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Flood Disaster : Risk Projection & Possibilities of Reducing Evacuation Time

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Abstract: ***The paper intends to first understand the common effects caused by floods due to heavy rainfalls , by studying various flood disaster cases under both Rural and Urban contexts. The Key aspects that are affected by the floods in both contexts will be discussed. The data collection is made by literature study of the statistics present in the historical data of the cases. The paper intends to come up with simple practical risk management solutions and precautions to tackle the situation by predicting and acting before the disaster threat starts thereby prevent loss of life , reduce response time of rescue and possible relief works using available resources.***

Keywords: Flood disaster[1], Rescue, Relief[2], Response time[3]

1. Introduction

Its seen since the dawn of humanity, the human settlements have often evolved along the river banks that helped their sustenance and development, supporting occupations like agriculture, fishing, trading by waterways etc. But the very same has even proved to be of potential risk to the settlements. Many settlements have been washed out with no traces.

India being a tropical country with numerous rivers and agriculture being the prime occupation , consists of a huge rural population. India since past decades being a fast growing economy competing with leading nations has number of cities located in the costal belts, riversides etc. The presences of the rivers and water forms have made both the rural and urban India vulnerable to overflowing waters especially during rainy day. This situation has caused a great deal of disaster and damage to life and assets in both rural as well as urban settlements. There has been a huge loss of life and damages to property that many are still recovering from losses and yet to be rehabilitated. This is repeating almost every year and lessons are far from being learnt.

Table 1: Abstract of the flood disasters

Year	State	Loss of Human life	Assests lost	Loss of Property
2005	Maharashtra	1094	-	550 Cr Rs
2005,	Gujarat	173	Homes, Cattle, Vehicles	700 Cr Rs
2015	Gujarat	258	Homes, Cattle	1045 Cr Rs
Year	State	Loss of Human life	Assets lost	Loss of Property
2013	Kerala	198	Homes, Cattle, Vehicles	675 Cr Rs
2009	Karnataka	396	Homes, Cattle, Vehicles	17973 Cr Rs
2011	Orissa	87	Homes, Cattle, Vehicles	2874 Cr Rs

Data source: Flood Forecast Monitoring Directorate; released by Central water Commission; Dtd :10th May 2018

2. Floods and its affects in Rural areas

Most of the rural areas are located in the vicinity of water bodies, lakes or even river streams, most of the hamlets in the coastal areas have deltas and mangroves, which are often naturally, formed catchment areas .These catchment areas during rainfall get filled quickly due to the surface runoffs leading to these water bodies. Once these catchment areas fill and over flow, they inundate the surrounding areas with further offloading of water from rivers these water bodies swell and flood there by causing havoc and disaster to the settlements around .This is a known fact.

The major effects of this situation in a rural context could be projected as listed below.

- Fields are flooded and crops are destroyed effecting agriculture which is the main occupation of the rural people.
- Majority of the rural houses are mud structures with tiled roofing that are easily destroyed due to monsoons and flooding leaving the residents devastated.
- All moveable assets like farm related equipment; vehicles etc. are damaged and washed away.
- Many villages have connecting pedestrian roads usually called Kutchha roads, sway bridges and walkways that interconnect neighboring villages are washed away loosing physical connectivity.
- Granaries are destroyed.
- Cattle that are main assets are washed away.
- Basic infrastructure that is limited to a primary school, Panchayath office and a primary health center may be destroyed.
- Livelihood of petty businessmen is lost.
- More devastating is the loss of human lives by people being washed out , dead due to building collapse, people stuck under Landslide etc.
- Basic infrastructure like power and communication lines snapped off leaving no means of communication for help.
- Health hazards and spread of epidemics.

Of these the most important task lies in preventing the loss of life which is the main intent of this paper.

3. Floods and its affects in urban areas

The urban areas though sophisticated are not spared of devastation. Since the urban settlements have a fully developed neighborhoods , that comprise of Buildings and structures with network of streets and infrastructure like public transport- metro rails, public bus transport, water supply and sanitary systems, Power grids, Industries and a huge population. Though it has a planned network of storm water drains Heavy rains cause overflow of water to streets mainly due to insufficient size to cater to heavy runoffs .These runoffs are mainly due to non-permeability of rainwater as most of the ground is covered with buildings that have large surface area collecting more water and disposing it as run off .The roads asphalted also contribute to runoff thereby leading to a volume of water that is greater than the drains can carry , result is flooding this is catalyzed by blocked drains due to presence of garbage, un scientific disposal of drain water in sewer lines leading to flooding with sewage . All these complement to worsen the disasters due to floods.

