Disaster Management System

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Abstract— **Bangladesh is a very disaster prone country because of its geo-location.Bangladeshs flat topography, low-lying and climatic features, combined with its population density and socio-economic environment, make it highly susceptible to many natural hazards, including floods, droughts, cyclones and earthquakes etc [1].Also because of lack of awareness,corruption man made disasters have also quite the impact on our lives.In present state there is no centralized disaster management system in our country which handles all sorts of disasters.Although an early warning system has been developed which sends warning texts to people living in endangered areas.Apart from that every disaster situation is handled manually,without proper co-ordination and efficiency which is why we couldn't control the damage like we would like to.Our project proposes a centralized system which will record every disaster event man made or natural for future assessment,accelerate mitigation process and provide information for preventive measures.Our system is very user friendly which we could be put to use for a national agency for disaster management.**

Index Terms—**topography,disaster,warning-system,manually,automated,mitigation**

I. INTRODUCTION

Bangladesh is a disaster-prone country of an area of about 1,47,570 sq. km. with population nearing 140 million. The country is well within the tropics and is the largest delta in the world formed by the mighty rivers namely the Ganges, the Brahamaputra and the Meghna. Bangladesh has special geographical feature. It has the Himalayan range to the north. The Bay of Bengal to the south with its funneling towards Meghna estuary and the vast stretch of Indian land to the west. The combined affects of the role played by this special geographical features have significant bearing on weather system of Bangladesh. The weather system are not always favourable. Due to this weather system, Bangladesh becomes the worst victim of natural calamities causing colossal loss of lives and properties. Referenced from [2]

- Goal: The main goal of the disaster management system is to help people affected by the disaster. Also create awareness among people who can be victim of the disaster.
- Definition: Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters. Referenced from [3]

- Lacking: Disaster Management System mainly works during the occurrence of natural calamity or after the natural disaster. But it can't help people before any natural disaster. Our sites can help people who visits it everyday by giving warning of any natural disaster. But people of rural areas can't always get the information. So, We can't directly help them. Again due to lack of information, we can't always help the people who needs our help. Again our disaster management system doesn't have shelter construction and management sector. It is really necessary during disaster. We will include that in future.
- Solution: We can solve the problems if the communication develops. We have rescue teams and volunteers in many section of the country who are responsible for informing people in that areas which are about to fall in incoming disaster. Moreover, disaster management course has to be included in the school curriculum. Various types of programs are to be launched in order to raise the public awareness. For an effective early warning system, it is needed to develop a scientific detection system to monitor changes in the physical environment. The system of hazard mapping, vulnerability assessment, risk analysis has to be developed as all these sectors are still at primitive stage. For all this, political commitment and effective policy formulation and their implementation are very necessary. Referenced from [4]
- Motivation: What motivates people to volunteer and remain volunteers? What discourages them to volunteer? The Motivation of volunteers technical team will be using existing motivation theories to capture and analyze volunteer motivation levels and link them to management practices, by developing an iMotivate tool.

Fig. 1: Volunteers during Disaster

The technical team will test the iMotivate tool and do an analysis of the results until May 2019 with the members

of the technical team, with at least 200 volunteers from each National Society.

The tool will monitor the following elements of motivation:

- Volunteers satisfaction of basic needs for autonomy, competence, and relatedness
- Overall satisfaction with their activity
- Organizational commitment and identification
- Intent to remain with the organization or the project
- Quality of supervision using Self Determination Theory concepts of autonomy support
- Social support among volunteers and between volunteers and professionals
- Respect and appreciation

Referenced from [5]

- Context and Contribution:
  - Bangladesh is highly disaster-prone and throughout its existence has been shaped by the impact of both extensive (low-severity, high-frequency events) and intensive (high-severity, mid-frequency to low-frequency events) natural hazards. As a result, managing disasters and their impact has been a major area of focus, with investments in DM decreasing disaster mortality in the past four decades to 1 per cent in 2010 compared to disaster mortality in the 1970s.
  - The disaster risk context, however, is changing. Bangladesh is as one of the countries in the world most at risk from the negative impacts of climate change including increases in incidence and intensity of extreme weather events and hazards such as soil salinization, rising sea levels and riverbank erosion. There is also the risk of earthquakes, posing a challenge particularly for Bangladeshs growing cities.
  - Women and girls in Bangladesh are disproportionally impacted by disasters. However, womens contributions to disaster risk reduction are often overlooked, and current national DM systems and mechanisms require more emphasis on managing risks in a gender-responsive manner.

