The entanglement of Disaster and Climate Change with special reference to Flood

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DOI: 10.29322/IJSRP.8.3.2018.p7548
http://dx.doi.org/10.29322/IJSRP.8.3.2018.p7548

Abstract- *Since the Industrial revolution in the World, there has been tremendous increase in the vulnerable activities of humankind to the climate and environment of our Planet. In particular, during the last 100 years, the astronomically fuel consumption in various technological and household utilities have aggregated devastating impacts on the environment, like global warning, ozone layer depletion, volatile weather etc. This resulted adverse effects on our climate, resulting it more erratic and volatile in various forms of disasters across the World. This paper discusses the effects of climate change on the flood disasters in India and World level. It also discusses my case study on the devastating flood in Kawas (Barmer) in the Thar Desert, which struck during August month of 2006, from the perspective of execution of Disaster Management. Though the case study is not linked directly to climate change aspect, however, the extreme weather in Kawas region during flood may be due to climate change. Therefore the presented case study is just aimed to show the indirect adverse effects of climate change in the form of Flash Flood in the desert area, which has led to great challenge for the people and the administration which are normally do not accustomed to Flash Flood.*

Index Terms- *Climate Change, Flood Disaster, Kawas Flash Flood, Disaster Management*

I. Introduction

The problem of human induced climate change was hypothesized in the early 1890s by Swedish Scientist Svante Arrhenius, who warned about the possibility of a so called "enhanced" green house effects caused by excess carbon dioxide in the atmosphere [1]. In the late 1980s, the World Meteorological Organization /International Council of Scientific Unions/ UN Environment Programme/ Advisory Group on Green House Gases identified two main temperature indicators or threshold with different levels of risk. Based on the available knowledge at that time, 2 ℃ increase was determined to be "An upper limit beyond which the risk of grave damage to Ecosystem and of Nonlinear response, are expected to increase rapidly" [2]. The earth's temperature is expected to increase by 1.8-4 ℃ by the turn of the century owing to increase in greenhouses gas emission if one were to go by the estimate of the Intergovernmental Panel on Climate Change (IPCC) [3]. Results from a wide range of climate model simulations suggest that our planet's average temperature could be between 2 and 9.7 °F (1.1 to 5.4℃) warmer in 2100 than it is today [4].

Earth's climate has never been stable over extended period of time. Climate change represents the changes in the variability or average state of the atmosphere over time (decades to millions of years) and over region (local to global scale) or in other words all forms of climatic in consistency [5]. As per the definition of the American Meteorological Society, "climate change is any systematic change in the long terms statistics of climate elements (such as temperature, pressure or, winds) sustained over several decades or longer. Climate change may be due to natural, external forcing, such as changes in solar emission or slow changes in the earth's orbital elements, natural internal processes of the climate system, or anthropogenic forcing" [6].

Climate change will exacerbate the adverse impacts of the un-sustainable resource's utilization. Fresh water and other natural resources were under constant threat from pollution and depletion due to un-sustainable consumptions. Higher temperatures, intense floods, severe droughts, sea level rise, cyclones, hurricanes, glacier retreat, and spread of climate sensitive diseases were the consequences of climate change [7]. Climatic studies have shown that warming trends are linked to global changes in the hydrological cycle [8]. One of the main consequences is an increased extreme precipitation event such as flooding and droughts as described by many experts [9-13]. As noted by Bats et al (2008) [8], floods are affected by various characteristics of the climatic system, most notably precipitation (intensity, duration, amount, timing, phase rain or snow), but also temperature patterns responsible for such phenomena as soil freezing, snow affected by drainage, rivers, the snow and ice cover, the soil character and status (permeability, soil moisture content and its vertical distribution), the rate of urbanization, and the presence of dikes, dams and reservoirs, close to sea level, river flooding may be concurrent with storm surge or extreme tide events [14].

