

**THE BIHAR FLOOD 2008: IS IT A MAN-MADE DISASTER OR A  
NATURAL HAZARD?  
AN ANALYSIS OF THE BIHAR FLOOD WITH THE SAFETY CHAIN**

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**ABSTRACT**

The Ganges-Brahmaputra Basin is one of the largest river basins in the world and extends a large area of Nepal, India and Bangladesh. The area is very vulnerable to floods due to the combination of heavy rains, high sediment load and tectonic activity. Although floods can result in more fertile soils, floods in the Kosi catchment resulted in extensive damage and the river is often called 'the Sorrow of Bihar'. After severe floods in 1953-1954, social and political pressure resulted in a consensus between the Nepal and Indian government in the form of the 'Kosi project' which aimed at flood control and provide water for irrigation. The Kosi River is characterized by its strong meanders. Two spurs, respectively 12.1km and 12.9km from the Bhirmnagar Barrage at the Nepal embankments became eroded and damaged by the meandering river. The first signs of erosion of those embankments were recognized on 5 August 2008 as the embankment collapsed on 18 August 2008. The collapse of the embankment resulted in damage or destruction of houses, cultivated land and properties. Furthermore, there were many victims as people died or were displaced. There were heavy monsoon rains which resulted in a high discharge of the Kosi River. The meandering river eroded the western river banks at the Nepalese side. From mankind perspective, the erosion was recognized but the embankment had not been repaired and there was no risk preparation from governmental bodies.

This study adopted the safety chain approach in analysis of the Bihar floods. The Dutch version of the safety chain was used; it consists of pro-action, prevention, preparation, response, and recovery. The 5 links can be divided into two categories: risk management and crisis management. Pro-action and prevention are important for risk management and preparation. This five links provide a way to structure the disaster management and policies. Therefore it is a good way to get an overview of the disaster management.

Across the safety chain, the relationships between both India-Nepal and India-Bihar can be characterized as discussing each other's responsibility and the one-dimensional technical focus. This resulted in a lack of proper emergency plans. The aid and response of governmental bodies

was very inadequate and ineffective due to slowly responses as the floods were not considered as important by governments. It can be concluded that it seems to be better to invest in pro-action measurements which address the need of the locals, indigenous knowledge and local capacity as well the political situation. Alternative technologies which do not require advanced technical skills, maintenance and money, may address local situation better and result in advances of flood regulation. The situation of people living in the banks should be controlled. The lack of services within the embankment their vulnerability and thereby enlarges the negative impacts of the floods. It is also imperative to improve people's local capacity to deal with floods.

**Keywords:** Safety chain, flood, disaster management, local capacity, vulnerability

## **INTRODUCTION**

In 2008 there was a huge flooding in the area around the Kosi River in India. One week after the flood, the Indian media reported that 16 districts with 1.704 villages and 3.065.000 persons were hit by the flood. 56 people died and 109.000 hectares of cropland were affected (*Mishra, 2008*). In the past decades the Kosi river has brought a lot of misery by floods, that is why the river is also called "the sorrow of Bihar" (*Sinha et al. 2008*).

This paper analysis this flood and the river management in the Kosi area as a case study area because of the river and risk management in relation to the disastrous floods that happened. The paper uses the safety chain approach. But it's important to understand whether Kosi flooding is really a disaster?

To know whether this flood is really a disaster, this paper first reviews definition of a disaster from literature. Literature gives various definitions of a natural disaster (*Frerks et al. 1999*). Because most definitions are very broad and don't capture all characteristics of a disaster, this paper prefer to describe characteristics of a disaster. These are the criteria that *Frerks et al. (1999)* listed: a natural disaster is an extreme phenomenon, occurring at a certain location, which has a great intensity and that involves a complex interplay between the physical and human systems. A disaster causes the loss of life, threats to public health, a disruption of people's livelihoods and physical damage to infrastructure. It exceeds local capacities and resources, so outside assistance is needed to cope with it.

From this description we can certainly consider the Kosi flood of 2008 a disaster, as it contains all characteristics described above: it was an extreme event with great intensity, because the river discharge was extremely high. It also has a complex interplay between human and natural systems, as there were embankments and dams build and there was also a lot of politics involved, but these did not prevent the flooding of 2008 (*Mishra, 2008a*). With that also a lot of people

were affected, there were some deaths, a lot of damage to infrastructure, houses and croplands and livelihoods of many people were affected. The disaster clearly exceeded local capacities and resources, so relief was brought by the national government trying to evacuate people by boats and helicopters (*Mishra, 2008a*).

Now that Kosi flood is a disaster, this paper outlines the background of the Kosi area and a problem statement. Subsequently the paper explains the safety chain approach, and uses this approach to analyze the situation in Kosi. There is a double focus here: both the relation between India and Nepal in the management of the Kosi River and the relation between India and the state of Bihar is assessed. Finally it concludes by the usefulness of the safety chain approach for analyzing a disaster prone area and what can be learned from the approach in the case of the Kosi flooding.

