Integrating Local Knowledge with Early Warning System for Disaster Risk Reduction

Parama Bhattacharyya

The impact of climate change manifested in terms of floods, cyclones or droughts is expected to be severe in the Asia-Pacific region in the coming years. But the coping capacity is weak in most countries and communities. As much of the management is site-specific and has to be developed at the individual and community level, it is crucial to harness local knowledge in designing adaptation strategies. Early warning systems play a crucial role especially in disaster risk reduction. But in most of the cases it is highly technical where community has little role to play with. Communication is not a function of technology alone; it has to reach all sections of people irrespective of their level of education, understanding etc. However, local knowledge was rarely taken into consideration by policy makers in designing risk reduction strategies and very few institutional mechanisms exist to mainstream traditional coping and adaptation. Various studies reveal that a proper communication system coupled with traditional knowledge can actually bring down the effect during a disaster situation and is helpful for ri.sk reduction. It is concluded that a shift in paradigm from "top-down strategy" to a "bottom-up participatory approach" and designing a policy framework comprising both "scientific"' and "indigenous" knowledge is vital to facilitate disaster risk reduction.

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Abstract on theme Disaster Communication Systems

THE RELEVANCE OF COMMUNITY BASED SOCIAL COMMUNICATION SYSTEMS TO ENHANCE THE COMMUNITY CAPACITY TO COPE WITH INCREASING HIGH TIDE LEVELS AND DISASTERS IN SOUTH-EASTERN PART OF SUNDARBAN, WEST BENGAL

By

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After the paradigm shift of disaster management research from dominant approach to community based bottom-up approach, people realized to revisit the root causes of disasters. Socio-economically and politically marginalized people from rural and slums areas are becoming victims of every disaster phenomena in developing counties.

These marginalized people are also being neglected from development and disaster management strategy. Though these groups are living with others dominating groups, but the communication level among these groups is tremendously very weak. According to Putnam it is because of poor social capital among the different groups in our society.

There are three types of communication process works in our society, i.e., Social Communication, literary communication and technical communication.

The community based communication system works among the groups from grassroots levels and connects the local people **to** disaster management policy makers. The social communication system provides a space to share their existing knowledge to mitigate and reduce the impacts of disaster. The social communication system by the local people identifies most vulnerable households within the community and existing community resources (Social, human, natural) to provide greater support during pre and post disaster situation.

On the other hand, the literary communication among communities leads through social communication system which helps **to** enhance the capacity of local people to deal with risk. In the same way technical communication will be successful by the existence of social and literary communication.

The main objective of this research is

(a) to explore the existing social communication system among the communities to reduce disasters impacts, and
(b) to find how community based mitigation can be successful through social communication system in Sunderban Delta Region.

The research follows the ethnographic approach in qualitative research paradigm. Three case studies have been conducted in three deltas of Sundarban region to understand the social communication system.

Design and Development of 'GSM Abis Interface over Satellite' Emulator to illustrate Communication Support for Disaster Management

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Extended Abstract- The first victim during any disaster is the terrestrial communication system and the first and foremost resource required after any disaster is the communication. Country like India is susceptible to disasters like earth quake, floods and cyclone frequently. Quick restoration of the existing communication system is the best option than to provide an alternate communication system during disaster management. Global System for mobile communication (GSM) has achieved wide popularity in developing countries with wide network availability, affordable handsets and variety of application. The Abis interface defined between (Base Tran receiver) BTS and (Base station controller) BSC of a GSM network is the prime victim during any natural disaster, which is considered here to be restored through the satellite link, The existing user handset even though operational cannot extend the communication during this emergency period. Under this scenario the optimum solution is to restore a BTS with Abis interface over the satellite link and resume the communication link with the existing handsets rather than other options like extending a new communication terminal like satellite phone. The satellite plays a major role in establishing a quick, cost effective and reliable GSM communication link. The Abis-satellite link can be restored with any location independent BSC in the network. The Abis - satellite interface provides maximum interoperability and flexibility between terrestrial and satellite scenario for the handset (MS). The widely spread user Handset configuration remain unchanged for both the cases. Abis interface was originally designed for more reliable wire line communication links, hence to establish Abis interface over satellite, the signaling architecture of the interface and its protocol stack should be evaluated considering the parameters like Satellite delay and high loss. An Abis interface emulator is required to be developed and should be tested over a satellite link to study the protocol modifications with out loosing the interoperability between the adjacent interfaces. Impairment of satellite communication such as high delay (240ms~300ms) will affect protocols which work in acknowledgment mode need to be evaluated.

We have designed and developed a PC based 'Abis interface over satellite' emulator to illustrate a quick and cost effective communication restoration and presented the performance evaluation of the Abis over satellite interface. Impairments with respect to loss and delay to the signaling parameters were emulated and proposed modifications in the signaling protocol for an optimized Abis over satellite link. The emulator is flexible in reconfiguring its protocol parameters in the satellite environment and analyzes major Abis signaling parameters. We have experimented and optimized the emulated Abis interface over the GSAT3 satellite with respect to call set up signaling procedure and the results were compared with the performance of normal Abis interface.

Importance Of Ham Radio in Disaster Communication

DCSHARMA, VU2DCT

Amateur Radio plays vital role in disaster communication. It has a unique ability to provide radio communications independently. In the first few days before relief agencies are at the scene and have set up for work.

Disasters, whether natural or man-made are bound to happen at anytime and anywhere But the key is to be prepared in advance in order to mitigate and reduce the impact of potential damage, the disaster may have caused other wise.