Recent experiences with extreme events show that many societies are severely exposed to loss and damage during extreme events such as floods [15]. Flood disasters account for about one third of all natural catastrophes in the World (by number and economic loss) and are responsible for about one half of the fatalities [16]. In terms of exposure to flooding, about 800 million people worldwide (i.e., over 11% of the global population) are currently leaving in flood prone areas and about 70 million of those people (i.e., 1 % of the global population) are on average, exposed to floods each year [17]. There is an increasingly alarming trend in the number of people affected by natural disasters with an average of 147 million affected per year (1981-1990) rising to 211 million per year (1991-2000), with flooding alone accounting for over two thirds of those affected

[18]. For the period 1980-2011, reported flood losses have increased from an average of US $ 7 billion per year in the 1980s to some US $ 24 billion per year in the period 2001-2011, of which an average of 9 % was insured [19].
Several headlines events have piqued concerned about extreme weather disasters in the recent years. Record-Setting storms, flooding, drought, and heat wave all had for reaching consequences [20, 21]. Here are some recent major Flood Disasters which occurred across the World:

- The major flood event at the turn of the 21st century, and the most economically destructive disaster in Europe's history, occurred in 2002. Flood took place along the Danube and Elbe rivers, affecting much of the Central Europe; there was also significant flooding in the UK and France. 6 lakhs people were affected and 80 were killed in the 11 countries. Economic losses were at least 15 billion euro [22].
- In the Amazon region in South America, the July 2009 flood set record high in the 106 years of data for the Rio Negro at the Manaus gauge site [23].
- Soong and Zhao (Soong and Zhao (1994) [24]) reported that in nearly 2000 years of recorded history, the Yellow River has had seven major course changes and 1593 levee branches. In the 1990s the frequency of flooding along the Yangtze River increased, with tremendous damage occurring in the floods of 1991,1994,1996,1998 [25]. During the summer of 1998 Yangtze River flood began in early June when the seasonal rains arrived earlier and were heaviour than usual. The 1998 flood killed over 200 people and left 14 million homeless [26].
- Bangladesh seems to be one of the worst of the victims of climate changed ravaged by major disaster events like 1998 flood, 2000 flood, 2007 cyclone SIDR and 2009 cyclone AILA [27-28]. Mirza (2000) [29] stated that global warming introduced changes in Monsoon precipitation that would increase the magnitude, depth and extent of flooding in Bangladesh. As a result, the land area under extensive inundation would increase an agricultural productivity might decrease.
- A record-breaking, destructive flood occurred in Thailand, where the 2011 monsoon season was exceptionally heavy and led to extensive and long-lasting flooding in the Chao Phraya and Mekong river basins. Flooding was exacerbated by the rapid expansion of urban areas into flood plains. The flooding lasted from July 2011 to mid-January 2012 and was the costliest natural disaster in the country's history, with direct damages estimated at US$45 billion. As a result, Thailand's annual 2011 economic growth was slashed to 1.5% from a pre flood estimate of 3.5-4%. In part, the severity of this event was due to failure of flood control structures and systems that had effectively alleviated the damages from smaller events in the past. The 2011 flood in Thailand caused the most expensive insurance loss ever, worldwide caused by a flood, with the total liability estimated at US$ 15 billion [30].

II Climate change and Flood disasters in India

Floods are natural feature of India's river basins. They are very important as they form the lifeline of India whose economy is still dominated by Agriculture. However, due to climate change in the last 30 years, India has also become more vulnerable to flood related disasters. According to World Bank report [31], "the Ganges-Brahmaputra and Indus river systems are highly prone to flooding. The magnitude of flooding has increased in recent decades, from approximately 19 million hectares affected 50 years ago to 40 million hectares in 2003, about 12% of India's geographic area. Floods have occurred almost every year since 1980, and their extent substantially increased in 2003 due to widespread rains, which affected even some of the most drought-prone areas. In recent years an increase in population in vulnerable areas, inadequate drainage and deforestation has all contributed to the rise in flood damage". In the last 10 years India has received many deadly floods which have created a great concern because of their spatial and temporal irregularities. Here, I would like to discuss Mumbai Flash Flood (2005), Koshi flood (2008) and recently Uttrakhand Flash Flood in 2013. These types of flood are unprecedented in the recent past therefore I am describing them.