## 1. Background of Kosi River Flood

### 1.1. Study area

The Ganges-Brahmaputra Basin is one of the largest river basins in the world and extends a large area of Nepal, India and Bangladesh. The Kosi River is a main tributary of the Ganges River and originates deep in the Himalaya with the upper catchment located in Tibet and Nepal (*Mishra, 2008a*). The 69.300km<sup>2</sup> large catchment is mainly located in Nepal with a minor area in Bihar, India (*Reddy et al., 2008*). The river has a length of 729km. Before crossing the Nepal-Indian border, the Kosi river is formed of seven tributaries; Indavati, Sun Kosi, Tama Kosi, Liklu Kosi, Dudh Kosi, Arhun Kosi and the Tamar. Before flowing in the Ganges River, the rivers Kamla, Baghmata and the Budhi Gandak flow into the Kosi River (*Reddy et al., 2008*).

The climate in the Kosi catchment is characterized by monsoon rains with heavy rains during the months July, August and September. The annual average rainfall is 1451.8mm (*Reddy et al., 2008*). Through the monsoon rains, there is a high variability in run-off with the peak flow during the monsoon rains which can be 5 to 10 times higher than during non-monsoon periods (*Sinha, 2008a*). The average monsoon discharge is 5156m<sup>3</sup>/s and the average non-monsoon discharge is 1175m<sup>3</sup>/s (*Sinha et al., 2008*). The high and intensive rainfall causes soil erosion in the upland areas and results in a high annual silt load of 80 million tonnes (*Reddy et al., 2008*).

In geomorphologic studies, the Kosi system is characterized as 'inland delta', 'cone' and 'megafan' and refers to the wide and relatively flat bed of the Kosi catchment. The northern

border of this megafan is formed by the Himalayan Mountains and the Ganges forms the southern border. The west-east line is parallel to the Himalayan with a distance of 3000km (*Sinha & Friend, 1994*). The slopes are steeper in the north (55-75cm/km) and flatter in the south (6cm/km) (*Sinha et al., 2008*). The area is dissected by many small channels which can form muddy streams during storms (*Sinha et al., 2008*).

An obvious characteristic of the Kosi River is the strong meandering. In the period between 1723 and 1948, the river shifted the flow almost 150km in western direction (*Sinha et al., 2008*). This shifting in loop is a natural process and includes the high sediment load, landslides and the geomorphologic condition of the Kosi megafan (*Reddy et al., 2008*). Regulation of the Kosi River

The area is very vulnerable for floods due to the combination of heavy rains, high sediment load and tectonic activity. Although floods can result in more fertile soils, floods in the Kosi catchment resulted in extensive damage and the river is often called ‘the Sorrow of Bihar’ (*Sinha et al., 2002*). After severe floods in 1953-1954, social and political pressure resulted in a consensus between the Nepal and Indian government in the form of the ‘Kosi project’ which aimed at flood control and provide water for irrigation. Embankments on both North and South side should protect 2800km<sup>2</sup> of land, but the flooding problems continued as the embankments regularly breached (*Sinha et al., 2008*). The Kosi River is regulated since 1963 through a barrage at Bhimnagar. The flow was regulated through the Eastern Kosi Main Canal. A 125km long embankment was built on the eastern bank of the Kosi, from Birpur to Kopadia and another 126km long, from Bhardah in Nepal to Ghonghepur in Saharsa, on the western bank (*Mishra 2008a*). In Nepal, an embankment of 34km was constructed to protect the areas on the western side of the river. The responsibility to manage and maintain the embankment of the Kosi River in Bihar as well in Nepal is for the stake of the water resource department in Bihar (*Mishra, 2008b*).

## **2. The Kosi River Flood**

The Kosi River is characterized by its strong meanders. Two spurs of; 12.1 and 12.9 kilometres respectively from the Bhirmnagar Barrage at the Nepal embankments which became eroded and damaged by the meandering river. The first signs of erosion of those embankments were recognized on 5th August, 2008 and the embankment collapsed on 18<sup>th</sup> of the same month (*Mishra, 2008a*). The collapse of the embankment resulted in damage or destruction of houses, cultivated land and other properties. Furthermore, there were many victims as people died and many more displaced.

An important question is; how was this disaster was caused?. There were heavy monsoon rains which resulted in a high discharge of the Kosi River. The meandering river eroded the western river banks at the Nepalese side. From mankind perspective, the erosion was recognized but the embankment had not been repaired and there was no risk preparation from governmental bodies. Figure 1 provides an overview of the causes, problem and consequences.

