

## **Analysis of the Main Causes and Damages of 2010 Flood in Pakistan (A case study of Hameed Dhere & Faqir Abad District Charsadda)**

**Ismail Shahid<sup>1\*</sup>, Luis Antonio Bittar Venturi<sup>2</sup>**

Institute of physical Geography University of Sao Paulo Brazil

**ABSTRACT:** This research attempts to assess the causes and damages of the 2010 flood that severely affected the Hameed Dheri and Faqeer Abad, District charssada Khyber Pakhtunkhwa (KPK) province Pakistan and suggest recommendations for overcoming future events of this nature. Pakistan is famous for its summer floods, but the 2010 flood was considered the worst of the 21<sup>st</sup> century. It broke all previous records in terms of discharge, damage and amount of rain. Flood seriously affects the agriculture sector, and physical infrastructure in the area. Flood hazard hinders the socio-economic development of the study area. Data for this study were obtained from primary and secondary sources. A total of 180 questionnaires were answered by that flood victims. However, secondary data were obtained from the Pakistan Meteorological Department, the Flood Prediction and Warning Centre, the Federal Flood Commission, the Provincial Disaster Management Authority, the Surface Waters and the Provincial Irrigation and Drainage Authority. The analysis reveals that heavy and prolonged rainfall was the main cause of the 2010 floods. In addition, the Rapid deforestation, stagnation of the river by the highway, blocking bridges by tree trunks and the subsequent collapse of temporary dams have all played their part in causing disastrous flooding in almost all rivers from KPK. This article consists of many sections. After a brief introduction of the study, section two gives a description of the study area, Section three states research methodology, Section four highlights causes of floods, Section five deals with impacts/damages of floods and section six evaluates flood hazard reduction measurements. Section seven gives findings of the study whereas section eight suggests recommendations for mitigation of flood disasters.

**Keywords:** causes of flood, damages of flood, Pakistan flood, disaster management

*Submitted: 10 March; Revised: 21 March; Accepted: 26 March*

**Corresponding Author:** [ismailshahid203@gmail.com](mailto:ismailshahid203@gmail.com)

## **INTRODUCTION**

Floods remain the most common natural disaster in the world affecting both developing and developed countries. Over the past decades (a period of ten years), there have been over 2000 reported floods affecting over 2.6 billion people (Shafique, 2002). The numbers of flood catastrophes (suffering) have been increased on all most three times since in 1980 to 2009 and it is assumed that flood risks will continue to increase (Tamannaz, 1995). Since last few years many rivers all over the world flooded, such as Ganges in India, the Jamna river in Bangladesh, Mississippi in north America, the Yangtze and Yellow river in China, the order and the Vistula in Poland which cause numerous damages to lives and properties. Since 1947, Pakistan incurred heavy floods in 1952, 1956, 1957, 1976, 1988, 1992, 1995, 1996, and 2001 (Ismail , 2008) . However the flood of July, 2010 was the most damaging and severe flood, which was the second most costly weather related disaster in the history of Pakistan after earthquake 2005, the government of Pakistan has termed the scale of the disaster worse than Haiti's earthquake, the 2004 tsunami in south-eastern Asia, and the 2005 earthquake of Pakistan (*Macfarquhar & Neil, 2010*). According to NDMA (National Disaster Management Authority) Pakistan, the 2010 flood killed 1,985 and others 2,946 are injured. A total of 17,444,471 houses were damaged and 20,184,550 people were affected. Moreover, 2,244,644 acres of standing crops were washed away by that flood of Pakistan. The total estimate loses by flood was 9.5 billion US dollar (*Wang et al, 2011*). In the study area floods during summer season is a recurrent environmental hazard. Consequently, it adversely affects life and property. Today there is great pressure on land particularly on agricultural land, as a result of the rapid expansion in the built up area. Due to this pressure fluvial flood plains are occupied for dwelling purposes. Consequently, they are vulnerable to flood hazard. It is therefore, the need of the hour to safeguard land as well as settlements from flooding. In the study area a number of rivers and drains flow through Charsadda district that often experience floods during rainy season causing tremendous losses. Charsadda district is characteristically the most thickly

populated and fertile heart of Peshawar valley. So far, no comprehensive research work has been carried out in the area. The present study is an attempt to highlight the causes and damages of the floods as well as to evaluate flood protective measures in the area. The study mainly focuses on 2010 flood in Faqir Abad and Hameed Dheri, with the manageable catchment area. The drain flows from north to south in the eastern extremities of District Charsadda. Jindi River and Khayali River often experiences floods during summer season and in effect cause damages. The study area is an elongated along Khayali river and Jindi river. We select only two sample villages for detail study.

