

Community Based Flood Risk Reduction in District Muzaffargarh, Punjab Province of Pakistan

Muhammad Shahjahan Raza

Abstract—Pakistan shares geographical region which is prone to different kinds of natural disasters. Inception of technology and advancement has brought drastic change in living standards, this shift resulted in occurrence of natural and manmade disasters such as floods, global warming, greenhouse gasses and landslides etc. Floods are most catastrophic in terms of losses. Floods are one of the major type of natural disaster which cannot be stopped but its impact can be controlled and minimized. With the help of community-based risk reduction measure, we can mitigate the adverse effect of floods. The aim of this research paper is to highlight community approach and attitude towards disaster risk reduction and highlight the problems which local community of district Muzaffargarh is facing because of floods. This paper will inspect various factors contributing towards occurrence of floods. Further paper will come up with recommendation solely based on indigenous knowledge and local community suggestions, approaches and perceptions.

Index Terms— vulnerability, hazard, mitigation, local community, Disaster Risk Reduction, Natural Disasters, Catastrophic.

1 INTRODUCTION

District Muzaffargarh is in southern belt of Punjab province at the distance of 34 kilometers across river Chenab on its East. On its North it shares boundary with subdivision of district Lyaah. It is bounded with Dera Ghazi Khan on its West. District Bahawalpur and Rahimyar Khan is located on its south and south west respectively. It shares area of 2052571 acre. Major portion of district Muzaffargarh consist of dry and sand dunes generally known as Thal Area. The belt along with river Chenab is less dry due to inundation canals. Area is divided into three terrains; Plain, Riverine and Sandy terrains.

A survey reflects around 1132889-acre land fall within cultivated territory, and 868982 acres fall within uncultivated territory. May to September weather conditions are extremely hot. Whereas mid night is comparatively cooler. November to February are quite cold and serve frost fall during night which cause serious damage to cotton, mango, sugarcane and vegetables etc. What makes Muzaffargarh district unique is its territory which share combination of fertile and dry arid lands.

Economically it is agriculture-based district along with some industrial zones. Agriculture serve as base lined for community employment or source of income.

District Muzaffargarh is prone to seasonal flood due to its boundary with river Chenab. It has witnessed several disasters in past decades. Epidemics, road accidents, industrial and environmental hazard are also common. Level of awareness in local community and population is relatively less due to poor community and lack of education. These factors increase vulnerability of flood damages. Harsh climate, poor communication and transport structure make district vulnerable of any sort of hazards. In context to floods, district Muzaffargarh lies between two rivers; Chenab on its East and Indus on its West covering length of 100 miles. Every year, seasonal flood due to overflow of Chenab and Indus disrupts flow of livelihood. It causes serious damage in the form of life losses, crops damages, damage of infrastructure etc. Both rivers are active from July to October. Massive damage has been recorded due to seasonal floods in district Muzaffargarh [1].

- Author Muhammad Shahjahan Raza, currently pursuing master's degree in Disaster Management from Military College of Engineering NUST, Risalpur, Pakistan. E-mail: shahjahan.raza149@gmail.com.

2. FLOOD WITH REFERENCE TO PAKISTAN

Pakistan has been experiencing seasonal flood for long time. From history flood of 2010 was worst and destructive. It cost massive loss in the form of economy, nature, physical etc. Migration toward riverine zone has been increased in past decades. Due to less price of such lands, people with poor background prefer to settle there. This has increased vulnerability toward flood. Change in pattern of seasonal rainfall and excessive rainfall has increased water supply, within short time span enormous quantity of water was recorded which created flood and resulted in massive loss of life and property [2].

In Pakistan There are some eminent factors, which add to the severity of floods. By considering all these factors, it can be possible to easily mitigate damages caused by floods by considering those factors.

2.1 Seasonal Rainfall

Seasonal rainfall is major contributor of floods in Pakistan. Annually two seasonal rainfalls occur. Usually one season in the summer season starts from June to September known as Monsoon. The other one starts from December to January known as winter rain. Floods in Pakistan mostly occur in Monsoon [3].

2.2 Lack of Awareness

Another contributing factor is awareness. In Pakistan, literacy rate is quite low, people are now well educated and trained. Due to lack of awareness flood turns massive disaster and creates huge problems and destroys community assets such as infrastructure, buildings and life losses. Lack of awareness and use of safety precaution measures increase the severity of flood. This disrupts the flow of life [4].

2.3 Infrastructure Development

Unplanned development is another contributing factor toward adverse effects of floods. Floods of 2010 were most catastrophic in the history of Pakistan, if caused major destruction due to unplanned development. Main reason is we have no structure and mechanism to incorporate disaster risk reduction measures into policy making, building codes and overall development. District Muzaffargarh is generally a backward district in terms of developments. Infrastructure is mainly insecure in terms of resilience. Houses are mostly mud houses and those which are made up of concrete are not disaster resilient. Water runoff carries all the sediments with it and deposits them into the river bed. The storing capacity of the river decreased due to these sediments which cause floods [5].