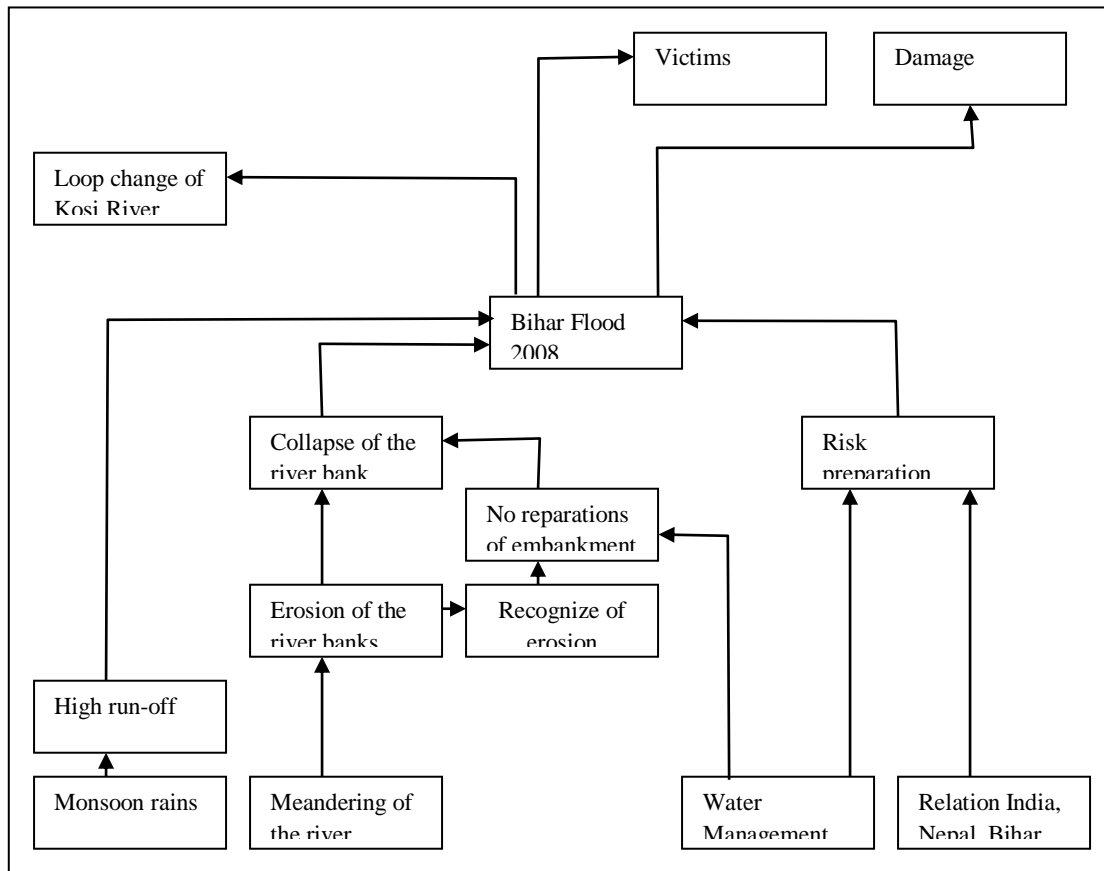


Figure 1 Causes and consequences of the Bihar flood

The Bihar floods can be considered as a complex situation since there is many unexplained uncertainties which make it difficult to know where to place the blame for this disaster. Being trans-boundary in its scope, the management of Bihar floods depends much on the political good will from the government of India, Nepal and Bangladesh. Under the prevailing situation, it is rather difficult to understand the efforts each of them has put in place as far as the management

of the floods is concerned. It is even more difficult to project how they would behave over the same in the future, and this is the problem that needs to be investigated:

### **3. Adopted Approach**

#### **3.1. The safety chain approach**

This study adopted the safety chain approach in analyzing the Bihar floods. The safety chain concept was developed by the United States Federal Emergency Management Agency (FEMA), which is; the government agency for disaster control and crisis management. The original American idea in this concept consisted of 4 links namely: mitigation, preparedness, response, and recovery. In Holland this chain concept approach was adjusted to include pro-action and to replace mitigation with prevention. Thus the safety chain that is used in Holland consists of pro-action, prevention, preparation, response and recovery (*Ten Brinke et al., 2008*). This paper uses the Dutch version of the safety chain.

The 5 links can be divided into two categories: risk management and crisis management. Pro-action and prevention are important for risk management and preparation. Pro-action is defined as “eliminating structural causes of accidents and disasters to prevent them from happening” (*Ten Brinke et al., 2008*). The easiest way to eliminate causes of accidents is by separating the risk source from the population or economic activities. An example of this pro-action in floods protection that could be used in the case of Kosi flooding is restricted building in flood-prone areas.

Prevention is “taking measures beforehand that aim to prevent accidents and disasters and limit the consequences in case such events do occur” (*Ten Brinke et al., 2008*). Prevention measures related to floods management are for example construction of dikes and storm surge barriers.

Crisis management is about preparation, response, and recovery. Preparation is the taking of measures to deal with accidents and disasters in case they happen. Examples of preparation measures are training crisis teams and making emergency plans. In the response phase an accident or disaster is dealt with, usually by emergency services like the police, fire brigade, or medical aid. The last link is recovery, which consists of all activities that lead to recovery of the consequences of accidents and disasters so that life can return to normal. Recovery can also apply in situations where disaster almost happened. In such a case, recovery may be used to learn

from what could have happened and what to use to make society less vulnerable to similar events in the future (*Ten Brinke et al., 2008*).