The effects of flooding in an urban situation is far more devastating since there is no proper channel to manage storm water and lack of water bodies acting as catchments.

- The streets are flooded leaving no chance for people to escape to safety.
- Water along with sewage floods the buildings destroying all assets like appliances, furniture etc.
- Pets and animals are washed away.
- Vehicles are washed away , equipments and machinery are left damaged.
- There is a great danger of people getting washed away or falling into damaged drains.
- Transport and other infrastructure like power ,water, communication fully destroyed.
- Business establishments, commercial buildings, offices and industries are destroyed there by effecting the economy and revenue.
- Buildings collapse causing damages to neighboring structures since they are closely built.
- Major essential infrastructure like Educational institutions, hospitals, offices etc which are to be active during post disaster phase ,face the risk of destruction.

4. Major risks and challenges to relief works in Rural and Urban areas

Before talking about risks and challenges we have to understand the meaning of rescue and relief. Rescue is a help offered by an external source during a calamity or a disaster to those affected by it. Rescue work takes certain time after the disaster starts. The rescue must be quick in response to reduce delays and prevent loss of life. Delay in offering rescue leads to increase in the complexity of the situation and reduce the possibility of saving more lives.

Relief is the basic aid given to the survivors of the disaster that is required for their immediate survival and sustenance. Since the survivors lose their homes, assets, livelihood and dear ones, they are in immediate need of 4 basic amenities. Food, Clothing, Shelter and protection from infections and epidemics.

5. Risks in Relief works

5.1 Rural flood zones

- Treacherous landforms and contours that the relief workers are unfamiliar other than the natives.
- Washed off roads and connecting bridges providing poor or no access to rescue points.
- Blocked routes due to landslides or washed out roads.
- Difficult to reach by boats due to high velocity of wind and water flow in the open lands.
- Even airlifting takes time since only limited people can be rescued per flight and have to be flown to dry areas which possibly might be far off since vast areas are flooded, this takes time to drop one set and return for the rest by which time the situation could be worsened.
- Saving cattle is one major challenge and shifting them to a safe zone is tedious.
- Sometimes have to tackle wild animals that have come from forests nearby there by threatening the safety of the people and cattle.

5.2 Urban flood zones

- Presence of built structures makes it no room for free space available for rescue operations.
- Urban area is characterized presence of a variety of infrastructure like power lines, sewage drains, transport systems like local trains, metros, bus services which crisscross the entire city thereby increasing critical points like subways, underpasses, overbridges, transformer yards etc. which is risky to even approach by rescue teams .
- Over flooding of drains, blocked drains lead to lifting of manhole covers leading to people accidentally getting washed away or sucked into the drains.
- Major risks is the population density that the rescue staff has to deal with, it requires a huge number of people to achieve the task, more facilities like life boats etc.
- Airlifting victims to safety has to be done at a fast pace to rescue all before the rest are endangered.
- Risk of epidemics is high.
- Risk of building collapses is high further complicating things.
- Locating safe land for refugee camps is critical since it has to be done away from the main areas.

6. Possible Solutions to mitigate the general risks and challenges

The critical risk in any flood situation is the timely rescue but as we say that prevention is better than cure , be it Urban or Rural faster the victims are trans located to a safe zone lesser is the loss of life .

The main objective of this is to react and reduce the response time.