- These emerging risks present major challenges to the continued human development, poverty reduction and economic growth of the country, and to the lives, livelihoods and health of its people. The poorest, most marginalized and vulnerable communities are hardest hit by disasters in Bangladesh as they are repeatedly exposed to natural hazards without the means to recover well.
- Despite these challenges, Bangladesh has made major gains in improving socio-economic conditions in recent years with positive economic trends, accelerating growth, making growth pro-poor and improving the indicators of social progress. With an average 6 per cent economic growth in the last 10 years, the country reached lower middle income country status in 2015 and at the same time had achieved significant progress in the Millennium
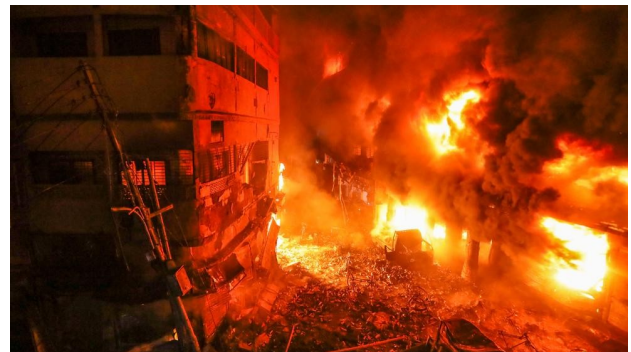

Fig. 2: Flood

Fig. 3: Fire

Development Goals. As an ascending middle income country, Bangladesh has entered a new development context with a growing asset base and connectedness to global markets. Referenced from [6]

Overview and contribution: The paper is totally related to disaster management, its capability, its current situation, its proper use toward general people who are victim and who works for the victims. The main goal is to motivate people who don't have knowledge in this section and who wants to help but can't due to lack of information.

Our work in better than others to solve the existing prob-

Fig. 4: Earthquake

Fig. 5: Disaster

lems. Because it is ready to help people with emergency response and people can report for any kind of sudden disasters. We have a report policy for this section. Again, Victims can get donation directly from our organization after ensuring their identity. Volunteers can also get information from our organization and acknowledge to respond. So, we have a balanced system here to help the people who need us. As it solves all this required problems, so we can say our work is identical and ensures better help than many other organizations.

The rest of the paper is organized as follows: Section II presents the related works in the relevant field, section III demonstrates the present scenario while IV describes the features, conceptual design and implementation along with the work flow of our proposed approach. The over all discussion has been added in Section V. Section VI discusses the limitation and future expansion of our system. Finally, Section VII concludes the paper.

II. LITERATURE REVIEW

Following points should be maintained in this section:

1) Since the independence of Bangladesh various measures had been taken by government and non-government organizations with an aim to manage disasters efficiently . Much effort is being given for a long time to bring the entire task of disaster management under a well organized system .

2) The Government of Bangladesh initiated a project "Support to Comprehensive Disaster Management" [2] in 1993 with overall goal to reduce the human, economic and environmental costs of disaster in Bangladesh. One of the main elements for the development objective of the project was to increase the capacities of the households and local communities in the highly disaster prone areas through establishment of Local Disaster Action Plans (LDAPs) to cope with cyclones, floods and other potentially disaster situations. Training and awareness raising was another main element of the development objective under the project. The project has been completed on

30 June, 2001. Though this project had played a major role in disaster mitigation , it could not bring the entire process into a digitized system as the technology at that time was not much developed as it is now .