These five links provide a way to structure the disaster management in terms of policies and regulations. It is important to have an overview of the disaster management principles so as to identify the strength and weaknesses of each link with a view to understand the existing situation and point out the best disaster reduction strategy. This approach was used in the case of Kosi to gain insight in the situation of the Kosi river floods and risk management.

### **3.2. Relations between India and Nepal**

#### **3.2.1. A deathless blame-game?**

It is stated that the Saptakoshi collapse at Kusaha, Nepal, on August 18th was not a natural but a man-made disaster (*Dipak Gyawali, 2008*). In his article he points at the three main-mistakes: wrong technological decisions, bad institutional arrangements and half of a century of political misconduct.

Political leaders on either side of the India-Nepal border have been blaming each other's country for failing to prevent such a massive disaster. Some politicians like Nepal's prime minister blame the Kosi river agreement of 1954. This agreement or treaty was mainly technical, which was common during that time. There were a number of issues in this agreement which caused friction between India and Nepal, and the main issue being the compensation for the damages made by the construction of barrages (*Medha Bisht, 2008*). The Kosi embankment that breached in Nepal in August 2008 was 50 years old.

#### **3.2.2. Pro-action**

The inhabitants of the Kosi River flood plains have been lived there for centuries (*Krishnamurthy Ramasubbu, 2008*) and therefore are able to utilise the benefiting component of the flood events. Every farmer would require floods, if the river had to spill naturally in a gentle manner since such flooding ends up depositing the fine silt and alluvium soils which are good for agriculture as opposed to coarse debris which promote erosion through abrasion. Natural spills encourage delta formation and are therefore constructive in nature. When an embankment is breached or broken the floods violently spill over and use the coarse debris load to further erode the entire embankment and cause much damage in the surrounding area. Such situations can be avoided through pro-active approach.



It is rather unfortunate that neither India nor Nepal stimulates tangible pro-active measures at the moment as expressed by Dipak Gyawali in his call for adoption of new pro-active technologies suitable to solve the Natal Bihar floods problem (Dipak Gyawali, 2008). Being a former Minister for Water Resources, head Nepal Water Conservation Foundation as well as hydropower production, the remarks by Dipak were as good as official position.

Such adaptive technologies with strong social components have been traditionally used by people in the form of houses on silts and building villages with raised plinth levels that keep life and property safe while allowing the floods to easily pass by leaving fertile silt behind. It will also call into serious question the current design practices in the transportation, housing, agriculture and other sectors, forcing the adopting of new approaches that look not so much to the watershed but to the 'problem shed' for answers. He thinks there is no permanent solution as a dam is even not permanent (max. 20 to 30 years) and to build houses on stilts is a cheaper and a more doable solution.

### **3.2.3. Prevention**

Where people or community envisages a possible disaster, there should be preparedness, prediction and anticipation of the outcome in order to minimize the effects of such disasters when they happen. Construction of embankments by the governments of India and Nepal was for prevention according to Dipak Gyawadi (2008), these embankments; are worn-out and can no longer function properly and therefore need to be repaired. Another problem in the management of floods through the embankments is the fact that the river has changed its course.

Under bilateral agreement, India is supposed to maintain and repair the embankments (*Dipak Gyawali, 2008*). The Indian Water Resources Minister Saif-U-Din Soz told BBC that they were serious about these embankments works. Quotes: "We have flood control as our top priority when it comes to managing water resources together with our neighbours," he said, just before Nepal and India signed an agreement on safeguarding measures for both embankments (*Navin Singh Khadka, 2008*).

The Nepal Prime Minister Pushpa Kamal Dahal visited India in 2008 to talk about the controversial Kosi treaty and to revive the idea of an old proposal by the British in 1930s to build



Kosi high dam as a way of controlling the floods. This proposal was abandoned because it was suspected not to be beyond 30 years of operation.

A report titled “Kosi Deluge”, meaning “The worst is still to come” was made by a team that had been constituted in Nepal to investigate the pros and cons of the Kosi high dam if constructed. The team comprised of flood experts, river ecologists, landscape architects, researchers, representatives from environmental organizations and professors.

The report emphasized that attempts to commission projects which had earlier been rejected whether embankments or dams construction would only worsen the situation by for example making the rivers in north Bihar more vulnerable to floods (*Shweta Srinivasan, 2008*). The Nepali experts also felt that instead of finding a political escape route like structural solutions, the landscape must be restored for natural flooding with people's full participation, engineers' help and political foresight over a gradual period of time.

The report further stated that, a high and expensive dam on the Kosi would take decades to construct and therefore would fail to address problems of current and immediate future concerns, like sedimentation of water bodies including reservoirs and earthquake which was also a common feature in this zone.