Members of MAM Radio Community who are licensed Radio Amateurs may be called upon to furnish backup communications services for local agencies in the event of any emergency, disaster and special events wherein regular communication systems are disrupted or overloaded. They may also be called upon whenever they can provide communications services which are more efficient than those normally available **to** those agencies or officials responding to an emergency.

Since Amateur Radio equipment does not rely on wires it is immune to disruptions with the telephone system. Licensed Radio Amateurs also called Hams use a wide range of radio bands, each one with its particular strength in overcoming the barriers to radio communications,

HF (High Frequency) can propagate over mountains and valleys and between islands to provide coverage beyond VHF and VHF. Hams can use a wide range of communications modes, whether TV, data, voice or Morse code to exchange messages. The very nature of the Amateur Radio service encourages amateurs to learn how to make contacts, regardless of the challenges that may abound.

Amateur Radio operators are distributed throughout the community and the nation, near schools, offices, buildings and park/open grounds facilities which are often used for evacuation shelters.

Hams are duly licensed from Ministry of Communication and pre-authorized to communicate internationally into and out of places hard hit during natural disasters.

Amateur Radio operators use their equipment regularly, which verifies that it's maintained and operational. Some of the equipment includes hand-held portables or mobiles installed in vehicles. The Amateur Radio operators are familiar with the operation and capabilities of their equipment, and how to overcome obstacles to radio communications that may exist within their neighborhood.

Amateurs have 2 distinct advantages:
independence of infrastructure
dedicated, skilled operators, able to improvise

Types of communications amateur services can provide
Short and long-range (VHF/UHF/HF) Point-to-
point and nets Terrestrial and satellite Voice, data,
image (still and moving) L ocation/tracking

Amateurs help with various disaster communications needs iike:-
Severe-weather spotting and reporting Supporting
evacuation to safe areas Shelter operations,
locating people Assisting government agencies
Medical help requests Critical supplies requests
Property damage surveys and cleanup.

Community-based Communication Systems for disaster mitigation
Community & Communication towards connectivity

Abstract:

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Community-based communication approaches is increasingly being realized as significant and effective to disaster risk reduction, more so because it is the community that are the front liners in any phase of the disaster management, in preparedness, emergency and long-term mitigation haul. It has become apparent that top-down approach to managing disaster risks is not sufficient in holistically addressing specific and localized vulnerabilities of communities. At times, it further increases the vulnerability of the communities, both rural and urban communities. We, the disaster practitioners, have attached considerable importance to community-focused and community-led approaches to the "last mile of connectivity". But then, again it can certainly be mulled over if the approach is the "first mile" or the "last mile". Community action for disaster mitigation is a crucial element in promoting a "culture of prevention" and creating safer communities.

Communication system options available to communities today are many but they are also compounded with challenges, for both rural and urban communities. This paper, while deliberating on community-based communication systems, will now and then approach it from the emerging challenges and from the point of the rural and urban communities. (Community, many a times has a "rural connotation" to it.) Now, these challenges could be technical, financial, political or ideological. From the vantage point of a rural community in a developing country, getting connected with phone lines, payphones, community telecentres and even internet services is not a luxury. For a rural person, getting connected is a means for making better and more informed decisions, a means for staying in contact, a means for linking. Many urban people, and many of those who make decisions about allocation of development resources, take the privilege of connectivity for granted.

With the advent of various Information & Communication technologies (ICT) for early warning, for education & awareness, gaps need to be addressed between the service providers of these technologies and the communities in terms of access to the technologies, influence on their use,
that must be equitable across the diverse groupings within rural communities (including gender, class, ethnicity, age and wealth). Rural community must be enabled to participate in making decisions about how and where telecommunication technologies will be put to use. To be sustainable, rural telecommunication technologies need to be designed with rural community as active participants in strategizing, planning, implementing and evaluating. Solutions for rural connectivity are best developed with and for rural people.

The paper will reflect on several good examples from the region and beyond of both indigenous and technology-based communication systems, be it visual awareness, community radios, participatory

radios, cable TVs, multi-media mobile community centers (Telecenters on wheels, Bangladesh) to more evolving trends, like citizen journalism, the e-centers, blogs, internet etc, for community behavior change, simulations for local action, sensitization & critical awareness,
Community-based disaster risk communication has come a long way and is here to stay with more ICT scope, options & possibilities.

Reducing Vulnerability to Technological Hazards through better Risk Communication

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With the unplanned development of industrial clusters housing units with high hazard potential, the risks arising as a result of technological hazards in India have gone up manifold. Prevailing low perception on technological risks and lack of awareness amongst key stakeholders and the public in general can play a significant role in aggravating damage caused by an industrial accident, as has been witnessed during the Bhopal gas tragedy. Though initiatives for technological risk communication like Risikokart in Netherlands, Toxic Release Inventory chemical database in US have gained ground in developed countries, not much of progress in this direction has been made in India to improve risk perception and awareness amongst decisions makers, stakeholders of interest and the **community** in general. Nevertheless, with rapid advances being made in information technology in the country, there is an immense scope to harness IT tools in advancing societal awareness on technological risks in an efficient and effective manner and thus help to reduce vulnerability. The Environment Risk Reporting and Information System (ERRIS) project implemented in the industrial towns of Haldia and Durgapur in West Bengal demonstrated a GIS based technological risk communication tool that can provide selective information to various relevant stakeholders thereby strengthening their ability to cope with potential hazards arising out of an industrial accident and minimize damage to lives and property. ERRIS is built on a distributed GIS platform and provides vital spatial as well as attribute information on hazards, control mechanisms available with industries, capabilities and resource availability with public response agencies, sensitive receptors, contact information of key people, transportation and evacuation routes and guidance on risk prevention to the community through web-based information system. One of the key features of ERRIS allows most information to be updated online through web based forms through secure access.

