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RESEARCH ARTICLE

Effects of Floods policy in Pakistan and Management Issues: (Case of District Dera-Ghazi Khan)

***Bilal Ahmed[1], Song Wei[2], Yuan Guang Fu[3], Muhammad Shabbir[1], Ghulam Nabi[1], Kashif Ullah Khan[1]**

1. PhD Candidate, School of Public Affairs, University of Science and Technology of China
2. Professor & Executive Dean, School of Public Affairs, University of Science and Technology of China
3. Associate Professor & Director, Asia-Pacific Policy Research Centre, University of Science and Technology of China

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Corresponding Author

***Bilal Ahmed**
E-mail:
ba715@mail.ustc.edu.cn

Abstract

Flood is a recurring calamity in Pakistan. Every other year, it destroys infrastructure and claims hundreds of lives. Thousands of people have become the victim of floods in Pakistan. It is difficult for developing countries like Pakistan to control and curb the menace of flood. The present study explores the challenges faced by the people due to flood disaster. This research scrutinizes the crisis of floods in the district "Dera-Ghazi Khan" during the year 2012. To collect the information, a brief questionnaire was constructed for the sample of population. We have applied the correlation technique and Chi Square distribution to seek out the degree of association among different variables. Flood-affected people face serious challenges during floods, and the management procedure seems too inadequate to prevent anxieties of the people. Proper budgeting for the arrangement of the flood-affected communities, technical efficiency and coordination in coping with floods disaster can minimize the brutal effects.

Introduction

Settlements in hazard-prone areas have been growing rapidly since 1950s (Benson and Clay, 2004). For the earning reasons, people move towards flood plains and make vulnerable safety with dykes (Plate, 2002). The increasing disaster-loss is also because of human choice to settle and live in flood-prone areas and this ratio is observed more in developing countries where the fragile economies become even feebler afterwards (Benson and Clay, 2004; Hansson et al, 2007). Environmental change which is leading towards rising of the level of the sea and severe weather conditions in the result of global warming and trends towards urbanization in developing countries are key factors of flood disaster. The ratio will even pick the pace up by next 50 years (Jha et al, 2011).

Geographically, the position of Pakistan is full of natural threats (Khan, 2007; Qaddafi, 2010a). According to its physical features that comprise mountains and flood plains, Pakistan faces huge threats of all the kinds of disasters (IFRC, 2010). Among all the types of natural disasters in Pakistan, flood contributes its disastrous effects up to ninety percent (Tariq and Giesen, 2011). Pakistan has been counting financial and economic loss as a result of flood devastation. Many observers are of the view that recurring floods are also one of the causes of depreciating economy. Flood is known as a natural hazard which is difficult to control in Pakistan. Regions with different features have been exposed to various natural catastrophes with striking visibility and impacts particularly during past decade. The boosting amount can be ascribed to hydro-meteorological phenomena and climate change. The increasing ratio and severity of the natural disasters have been seen during the 21st century that is smashing social, economic and physical infrastructure. None of the plane-settled regions are secure from flooding in Pakistan.

The Indus River and the Monsoon

Topography is the major cause of inundations. Climatic conditions bring about floods in Pakistan (Qaddafi, 2010a). "It is speculated that glaciers melt in the Himalayas are projected to augment flooding" (EPA, no date). Coastal belt is also highly susceptible to cyclonic floods (IFRC, 2010). Nonetheless, heavy monsoon atmospheric conditions from July to September that result in severe precipitations become the direct cause of flooding (CRS, 2010; NDRP, 2010; PWP, 2012). Geographical features divide the nature of flooding in Pakistan. Pakistan comprises three different physiological regions. Among these, Indus River plains cover the area of 311,766 km2 which is almost 40% of the total and is the most devastating (Wang, 2006; Tariq and Giesen, 2011). Indus plains are densely populated and economically stable. Floods here are the most terrible (Tariq and Giesen, 2011). The Indus river commences from Tibet glacier streams, lies in Himalaya and approaches Pakistan from north east side is the major source of flooding in Pakistan, then the monsoon precipitations in the summer season proceed the flow of the Indus River. Glacier melting and concomitant monsoon precipitations cause inundations in the Indus plains (Gaurav et al, 2011; NDRP, 2010; Rehman and Kamal, 2010).