Another problem in prevention is corruption which is deeply rooted in the leadership of both Nepal and Bihar. This practice depletes any budget meant for taking measures such as construction work by channelling most of the monetary involved to the pockets of politicians, government engineers and contractors (*Dipak Gyawali, 2008*).

#### **3.2.4. Preparation**

India lacks preparation measurements and because of the blame-game with Nepal, none of them is committed to putting, preparation measures in place. Each country tends to run away from her responsibilities by maliciously blaming the other for something she ought to have done herself.

Says Thakkar, "Some key areas that must be addressed in India include sustaining and improving natural systems' ability to absorb floodwaters; improving dam management, and instituting clearly defined and transparent operating rules that are stringently enforced; improving the maintenance of existing flood infrastructure rather than spending money on new dams and embankments; undertaking a credible and participatory performance appraisal of existing infrastructure, and removing embankments that are found to be ineffective; and producing transparent disaster management plans intended to be implemented in a participatory way.

Perhaps most importantly, India needs to assess the potential impacts of climate change on rainfall and on the performance of flood-related infrastructure, and begin planning for the necessary adaptation to the changing climate." (*International Rivers*)

Even without the climate change there is proof in literature that the current rains and discharges can be devastating.

### **3.2.5. Response**

There are different views on what brought about the Kosi disaster, where the responsibility lies, and whether the situation can be reversed. The human tragedy is enormous, and there is widespread criticism of the tardiness and inadequacy of the administrative response to it (*Ramaswamy R. Iyer, 2008*).

Just as Hurricane Katrina (*Steven Lukes, 2005*) caused levees in the Mississippi Delta to breach in August 2005, flooding large parts of New Orleans, this year's monsoon has breached embankments on the powerful Kosi River, causing flooding that affected three million people and killing at least 2,000 in Bihar, India and in eastern Nepal. After breaching its embankments on August 18, the Kosi took a path it had abandoned 200 years ago, 100km from its channelled course, drowning hundreds of villages and fields on its way. Experts note that year's monsoon was not especially powerful, and that the embankment system failed in part because of heavy siltation building up within the embanked river channel. Another cause of the problem was poor maintenance of the system. (*International Rivers*)

### **3.2.6. Recovery**

"The Kosi River disaster is unfortunately not an isolated incident", says Himanshu Thakkar of South Asia Network on Dams, Rivers & People: "Over the years, India has seen its flood damages increase, at the same time that the total area supposedly protected by flood-control engineering projects has grown. It is noteworthy that most of these high flood events occurred after the flood control projects were in place."

The hard and fatal lessons learnt by India and Nepal governments have given them a motivation to start talking about the Kosi River floods and the need to jointly address it.

Many experts from both countries conclude that the river is not something one can try to tame and control, but people should adapt to the fact that this river floods during the monsoon floods saying that farmers could benefit from such adaptation. The experts are of the opinion that relatively small embankments could protect certain parts when constructed as opposed to large

dams which have more disadvantages, are costly and can't guarantee total protection. Partly because of the bad India-Nepal relationship, the floods made so many people to be victims.

Mishra, a Gandhian and environmental activist, expert and author on books about this problem, feels that there is need for authorities and people to understand flood management techniques adopted by local people in the past and assess whether they can be used in the present situation.

He argues that the region used to have thousands of natural and man-made depressions running for 5 to 10 kilometres which were filled and turned into lakes during monsoons and therefore, controlled flooding waters and during dry seasons and droughts, these were used as water holes. The government and authorities, in a haste to tap the agricultural potential of the soil, filled the depressions and encouraged cultivation in them. Now with no depressions left, the waters run helter-skelterly wreaking havoc on the lives of people that worship it. Ironically all that agricultural potential that was to be is no-longer there given the prevailing conditions and therefore it is upon the authorities to choose either to save the lives and property of the millions of people in the Kosi plains or continue with agricultural activities that they cannot sustain in the long run *Shweta Srinivasan, (2008)*

### **3.3 Relationship between India and Bihar**

In the previous sections the analysis of the Kosi flood with help of the safety-chain approach with a focus on the India-Nepal relationship is given. In this section we look at a different scale of the Kosi flood, namely the relationship between India and Bihar.

Bihar is one of the eight India states along the Ganga River and is known as less developed both economically as politically. The capital of Bihar is Patna, where also the bureaucracies are settled (*Gyawali, 1999*). There are different perceptions about disasters (*Heijmans, 2004*), which also influences the ideas about what should be done in the different stages of the safety-chain. Looking at the relationship between India and Bihar there are also two different levels with different stakeholders and ideas. The paper highlights that there is a big difference between the bureaucracies in Delhi and Patna, but also between those bureaucracies on one side and the grassroots activists and local farmers on the other.