3. FLOOD IN DISTRICT MUZAFFARGARH

There are various factors contributing toward flooding in district Muzaffargarh. Like discussed above, rainfall, encroachment, lack of awareness, improper development and long time etc. are common factors. Meteorological and physical conditions of Muzaffargarh district are also responsible for floods.

Factors contributing in flood with respect of district Muzaffargarh are almost like all over Pakistan. Monsoon is the major contributor of floods. It starts in July till August. This time span is season of extreme heavy rainfall, because of which there is an increase in water supply. This water is difficult to control and manage therefore it turns into flood and destroys everything in its pathway. Another cause of melting of glaciers, ice melting on mountains increases the flow of water in the river Chenab and Indus [6].

Human activities played an important role in flood generation process in a context of Muzaffargarh floods, the three major contributing anthropogenic activities in context of floods are:

Intensive agricultural activities in flood prone areas, sediments from agricultural areas come with runoff water which and deposits them into drains and river bed. In result of which the storing capacity of the drains gets lowered and becomes shallow. So, overflow of water in case of heavy discharge can cause flood.

Population density is another major contributing factor. Encroachment towards flood prone area is observed due to dense population. In flood prone areas rapid development cuts short the flow of water. So, water diffuses and damages buildings in areas that are prone to flood.

Narrow construction of bridges throughout the drain at various locations also troubles the natural flow of water. Which can become another cause of flood [7].

3. LITERATURE REVIEW

Research has been conducted in the field of flood risk reduction. Several studies reveal some important aspects that can help in community based risk reduction. Floods can affect major portion of society. One study reveals that flood has adverse effects on both poor and rich, prepared and unprepared communities. Therefore, flood cannot be stopped in any situation. Such characteristics of flood make it most destructive. All we can do is to mitigate its impact

through proper early warning mechanism, formation of river banks, providing education and training to local communities. Reforestation can also play a vital role towards minimizing damages with the help of reducing runoff speed. Effective weather forecasting system can also play its role towards flood risk reduction. By implementing such methods, we can cope up with impacts of floods [8].

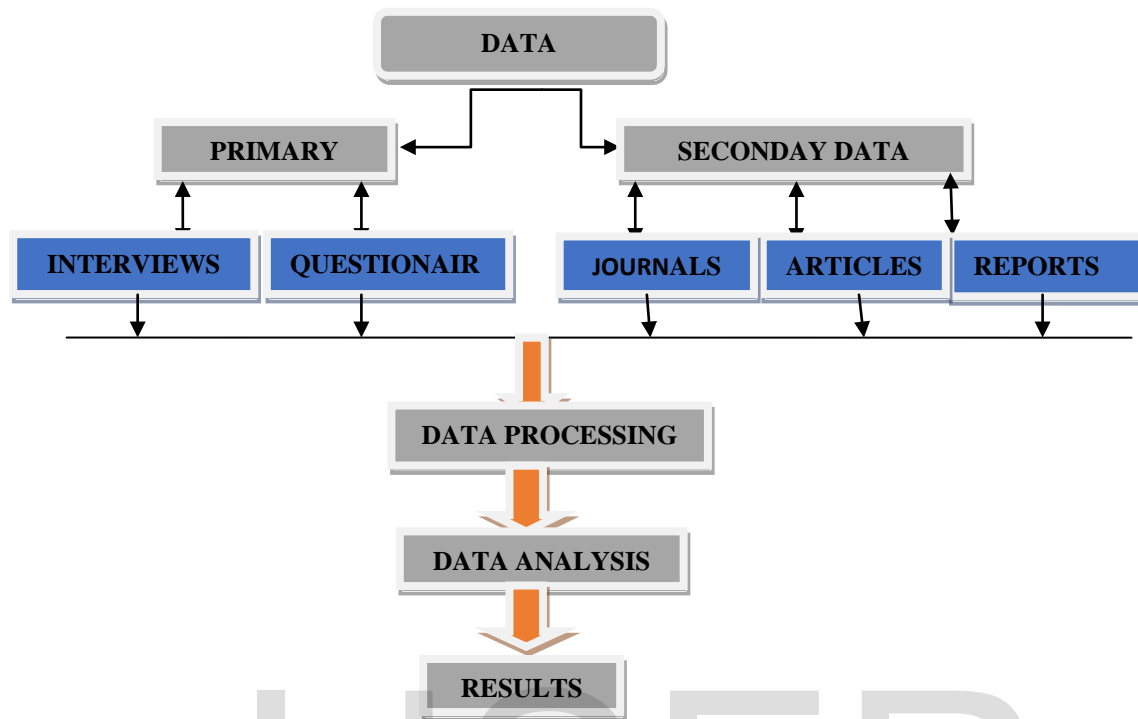
It has been observed from past two decades that natural disasters are increasing all around the world. Some of the human interventions are becoming the cause of many phenomena such as melting of glaciers global warming, greenhouse gases. These phenomena are causing rise in sea level as a result [9]. Talking with respect to Pakistan, floods are most common naturally occurring disasters. Almost all the major regions of Pakistan are getting adversely affected by that. Risk assessment and flood prediction have become critical in prevention of future disasters, and this has improved after flood of 2010. Skills in Technology and management have started grooming in this perspective to attain its apex. Remote sensing, geographical information-based analysis, computer modeling and real-time forecasting are some of advance technologies that have grown to be effective and becoming fundamental requisite of everyday life [10].

