Use of ICT as Risk Mitigation in Disaster Management

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Abstract
With expansion in Information and Communication Technology Internet, GIS, Remote Sensing, Satellite-based communication links can help in planning and implementation of disaster risk reduction and prevention measures. ICT Technologies have been playing a major role in scheming early warning systems, response and improvement. ICT tools are also being widely used to build knowledge warehouses using internet and data warehousing techniques. These knowledge warehouses can assist planning, response, revival and mitigation at all levels. GIS-based systems improve the quality of analysis of hazard vulnerability. Communication systems have also become necessary for providing emergency communication and timely reinforcement and response measures. ICT can play a significant role in highlighting risk areas, vulnerabilities and potentially affected populations by producing geographically referenced analysis through, for example, a geographic information system (GIS). The importance of timely disaster warning in mitigating negative impacts can never be underestimated.
***Keywords*- GIS (Geographic Information System), ICT**

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1 INTRODUCTON

Advances in Information and Communication Technologies have provided all stakeholders with more ways to seek information during disaster situations and to look for support in the emergency management process. Recent disasters and emergencies have highlighted the role that ICT play in disaster management. With a century old history of investigation, the sociological study of crises is aware that ICT has expanded the reach of disaster sociology, adding new challenges to this area. Successful disaster response exercises in managing human resources under very difficult conditions. Catastrophic disasters can disrupt both the physical communication networks and the social networks critical for efficient response and recovery. While notes that a well-designed disaster plan serves as a framework, it often requires communication and collaboration between responders to adapt it to the situation at hand, this therefore means that in order to cope with disasters in a fast and highly coordinated manner, the optimal provision of information concerning the situation is an essential pre-requisite. Since coordination requires current information, and such information must be communicated in real-time, there is need for an Integrated Communication and Information System for Disaster Management that provides efficient, reliable, secure exchange and processing of relevant information. Whereas Climate changes are impressive, the impacts are not negligible, in long terms theses impacts can be consequences for various types of destructive events like natural disasters. Technology adoption and integration in Climate Changes Monitoring, Mitigation and adaptation can help to save environment from destruction and degradation.

ICT can play a pivotal role in monitoring, mitigation and adaptation of Climate changes challenges. Both developed and developing countries suffer the impacts of climate change and to get ride off these challenges they are emphasizing use of ICT. Much as developed countries are enrich in using technology in observing climate changes or disaster management, developing countries are still looking at deploying these technologies in climate change and Disaster Management a factor which attributes to insufficient budget, short term planning, lack of awareness, uneducated community, inadequate training and many social, economic and political factors as the main obstacle in deploying and adopting ICT in developing countries.

2 KEY TERMINOLOGIES

ICT refers to—Electronic means of capturing, processing, storing and disseminating information‖. This means can be further grouped as"New ICTs": Computers, satellites, wireless one-on-one communications (including mobile phones), the Internet, e-mail and multimedia generally fall into the New ICT category. Most of these, and virtually all new versions of them, are based on digital communication whereas ―

Old ICTs" include; Radio, television, land-line telephones and telegraph. They have been in reasonably common use throughout much of the world for many decades. Traditionally, these technologies have used analog transmission techniques, although they too are migrating to the now less expensive digital format.