#### **3.2.7. Pro-action**

In the pro-action stage it is important to prevent a disaster or limit the consequences, by addressing vulnerabilities. "Vulnerabilities refer to the long-term factors which affect the ability

of a community to respond to events or which make it susceptible to calamities” (*Anderson and Woodrow, 1989:10*)

The Kosi floods are part of a natural system which besides doing much harm also has its positive effects such as creating fertile soils through alluvial deposition. Naturally people would always occupy all sorts of landscapes including river riparian, steep slopes and flood plains in pursuit of socio-economic gains. Land tenure, land scarcity and economic factors are some of the driving forces behind such occupation of land and risk taken in doing so. It is therefore not practical or possible to prevent a disaster by restricting, putting up buildings in flood-prone areas. In the next stage (prevention) along the Kosi a lot of embankments have been build for flood control. Although it turns out in practice that this does more harm than good for the people living close to these embankments, there are also people living within the embankment. The situation of people living within the embankments is devastating. These people were first told not to be in danger when the embankments would be built. This however turned out to be a political game and besides this it took a long time before the government started to think about compensation and rehabilitation of these people. When they finally did, they decided that payment would cause people to ask for compensation for all such projects in the future and was therefore denied. Also the rehabilitation measures were not very effective. There was not sufficient land available and people were promised boats, however this promise was mostly not fulfilled. Instead of recognizing the problems of rehabilitation it was argued that people did not want to leave the lands of their ancestors (*Mishra, 2008b*).

The fact that basic services, like schools, health service, employment opportunities are all outside the embankments, makes these people even more vulnerable. The illiteracy levels here are very high and people living “within the Kosi embankments are 40 years behind the rest of India and 20 years behind the rest of Bihar as far education is concerned” (*Mishra, 2008b: 50*). Despite these problems, the situation where these people are living in is not on any political agenda. The government even denies any obligation to the people living within the embankments (*Mishra, 2008b*).

### **3.2.8. Prevention**

There are different perceptions about dealing with floods. One controversy is the difference between ‘flood control’ and ‘flood management’. Where ‘flood control’ proposes physical interventions and tries to regulate the environment, ‘flood management’ believes that people can live with floods by local knowledge and indigenous institutions (*Rahman, 1996*). Floods management tries to reduce the vulnerability of people to floods events by increasing their capacity to deal with the floods. In India the prevention measures aimed at controlling floods are

full of bureaucracies which deny local people the opportunity to use their capacity gained over time to deal with the floods.

After India's independence 194 to date, different large-scale regime modifications have taken place within Bihar river basin aimed at controlling floods and irrigation agriculture. Embankments for example were built along riverbanks to prevent the river from spilling its waters onto bordering areas during high flows and to prevent water leaking out of the embankments during times of low flows equally important is that embankments also prevents water from draining into the river when the floods drops (*Gyawali, 1999*). Thus, the notion by the activists who live and work in the riverside villages that the embankments do not protect villagers and their land from floods but the water bureaucracy, which is single-mindedly pursuing the building of embankments, seems to filter out these uncomfortable truths (*Gyawali, 1999: 446*).

There are different perceptions about disasters, their causes and the solutions needed. The technocratic view sees nature as cause of disasters and therefore searches for technologic and scientific solutions (*Heijmans, 2004*). The bureaucracies in Delhi and Patna are very technically oriented. Although Patna feels left out in the decision making of Delhi, Patna is pacified with the promise to build a Kosi High Dam in Nepal on the main branch of the Ganga closest to Bihar. Grassroots activists however are afraid for bad consequences for the local people like past experiences with the embankments (*Gyawali, 1999*).

This technical view of high-expertise, capital-intensive projects like building dams, barrages, canals and embankments is founded in the Nirmali Conference of 1947 and after their implementation they are barely evaluated. "In the case of Bihar, much of the inflexibility comes from the 'single mission' nature of organizations created to build embankments and canals which choose not to engage in more holistic, complex and social-setting specific methods of water management" (*Gyawali, 1999: 448*). Where local people used to be passive receivers of bureaucratic decision making, grassroots activists are rising up presently to oppose such actions as a result of the differences between the technical promises and daily realities that come from such undertakings. The activities organized for example a new Nirmali Conference in 1997, and used the forum to emphasize the importance of taking local people's opinion into account when making decisions on things that affect them. They also opposed the construction of the proposed Barahakshetra high dam in Nepal (*Gyawali, 1999*).

A high level of corruption also enhances the problem of flooding in that; money for maintenance work more often than not disappears with politicians, bureaucrats, engineers and contractors leaving shoddy or not repair and maintenance work done on the barrages. Activists and other

concerned groups are of the opinion that contractors and engineers overlooked the threat from the breach of Kushaha which was believed to be the cause of the Kosi floods. An Indian Embassy's spokesman stated however, that, the problem was known by engineers, but the Nepalese officials physically prevented them from fixing the problem (*TISS Assessment Team, 2008*).

Experts also pointed out that the barrages meant to control floods control have turned out to be disastrous since were no mechanisms put in place to check their physical conditions (*TISS Assessment Team, 2008*).

From the foregoing discussions it is clear that preventive measures especially the control aspect has not been given priority and weight that it deserves. The government organs entrusted with such responsibilities ought to be honest and corruption free and have full participation of the local communities.