Risk factor is the central reason behind the turning of word disaster into risk disaster management [11]. Identification of risk is vital element of disaster management. Initially elements which are at risk are unknown, but when hazard is converted in a disaster all those elements are cleared. So, It is important to identify risk; the elements which are at risk and the degree of their at risk [12].

Traditionally researches are conducted by experts in relevant field and development of policies, strategies are done by central authorities. Now this trend has been changed and new trend incorporates involvement of local communities, line ministers and organization at ground level because they are aware of their community needs and requirements [13]. For the valuable risk reduction assessments, it was observed that focusing only on physical component of the risk and mitigation programs are not enough. Participation of local community in risk assessment plan or strategy is an indispensable part of the disaster management. For the lessening of damages up to minimum level in disaster, it is highly encouraged that local parties should participate, and weightage should be given to their suggestion while making plans for risk reduction [14].

A simple research methodology was adapted for this research paper. This paper contains information and knowledge collected through previous publications and local community observation. No technical methodology was followed. Generic rubric of research methodology is illustrated below in the form of flow chart.

4. RESEARCH METHODOLOGY



Data collection is done with the help of two information sources. Primary and Secondary. Primary information is gathered through direct interviews and questioners, whereas secondary information is gathered through research articles, publication and journals etc. Information gathered for this research study is solely based on secondary information course. Secondary data was gathered through international, national journals, Pakistan meteorology department and disaster risk management plan of Muzaffargarh district. Next phase of methodology was analysis of information along with data processing and results. A general analysis of information was done and suggestion, recommendation will be given based on analysis and discussion. The aim of paper was limited to local community practices toward flood risk reduction.

5. COMMUNITY BASED FLOOD RISK REDUCION MEASURES:

The most important step in planning processes and implementation of programs is the involvement of indigenous knowledge. Local communities are the first responder to any sort of hazard. Therefore, active participation of local communities and ground organization should take part in flood risk management. This will reduce causalities and damages to lowest level. Disaster preparedness activities by stakeholder should incorporate the involvement of local community at national, regional and local level. Participation of local bodies at preparedness stages is extremely critical in term of risk reduction. Local community and grassroot organizations have depth knowledge on their regional practices and measures toward risk reduction. Local approaches should be considered in terms of opinions and suggestions [15].

Evacuation and public awareness should be conducted with the involvement of local community, as they have deeper depth of their traditional and cultural norms toward this activity. Local communities are aware of nature of vulnerability in terms of social, economic and political etc. Evacuation is always conduction through triage. Local community will help us understand which group should be evacuated first. Their suggestion should be incorporated in all risk reduction measures [16].