3) On 12th December 1017 , Bangladesh launched a toll-free national emergency helpline 999 [7] for immediate needs in the case of any accident,crime,fire or ambulance.For now, it provides three types of emergency services:

   - Crime/abduction/accident/disaster-related
   - Fire service
   - Ambulance service

   The toll-free service will be open round the clock, Inspector General of Police (IGP) AKM Shahidul Hoque said while briefing journalists during the inaugural function.The service can be availed even at zero-balance. The call centre, at Abdul Gani Road, is currently equipped with staff capable to handle 120 calls at a time.

4) Though this system is a highly praiseworthy one and has benefited the citizens in numerous ways , there are still rooms for further improvement on which still work is being done . The IGP said regarding this ,We also are working to link the call centre with the social media platforms so that people can get the service from it immediately.

5) Weather and Climate Services Regional Project for Bangladesh (USD US 113 million) is another notable project approved by the World Bank Board by June 2016. The development objective of the Weather and Climate Services Regional Project for Bangladesh is to strengthen Bangladeshs capacity to deliver reliable weather, water, and climate information services and improve access to such services by priority sectors and communities. The project comprises of some components. The first component, strengthening meteorological information services will help achieve the project development objective by strengthening the Bangladesh Meteorology Department meteorological monitoring network, forecasting capacity and delivery of weather and climate services. The second component, strengthening hydrological information services and early warning systems objective is to improve hydrological observation, forecasting, and early warning systems. The third component, agrometeorological information systems development objective is to provide agrometeorological services to farmers in order to increase agricultural productivity and assist them in coping with weather and climate extremes.

6) Though this project is a really good one ,it mainly focuses on providing meteorological information and improve forecasting.

7) Our system is new type of system in the sense that it has focused on digitizing the entire disaster management system. It has several unique features which include:

   - functionality to set up volunteers against a real time disaster
   - scope for reporting disasters online

- facilities for donation to ministry and victims online
- facility to let the system know if one has become a victim
- storage of the conditions of the roads,infrastructures and land
- year wise and disaster wise statistics
- monitoring of the banks and hospitals related to disasters and victims
- monitoring training programs
- monitoring resources

8) The first feature is a bit similar to the Vehicle Setup System of Pathao,Uber or other ride sharing systems . Where in response to a request , the nearest drivers response . The second feature is similar to 999 but it is unique in the sense that it is being done online .Also the infrastructure of out system has been inspired by the files (hard copy) and documents (hard copy) we saw during our trip to the Palashi Fire station.

9) This project can contribute much to aid the overall disaster management system as it has covered a wide range of fields (showed in the features as well as the ER diagram) . Also it has the capacity to deal with real time problems as mentioned among the features .

III. PRESENT SYSTEM

There is no current centralized or digital system for disaster management.The entire system is paper based and non-automated.There are individual organizations handling small to large scale disasters that occurs in our country.So often times when there are nation wide disasters there is the problem of co-ordination.During our site visitation at Polashi fire station we saw first hand that every record that has been kept is on papers in the form of large books.So searching records is very time consuming and inefficient.Also as the organizations don't work under a single entity and often times police or fire brigade during the time of emergencies face difficulties.The Post disaster situation is also very disorganized.Since we don't evaluate the disasters properly we can't properly estimate how much cost it would take to remedy the loss and carry out relief programs .The whole point of creating a digital system is to make things faster.Even a little faster can make a difference by saving lives.

Our current system for disaster response and mitigation is pretty slow paced.But quite a few steps are taken for preventive measure.Mass awareness programs are held in educational institutions,different drills in the time of emergencies,volunteer training programs etc.All these plan are described in National Planning for Disaster Management(NPDM).Some Technological advances were also made in this sector.Now there are mobile based sms system which gives early warning to people living in coastal areas in the times flood or cyclone.People living there just need to register their number as a resident of that area and thats pretty much.Similar system were created in the cases of possible landslide events.A yearlong research was conducted by BUET-JIDPUS under the title ' Developing Dynamic Web-GIS based Early Warning System for the