Management by the flood Related Institutions

Research on the vulnerability, its time-dependence and the risk assessment are indispensable for better management (Zadeh and Takeuchi, 2007). Flood risk management in Pakistan is tackled mainly by the departments working at federal level and by some means at provincial level that generally needs reconsideration to develop new ways and techniques to tackle the hazard (Plate, 2002; Tariq and Giesen, 2011). "Based on the nature of services, these institutions can be grouped under risk-managing and crisis-managing institutions. Risk-managing institutions deal with structural and non-structural measures, whereas crisis-managing institutes are concerned with rescue, relief, and rehabilitation operations" (Tariq and Giesen, 2011). The government of Pakistan has done a lot for relief during last 67 years. Several ordinances and acts form the flood policies. The development of organizational system for flood crises and crises management is in progress. Yet, flood-to-damage ratio figures and data prove no declination (Tariq and Giesen, 2011). Humanitarian functions of these government organizations are inadequate and not up to the mark (Khan and Schwoebel, 2010).

The Government of Pakistan for the sake to disaster risk reduction for general sustainability and environmental growth embarked upon some schemes, and put the actions into practice to minimize the vulnerabilities. On this subject, after the approval from National Disaster Management Commission (NDMC) in 2006, National Disaster Management Ordinance (NDMO) was approved (NDRMFP, 2007). After the havoc floods in 1973, National Disaster Plan was prepared in 1974 that covered organizational procedures and monitored the disaster operations but now after the establishment of NDMA, during hazards, NDMA keeps upper hand over all other organizations (Din, 2010; Tariq and Giesen, 2011). The Emergency Relief Cell prepares policy and appraisal of relief fulfillment during major hazards. Emergency Relief Cell fulfils all the basic exigencies during hazards, it also helps NGOs and donors in their relief work. Governments at local and provincial level work for relief operations (Tariq and Giesen, 2011).

Management and its Failure

Flooding has its negative impacts, and as a result of negligence of the government, it becomes more damaging in its after-effects (Khan and Schwoebel, 2010). Flood hazard management is a process to establish a system and the perfection in this structure requires new techniques (Plate, 2002). Corruption, business interests and lack of political will are the major hurdles in flood restoration process (NDRMF, 2007). There is no implementation of any scheme through which floods can be controlled in a specific region by flood related organisations. That is the reason, in hazard-prone regions; people are suspicious about their regional future (Tariq and Giesen, 2011).

Flood Warning System in Pakistan

There is a need of scientific and technical knowledge to deal with catastrophes (Qaddafi, 2010b). The current approach for flood risk management combines structural and non-structural actions. Nevertheless the inter-linkage between the mentioned measurements still needs perfection (Rehman and kamal, 2010). National meteorological and hydrological departments provide weather data including the proclamation of floods early warnings. Regional, sub-regional and global associations also measure it. These organisations use the same systems that are used for disaster risk reduction (UNISDR, 2009). Early warning system has the capability to decrease the effects of the disaster but Pakistan does not possess a responsive early warning mechanism for floods (Chaudhry, 2006; Hansson et al, 2007).

Man-made factors that worsen the effects

Flood is a natural phenomenon that cannot be prevented however some human activities participate to increase the potential and adverse its effects (Hashmi et al, 2012). Individual scarcity of resources, urban poverty, agricultural interests, unawareness and untrained man-power are the key factors to worsen the flood disaster

especially in rural areas where the people have lack of access to scientific knowledge (Hansson et al, 2007; NDRMFP, 2007). Mostly housings in rural areas are adobe and highly vulnerable to floods. There are no construction criteria in most of the urban areas. The rapid increase of slums and urban poverty has compounded unsafe construction practices. Business interests, lack of information and untrained man-power are also the reasons to worsen the flood disaster (NDRMFP, 2007).

Problem Statement

Many floods approached to remove the infrastructure and lives but last three years are the eye opener in this respect. The terrible figures of the last three years are given (in Table 1) that sketch the severity of the hazard.