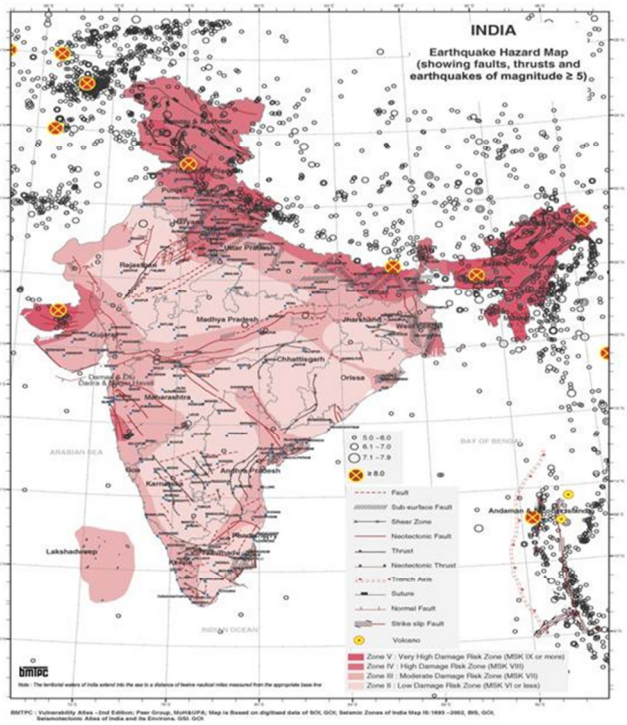

Fig 1: Earthquake Hazard Map

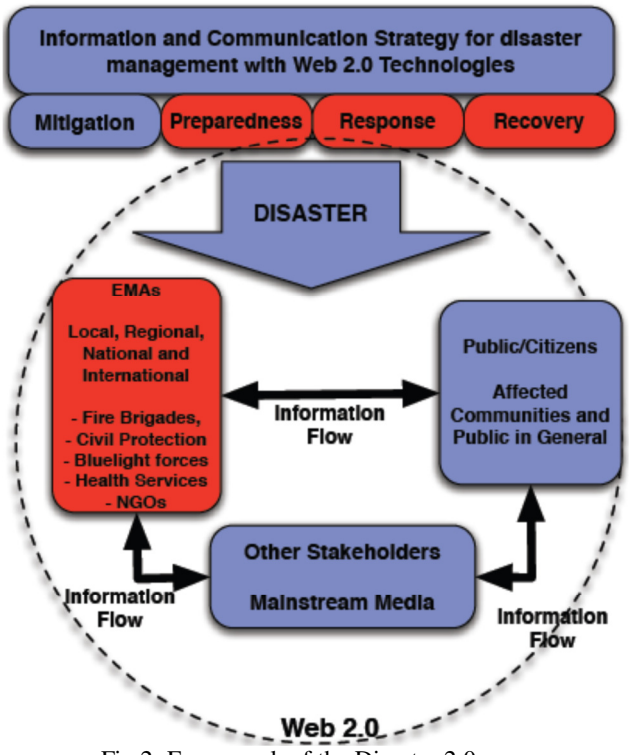

Fig 2: Framework of the Disaster 2.0
Project Source: Emergency Management Agencies use and adoption of Web 2.0 http://www.disaster20.eu

3 CATEGORIES OF DISASTER AND DISASTER MANAGEMENT PHASES

Disaster and its managing phases can be grouped in five categories:

i. *Geophysical*: Events originating from solid earth

ii.*Meteorological*: Events caused by short-lived/small to meso-scale atmospheric processes (in the spectrum from minutes to days)

Iii.Hydro *logical*: Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up

iv.*Climatological*: Events caused by long-lived/meso-to macro-scale processes (in the spectrum from intra-seasonal to multi-decadal climat
e variability)

v.Biological: Disaster caused by the exposure of living organisms to germs and toxic substances

4 CHALLENGES ASSOCIATED TO DISASTERS–THE REQUIREMENT FOR DISASTER MANAGEMENT

Emergency services rely on data communications particularly public radio networks like GPRS.

Occasionally in disaster situations, even GSM is used for voice communication between relief workers. In case of emergency the public networks may get burdened. So, the use of generally available public networks is not considered to be reliable enough for emergency situations. Moreover, GSM/GPRS is an infrastructure based network, highly susceptible to disasters in small and medium sized urban areas.