- Severe flooding occurs in Mumbai in July, 2005 after 944 mm rainfall in a 24 hour period [32]. This has created huge disruption in the normal life of Mumbai causing huge havoc to the city itself and made it standstill for couple of days. According to Ranger et al [33], Mumbai experienced unprecedented flooding, causing direct economic damages estimated at almost two billion US$ and 500 fatalities.

- The Kosi River is known as the "Sorrow of Bihar" as the annual floods affect about 21,000 km^2 (8,100 sq mi) of fertile agricultural lands thereby disturbing the rural economy [34]. According to UNDP, India report (2009) [35], the valuation of houses damaged stands at around Rs.880 crores (US$ 195 million). Enormous amounts of goods were lost, including food grains and domestic items estimated to be worth Rs.400 crores (nearly US$ 88 million) and Rs.155 crores (US$ 34 million) respectively. It further pointed out that 493 people died due to this flood in 40 villages in which they surveyed. Around 3.78 lacs people were affected due to this flood.

- Recently, the Flash Floods triggered by very heavy rainfall and cloudburst in Uttarakhand on 16-17 June 2013, affected 12 out of the 13 districts in Uttarakhand. The 4 districts that were worst affected were Rudraprayag, Chamoli, Uttarkashi and Pithoragarh. The deluge has washed away roads, bridges and other infrastructure. Many people either died or went missing. In Kedarnath alone about 75,000 pilgrims had been stranded due to landslides and Flash Floods [36]. South Asia Network on Dams, Rivers and People has published a report in which the main culprit for such a Flash Flood is various human activities. The report cites NIDM:[37] "Thus, the natural terrain conditions combined with climatic / weather conditions and haphazard human intervention made a conducive environment for such a hazardous process to take place in this valley."

The above mentioned unprecedented deluges are due to direct/indirect effects of climate change because they are extreme weather conditions which are normally not a part of their climate conditions. Since flooding in India is directly related to the Monsoon which is related to climate related parameters like sea level temperature, pressure, wind direction etc. Therefore the volatile nature of flooding is directly/indirectly related to climate change. In 2003, World Meteorological Organization had warned of an increase in frequency of extreme weather events because of climate change. Further, the article in [38] clearly relates the Flash Flood in Rajasthan in 2006 with the global warming by saying "The deluge in Rajasthan was caused by a low pressure zone over the area, itself a result of extreme heat conditions, experts note. Low Pressure area in deserts that result from the extreme heat is referred to as thermal low in meteorological parlance. Such conditions could be caused by global warming. The thermal low caused southwest monsoons to bring rain over Barmer and Jaisalmer".

I present here the case study of the Flash Flood in Kawas region of the Thar desert in August, 2006. The case study is mainly focused on the various aspects of the Disaster Management Policy and its execution. It is not linked directly to the climate related issues. Many studies have pointed out that the extreme weather conditions are due to direct/indirect climate change. The above mentioned references in the previous paragraph also pointed out the possible role of climate change in the Rajasthan deluge in 2006, in particular in the Kawas region of Barmer district. Therefore, my aim is to present this case study of the Flash Flood on the affected people is not directly linked with the climate change. However, the Flash Flood, like in Kawas, is the result of the climate change in the World and thus making a burden on the Disaster Management policy. This case study should be seen from this perspective. At the end of the day, it is the common people who have to pay the price of climate change due to human intervention to nature. The Kawas region is located in the Barmer district of the Thar desert with the arid climate. The flooding for them is normally an unusual phenomenon. The

devastating Flash Flood in Kawas in 2006 was a nightmare for that area.

III CASE STUDY ON KAWAS FLASH FLOOD (2006)

Rajasthan is one of the driest states in the country. Though the State is generally deficit in rainfall, it has also experienced floods in many areas during monsoon period. The erratic and temporal occurrence of floods in Rajasthan adds to the difficulty of formulating an effective system to cope up the flood related disasters. The average normal rainfall of India is about 883 mm, whereas the average normal rainfall of Rajasthan is 531 mm. Western Rajasthan receives average rainfall of 279 mm and Eastern Rajasthan receives average rainfall of 631 mm [39].