### **3.2.9. Preparation**

In the preparation phase, the government and other related organizations should take measures to limit the consequences of the flood, like for example making an emergency plan on how to move people to safer areas, provide medication, foodstuff and beddings etc.. In the case of India and Bihar, it however looks like the authorities and other organizations are busy with finger pointing and counter-accusations instead of confronting the problem at hand, the floods and its implications. Where there is a lot of information about discussions on responsibility and rights concerning a flood, information about how people are prepared for the flood seem to be missing.

The preparations which are taken also seem to be badly regulated. The aspect of bad regulations could be from the speech by the Minister for disaster management in Bihar at a meeting organized by non-governmental organizations in Patna on the 5<sup>th</sup> of August 2008. Some of the steps and measures he mentioned to be taken by the government and other stakeholders on Bihar in case of disaster were ignored. Conspicuously absent at the meeting were representatives from the Ministries of Water, Lands, Natural Resources Management among others. This was a strange omission given that most disaster in Bihar are water-related and therefore such stakeholders deserved to be invited (*Mishra, 2008a*). These are some of the indications that preparations approaches cannot be without irregularities.

### **3.2.10. Response**

While the above stages; pro-action, prevention and preparation aim at addressing people's vulnerabilities, response phase is concerned with fulfilling people's needs following a disaster. "Needs, as used in a disaster context, refer to immediate requirements for survival or recovery from a calamity" (*Anderson and Woodrow, 1989: 10*). The consequences of a disaster are not the same for everyone since not all people suffer equally. Generally social networks offer assist to victims of such disasters in terms of evacuation to safer grounds so as to prevent deaths and loss of properties, supply food, clothing etc. On the other hand, social networks may employ dubious and orthodox ways meant to manipulate the victims of their relief assistance and the other benefits that come with such support (*Frerks, Hillhorst and Moreyra, 1999: 23*)

Response in the case of Kosi floods on the 18<sup>th</sup> August 2008 really delayed with even the media taking a whole week to sensitize the people that the situation in Kosi basin should actually be treated as a national disaster. When aid was finally coming it was very ineffective. The government portrayed their help as being a favour for the people and was highly unorganized.

Adding to this unfortunate behaviour by the government was not only the small number of NGOs that operated in the area but also their inexperience in handling floods issues. They lacked team work during response operations (*TISS Assessment Team, 2008*).

The help given to the Kosi river flood victims; food, shelter, medicines and clothing was inadequate, falling too far below the people's expectations, especially from the government (*TISS Assessment Team, 2008*).

There were for example too few boats to evacuate people from flooded areas making it necessary to select those to evacuate first on some basis such as gender, age and social network like caste and religion.

Boatmen have often than not used such opportunities to ask for money from the victims before they can be evacuated.

The inadequacies in the relief camps are often seen in over-crowding, shortage of food, sanitation and drinking water and medicines among others. Such shortages usually lead to discrimination based on gender, age and social networks with sexual harassment met mainly on women. The high illiteracy level within Bihar region increases the problems in aid applications

(*TISS Assessment Team, 2008*).



### **3.2.11. Recovery**

Recovering from the aftermaths of floods disaster in the Bihar is a slow process since the blame games and exonerations by the stakeholders from their responsibilities are in play just like in the other phases discussed above. The stakeholders are often busy discussing who is accountable for what rather than taking appropriate measures to help the victims recover from the shock and calamities and also to draw plans/conclusions for the future.

Although many critics emphasize the importance of pro-action, prevention and preparation as approaches in dealing with floods related disasters in consultation with the various stakeholders the question that is in everyone's mind is whether the government will change her stand and show the lead (doing what is expected of her and eradicate corruption from her levels). Given the history of floods events in Bihar, the Kosi floods of 2008 ought not to have resulted in such kind of damage and loss of lives if the government institutions were effective in their operations. The inadequate responses and lack of enough information on how victims recover after disasters leave doubts on whether things will finally change in the Bihar in terms of solving floods menace.

## **4. Conclusion**

The main focus in this paper was to analyze the relationship that existed between India – Nepal and India –Bihar in the context of the Kosi river floods. Across the safety chain, the relationships between both India-Nepal and India-Bihar can be characterized as discussing each other's responsibility and the one-dimensional technical focus.

In the pro-action phase, none of the governments had invested on evacuation plans or stimulating pro-action measurements. Governments consider technical constructions as the best way to control floods and do not address the needs of the locals. The only prevention measurements for floods are the construction of the embankments. India is responsible for the maintenance of these constructions. But the situation is more difficult through the corrupt Nepal and Bihar governments. In the prevention of floods, the focus is at technical solutions which do not include local knowledge and capacities. Mistrust and blaming each other for responsibility characterized the preparation phase in the Kosi floods. This resulted in a lack of proper emergency plans. The aid and responses of governmental bodies was very inadequate and ineffective and this led to slow responses more so that the floods were not considered as important by these governments.

