river channel but they have protected their lands from floods to a large extent through embankments. Hence the people didn't prefer to leave their native locality and community. Moreover, the people in the study area are economically weak and cannot afford to shift to other locality. Hence, majority of the people had strong affinity towards their native land in spite of flood risks (Table 5).

CONCLUSION

Human perception of floods has an important role in decision-making regarding floodplain utilization. The level of perceptions was uniform throughout the flood affected area. Floods were perceived as disastrous hazard in the study area. People of the area definitely perceived the occurrence of future floods, and flood season but they didn't know which year it would exactly occur. Majority of the people in the area perceived the flood damages as substantial to settlements and infrastructure along the Khyber Stream and to agricultural land along the Chora River channel. Floods frequency had increased with the passage of time in the area. Almost all the people preferred to stay in their native localities and communities regardless of flood risks. People had adopted adjustment



Plate 2: Proximity of agricultural land to Chora River

to flood hazard at some extent and had greater concern for socioeconomic factors rather than flood risks.

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