## **THEORETICAL REVIEW**

### **Location And Characterization Of The Study Area:**

The district lies in the northern Pakistan between 34-03' and 34-28' north latitude and 71-28' and 71-53' east longitude.

It is bounded by Malakand district on the north, Mardan district on the east, Nowshera and Peshawar district on the south and Mohmand Agency on the west.

## **CLIMATE**

The climate of Charsadda District is subtropical of continental type. It can be divided into three periods, winter season, from December to April, summer season from May to September and monsoon period start from July to September, and May to November. June is extremely hot and dry when the temperature rises to over 42°C. The months of July and August are hot and humid. The water vapour (Humidity) content in the atmosphere shows its maximum record during the month of August. The humidity record shows conformity with that of precipitation. The spring comes in the middle of March, which is the most pleasant season of the year (GOP, 1999).

There are two spells of rainy season in a year. The winter rainfall, due to western disturbances, shows a high record during the months of March and April

whereas the highest summer rainfall is in the month of August due to monsoon. The average winter rainfall is higher than of summer rainfall.

## **SOCIO-ECONOMIC CONDITIONS**

It is a common view that economic and social development go together and this is exactly, in case of this area. Characteristically a rural area, among the economic activities of these sample villages, agriculture dominates; more than 90 percent of the people are directly engaged in agriculture, Absentee landlordism is pre-dominant in the area, so cultivators in general have no respectable and good status in the society because they are economically weak.

### **Housing Condition and Facilities**

Housing condition and facilities measure the socio-economic condition of an area. The percentage of Pacca(concreted), Semi-pacca and Kacha(made from Mud) houses is 27%,4%and 69% respectively in the study area while at the district level they are 29%, 1.6% and 28% in the same order. Similarly, access to potable water and electricity facilities in the study area are 6% and 83% respectively whereas, at the district level they are 17.6% and 90.5% in the same order.

### **Cropping Pattern**

There are two crops, namely Kharif and Rabi Crops grown in the area. Acreage of Kharif crop is greater than that of Rabi crop. Sugarcane, maize, fruit orchards and vegetables are main Kharif crops (GOP 1999).While Rabi crops include wheat, Sugar-beets, barley, fodder crops, pea, vegetables and oil seeds.

## METHODOLOGY

Data required for the research were collected on the following aspects:

To assess the first hypothesis, we collected the causes and damages of flood data by a constructed questionnaire to directly interview the correspondent people of Pakistan and from the Meteorological Department of Pakistan.

To assess the second hypothesis, we collected the data from Government organization, NGOs and public interview (individual, community).

1. Causes of flood, we collected the main cause of flood data by a constructed questionnaire interview the correspondent people of effected area by questionnaire's survey and from meteorological department of Pakistan.

2. Impacts of flood hazard, this data obtain from questionnaire and also from secondary sources like NDMA (National Disaster Management Authority of Pakistan) and NGOs which is already collected.

3. Public response and perceptions: According to the public response, perception of risk must be in the centre of attention, because the authorities' lack of understanding the society is the reason for failure in the politics of flood risk management. According to the Bradford et al, 2012 when faced with diverse perceptions of the flood risk, it is necessary to know the factors influencing flood risk perception. That would allow developing a strategy for communicating the danger that would increase the communities' resistance to a flood hazard.

4. Role and responsibility of line agencies: Government of Pakistan, and its partners from rescue and relief activities in the immediate aftermath of the catastrophic 2010 floods some of this government agencies, donors, military, UN, and individuals who came to the assistance of the affected communities.

## **DATA COLLECTION TECHNIQUES**

### **Primary Data**

Primary data were collected directly from the study area through questioner. The study area consists of about two villages. The selected sample villages are namely Faqir Abad (Rajar) and Hameed dheri(Tarnab). A standard questionnaire was designed in order to collect baseline information regarding the flood hazards Faqir Abad and Hameed dheri. The data were collected through interview survey procedure. In the study area about 140 questionnaires were filled from the respondents which included farmers, educationists, labourers and businessmen etc.