Taken as a whole, 20 most disastrous floods during last 63 years are the key challenges to the economic progress. Overall, almost 11,243 inhabitants from different regions of the country have become a complete physical victim to floods. The country endured financial loss of US$ 30 billion. 2010 floods were the most brutal among all the severe flood events in Pakistan (FFC, 2010; Tariq and Geisen 2011; Hashmi et al, 2012; NDMA, 2013). In the year 2010, the number of flood affected people in Pakistan (see Table 1) were beyond those who were affected by the 2004 Indian Ocean tsunami, 2005 Kashmir earthquake and 2010 Haiti earthquake altogether (Aon, 2010).

Flood is a destructive power. Perception about floods in Pakistan is to wash away the whole cities. Ratio of floods hazard is very high in Pakistan. Although floods are inevitable and the people including their properties will continue to be lost to inundations. Nevertheless, data of flood disaster occurrence and data of its affects are vital for better management that can reduce the effects and losses.

Significance of the study

People have been losing both their belongings and physical wealth as a result of floods in Pakistan. There is a need of planning, firmness and innovation in the flood management sector. Facts and figures of the extent flood catastrophe and its effects on the people are essential prerequisites to manage the hazard. **S**tudies about various flood-related topics have been done particularly after 2010 havoc inundations. Most of the flood related works consist of geological theories and natural causes of floods but despite the management by the government is the most arguable issue, yet the research on the sufferings of the affected people and neglectful management is inadequate. So, this study narrates the condition of the flood victims and analyzes the role of the government.

Data Collection and Methodology

Flood in 2012 inundated more than a dozen of districts along with hundreds of villages. To achieve the aim of the study, data was collected from two sources. Primary source was considered as the most appropriate tool for undertaking this type of research. Figures were collected from the affected rural and urban areas of District D.G Khan (30.0500° N, 70.6333° E latitude and longitude) in the province of the Punjab through comprehensive questionnaires, focus group discussions and personal observations. In total, 486 questionnaires were distributed among which 290 questionnaires in urban areas and 196 questionnaires were distributed in rural areas of DG Khan District. For personal observation, we also visited to the officials of the National Disaster Management Authority (NDMA) and inquired about their contemporary management and future strategies. They were mainly asked the utility of this disaster management institution so what they had done especially during last three years after the 2010. It provided me fresh information and the seriousness of the government for the mitigation of the flood. Secondary data was collected through published papers, books and reports published by the hazard-related government departments and NGOs. With the help of both primary and secondary data, study has examined the sufferings of the people and analyzed recent policies adapted by the government of Pakistan to cope up with floods. On the basis of these types of data, it was possible to explore the role of flood-related institutions.

We have applied the correlation technique and Chi Square distribution to seek out the relationship and the degree of association between different variables by using 5% level of significance as a decision making tool. To decide the degree of association, we used Chi Square with the help of SPSS-21.

Findings and Discussion

The study has been conducted in the worst hit areas of whole district of D.G Khan in the province of the Punjab. The city is flood prone where 2012 floods affected 0.62 Million people (NDMA, 2013). Several rural and urban areas have been examined during survey. Various villages and urban areas are badly inundated. The extent of the damage is severer in rural areas. However, 50 percent of the urban area is also surged under water. Heavy precipitations and concurrently weak dykes cause D.G. Khan Canal to breach. The breached canal caused heavy inundations. It is also disclosed that the dykes had been removed with the conspiracy of politicians.

Floods have damaged properties both in rural as well as in urban areas. There have been three deaths in the affected areas. It has ruined adobe houses in the rural areas but still the people and the governments are not

prepared. Politics is involved and the people although have some awareness, yet they are unable to get their proper social and economic rights. More results are being presented in form of tables.

Table 1: Devastations due to floods in Pakistan during last three years in Pakistan

Year	**2010**	**2011**	**2012**
Death Toll	2000	520	571
Total Affected People (in millions)	20.20	9.2	5.05
Arable Land Affected (million hector)	14.71	2.11	0.47
Economic Loss (in billions US$)	10.44	3.71	2.7
Severely Affected Districts	78	16	16
Total Homes Affected	1894530	1524773	626956

Sources: MoF, 2012; NDMA, 2013

Table 2 Peoples' Overall Satisfaction with the Efforts of the Government

Satisfaction	Urban Communities	Rural Communities	Cumulative Avg.
Strongly Agreed	01.39%	00.51%	01.04%
Agreed	03.48%	10.77%	06.43%
Disagreed	26.13%	52.31%	36.72%
Strongly Disagreed	69.00%	36.41%	55.81%