In 2006, the monsoon has created formidable situation in many parts of Rajasthan. Barmer was deluged with heavy downpour in the last week of August 2006. Thirty-six hours of non-stop rains have converted village Kawas in Barmer district into the biggest mortuary in the Thar Desert. Barmer district had a severe intensity of rain-spell between 19 - 23 August with a total rainfall of 426 mm at Barmer teshil, 392 mm at Ramsar, 383 mm at Gadraroad, 364 mm at Baitu, 311 mm at Sheo and 306 mm at Gida. Floods claimed 85 lives including 50 alone in Barmer district, while media reports claim 300 people have died in the state. Approx 75,000 cattle heads perished besides property and monsoon crop damage amounting to Rs. 13 billion**.** Being a desert state, prone to droughts, the floods were unprecedented and the worst in 200 years (see NIDM data for further details). As shown in the figure 1, the affected area of Kawas is located in the desert region of Rajasthan and, normally, is an arid region. Though the warning was given to people in advance, regarding heavy rainfall and chances of floods, villagers didn't believe the possibility of flood in a desert. The water level went up to 25-27 feet above ground level; villages in a radius of 60 km were under water without road, rail, phone and electricity. There was huge loss of livestock which is the mainstay of the local economy (NIDM) [40].

Normally the western part of Rajasthan is a desert area and always prone to drought. The devastating flood of 2006 in Kawas (Barmer) was not expected as this area receives scanty rainfall during monsoon season. Kawas was the worst hit by the flood. Houses were submerged 15 feet in water for quite long time. Ironically, the region has rich Gypsum deposits which became curse for it [42]. As this area is not vulnerable to such types of sudden floods, the people and administration were probably not had enough expertise and experience to cope up with this menace. This warrants looking into the disaster policies with proper planning to handle such types of disasters.

Figure 1: Geographical location of Kawas area (Barmer) [41].

III.(a) Research Methodology

The Flash Flood in the Kawas is an unusual phenomenon because the area is drought prone and located in the desert region. Therefore, the people are, largely, not prepared enough to cope up with such type of Flash Flood. This has created a huge havoc for the region at psychologically, economically and ecologically. Kawas is located in Baytoo Tehsil in Barmer District of Rajasthan State. It is located 49 KM towards East from Barmer [43]. I chose this area for the survey because of the reasons mentioned above. Further, instead of relying on the secondary data, I found it more appropriate to collect primary data through the random survey from the perspectives of Disaster

Management. I briefly describe the Methodology adopted for the study as per follows:

(i) Coverage:

The reported case study, mainly, relied on the primary data, collected from the interviewees of the Kawas region. The survey was kept random in nature so that everybody could give their feedback and inputs. A total of 250 respondents were drawn as a sample size in the process of survey which belonged to various strata of the society, like persons from the under-privileged section, government employees, NGO workers, local representatives, shopkeepers, house wives, students etc. The questionnaire was designed in such a manner that it should reflect the actual picture of Disaster Management and also highlights the shortcomings of Disaster Management plan of whatever form, like discrimination in the relief and rehabilitation work, mismanagement in the execution in the Disaster Management, lack of information etc. The primary concern was with vulnerability to short term disaster, in particular impacts to flood.

Table 1: Socio-economic data of the respondents in Kawas region

	Questions related to	Kawas Response
1.	No. Of Males and Females	Male: 221, Female: 29
2.	Age group of respondents	10-20 years: 20 %, 20-30 years: 33.3% 30-40 years: 20 %, More than 40 years: 26.7 %
3.	Marital status	Married: 73.3%, Unmarried: 23.3% Widows: 2.67%, Widowers: 0.667 % Divorced-nil
4.	Education background	Illiterate: 13.2%, Barely literate: 19.9% Primary : 26.5%, Secondary: 33.1% Higher : 7.28%
5.	Per Capita monthly Income	Less than Rs. 1000: 5.43%, 1000-3000: 59.8% 3000-5000: 21.7%, More than 5000: 13%
6.	Status of Family	Nucleus : 33.3%, Joint: 66.7%
7.	Head of Family	Male Head: 90%, Female Head: 10%

(ii) Research Questions

The philosophy of the questions was based on the execution of the Disaster Management Policy within the perspective of its main pillars, viz-a-viz Mitigation, Preparedness, Response and Recovery. It was also based on the economical, social, psychological, ecological implication of Disaster on the local area. The socio-economic status of the affected area was covered in the Questionnaire. Personal feedback and suggestions etc. are taken care as a separate section in the Questionnaire.