Keywords: Information system, ERRIS, Risk communication.

Application of Wireless Sensor Network in Forest Fire Detection

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Abstract

Wireless Sensor Network (WSN) technology is considered as one of the key technology for 21st Century. These networks are widely used in environmental applications, like military application, habitat monitoring, forest fire detection, agricultural research etc. In order to use WSN effectively in various disaster situations, a lot of research has been carried out in the areas like WSN architecture, routing protocols, naming and addressing the sensor nodes etc. In particular, existing routing protocols in WSN are application specific. In other words, based on the type of application, suitable routing protocol must be chosen to run the application efficiently in the network.

This paper investigates for suitable routing protocols for forest fire detection using WSN. In general, sensor nodes sense, aggregate and/or suppress sensing data and forward them to the sink. For real life forest fire detection, parameters like temperature etc. can be sensed and when the sensed data exceeds a certain value, then that particular reading is sent to the sink to generate alert. We have carried out a simulation study of SPIN (Sensor Protocols for Information via Negotiation) protocol to route the environmental data from the active region to the sink wirelessly.

In our simulated environment, each sensor node in the network measures a certain number of parameters to which we will refer as attributes (e.g. temperature). Each sensor periodically measures these attributes. First the sensed data from active region are compared with a certain threshold value. If the measured data exceeds the threshold value, a short message (an *adv* message) is forwarded. The messages are transferred to other sensor nodes towards the sink using multi-hop technique. When the sink receives multiple messages from different direction, it realizes that there is a chance of forest fire. Thus, it sends a requirement packet to the originating nodes and receives actual data along with the location of the originating node in response. These data is used to generate a map of the location of the forest fire. Currently, we have only simulated the protocol using TOSSIM.

PROSPECTS FOR COMMUNITY BASED COMMUNICATION SYSTEMS FOR DISASTER MANAGEMENT: EXPERIENCES FROM RURAL ZIMBABWE

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This paper is based on DFID-CHF funded disaster risk reduction initiatives being implemented by Practical Action Limited-Southern Africa in Zimbabwe, under the project 'Mainstreaming Livelihood Centred Approaches to Disaster Management'. The project involves building the capacity of community members to develop and action their own 'disaster-proofed' development plans, conducting local level reviews, community based extension and training initiatives. As these activities unfold, they generate an intricate communication system which, though imperfect, may be built upon to enhance dissemination of disaster information for community asset protection and resilience. Key features of these initiatives are vulnerability and capacity assessments made at local, District and Provincial levels. A lot of humanitarian, government and private sector organizations are getting involved in Disaster Risk Management initiatives at all levels - micro, meso and macro. Whereas these initiatives have great potential in dissemination of information and knowledge on hazards and disasters, a lot still needs to be done in terms of integrating and linking that information with the community level. When this happens, there will be strengthening of 'horizontal level[1] communication systems for disaster management, which are currently embedded in Community Early Warning System (EWS). For effective community level dissemination of disaster information, there is need for unpacking and simplifying current loaded jargon which is resulting in creating gaps and 'institutional isolation' of humanitarian agencies' communication strategies from community-based ones. When communities are given the opportunity to formulate and develop their own disaster communication strategies based on own experience and conceptions, marrying such strategies to 'official' strategies enables generation of relevant and timely disaster communication for community resilience. Intra- and inter-community relaying of disaster information in Zimbabwe should capitalize on the high literacy levels prevailing in the country (national average 90% literacy).

RISK COMMUNICATION MANAGEMENT: BRIDGING CLIMATE PRODUCTS TO FINAL USERS AND DECISION MAKERS ALONG ECUADORIAN COAST

"DEVELOPING SOLUTIONS TO ENHANCE COMMUNICATION SYSTEMS"
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For the last decades there has been an exponential improvement to developed more accurate climate products in different fields: dynamic modeling, statistical modeling, geographic information systems, and climate early warning systems, among others. Each of these tools is managed by climate information producers in order to analyzed probable scenarios to cope disaster management and specially community resilience to enable adaptive capacities. Unfortunately, this important information has almost never reached properly final users and/or decision makers. The technical processes of generate all this information could only be truly effective if these climate products generate a positive response in the community to build up behavior response and is precisely this, which becomes a permanent challenge.

The current difficulties to reached users of climate information are standard in developing countries. The general population does not have the appropriate formation level to understand scientific language such as maps, forecast analysis (deterministic, shorter term or probabilistic) and different technologies to represent climate data. In addition, certain communities live in remote locations, in most cases in very vulnerable rural areas, which create a boundary for them to get or access information. This leads the community a negative response to accept new ideas to agriculture practices, and in general adaptive capacities to cope climate adversities.
Trough reliance on traditional indicators and local community knowledge it is possible to readjust this climate products in a way final users could understand them. Combining this with periodic capacity building workshops in strategic alliance with local government and private sector is possible to change local understanding about these climate information products and how useful and how they could benefit in their daily routines.