To achieve this there has to be a detailed study of the following:

- Parameters like topography, population, nature of settlement like rural or urban.
- The source of flooding like nearby water bodies, river streams, catchments etc.
- The natural gradients and contours that directs the flow and velocity of flood water.
- The distance of these sources from any kind of settlements in the close vicinity and categorizing them as high, medium and low risk zones depending upon the closeness to flood sources.
- This gives an analysis of the time taken to overflow and flood the surrounding areas with settlements.
- An early warning system of rising water levels similar to the warnings given to fishermen and effective communication to the locals about their local flood risk situations with technologies like apps on smart phones with all information loaded in the app.
- A safe zone pre-defined to hold the victims to be located in advance for quick and safe evacuation before the flood situation gets worse.
- In case the flooding happens faster than predicted, safe nodal evacuation points to be identified and mapped where the evacuees can assemble for final evacuation by boats or airlifting.
- Rescue camps to be pre equipped with basic accommodation, cooking and sanitation facilities with basic health modules placed to cater to aged and children.

7. Possible Solutions to mitigate the risks and challenges specific to context

Though some of the risks are common to both context what makes us to think is that there are also risks very specific to the context.

7.1 Rural Flood zones

- Most rural areas have contours or plain lands, or hilly regions that has a risk of landslides, these have to be carefully mapped by remote sensing and contours mapped zilla wise , just as it is done for landrecords. The purpose here is to understand the criticality of the topography by the people involved in rescue operations.
- To make a team of at least 10 volunteers per village who are good swimmers and train them in rescue operations, This is essential since these volunteers belong to the same place they are aware of the contours and landforms, and can easily make way in the shortest time and distance to rescue people during the early time of floods when the flood warning is flashed. Once the basic evacuation has been done they can assist the rescue team when they reach the zone. This not only reduces rescue time but also saves lives of people and cattle.
- To store life jackets, ropes, inflatable life boats at least 1: every 10 people in all Village panchayath offices for rescue purposes and quick assembly barges for evacuating cattle. The Village volunteers to be trained in using them.
- Also use of cost effective drones operated by the trained volunteers is effective in assessing early flood situation during monsoons and landslides.

7.2 Urban Flood zones

- Major problem in urban flood situation is victims trapped in public places like public transport, trains, underpasses etc.in such cases an early warning system to be sent to clear such critical places.
- Here all police stations to be prepared for such situations since every station is fully familiar and aware of its limits, the policemen working are always on duty, usually any disaster the police are the first to come to rescue. Keeping this in mind if trained along with early warning prove to be effective in evacuating people to safety. Since they have a control room its easy to flash messages at the earliest.
- Here similar to rural volunteers the Special police officers who the volunteering locals of the locality are appointed by the police must also be trained for such situations as it become effective in quick and safe evacuation at the flash of warning.
- Use of drones is very effective in assessing the rescue and early evacuation.
- The City Municipal council pays a pivotal role , since it has the demographic and the complete topographical map of the city ward wise both the administrative and the technical wing must be fully equipped and trained to handle the golden hour that can reduce the response time and save lives.
- The Mahanagar palikas must have the latest data of rainfall, possible flooding and action plans to evacuate the effected.
- All wards to be equipped with life jackets, ropes and inflatable life boats.

8. Conclusion

Flood is a natural calamity that causes havoc and disaster to settlements of any kind. Nobody has the ability to stop the power of nature, but can always be aware and prevent disaster and fatalities. Its often found that in spite of technology people are hesitant about the situation that might get worse, a proper step taken whether or not a disaster occurs though painstaking will definitely save lives that are lost in front of their kin watching helplessly being washed away.

The sole intent of this paper is to convey that its time we learn a lesson from the past experiences and equip ourselves , by acting before it happens and be safe rather than simply letting the situation go out of hand and watch helplessly. The underlying content of this paper is to predict , prepare and respond than to wait , waste those precious initial hours even nature gives before unleashing havoc.

This write-up is about all the possibilities we can venture and not a final opinion. A lot needs to be studied in these aspects , an outline to be developed , probabilities to be predicted, tested, proved and implemented, Finally a strong policy to be implemented .

The present work done by NDRF is commendable, but these views are projected looking at the hurdles they are facing, in some situations they themselves are victims. This is to

reinforce them and make the rescue more successful since the sole intent and purpose of any one is to save precious lives at the end of the day.

The bottom line of this write up is to switch to DISASTER RISK MANAGEMENT from only DISASTER MANAGEMENT.

References

[1] Data source : Flood Forcast Monitoring Directorate ; released by Central water Commission; Dtd :10th May 2018

Author Profile

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