(iii) Data Analysis

I present the data from the survey in the tabular from. The questionnaire was divided into two parts, viz-a-viz, socio economic data of the respondent and Disaster related data. The socio-economic data have been presented in the Table 1. The Disaster related data have been presented in Tables 2-4. The responses have been projected on percentage basis. The questionnaire also gave the respondents to give their suggestions for the improvement of mitigative measures for any future Flash Flood in the region. Many people gave their suggestions. I compile their best suggestions and present it them in the next Section.

III.(b) Results and Discussion

In the Table 1, I present the Socio-economic data of the Kawas region. The table is self explanatory so I refrain from its discussion. Apart from the Socio-economic data, I have asked 19 questions related to the Disaster Management cycle, viz. Preparedness, Response, Recovery and Mitigation, in the questionnaire. I compiled the data of the survey and present them in Table 2, 3 and 4.

Table 2: Statistics of Kawas flood in 2006

Q.No.	Question	Response
1.	What types of frequent disasters did you face recently?	Drought: 98.6%, Earth quake: 46.6% Flood: 73.33%, Others: 11.33%
2.	Which of the following losses did you meet during the flood?	Food grain: 75.33%, Animal: 74.66% Human loss: 29.33%, Others: 38%
3.	How long did it take to reach flood situation?	3 hours: 2.01%, less than 3 hours: 9.41% Between 3 and 5 hours: 1.34% More than 5 hours: 87.2%
4.	(i) Did government warn you about the possibility of flood? Q4(ii) If yes to Q 4(i) then by which mode they have warned you?	Yes: 8.2%, No: 91.8% Using :Siren: 25%, Using radio: 25% Through Panchayat: 37.5% Others: 12.5%
5.	Did you find yourself a way to recede the area after finding more than average rain? Q5(ii) If yes to Q5(i) then which of the following modes you have used:	Yes: 89.8%, No: 10.2% Migrated on feet: 89.7% Migrated using personal vehicles:5.88% Migrated using Govt. vehicles: 3.68% Migrated using Community vehicles: 0.7%
6.	What was the operational condition of communication and electricity during flood?	Uninterrupted:0.66%, Good: 3.33% Insufficient: 87.3%, Don't know: 8.67%

From Table 2, I summarize my findings as:

1. Since they were not prepared for the Flash Flood due to arid climate of the region. They were not able to effectively fight against the Flash Flood resulting huge loss in the livelihood stocks (see the Table-2).
2. Similarly, the administration was also seemed to be not prepared enough to manage this disaster. It took more than 5 hours to build up the flooding in the region, the administration would have managed the disaster effectively, had it equipped enough to fight the Flash Flood. Relief and rescue works were badly managed due to poor facility in dissemination of flood warning, transportation for the evacuation of the affected people, and the electricity and communication system.

The Table 3 is related to the Relief, Rehabilitation and Gender related issues. The findings can be summarized as follows:

1. The immediate reliefs were not equally distributed to the affected people. Only 11.1% people got all the assistance like food, cloths, medical attention and temporary houses (see Question No. 7 of Table 3). Normally we expect all the necessary aids should be extended by the administration immediately after the flood. Naturally this was not the case for Kawas region.

2. There was also a Lacuna in the long term development of the affected area. The survey clearly showed that it took more than 6 months to remove the water from the area. The then administration did not take interest to pump out the water. The stagnated water was

vulnerable to their houses, farms, water born diseases and other essential services.