The Role of Social Networks in Disaster Information and Management

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Globally there is an increase in the social and economic impacts of different kinds of disasters. But the vulnerability to disasters can be reduced if any individual or family has links through diverse social networks. As disaster vulnerability is socially constructed, i.e., it arises out of the social and economic circumstances of everyday living. For example - during the 1999 Super Cyclone in Orissa the relatives (a type of social network) not only disseminated the warning message to Us potential victims but were also the first to reach the affected people in the post-disaster situation and provided them help in terms of cash and kind. From this one can infer that social networks are an important mechanism for transferring disaster related information and a means for assessing disaster risks.

There arc different types **of** social networks such as family, relatives. Neighbourers or the network link through community - based services, etc. Social networks are reservoirs for the development of a disaster affected community. It even provides social capital to cope with the losses of disaster. What is most important about the role **of** social networks is that il prepares a community to face a disaster before its actual occurrence.

Social networks are part of **a** basic motivational imperative for safety. It is actually the need for physical and emotional safety which enhances individuals" motives and feelings of dependency, trust and support, and provides the fundamental basis **for** social cohesion, which is an important characteristic in social networks. **This** is even true in case of disaster based social networks.

In this paper, by using secondary sources, 1 will attempt to analyze how social networks help in providing disaster related information to its potential victims and even help in managing disaster in an effective manner.

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Cyclonic Disaster Warnings and the Broadcast Media: A Study on People's Response in the Coastal Region of Bangladesh

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People's response to broadcast media reaches at the most critical juncture while these media involve in disseminating information of cyclone warnings. The broadcast media-- radio and television— are highly effective to guide the people in protecting their lives and properties from natural disasters. Both the media play a pivotal role in the process of natural disaster preparedness and mitigation in different phases; particularly immediate before and during a cyclone. These media aim to bridge the gap between awareness

and decision-making by disseminating warning signals from meteorological office to the public. But depending upon God's mercy around 20 million population throughout the 710 km coastal region in Bangladesh usually follow the *'Wait and See'* rule in facing the impending cyclone and tidal bore and hardly pay heed to warning signals aired by broadcast media. In addition, a significant number of people who are unaware about cyclone related warning signals fail to take due measures for preparation. As per the above information, it is not hard to realize that the broadcast media in Bangladesh face adversity in handling cyclonic disaster mitigation properly as people have less confidence in the media. The absence of adequate facilities for media access throughout the cyclone- prone coastal regions and the lack of due guidelines for media practitioners also narrows the authenticity of mediated warning and create confusion among the panic stricken coastal community. This paper with the outcome of a baseline survey among several hundred coastal locales focuses the people's response to and perceived believability of information regarding preparedness measures during cyclonic disaster disseminated through the broadcast media.

Connecting Community with Knowledge: A Strategic Media Convergence

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The Sandhan Foundation of Bhubaneswar, in conjunction with the **UNEP-GPA** and the Government of Orissa, has implemented an innovative management model 'Coastal Community Resource Center (CCRC)', located at village 'Gupti' of the internationally known Mangrove Ecosystem of Bhitarkanika.

The Center's objective is to educate the coastal people to rehearse knowledge management and packaging of information on the community behavior to tackle critical situations. They are canvassed to learn the importance of wise management of the mangrove forest both for the protection from the effects of climate change which regulates disaster. It put practices of mass media convergence to take advantage of developing a science oriented community with technology interface.

The CCRC endeavors to connect the community with knowledge through strategic convergence on the purposeful conservation of mangrove ecosystem of Bhitarkanika. The regular community previewing of our Documentary films on this Mangrove Ecosystem has made them understood the intricacy of **the** mangrove vegetation and its surroundings.

To begin this mission-zeal the CCRC Young Eco-Army has been formed to attend education to spread awareness on wise use of coastal resources along with the disaster preparedness avenues. They learn here the awareness campaign messages for coastal resource conservation through ICT equipped curriculum and convince the people not to destroy the mangrove vegetation which help deterring the coastal disasters. They are

being trained to army the CCRC mission voluntarily on the programs of community participation in disaster preparedness.

After 'Super-Cyclone-1999' the coastal fabric of Orissa got devastated and thus seen extreme lack of disaster preparedness even there after. Extreme and imminent disaster persists due to lack of mission-zeal and appropriate disaster mitigation opportunities. The 'UNEP-GPA CCRC is modeled as the common platform to discuss issues of disaster communication and its impact in extracting response from communities during early warning, mitigation and adaptation process.

LANDSLIDE HAZARD WARNING SYSTEM (LANDWARNS)

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Abstract

Landslides cause huge loss socio-economic infrastructures and personal life & property **all** over the world, specifically in hilly terrains. It is a locaii/ed phenomenon usually gets triggered by rainfall. In this paper, a framework for a warning system for prediction of hazard due to landslides has been proposed. The system warns against rainfall-triggered landslides making use of a Knowledge Based System, ll consists of an input module, an understanding module, a rainfall prediction module, an expert module, an output **module** and an warning module. The input module accepts scanned images of thematic maps of contributing factors of landslides as well as output from rainfall prediction module, based on Held observed GPS data. The understanding module interprets input information to extract relevant information as required by expert module. The expert module consists of a Knowledge Base (KB) and Inference strategy to categorize the given region into different intensities of landslide hazard, output module provides a warning message based on decision of inference module and finally, warning module send the message **to** user. At present, the system has the capability to prepare a Landslide Susceptibility Zone map of a region and ils extension lo a prediction system is under development. **The** major outcome of the proposed system will be the availability of a warning system for local geo-hazard analyses and provide a support system for landslide disaster preparedness and mitigation activities.