The discussion over responsibility continued in the recovery phase. Politicians are not learning lessons from this, but continuing blaming each other.

The focus of the Indian, Nepalese and Bihar governments was on regulation of the river flow and to control floods. They continue discussing the responsibility of the other without taking their own responsibility. Controlling the river is seen as the solution for the prevention of the floods, but one can wonder whether it is possible to control the river as there are always unpredictable events. The solution of controlling floods was found in technical interventions. But these failed and resulted in a disaster due to a combination of complex relations between the governments, poor maintenance of the construction, lack of evacuation plans and the physical environment of the area. It can be concluded that it seems to be better to invest in pro-action measurements which address the need of the locals, indigenous knowledge and local capacity as well as the political situation. Alternative technologies which do not require advanced technical skills, maintenance and money, may address local situation better and result in advances of flood regulation. The settling in the banks should be controlled while servicing of the embankment should be given priority. People's vulnerability to floods should also be analyzed so as to understand the likely impacts. It is also imperative to improve people's local capacity to deal with floods.

### **References**

- Anderson, M.B., and P Woodrow. 1989. "A framework for analyzing capacities and vulnerabilities." In: *Rising from the ashes, development strategies in times of disaster*. Boulder & San Fransisco: Westview Press. 9-25.
- Brinke, W.B. ten, G.E. M. Saeijs, Helsloot, J. van Alphen (2008) *Safety chain approach in flood risk management* Municipal engineer, 151 (2) 93-102.
- Dipak Gyawali, 2008, "Poor planning and corruption caused Kosi flood", Science and Development Network, [www.scidev.net/](http://www.scidev.net/) (Accessed 7march, 2013).
- Frerks, G., D.J.M. Hilhorst, and A. Moreyra. 1999. "Local actors and the interface of interventions." In *Natural disasters; a framework for analysis and action; Report for MSF*. Wageningen: Disaster Studies. 16-24.

- Frerks G., D.J.M. Hilhorst and A. Moreyra (1999) *Natural disasters: Definitions and concepts* Natural disasters, a framework for analysis and action; Report for MSF. Wageningen Disaster Studies 7-15.
- Gyawali D., 1999, Institutional forces behind water conflict in the Ganga plains, *GeoJournal* 47:443-452, 1999.
- Heijmans, A. 2004. "From vulnerability to empowerment." In *Mapping vulnerability; disasters, development and people*, edited by G. Bankoff, G. Frerks, and D.J.M. Hilhorst. London: Earthscan. 115-127.
- International Rivers: "The Kosi Disaster: Millions Flooded Out"  
The Kathmandu Post, 2008, interview
- Krishnamurthy Ramasubbu, 2008, [www.livemint.com/articles](http://www.livemint.com/articles) (Accessed 7march,2013).
- Mishra D.K., 2008a, Bihar Flood: The inevitable has happened, *Economic & Political Weekly*, September 6, 2008.
- Mishra D.K., 2008b, The Kosi and the embankment story, *Economic & Political Weekly*, November 15, 2008.
- Navin Singh Khadka, 2008, "Weak flood defences 'risking lives'", BBC Nepali Service.
- Medha Bisht, 2008, "Revisiting the Kosi Agreement: Lessons for Indo-Nepal Water Diplomacy", Institute for Defence Studies & Analyses.
- Rahman, A. 1996 "Peoples' perception and response to floodings: the Bangladesh experience." *Journal of contingencies and crisis management* 4:198-207.
- Ramaswamy R. Iyer, 2008, "Water in India-Nepal relations", *The Hindu* (newspaper).
- Reddy D.V., D. Kumar, Dipankar Shaha and M.K. Mandal, 2008, The 18 August 2008 Kosi river breach: an evaluation, *Current Science*, volume 95, no 12, 2008.
- Shweta Srinivasan, 2008, "Dams to check Kosi shouldn't be made blindly", *Hindustan Times* (newspaper).
- Shweta Srinivasan, 2008 (2), "Trying to tame Kosi recipe for more disaster", *Daily Times India* (newspaper).
- Sinha R., G.V. Bapalu, L.K. Singh, and B. Rath (2008) *Flood risk analysis in the Kosi river basin, north Bihar using multiparametric approach of Analytical Hierarchy Process (AHP)* *J. Indian Soc. Remote Sens.* Vol. 36:293–307.

Sinha R., 2008, Channels and Human Disasters, Economic & Political Weekly, November 15, 2008.

Sinha, R., 2008, Kosi: Rising Waters, Dynamic Channels and Human Disasters, Economic & Political Weekly, November 15, 2008.

Sinha R. & P.F. Friend, 1994, River systems and their sediment flux, Indo-Gangetic plains, Northern Bihar, India, Sedimentology (1994) 41, 825-845.

Steven Lukes, 2005, "Questions about power: Lessons from the Louisiana Hurricane", reader.

TISS Assessment Team, 2008, "Disaster in Bihar: A Report from the TISS Assessment Team".