3. They were assisted, mainly, by the Army and NGOs. They also got help from their respective community based organization. The NSS/NCC like youth organizations should be brought into the Disaster Management aspect as there was no contribution reported in the survey.
4. The gender related issues were raised in the survey. Most of women found difficulty to get the assistance due to their gender (76.5%), especially in medical services. They also found very little assistance from the government in terms of house, finance. The administration has not taken interest to set up the Women's group for their economic upliftment and empowerment.
5. Most respondents got the benefit of the rehabilitation policy related to housing. However, they were not properly aided financially as well as other aspects shown in the data related to the question 12 (see Table

Table 3: Statistics of Kawas flood

Q.No.	Question	Response
7.	During the disaster what types of government aids were available?	Food and cloths: 62%, Medical: 37%, Temporary houses: 53% All of above: 19%
8.	How long did it take to remove the water from Kawas?	6 months: 0.68%, 1 year: 7.48% More than 1 year: 16.3% More than 2 years: 75.5%
9.	Apart from government assistance, which of the following organizations assisted you?	NGOs: 50.66%, Community based organization:53%, NCC/NSS: nil Army: 68%
10.	(i) Did you find any problem in the assistance during the disaster due to woman? Q10(ii)If Yes to Q10(i) then what types of problems have you faced?	Yes: 76.5%, No.: 23.5% Food: 20.8%, Logistic: 25%, Medical: 54.2%,Others: 0%
11.	(i)Did you receive any type of governmental aid? (ii) If yes to Q11(i) then what types of aids did you receive from the government?	Yes: 31.3%, No: 68.8% Financial: 75%, Education: 0% Setting up Women Group: 0% House: 25%
12.	(i) Whether any rehabilitation policy implemented in the village? (ii) If yes to Q12(i) then what types of rehabilitation policies were implemented during post disaster period?	Yes: 80%, No: 20% Housing: 72.1% Disaster Mitigation Training: 6.13% Water drainage system: 13.6% Financial plans: 8.16%

3). The quality of housing was also questioned by many people.

Table 4 is related to post disaster works and mitigative measures. It is also related to their readiness to face such types of Disasters in near future (question no. 19). The summery of the findings are as follows:

1. Most people got assistance mainly from NGOs, local organizations, like Nehru Yuva Mandal, Mali Samaj, Jodhpur or neighboring villages and educational organizations (see question no. 13 in the Table 4).
2. Most people appreciated the Medical Camps organized by the administration after the flood.
3. The coordination between the Govt. and NGOs are essentially good for better management in the rehabilitation process. However, my findings clearly show that people found no coordination between Govt. agencies and NGOs (67.9%, see question no. 15 in the Table 4).
4. They have shown their resentments about the present drainage system. Around 83% people told me that they do not have any drainage system to channelize the excessive water in case they get similar Flash Flood in near future. This is really a serious concern for them as they had been stranded earlier in the Flash Flood.
5. People are not satisfied with the Government aids they received. Around 94.7 % people have complained about the lack of basic needs in the allotted houses. They had also general feeling about various lacunae in financial aids, corruption and lack of transparency as well as lack of people's participation at local level (see question no. 17 in the Table 4).
6. People have now better awareness about the various Disasters and have more skill to cope up the natural disasters because many people have responded positively that the Government has been organizing various training camps to enhance the capabilities of the local people to face the disaster (question no. 18 in the Table 4).
7. Despite of the training, 86% people are not prepared enough to face such type of disaster in near future. I find this a very worrisome situation, especially after facing the 2006 Flash Flood.

III.(c) FEEDBACK AND SUGGESTIONS FROM RESPONDENTS

I have left question number 20 of the schedule to collect their feedback and suggestions regarding present system for the prevention of 2006 flood like situation. I have got enormous response from the people. I compiled their suggestions.

Their main suggestions and feedback are summarized as follows:

(i) The stagnated water, which caused the flood in 2006, originated from Jaisalmer should be channelized properly possibly using Canal.

(ii) The most vulnerable village prone to the stagnated water has to be identified and the stagnated water from the village has to be channelized to Sindhi-Luni river.

(iii) The affected villages have to be equipped with the Disaster Management Centres.

(iv) There has to be physical verification of disaster aids.

(v) Rehabilitation policy 2005 should be implemented.

(vi) The ex-gratia to the next of kin to the deceased person should be uniform in India.

(vii) The allotted houses are small and designed not as per family requirement.

(viii) Make the affected agriculture land fertile again.

(ix) Boats should be kept at Panchayat level.

(x) The District level committee charged for disaster specific matters should include persons from village level with women participation.