Keywords: Gco-deformation. Rainfall forecasting, GPS, Landslide Warning, Automated System. Thematic Map, Map understanding, Knowledge Base, Knowledge Representation, Natural disaster.

COMMUNITY CAPACITY AS THE FIRST CHAIN FAR EARLY WARNING SYSTEM

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The strong earthquake, which followed by Tsunami on December 26, 2004 caused more than 250.000 people killed especially in Aceh, Indonesia. We have to admit the people in that area had no knowledge about those related disasters. They did not respond the natural warning correctly. Moreover, we also learn that only 7 people died in remote island called Simuelue that habited by 78,000 populations. The people did not react spontaneously but they did proper evacuation to higher ground and brought all emergency needs for 5 days survival. Simeulue Islands has local wisdom in disaster communication so that they could survive from tsunami (UPI-UNESCO/1SDR, 2006).

With this evidence, KOGAMI believe the capacity building of community should be the

most important chain for early warning system while we use technology just to support the community efforts. As the pilot area in Indonesia, Padang city has been executing many programs for the community; increasing the knowledge; making preparedness and evacuation plans, executing drills, and giving recommendation to the government for community needs related to critical infrastructure for mitigation. Disaster communication extremely not just discuss about high technology but about how to disseminate information comprehensively so that communities know how to anticipate hazard and respond the early warning properly. By treating communities as the subject in making preparedness and emergency plan. We have designed the proper method based on the background of participants, such; for school, rural community, public-transportation driver, government officer, private sector so that the disaster communication cover all components in the area. After being successful to bring Padang as the pilot project for disaster-preparedness program in Indonesia, KOGAMI has been starting to replicate the program to other three districts; Kabupaten Padang Pariaman, Kabupaten Pesisir Selatan, and Kabupaten Nias. Those districts are in West Sumatra.

"FLOOD WARNING-DECISION SUPPORT SYSTEM DESIGN FOR URBAN FLASH FLOOD MITIGATION CASE STUDY: NORTHERN TEHRAN BASIN"

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Abstracts

Flood is amongst the most commonplace and devastating natural disasters. Existing data shows that the frequency of Hood events has arisen severely from 90"s mostly due to climate change together with increase in human-nature interference.

There has been found more advantages of combined use of non-structural and structural flood management criteria rather than solely use of them. Amongst non-structural approaches, flood warning criterion has been recognized very essential in loss reduction in urban areas. With respect to the rapid growing and development of information management systems, there is of benefit to incorporate them in flood warning systcm's {FWD) configuration which aims in advances in flood preparation, response and also recovery.

Decision support system (DSS) is categorized as a knowledge-base system that aids decision makers in adopting efficient decisions facing with disastrous situations. A DSS consists of several elements and layers compound of different models which totally convert data into relevant in format ion.

The combined set-up of FWS and DSS collects the related data of prediction including meteorological, precipitation, water level and river flow by monitoring the related parameters. The set of real-time data would be used in threat recognition that consequently results in adoption of any emergency action in response to flood impacts.

Urban flash floods happen rapidly and cause severs damages to the facilities and social structures in a very short time. On July 1987 the 26th a devastating flood happened to north of Tehran. The number of victims was nearly 300 and a large amount of losses was happened to **different stakeholders.**

The frequent happening of such flash floods during the last century has leaded the

urban authorities to study flood management strategies for northern Tehran basin. This paper focuses on designing elements and parameters of a practical DSS-FW system for the mentioned basin. The outcomes of the study show that meteorological prediction together with organizational setup plays a vital role in emergency management of the study region.

Key **word:** Urban Flash Floods, Flood Management Criteria, Flood Warning System, Information Management System, Decision Support System

IMPLEMENTING INCLUSIVE ICTS: MOBILE CELL BROADCASTING FOR A PUBLIC WARNING SYSTEM IN THE MALDIVES

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Cell broadcast is an integrated open system that allows emergency officials one-touch notification to cell phones with guarantee of covering all carriers. Cell broadcast technology enables a government entity to securely transmit an emergency alert of natural or manmade disasters to cell phones in an affected area within two minutes, regardless of the size of the area and regardless of the subscriber's carrier. Given its geographic location and distribution, and its 2004 tsunami experience, the Maldives exhibits unique characteristics that would enable cell broadcast's success in the dissemination of both general and hazard information.

Currently there are two main GSM service providers in the Maldives. Each has the in-built capability for cell broadcast. Recently, a technical committee on early warning and emergency telecommunications, and a national plan on early warning dissemination and emergency communication was set up and developed, respectively. The atoll nation has made some notable initiatives in emergency alert, including: emergency alert via broadcasting [EAB), and the use of bulk SMS on a mobile network, priority calling and national roaming, and the establishment of a national Emergency Operating Center.

While public warning is of paramount interest, the Maldives wants to ensure sustainability and optimal use of this novel technology. This paper will explore the ways in which the Maldives can provide an ideal environment for cell broadcasting to improve information dissemination, both hazard and general, inclusive of all.