Table 3 Satisfaction with the Warning System

	Urban	Rural	Cumulative Average
Satisfied	8.28%	5.10%	7.00%
neutral	39.65%	31.63%	36.42%
Dissatisfied	52.07%	63.27%	56.58%

Table 3a Chi-Square Tests and Correlation between Warning Satisfaction and Overall Satisfaction

	Value	df	P-Value
Pearson Chi-Square	114.963	6	.000
Likelihood Ratio	114.926	6	.000
Linear-by-Linear Association	104.030	1	.000
Spearman Correlation	0.469		.000
N of Valid Cases	482		

The Value of $\chi^2_{d.f=6}$ is 114.693a and (P=0.00 < 0.05) Shows a significant result concluding that there exists the degree of association between warning satisfaction and overall satisfaction and the same result in case of correlation as well.

Table 4 Peoples' Evacuation to Safe Places

Time Period	Urban Evacuation	Rural Evacuation	Cumulative Average
For One to Three Days	16.07%	20.51%	17.89%
For Four to Seven Days	06.43%	28. 72%	15.58%
For More Than Seven Days	00.00%	10.26%	04.21%
Did not Evacuate	77.50%	40.51%	62.32%

Table 4a Chi-Square Tests and Correlation between Peoples' Evacuation to Safe Places and their Satisfaction

	Value	df	P-Value
Pearson Chi-Square	27.707	9	.001
Likelihood Ratio	32.216	9	.000
Linear-by-Linear Association	9.227	1	.002
Spearman Correlation	-.164		.000
N of Valid Cases	471		

The Value of $\chi^2_{d.f=9}$ is 27.707a and (P=0.01 < 0.05) Shows a significant result concluding that there exists the degree of association between warning satisfaction and overall satisfaction and the negative relationship in case of correlation.

Table 5 Food Obtainment was Easy During the Period of Inundations

	Urban Communities	Rural Communities	Cumulative Average
Strongly Agreed	04.64%	00.00%	02.79%
Agreed	05.36%	00.00%	03.21%
Disagreed	73.57%	34.04%	57.60%
Strongly Disagreed	20.00%	65.96%	36.40%

Table 5a Chi-Square Tests and Correlation between food and Satisfaction

	Value	df	P-Value
Pearson Chi-Square	124.328[a]	9	.000
Likelihood Ratio	121.461	9	.000
Linear-by-Linear Association	88.668	1	.000
Spearman Correlation	.433		.000
N of Valid Cases	466		

The Value of $\chi^2_{d.f=9}$ is 124.328 and (P=0.00 < 0.05) Shows a significant result concluding that there exists the degree of association between food obtainment ease and overall satisfaction, and the same result in case of correlation as well.

Table 6 Health Facilities during Floods

	Urban Communities	Rural Communities	Cumulative Average
Excellent	08.75%	00.00%	05.24%
Satisfactory	47.15%	45.45%	46.47%
Awful	44.10%	54.55%	48.29%

Table 6a Chi-Square Tests and Correlation between Health Facilities and Satisfaction

	Value	df	P-Value
Pearson Chi-Square	110.275	6	.000
Likelihood Ratio	50.239	6	.000
Linear-by-Linear Association	32.143	1	.000
Spearman Correlation	.237		.000
N of Valid Cases	435		

The Value of $\chi^2_{d.f=6}$ is 110.275 and (P=0.00 < 0.05) Shows a significant result concluding that there exists the degree of association between health facilities and satisfaction, and the same result in case of correlation as well.

Table: 7 Compensation by the Government to the Floods Affectees

	Urban Communities	Rural Communities	Cumulative Average
Full Compensation	00.00%	00.00%	00.00%
Partial Compensation	20.70%	23.56%	21.85%
No compensation	79.30%	74.44%	78.15%

Table 7a Chi-Square Tests and Correlation between Flood Compensation and Satisfaction

	Value	df	P-Value
Pearson Chi-Square	124.576	3	.000
Likelihood Ratio	109.698	3	.000
Linear-by-Linear Association	80.656	1	.000
Spearman Correlation	.469		.000
N of Valid Cases	474		

The Value of $\chi^2_{d.f=3}$ is 124.576 and (P=0.00 < 0.05) Shows a significant result concluding that there exists the degree of association between compensation and satisfaction and association in case of correlation.