Table 4: Statistics of Kawas Disaster

Q.No.	Question	Response
13.	Apart from government administration, which of the following organizations have helped in the rehabilitation of affected people?	NGOs: 78% Local Organization: 42.66% Neighbouring Villages: 20.66% Educational Institutes: 6%
14.	(i) Were there any medical camps organized by the civil administration regularly? (ii) If Yes to Q14(i) then what was the frequency of the camp?	Yes: 80.1%, No.: 19.9% 1 month: 21.6%, 3 months: 48.6% 6 months: 18% More than 6 months: 11.7%
15.	Whether there was any proper coordination between civil administration and NGOs during relief works?	Yes: 2.86%, No: 67.9% Do not know: 29.3%
16.	Give your opinion about present water drainage System?	Proper arrangement: 3.33% Improper arrangement: 10.7% Under construction: 3.33% No arrangement: 82.7%
17.	What types of loopholes did you find in the aid you received?	Lack of basic needs in the allotted houses: 94.66% Delay in financial aids: 70.66% Lack of people's participation at local level: 72% Corruption and lack of transparency: 77.33%
18.	Does Government organize following practices to cope up with natural disasters?	Warning before Disaster: 88% Training to survive during Disaster: 90% Information about Government role: 66% All of the above: 51.33%
19.	Are you prepared enough to face this type of disaster (i.e., 2006 flood)?	Yes: 14%, No: 86%

III.(d) FINDINGS AND FUTURE PROSPECTS OF THE CASE STUDY

As per present findings, the Kawas flood situation was very ill-managed by the government and the management work was not as per desired in the Disaster Management plan.

Suggestions can be summarized as per following points:

- Education of the community palys an important role in its empowerment, its goal is to change people's apathy concerning disasters. "Hazards education attempts to increase protactive actions by people, groups and institutions by presenting information about hazard and risk" (McEntire and Myers (2004) [44]).
- Disaster Management process must incorpotrate people's participation at the local decision making level. Participation of community has been successfully tested in several programmes around the World. ((Pearse (2003) [45], Osti (2004) [46]).
- Communication and team work are the key elements of successful Diaster and Emergency Management (Trim (2004) [47]). It is advisable that the committees should have well defined communication channels within the village and with county (state) authorities. It is important that the person in charge of communications to be equipped with adequate radio or telephone devices in order to keep with the county (state) authority (Newport and Jawahar (2003) [48]).
- A contingency plan for emergency has to be prepared involving all groups.

- The immediate government aid is necessary for rescue and relief operation. The Kawas study has shown that the people were not given immediate aids of Food, Cloths and Temporary logistic arrangements by the government administration. They also compalined huge delay in the given aids. Again this finding reflects the apathy and casualness of the then Barmer District administration to the disaster.
- For effective implementation of any disaster management plan it is required to have proper coordination between civil administration and NGOs in the relief and rescue works. The case study of Kawas found that almost all people found no proper coordination between them. The outcome here is alarming and serious. There has to be coherent coordination between these two agencies and has synergy between their operations during the disaster.

IV CONCLUSION

In this paper, I presented a brief study related to the climate change and its effects on disasters, especially on flood related disasters. Various reports on climate change has clearly shown that during last 30 years, there has been growing tendency in the global warming resulting more disasters and their adverse effects on economy, ecosystem, development, environment and other related issues. This paper also highlights few flood disasters in the World as well as in India. The Indian subcontinent is more vulnerable to climate changes because of its unique Monsoon pattern coupled with highly densed population with pathetic economic conditions of majority of its population. The Uttrakhand Flash Flood in Kedarnath region is the recent testimony of adverse effects of climate change. I also presented a detailed case study of Kawas (Barmer) Flash Flood in 2006, which was one of the unprecedented floods in India in the 21st century. The case study surfaced many issues related to the Disaster Management policy and its execution. I threw light on these issues and also suggested some points for the improvement of better management of Disaster Management. The recent erratic extreme weathers in many parts of World make this issue at global level. The awareness of the climate change and its effects on flooding should be brought to the grass root level with holistic approach, both at local and global level, so that people can be aware of controlling the activities which finally lead to the climate change.

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