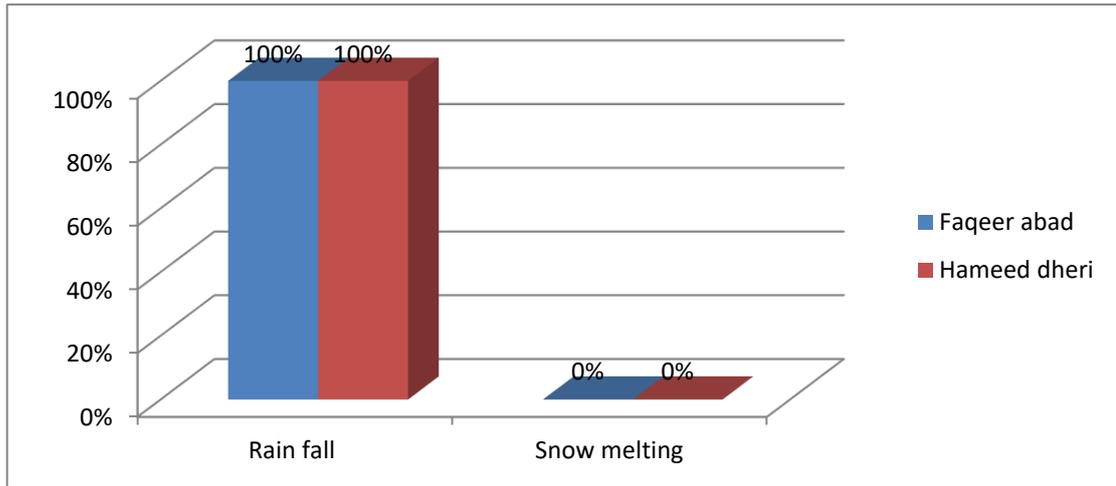
## **DATA ANALYSIS AND RESULT**

Primary data have been analysed by applying various cartographic as well as statistical techniques such as central tendency (average). Finally, the data has been presented in the form of graphs, tables and description/ analysis.

### **FIRST OBJECTIVE**

#### **CAUSES OF 2010 FLOOD IN THE STUDY AREA**

Heavy rain falls are one of the major causes of floods. The level of water in rivers or lakes rises due to heavy rain falls. When the level of water rises above the river banks or dams, the water starts overflowing, this causes floods. But the 2010 flood is stronger which is the main cause rain and Dams damaging in the upper areas of Pakistan (Chital, Upper Dir) so the water of Dams and heavy rainfall cause of the 2010 flood.



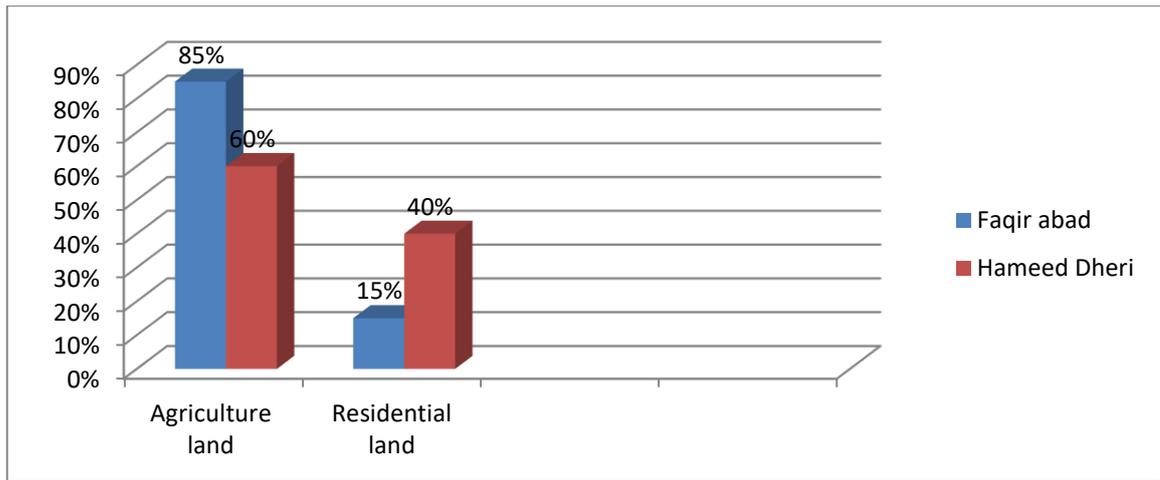
Source: Field survey 2010

Figure 1. Causes of 2010 Flood in Pakistan.

The figures 1 shown 100% cause of flood is rainfall according to the correspondent people we ask question regarding the cause of flood the answer is rainfall.

#### **Damages of flood in the study area.**

Flood hazards affect the people of the study area from time to time which causes a lot of damages to life and property of the area. The topics deals with the damages of flood on the people of the study area a flood hazards have many damages on the economy and social life of people. Though no estimate is available for the monitory cost of the annual damages from floods, the summary of the suffering measured in term of property loss or structures can be seen in the following order keeping in view that the score is based on the series of events of damage to life and property remembered by the respondents in the two villages.