There are many other variables that can affect the relationship between satisfaction and other independent variables, since the study is conducted in the field, so most of the Pearson's correlations values lie between 0.40 to 0.47 which is an acceptable level of correlation in a field study.

Observations reveal that the hazard is large in extent. Severe floods damage infrastructure and cultivation. Half of the city submerges under the water. However, results prove that the rural areas are more vulnerable to the

fluvial floods. Hence the floods are common, responsible institutions and media covers the situation reports, so the people even in the rural areas get awareness of the hazard in advance. However, it is seen that due to insufficient efforts and poor techniques, majority of the people cannot save anything except their lives. Minimum three people are died but the conflict occurs when the government reports that the mortality is nil in the whole district.

The provision of health facilities remain a real challenge for the government. Proper medications, during and after the floods are hardly available. System to avoid and fight against water-borne and water-related diseases seems too inadequate and there is lack of health facilities to cure all the infected people.

It has been examined during the survey that due to the lack of planning and proper management, food obtainment for the rural dwellers during inundation is not only difficult but also full of humiliation. People have to suffer to quest for the food and potable water during floods.

Rural dwellers lose their homes and crop yields. Although the tragedies cannot be compensated entirely, but here we see that the compensation by the government is almost naught. In all the aspects of survey, it is observed that people are not satisfied with the sluggish efforts of the government. Particularly the village dwellers are too frustrated.

Flood is usually called a natural force but here it is observed that it is vulnerability of dykes and other managerial aspects more than a natural destruction. Normally, D.G Khan receives 330 mm rain for a year. The highest amount of rainfall is recorded in the month of July. Average precipitation is not high enough to cause flash floods. It is mismanagement and defenseless infrastructure that bring about inundations in this area. It has been derived from the survey that the mechanism for flood management is weak. Inshort, it is the awakening point for the government which is responsible for the loss.

Conclusion and Recommendations

Sufferings and anxieties of the people during floods have been analyzed. They were given beneath their genuine needs. The structure of flood hazard management in Pakistan is still in its initial stages. Early warning system helped little and least to the victims. Restoration process launched by the government was not appropriate. Institutions failed to reduce the floods as well as they could not properly mitigate the post-flood restoration. Various restrictions and challenges proved a major hurdle for the mitigation process. Severe flooding in Pakistan is the sign of institutional failure. Consecutive floods during past years have exposed the reality of the government organizations. Although Pakistan is not a developed county however the appropriate use of the funds can be near to enough for at least post-flood rehabilitation. Flood contingency plans have been failed. It is derived that flood forecasting system in Pakistan can predict floods yet it seems imperfect and after the establishment of early warning system, the task of its proper implementation is being neglected.

Flood-prone areas in Pakistan are large, so the government is unable to confront the situation. It has been derived that the lack of technical knowledge in the flood-prone environment is another cause of devastation. Pakistan government has less trained personnel to curb the hazard. An unsophisticated manpower and undeveloped economy have resulted in a lower response to floods disaster. On the other hand, developed countries have managed to mitigate the threat. With the collaboration and long term plans, they have minimized the destructive consequences (IWA, 2010). According to plate (2002), appropriate use of technology as well as social awareness can play a vital role in the reduction of floods (Plate, 2002). So the same inferences can be made.

To avoid the hazardous consequences, the following recommendations are made:

i. Despite the environmental aspects, infrastructural insufficiency is the key factor of inundations in Pakistan. System from all the aspects needs to be developed and the perfection is required in structural reassessment. Flood hazard management needs connection between tasks and actions.
ii. Efficiency of the government in coping with disaster and coordination among its responsible organisations can help to reduce the effects of menace.
iii. Infrastructure made by the federal government must be revised and ought to be developed according to the consequences of 2010 and afterwards floods.
iv. For the sake of minimizing the consequences, early warning system must be upgraded.
v. Proper budgeting and training can reduce the effect of catastrophe.
vi. Water reservoirs should be increased in numbers as well as existing reservoirs and dykes are needed to be renovated.
vii. It has already been proved that the process of evacuation is inappropriate and full of threats. In this regard, federal government has to provide a proper guideline to the public through provincial Disaster Management Authorities and local authorities. And during the inundations, with the private collaboration government has to provide the facilities to the affected people.

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