Management Institution.jpg

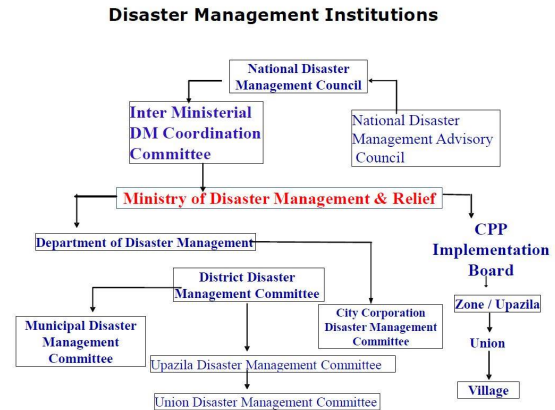**Disaster Management Institutions**

Fig. 6: Disaster Management Institutions

Communities at Landslide Risks in Chittagong Metropolitan Area, Bangladesh '. The project was funded by USAID in association with NASA.In this research they tested soil of those areas,weather condition and rainfall.By conducting these tests they found the affects of rainfall and weather on soil hence the cause of landslide.They identified the risky areas and identifed certain parameters to evaluate the risk factors.So when there are certain signs the system detects it , warns the people living in that location, and tells them which area might be safer for them.Also very recently our govt has started hotline service for any kinds of disasters.Anyone can call 999 from any operator and help will be on its way.This was indeed a long awaited initaitive.

Now that we have taken few steps to modern systems,there still is a lot of work to be done.With the help of IT we can make fast rescue missions,better analyze disaster statistics to reduce damage,build necessary infrastructures,utilize national resources properly,to improve inter agency communication.The most important thing for nation wide disaster management is to work under a single system which would be activated when needed.In this way we can reduce loss of lives,damages and make our country safer.

IV. PROPOSED SYSTEM

- Currently,in Bangladesh Disaster management system doesn't have records according to their need and whatever records we have they are paper based records. This huge pile of papers makes it very difficult and time consuming to find out a particular record. Also it cannot always ensure proper placement of records and the risk of loosing important information remains. Synchronizing different disaster related offices at the same speed is also a gruesome work to do in this way. Therefore, we feel there is an urgent need of a digitized Disaster management system. This can help to general people and administrators to allocate perticular victims and his/her proper information, donation and volunteer related information with a single

keytouch and most importantly relieve from the great mess of paper works and make the system work smoothly.

A. Conceptual Design

Our database includes Disaster management System under an organization, their projects, their evaluation against that project, their employees in that project, people under that project,etc. Evaluation is an important part of this project. We evaluated land, Infrastructures, Road, volunteers,etc. Land is evaluated by its quality, so that it can give support buildings during earthquake and landslides. Infrastructure is evaluated by its quality of the materials like rod, cement, soil,etc. So that, during landslide or earthquake it doesn't break away. Infrastructure are also evaluated by its rescue equipments like fire extingusher, exit, generator, water hose, boundary, etc. Road are evaluated so that vehicles can pass away during natural disaster. Moreover, Fire service can get to the location as fast as possible to erase the fire. Again manhole,drain and hydrant are evaluated so that it can reduce flood water as fast as possible so that city doesn't have to flood away. Volunteers are one of the most important part during a disaster. So we also evaluate them by their certain knowledge. We made a section called training program which will be used to train volunteers to be ready for all kind of disasters. We have a donation section which is used to donate victims who lost everything in natural disasters. People from any locality can help them by donating them or the organization. We also designed a section called hospital. It will ensure medical support to each victims and also take record about them. We also get their medical condition from this section. The main sector is Stastics. In this part we can see all the records of past disasters. It ensures this records can be found properly and quickly. Our database will ensure that each records are to be found intact and fast. The ovarall architecture of the proposed system is demonstrated in fig 7

B. Development of the System
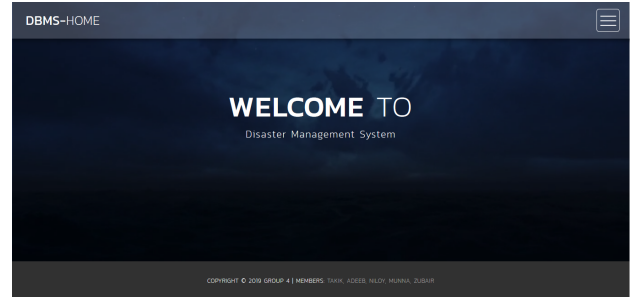
- User [?] can report disasters. Admin [?] approves them and assigns req. number of volunteers. Volunteers can respond to disasters. But not more than specified number defined by admin.
- An user can apply to become victim. Upon requesting, admin grants victim status.
- User can donate. There are two options. Donate to Ministry of Disaster or to any victim. User checks the victim list to find victims.