This therefore, demonstrates great deficiencies in all the phases of disaster management cycle because whenever there is emergency situation and response time taken is too long, the result is normally in form of great damages of lives and property hence, disaster recovery and response require a timely coordination of the emergency services. ICT provides a tremend- ous potential to increase efficiency and effectiveness in this area by propagating information efficiently to all the right locations. While ICTs have a crucial role to play in disaster management, there are tough challenges in making use of ICTs for the betterment of communities, in support of this, presents three phases of information systems that can be used for disaster response which are: the pre-phase addressing the preparations before, the post-phase analysing what happened during the disaster (lessons learnt e.g.

for training) and the phase in between, that is the situation during the emergency which should be a center focus for

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developing countries in an attempt to adopt to ICTs for the response and management of disaster situations.

5 ICT' S IN DISASTER MANAGEMENT

Geographical Information Systems (GIS):
GIS can provide a valuable support during various phases. During the preparedness and response phases, GIS can support better response planning for determining evacuation routes or locating critical infrastructure and vital lifelines, etc. Based on the information provided by GIS, it is also possible to
estimate what quantity of food supplies, bed space, clothes, and medicine. Similarly, GIS facilitates online monitoring of the status of ongoing work in the recovery phase. Thus, planned infrastructure for disaster information dissemination should offer an appropriate mix of communication technologies to respond to diverse requirements. The Utilization
of wireless technologies for disaster management and inclusion of GIS platform for holistic disaster management by developing nations can play a crucial role in all phases of disaster management especially where such application is still not wide spread perhaps due to limitation in infrastructure also maintain that the geospatial aspects of GIS may be
explicit, such as topographic maps, providing background information, or implicit, for example demographic data about population distribution in an affected area. In the same way this can also be exploited by using either dedicated tool to analyse
or incorporate geospatial aspects such as the usage of a GIS by a Geographical Information expert or the
information is integrated via interoperable Geographical services in a specific emergency management application to try and respond or manage disasters.
GSM Networks:
In GSM networks one key feature called―marking of origin‖ plays a significant role in emergency
response.In this case the phone number of the caller is transmitted to the network, and the address corresponding to the phone number can be found in the database of the phone network provider by using digital maps and mapping applications, the position of the address can be shown on the map instantly as calls arrive. Such a function is very valuable for the emergency call operator, as the help can be sent in the correct direction more quickly. It is therefore
desirable for the emergency call Centre that a location service for cellular phones is established and the location service is called ―Mobile Station Location‖ (MSL) which must be unique within the GSM coverage.
Satellite Radio Communications Technologies and Applications notes that, there are numerous satellite networks in orbit which provide support for disaster relief operations on a global basis, with a wide range of support for voice, data and video applications that enable first responders and relief workers to have access to critical communications when the terrestrial network infrastructure is damaged or the fixed and
mobile is overloaded. These can address a wide range of telecommunications requirements including;

- Fixed-to-Fixed (connecting emergency response headquarters to the field)
- Fixed-to-Mobile (connecting emergency response headquarters to mobile response units)
- Mobile-to-Mobile (connecting mobile response units to teams in the air or at sea)
- Point-to-Multipoint (broadcasting critical information to citizens)

6 CONCLUSION:

Current day emergency services rely on data communications especially public radio networks like GPRS.Sometimes in disaster situations, even GSM is used for voice communication between relief workers. However, in case of emergency the public networks may get overloaded. So, the use of generally available public networks is not considered to be reliable enough for emergency situations. Moreover, GSM/GPRS is an infrastructure based network, highly susceptible to disasters in small and medium sized urban areas**.** This therefore, demonstrates great deficiencies in all the phases of disaster management cycle because whenever there is emergency situation and response time taken is too long, the result is normally in form of great damages of lives and property hence, disaster recovery and response require a timely coordination of the emergency services. ICT provides a tremendous potential to increase efficiency and effectiveness in this area by propagating information efficiently to all the right locations. While ICTs have a crucial role
to play in disaster management, there are tough challenges in making use of ICTs for the betterment of communities, in support of this, presents three phases of information systems that can be used for disaster response which are: the prophase addressing the preparations before, the post-phase analysing what happened during the disaster (lessons learnt e.g.
for training) and the phase in between, that is the situation during the emergency which should be a center focus for developing countries in an attempt to adopt to ICTs for the response and management of disaster situations.

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