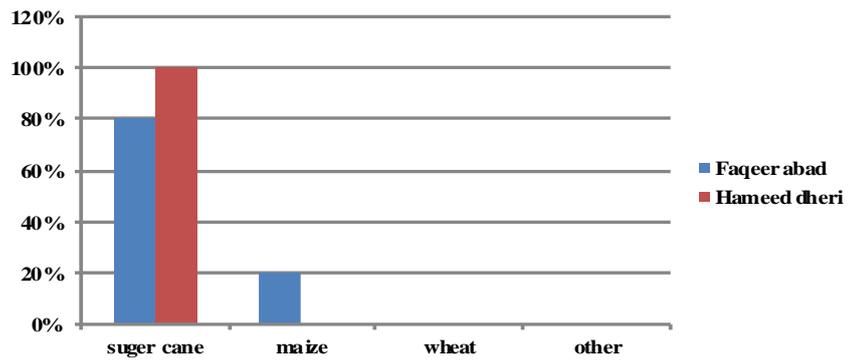
Source: Field Survey 2010

Figure 2. Damages of 2010 Flood in Pakistan



Source: Field survey 2010

Figure 3. The Damaged Infrastructure of Flood in Pakistan



Source: Field survey 2010

Figure 4. Crops Damage

Secondary impact of the flood:

1. Water Supply

Contamination of water. Clean drinking water becomes scarce.

2. Diseases

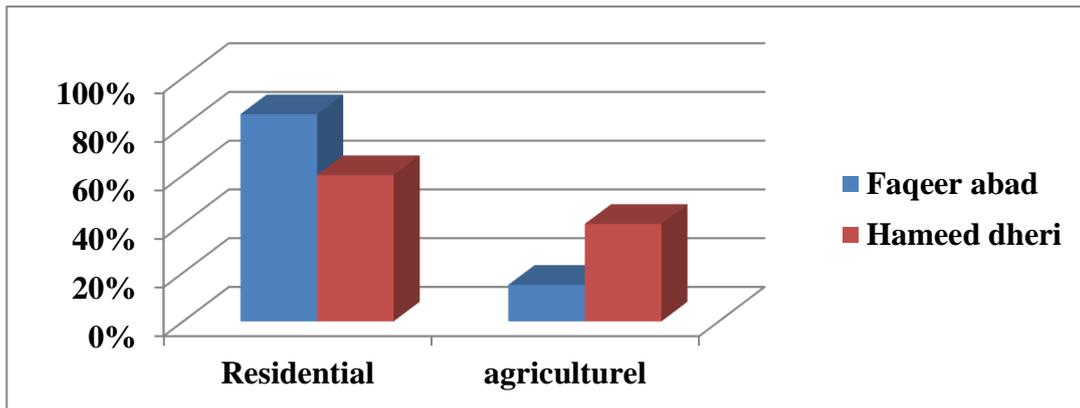
In the study area Unhygienic conditions. Spread of water-borne diseases scabies, Diarrhea etc.

3. Crops and food supplies

Shortage of food crops can be caused due to loss of entire harvest.

# Damage to land

Village	Residential	agricultural
Faqeer Abad	85%	15%
Hameed dheri	60%	40%



Source: Data obtained from questioners

Figure 6. Total Land Damages

## FINDINGS

Detailed analysis of the data revealed that the study area is one of most vulnerable places to flood hazard because there are many damages like crops, infrastructure, and also animal, people casualties and died). This increasing vulnerability of the study area is not only due to its location on the active floodplain, but also due to the construction of buildings and other developments in the area. An example is the cultivation of crops in highly vulnerable areas, such as canal bars, braided streams, for increasing damage to agriculture.

The main causes of flooding in the study area are torrential rain and snow melt; However, the risk of flooding in the study area is exacerbated by several anthropogenic factors, such as the construction of buildings and other infrastructures on active river floods, thereby reducing the cross-sectional area of the river channel. Deforestation in upper catchment is also in important intensifying factor. Because it causes erosion and consequently silting of the

rivers reducing table flow capacity. Flood had caused a number of causalities in the study area as well.

There is no specific authority to regulate the construction of protective work. Due to the dishonesty of the contractors and unskilled labour, weak material is used in the construction of these structures, the cost is shown very high in papers but very little effort is made to build strong and sustainable protective structures. In order to reduce the adverse effects of flood hazard in the study area some important and useful measures, have been suggested by the study, which are as follow;

1. The first attempt should be made to remedy this factor, which intensifies the flood, for this purpose deforestation and over-grassing should be controlled in the muddy areas must have set up.
2. Ground rules and people reported that houses were built far away from the river.
3. To prevent river erosion, a viable solution tree is planting along the river.
4. When some water content is high, some dry channels are formed, so they flow through dry channels and the amount of water flow is low.
5. They should be constructed with special care in the direction to protect catchment areas, backs and dikes.
6. An efficient and effective flood fore casting and warning system should be established in district charsadda which should be well equipped with the improved techniques including the installation and upgrading of various facilities such as improved warning dissemination through telephone etc besides warning should also be given to the people through local mosques, school and police station etc.
7. Small dams should be built in the upper course of for the accumulation of the flood water this water could be then used for irrigational purposes later.
8. Science more the 40 percent of the houses in the study area of the mud and stone which has little resistance to water erosion ,there should be

certain regulations and incentives to replace it by other locally available resistance material .