DISSEMINATION TO RESPONSE: IN SEARCH OF NEW STRATEGIES FOR MEDIA IN CYCLONE WARNING OF BANGLADESH

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Media and communication are always co-extensive with catastrophic management, as they are of immense importance in mobilizing human and other resources in any emergencies. Communication as one of the most important tools for life line agencies in disaster preparedness and management process plays a pivotal role **in** creating awareness among people and bridges up the gap among various management agencies. However, due to the lack of media penetration, public trust and the level of **confidence** towards media and other communication tools including proper skills and ideas among media professionals and activists on disaster preparedness issues, media failed to take appropriate strategies for campaign to mobilize human power in Bangladesh. **Examining** different risks communication models and existing cyclonic warning dissemination system, this paper attempts to address people's perception on mediated warning messages throughout the vulnerable coastal region of Bangladesh. This paper also suggests some newer skills and techniques for media professionals in finding out strategies to cope with these risks and to disseminate adequate warning message among panic-stricken 20 millions vulnerable people living in the cyclone- prone 710 km long coastal region of Bangladesh in pre cyclone, during and post periods to raise confidence when facing disaster risks.

THE POTENTIAL OF AN EARTHQUAKE EARLY WARNING SYSTEM FOR DELHI REGION

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Abstract

Unplanned and non-regulated growth of urbanization, particularly in areas near to major **seismogenic** sources, magnifies the level of earthquake risk to lives, urban utilities and other buildings. In the absence of any reliable and workable earthquake prediction strategy. **Earthquake** Early Warning System (EWS) can prove to be a useful tool in earthquake risk mitigation provided a reasonable warning time is extractable from an optimally configured system based on earthquake sources-to-city geometry. However, earthquakes in contrast to other natural disasters allow only small warning times being the time difference between detection of the event and the arrival of destructive S-wave part of the strong ground motion at a large urban area.

It is estimated (Lee et al,, 1996) that for a shallow earthquake event at a distance of 100 km and focal depth of 20 km, a warning time of about 17 seconds is available. **Earthquake** Warning System for earthquake sources constrained to the major active faults in the Western/ North Western Himalaya at **significant** distances from Delhi region can provide warning times of 60 to 75 seconds, similar to the Mexico **City** EWS. **The** potential of such an LWS based on detection of **P-wave** motion arriving at the epicenter. **the** travel time difference between the S-wave arriving at Delhi and the **P-wave** at **the epicenter** is considered. The prediction of the level of strong ground motion that the Delhi region is likely to experience from these seismogcnic sources can be estimated on the basis of scaling relation between P-wave amplitudes at the epicenter and the S-wave amplitudes at the target site .i.e. Delhi following the procedure suggested by Wenzel et al.{ 1999). A well constrained EWS exploiting the regional tectonics favorably can prove to be a useful tool in earthquake risk mitigation for highly urbanised Delhi region in addition to providing general real-time information to the public and disaster relief organizations.

Flood Forecast Technology for Disaster Preparedness in Bangladesh

Disaster Communication System Abstract
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Throughout Bangladesh's history, floods have ended the lives of millions of people, and deprived those left behind of their livelihoods. Bangladesh's vulnerability lies in its low-lying area combined with **a** dissecting river system. In response to this lethal predisposition to flood disaster, Bangladesh's Flood Early Warning System has become a critical component in disaster preparedness.

Previously, Bangladesh's flood forecasting system was only able to provide communities with a 72 hour warning in the face of an imminent flood. A host of researchers, institutions, and organizations have been working to save lives, by strengthening the

system with an aim of increasing the lead-time of flood forecasting in Bangladesh through the Climate Forecast Applications in Bangladesh (CFAB) program.

CARE's SHOUHARDO program, funded by USA ID, has supported the continuation of CFAB through the development of **a** three-tiered forecasting technology that has been transferred to Bangladesh institutions such as the Flood Forecasting and Warning Centre and the Bangladesh Meteorological Department.

A major outcome for CFAB includes **a** short term flood forecast system **(1-10** days) that allows time for emergency planning, which in turn will minimize loss of lives and livelihoods, and assist in planning both planting and harvesting patterns."Parallel to this, training is occurring at both community and local government levels in order to maximize the efficacy of the forecasts from this prediction system through mobilization of communities towards counteracting and employing pre-emptive action prior to the arrival of a flood. Flood information is disseminated via SMS, and flags are hoisted in an easily visible place using different colors to represent the severity of the flood.

CFAB's Flood Early Warning System will have a significant impact upon Bangladesh through its increased capacity in which to predict floods, and the dissemination of flood information to the community - thereby drastically minimizing the damage of the inevitability of natural disasters that Bangladesh faces.

Integrating Technological Interventions and Community Centric Approach for Disaster Risk Reduction

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Abstract

Disaster risk reduction begins with information and its appropriate dissemination. The advances in information and communication technologies (ICTs) that have emerged over die last two decades lend themselves to greater possibilities of integration of different communication systems. The interoperability of various communication systems including internet, mobile phones, fax, e-mail, radio and television is reaching out rapidly to the large cross-sections of die people, including the fishing communities. As a result, the possibilities of ICTs in disaster risk reduction are also increasing. **The** last mile' outreach of such systems is however driven by myriad of interventions at the various levels. There are both social and technical aspects to the application of ICTs in disaster risk reduction. The effective application of these technologies depends greatly upon their appropriateness for the social and economic context in which they are applied. Community owned ICTs based approaches sound to have greater impacts as well as enhanced sustainability. The present paper intends to describe the emerging role of ICTs for disaster risk reduction especially in the context of fisheries sector and highlight the emerging challenges in making the application of these technologies more effective.