6. RESULT AND DISCUSSION

Figure no. 01 discharge data of 2009 at Chenab

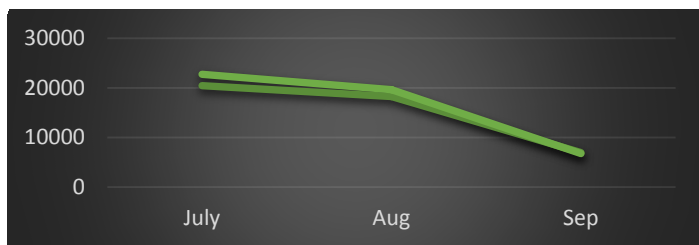


Figure no. 02 discharge data of 2010 at Chenab

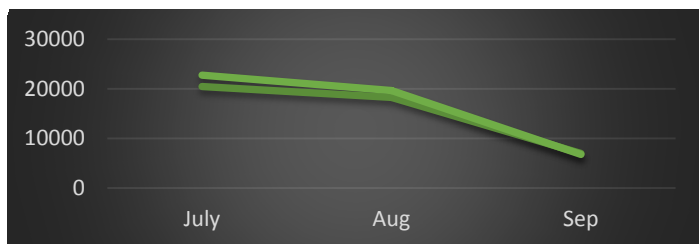
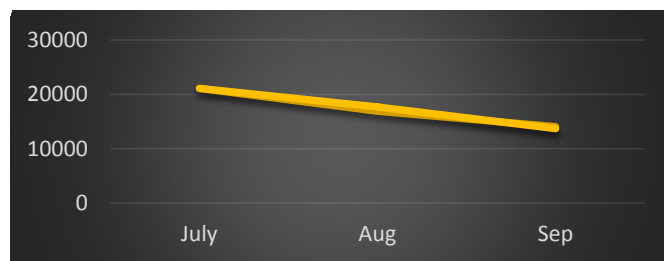


Figure no. 03 discharge data of 2011 at Chenab



SOURCE: PAKISTAM METROLOGICAL DEPARTMENT

Figure 1 illustrates graphical flow of discharge of river Chenab in 2009. It has been observed discharge in July is higher and discharge in September comparatively lower.

Figure 2 illustrates graphical flow of discharge of River Chenab in 2010. A similar patron has been observed. Discharge in July is higher than discharge in August and September.

Figure 3 illustrates graphical flow of discharge of River Chenab in 2011. A little change in discharge has been observed. Discharge in July August and September is lower as compare to relative discharges in 2009 and 2010.

This graph shows the discharge of 2011 which is quite low as compare to the discharge of 2010. Right after 2010 flood. In 2011 the reduction in discharge was observed throughout the year.

Information gathered through multiple sources reveals some facts on community understanding for floods in Muzaffargarh District. It has been observed, almost entire community of district affected from 2010 floods. 85% community was severely affected which 15 % were less effected. As far as early warning is concern, half of community is satisfied by early warning activities adapted prior to onset flood. Whereas half of community were not satisfied. (Survey/Reports)

Islamic Relief Organization report says; Almost major standing crops of district Muzaffargarh were completely damaged. Due to poor community, mud house and single brick house cover major portion of housing. 90 percent houses were completely and partially destroyed. Majority of community relocated in temporary shelters provided by government and NGOs. Rehabilitation and reconstruction was a very slow process. It cost average 50,000 PKR to reconstruct damaged houses.

7. SUGGESTIONS AND RECONMENDATIONS

With the help of interacting few community representatives of Muzaffargarh district, we gathered a general picture of local community risk reduction measures. They hold come suggestion and recommendation that can mitigate their hazard and make them respond effectively. Some of their recommendation are as following:

1. Community suggested proper system of embankment and flood control structures should be constructed to protect Muzaffargarh Dist. Currently there is no proper and protected embankment constructed. Every year flood enters the city and leave cause major destructions. Community suggested to have proper embankment.
2. Construction in Muzaffargarh district is mostly un planned and does not follow any building codes. Most of houses are either mud houses or single brick without any protection measures. Further, large number of community is living on flood plain areas. They have constructed facilities over there. Such constructions are high prone to floods. Local community need proper construction with proper building codes that can absorb future floods and mitigate damages.
3. Reforestation can be highly useful to reduce the flow of water in Muzaffargarh district. Reforestation is a natural process in which water is absorbed by the plants and increase water capacity under the surface of earth. This mechanism has dual importance. First it increases under surface water level, second reduces the flow of flood which help in mitigation process. Further is reduces soil erosion.
4. EWS is integral component in risk reduction. Muzaffargarh community suggested establishment of proper early warning system that can prepare community to adapt measure that can assist them in case of floods. Flood patron reflects regular flood every year. There for well-established early warning system should be ensured.

5. Channelization of river is another technology that can reduce flow and intensity of water. Channelization is part of effective water management system. Through proper channelization of river Chenab, flood in Muzaffargarh can be well managed and controlled. Channelization not only help in flood control, but it has major contribution in agriculture and irrigation.

8. CONCLUSION

In our study we conclude that flood is the most prominent and mainstream natural hazard in Muzaffargarh district. Flood history reflects floods of 2010 were most disastrous and damaging. Both natural and human factors contributed toward increase in vulnerability towards hazards. Low level of awareness and ignoring community need assessment and practices added vulnerability towards floods. Along with lack of public awareness, government lack of interest and incompetency and unplanned development are stakeholder for increase in vulnerability. It is important to incorporate local community in DRR process. Local community should be encouraged to participate in policy making and implementation process. Local community is aware of their area condition. Their suggestions and recommendations are highly fruitful and effective. Community of Muzaffargarh district lag in term of their active participation towards community-based disaster risk reduction. They need to be fully participating and considered as important stakeholder by planner, disaster management organizations and government bodies.

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