9. There should be proper relief distribution measures to reduce the losses experienced by the effected .The procedure followed for obtaining relief should be made simple and fast to ensure the rehabilitation of the effected in time.
10. For the quick assessment of the potential impact of the flood hazard and ignition of appropriate measures for reducing the impact, flood hazard maps should be prepared using modern tools e.g. GI S etc.
11. The line agencies related to the flood hazard mitigation are suffering from an acute shortage of trained managerial and technical staff, therefore these agencies should be provide with trained personnel for tacking flood hazard problem in an appropriate manner.
12. There is an urgent need to adopt long term strategies by skilfully combining engineering devices with proper land use management and regulatory policies.
13. the money allocated for the relief fund should by enhance and access of target population to relief be made easy and simple.
14. Proper education and training should be provided to the community leaders and effectees to enable them to respond in an effective manner to the flood hazard and to take various remedial measures by themselves.
15. According to the local population cottage industries should be established to provide job to the people. at will reduce to the pressure of intensive agriculture on the active flood plain on one hand , and discourage the timber industry on the other ,which is depriving the upper catchment of the trees and vegetation cover that is help full in reducing to surface runoff and increasing the flood volume.
16. The money allocated for the relief fund should be enhanced and access of target population to relief is made easy and simple.

## CONCLUSION

Flood hazard is a destructive and frequently occurring phenomenon in the study area and has caused heavy dead tolls and economic losses in the past. Although natural phenomenon e.g. Torrential rainfall and snow melt mainly cause its effect are intensified to a considerable extent by human intervention lack of efficient planning and management, that is why the risk of flooding and the subsequent damage in the study area is increasing with the passage of time, and more number of people and area is becoming vulnerable to it. Although its effect the man in very respect i.e. Physically, economically, socially and psychologically, its greatest damage is that to economy. The agro based economy of the study area suffers a lot of from the annual over flow of water. Although the remedial measures for the flood hazard are money, and most of them are applicable in the study area the community has adopted itself to this calamity and has undertaken some protective measure, however these are effective only in case of minor floods. The measure taken by the government so far, are ineffective and need to be carried out on a larger scale. For the reduction of vulnerability of the study area to flood hazard, there is urgent need to adopt long-term strategies by skilfully combining engineering devices with proper land use management and regulatory policies.

## REFERENCES

- Shafique (2002) " role of GIS as a tool for the assessment of flood hazard "(A case study of Muzafferabad City)
- Behram M.Phil thesis Flood Hazard in Hissara Drain
- Sheela, (2001) "flood hazard in tehsil matta district swat "a case study of village damaghar, mamdheri & sunderai) an unpublished report submitted to the department of geography, university of Peshawar
- Nawaz (sep. 2001)".The role of GIS in remote sensing as a tool for the assessment of flood hazard " (A case study of District Jhelum )
- Gerry FitzGerald, 2008).Flood fatalities in contemporary Australia (1997-2008)emm\_1284 180..186

Verstappen H. TTh, (1983) "Applied geomorphology" Elsevier Science publisher B.V.

Ismail (2008) Role of GIS as a Tol for the Assessment of FLOOD Hazard" (A case study of Batkhela Union Torrent )

Tamannaz (1995) Swat Valley Flood of 1995 Causes Effects, perception responses and Remedies "

Haque CE. Perspectives of natural disasters in East and South Asia, and the Pacific Island States: socio-economic correlates and needs assessment. Nat. Hazards 2003; 29: 465–83.

Neelofar , (2002) Flood Hazard ; Causes , Impact and Remedies (A case study of Neelum- Jhelum Flood Plan Muzaffarabad AJK)

White G.F (1974). Natural Hazard; Local National and Global New York Oxford University Prees.

Kingston, (1984) " Fluvial Forms and Processes " Edward Arnold (Publishers) Ltd.

Sajjad Ali and Jamil Khan (2008) Flash Flood In Tehsil Batkhela (Malakand) (A case study of union council Batkhela ,Thana and Dheri Alladand)