C. System Requirement

The proposed system is independent of any operating system. For obvious reasons the amount of data is huge, therefore for managing these huge amount of data we have used Oracle 11g database. The database needs extensive security measures. PHP framework is a highly secured technology. Besides, we are providing different login facilities to ensure security. The detail is shown in Table I
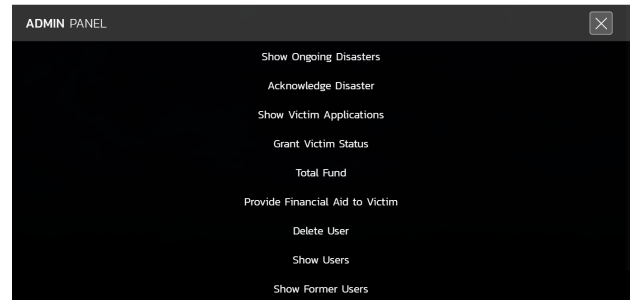

Fig. 7: Conceptual design

Fig. 8: Homepage Of Disaster Management System

Fig. 9: Admin Page

TABLE I: System Requirements

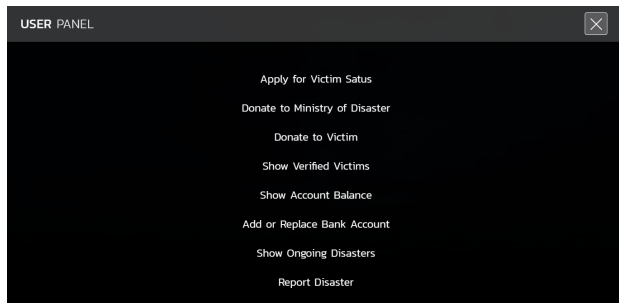| Name	Software	Version
Database	Oracle Database	11g XE 64 bit
Front End	PHP	7.2.12
Server Interface	XAMPP	3.2.2
Web Application	HTML / CSS / Bootstrap/javascript/jquery	N/A

Fig. 10: User Page

V. Discussion

Our work is mainly necessary during disaster, before any incoming disaster and after a disaster. Basically its necessity is always whenever we talk about disaster. Wherever someone talk about disaster, he or she will need our help from this project. Because, it will give them necessary information and records from the past. As we explained our work before, victims of different disaster will get a major help from our work. At the same time people can spread awareness before any disaster and emergency team can give their best using our management system. It will guide everyone how to be safe during disaster. Again our work is improving with the present world. Anyone can find help using their mobile phone. With the improvement of our work we will be able to send danger signal via messages. So in short, our Disaster management system will ensure all possible safety we can have to help people of our country.

VI. Limitations and Future Expansion

Our work is almost perfect but it has some limitations also. At this point it can't give danger signal via message or general people can't get help using 999 via mobile phone. So, our next plan is to solve this problem. If this system is implemented, many people will get help very easily. But during natural disaster this system may not help. So we need to grow awareness throughout out society about this. If people get to know what to do during disaster period, they will able to survive with less casualties. Again our project doesn't handle shelter construction and management. We can expand this section in our work. It is very important during disaster. Constructing Shelter can save many lives as many people lose their houses at that moment. Again agricultural lands are also ruined. We can't save these lands using our work. So we have to create a record of stock foods for future use. So that suffered people can get food during this period. We have a sector called relief goods. From here we can ensure these things.

VII. Conclusion

Our main target in this whole paper was to acknowledge people about disaster management. To ensure less casualties during disaster we created a database management system. It will do all our hard works. Victims won't have to rely on corrupted people on this process. They will get help from online system easily. They will get proper donation with their proper identity. We will able to help in any kind of natural disaster from our organization fund. Government will be able to ensure public safety through this system.

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