Space technology, as an important component of ICTs, provides both content as well as conduit. It enables last mile' outreach especially in underserved and backward areas and thus assumes greater significance in addressing the risk reduction issues with regard to fishing communities. Further, Remote sensing, particularly satellite meteorology (SatMet), enabled products has been extremely valuable to enhance likelihood opportunities and also to reduce the risk of fishing in the deep ocean. In fact, livelihood opportunities must be insulated from the risk and this is where die technological interventions from remote sensing as contents and satellite communication as conduit play the strategic roles for the fisheries sectors.

While taking the note of all success related factors under the different conditions and contexts, it reveals the fact that such technological interventions if used strategically and as an integral part of building the livelihood systems of farmers and fishermen, help in reducing risk. How well community learn from the use of, and increasing gain from access to such systems, is a function of many variables, including the opportunities to make profits from

Lessons from Bangladesh

The Cyclone Preparedness Program (CPP) in Bangladesh, managed joindy by the Government of Bangladesh and Bangladesh Red Crescent Society, is considered to be a success story. The CPP operates an extensive network of radio communications facilities in tiie coastal area, linked to its communication center at its headquarters in Dhaka. The network consists of a combination of HF and VHF radios which covers the high-risk cyclone zone areas. The entire program has a significant training and public awareness component. On recruitment, the volunteers are given preliminary training by the CPP officers. A three-day basic training is then given to the volunteers, batch by batch, on different aspects such as dissemination, evacuation, sheltering, rescue, first aid and relief operation. The training of volunteers is complemented by an extensive public awareness program that includes cyclone drills and demonstration, staging of dramas/ folk songs, distribution of posters, leaflets and booklets, film/ video shows and radio and TV programs. The CPP is a good example of how the use of communication technology in disasters can be made effective by preparing an appropriate social and cultural context in which these technologies are applied. A well-planned warning system with equal emphasis on both social

and technical components ensures that in case of an emergency, one-point failure in the system does not lead to a complete break down.

Towards a multi-node communication network

Traditionally, the application of ICTs in disasters risk reduction has been inspired by parallels in military operations, which follow a well-defined command-and control structure. However, growing emphasis on devolution of disaster management to community level and greater recognition of effectiveness of community-based disaster management would require that the disaster management community looks into innovative approaches for the application of emerging communication technologies in disaster management.

Localization

While ICTs have made the sharing of knowledge and information much faster and reliable, in the local language is going to be a major barrier in the effective application of these technologies. Translation software do not yet address the needs of rural communities, including the fishermen. In die coming years, overcoming the language barrier would be a major challenge and would require a combination of high-tech as well as more down to earth human-based systems.

CITIZEN CENTRIC TELECOMMUNICATION FOR EMERGENCIES - INFRASTUCTURAL AND APPLICATIONS

ABSTRACT

Citizen centric telecommunication includes both 'Citizen to Authority' as well as 'Citizen to Citizen' for voice and data service from wireless and landline access, including limited mobility on fixed line users. Telecommunications infrastructure failures are common occurrences during emergencies and disasters due to a variety of reasons including network congestion. Reducing the impact of emergencies and disasters through public telecommunications is a significant challenge, an urgent priority, and a fundamental expectation of the citizens from the government regulators and the telecommunication service providers. Public safety and disaster preparedness does not get the attention it merits as neither the government nor the individual find it worth the while to invest or pay for the 'add-ons' of emergency devices or facilities. On the other hand initiatives of the Indian telcos during disasters lack content and veer away from their core competencies. This paper focuses on the citizen related communication aspects and aims to establish realistic expectations in terms of the service and policy in the context of citizen centric emergency communications in India to include both infrastructure l aspects and applications.

Flood forecasting network of Mahanadi basin: A Critical Review

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The state Orissa is a riverine state having 11 major river basins. Out of them Mahanadi basin is the biggest one occupying 42% of geographical area of the state. Five coastal districts are normally affected by flood of Mahanadi. The basin lies in the south-west monsoon tract. The heavy monsoon along with 3-4 depressions every year remains the main reason for flood. Besides Mahanadi two other basins like Brahmani and Baitarani are also flood prone. Although the floods are always there, at present the increasing frequency of occurrence of flood and the rising peak are mostly alarming. The current decade has seen 4 floods so far in the delta of Mahanadi. Flood plains are getting encroached day by day. Simultaneously, construction of flood moderation or storage structures is becoming impossible due to many reasons. Other structural measures are not sufficient enough to combat flood damage. On this context the improvement of existing and adoption of new non-structural measures will be helpful in flood fighting and saving Life and property. Flood forecasting relating to early warning system plays an important role during floods. Development of a good flood forecasting network with adequate lead time helps in evacuation from probable affected areas. Present study investigates the existing network of flood forecasting in Mahanadi basin and emphasizes requirements for further development.

FROM TRADITIONAL TO PEOPLE CENTRIC EARLY WARNING SYSTEM – PRACTICES AND PROBLEMS IN WEST BENGAL

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Abstract

Traditional framework of Early Warning System (EWS) consists of three phases. Monitoring of precursors, forecasting of a probable event, notification of a warning or alert mechanism. With the development of conceptual framework of Disaster Management, People Centric EWS came into practice with four key elements, viz., risk knowledge, warning service, communication & dissemination, response capability. It requires strong technical foundations and good knowledge of risks with an efficient coordination between centralized and decentralized structural measures. As different hazards require different EWS, indigenous knowledge and education plays a major role.

All the districts of West Bengal suffer from different types of disasters. Natural disasters like cyclone, flood, landslide, drought, earthquake and man-made disasters like big fire, industrial disasters, and subsidence of land are the major types of disasters. Some of the districts have been identified as zones of multiple disasters.

The population of the state is 80 million of which 72% live in rural areas, with mountainous region, large areas of plains with rivers and wetlands and coastal areas. Agriculture, mining, industries formed the economic backbone of the state. Practice for EWS means to cover the whole population distributed in the above topography, with the government organizations consisting of 19 Districts, 65 Sub-divisions, 341 Blocks, 333 Panchayat Samities, 126 Municipalities, 3354 Gram Panchayats, 40782 Mauzas, 37945 inhabited villages, 375 towns and 463 Police Stations and also business organizations and NGOs.

This paper studied the different EWS practices regarding different types of hazards in the state. The objective of the study is to correlate this practice with the modern people centric EWS which consists of four key elements, viz., risk knowledge, warning service, communication & dissemination, response capability. The study also includes some techniques practiced by some NGOs regarding Last Mile Communication, using indigenous knowledge and education for EWS. The paper concludes with the recommendations of transcending to the modern People-centric EWS.

AN ARCHITECTURE OF RAPIDLY DEPLOYABLE COMMUNICATION NETWORK FOR DISASTER MANAGEMENT

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Abstract

The disaster management system requires timely coordination between its various components. Police, Fire Departments, Public Health, Civil Defense, NGO's, community volunteers and other stakeholder organizations have to react not only efficiently and individually, but also in a coordinated manner. Since lack of communication implies lack of information flow to government and other agencies, this would not only hamper initiation of timely action, but also hinder efficient resource usage and management. Moreover, this communication structure must function within extremely hostile conditions. During emergencies, when terrestrial telecommunication networks are damaged or severely impaired, alternative and flexible networking arrangements become critically important Thus, there is a recognized need for wireless communications, including high bandwidth wireless, for emergency management. All these give rise to the need for Rapidly Deployable Communication Network.

In this paper, a novel architecture has been presented for the Disaster management Information Network, which includes the Back-end, Backbone, Backhaul, Access and Frontier tiers of the network. This paper also presents the experience of the authors in setting up such networks and mock deployment in the Sundarbans area of West Bengal.

The paper describes the technologies used in different tiers of the network and the kind of software and databases to be overlaid in different tiers. The requirements considered in the design of the architecture are as follows:

1) Proper horizontal and vertical flow of information between the various architectural components of the system.
2) Timeliness and updating of information.
3) Integration and linkage of information.
4) Prioritization and standardization of information.

The paper presents the results of the Research Project funded by the Dept. of Information Technology, Govt. of India.

Environment, Climate-change and Disasters – Strategic Assessment and Risk Communication Protocol for India

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"Integrating Environment, Climate-change and Disasters" is very much alike concluding 'environmental management' as single common solution to two (climate-change, disasters) and more questions of, for example – development, livelihood, sustainability, conflicts-resolution, terrorism, naxalism, and over and above – human well being. 'Climate-change' awareness attributable to IPCC, UNFCCC, UNEP, IUCN, MoEF, ecologists, and future-thinkers at various levels, has brought in the realisation the need to understand the inter-relatedness of natural/human environmental systems, accelerating and aggravating threats, increasing susceptibility of resources and life, and the sustainability of development. Climate-change is a globe-wide phenomenon influencing differently different regions and systems/components, thus calling for region-specific and eco-component-wise interventions for adaptation strategies. However, 'who' is to adapt, for 'what' to adapt and where to 'adapt' are the continual pursuits.

Societies like India, used 'God' most often to bypass the accountability and therefore the term 'natural disaster – act of God' prevailed pretty long. Negatively, the 'climate-change' concern has given a new excuse for the defaulters to skip from responsibility of been cause in the aggravating the challenge – increasing disasters, vulnerability, and reduced GHG sink along – greencover, waterbodies, etc. besides creating the conditions of more and lasting destructions in the event of even a common intensity disaster. Accusing 'climate-change' is a fashion 'buzzword' in fund markets and business diplomacy. There is a need to carryout a systematic 'strategic impact assessment' or cyclic relationship of climate-change and disasters in the broach framework of environmental systems (local, regional and wider contexts). Socio-political scientists now join 'ecologists' in defining the stories of past/recent instability and conflicts in Indian regions of Punjab, J&K, Assam, Chattisgarh, Orissa, Jharkhand, Bihar, Karnataka, etc. as the public face of man-made environmental/natural resource challenges. Climate-change has to be now looked into regional/local ecological contexts, to address the global challenge.

Communication technology using space/satellite-support/data, GIS, bio-informatics / chemoinformatics, web-enabled systems along public media like – television, radio, mobile network has been looked in for disaster management, but has to be re-oriented for intensive application in supporting 'prevention' and 'mitigation' so as to workout the specific risk-communication protocols, an specific need under the 'CC adaptation' agenda. The present paper offers an innovative protocols based on case experiences of region-specific consultations on 'climate-change and disasters' and 'environment and disaster' programmes in coastal, desert-prone, north-India, Bundelkhand, lessons of UNDP-MoEF project "Climate-resilient development and adaptation' and 'environmental management planning for hilly districts". The discussion provides a framework charter for sustainability through integrated approach and also an institutional support plan at national, state/regional, district and local levels.