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Research Article

PREPAREDNESS PROGRAMME IN DISASTER MANAGEMENT: A STRUCTURAL MODEL

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ABSTRACT

Natural disaster is one of the single largest concerns for the present civilization. Vulnerability of a land or country to natural disaster is perceived based on geo-climatic and socio-economic conditions along with bad development practices. The natural disasters are often leading to loss of lives and adversely affect economies, agriculture, water, sanitation, environment and health. Overcoming from such frequently occurring distress has become a challenge before human being and hence comes the issue of disaster management. An effective disaster management can be outlined within the framework of four activities: mitigation, preparedness, response, and recovery. The objective of disaster research focuses on pre-disaster hazard vulnerability analysis and mitigation; and post-disaster emergency response and recovery. Preparedness, an important preventing course of action, serves as a temporal connector between the pre-impact and post-impact phases of a disaster event.

INTRODUCTION

Natural disasters are unforeseen and unpredictable extreme events in the nature. These are some rapid, instantaneous or profound impact of the natural environment upon the socio-economic system (Alexander, 1993). In recent years natural disasters have become frequent advent on the earth surface, the domain of origin being constituted of crustal process, atmospheric process and both. Disasters cannot be impeded or diverted else they can effectively be tackled by proper disaster management to minimize the devastation and victimization. Preparedness undertakes an important role in resisting to a greater degree of human suffering on which disaster management trust on.

Preparedness programme for disasters assigns two broad events such as long term and short term preparedness (Beura and Singh, 2006). Short term preparedness demands instant course of action to combat the immediate multidimensional sufferings of extremity. Whereas long term preparedness programme includes situational and permanent action plan to resettle the victimized habit and habitat of disaster prone zones.

Short term preparedness is highly sought for the activities like prediction system, warning system, public communication system (Petak, 1985), rescue operation, relief operation, health and medical care and socio-psychological disorders. Long-term preparedness programme is formulated in accordance with the long run constrains prevailed from the disasters in specific.

Disaster preparedness programme can only be successful by effective public education, awareness, community mobilization and participation in tune with the appraisal of government, NGO and technology. Technological tools like GIS during the preparedness phases, can accurately handle better response planning in determining evacuation routes or locating vulnerable infrastructure etc. It promptly plans the logistic support for rescue operation and relief supplies by providing previously available information on road connectivity, bridges, airports, railway and port conditions and limitations.

Disaster Risk Assessment for Preparedness

Before going for assessment it is important to understand the disaster risk. Disaster risk is a combination of the probability of the event and the vulnerability of a place to that event. Risk assessment can be formulated by taking the account of hazard and vulnerability assessments together. In real sense the hazard assessment deliver accurate disaster information about individual locations. Vulnerability to a particular hazard though concerns about critical products, services, hazardous materials, financial costs, personal damage, it undertakes the availability of resources personnel, commodity and time to make successful preparations.

Broadly the risk assessment should be undertaken with respect to the dynamics of change in urban or rural settlements. Various risk determinants of varying magnitude such as high-rise structures, mixed land use, high population density along with disaster accelerators like geomorphological and

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topographical setting are to be integrated to infer a correct risk assessment for disaster preparedness (Fig 1).

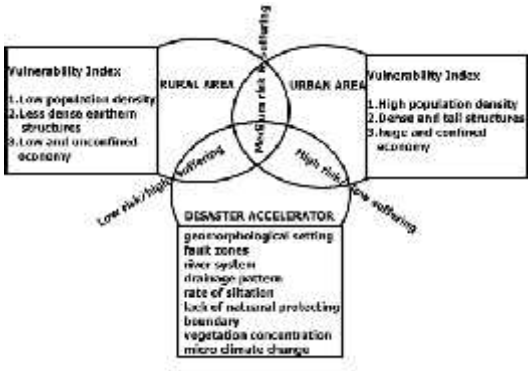

Figure 1 Disaster Risk Assessment (DRA) for preparedness programme

Compressive Disaster Preparedness Programme

Disaster preparedness is agglomeration of course of measures and alertness at the level of individuals, households, communities and countries to manage and recover effectively from natural disasters. Preparedness activities ensure the resource readiness and its proper utility while responding effectively to the disasters. A strong preparedness programme includes planning and coordination in organizing disaster-related skill development, commodity and resource mobilization, technological upgradation, and awareness activities. The prime objectives of preparedness are to undertake emergency actions in order to save life, protect property, manage disaster damage and disruption, and post-disaster restoration and early recovery activities.

A proper and accurate disaster risk assessment leads to a decision making framework of preparedness in the domain of disaster mitigation.

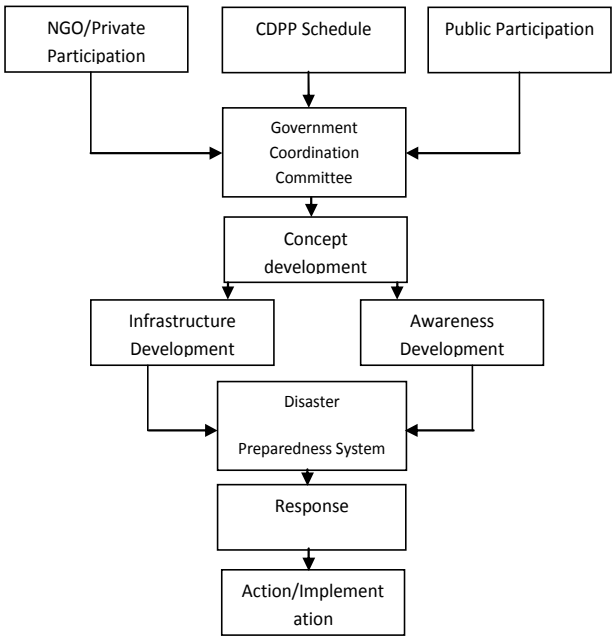

Figure 2 Comprehensive disaster preparedness programme (CDPP) execution framework

The structural synthesis of planning and execution of preparedness having infrastructural readiness speaks of a compressive disaster preparedness programme (CDPP) (Fig 2).

Structural mitigation measures relate to those activities and decision making systems, which provide the context within which disaster management and planning is operated and organized. They include measures such as preparation of preparedness plans, training and education, public education, evacuation planning, institution building, warning systems, and land use planning. Disaster preparedness programme functions according to the type of mitigation measures; whether they are structural or non-structural (Micklin, 1973). Both structural and non-structural measures are active or passive in nature. Active measures comprising of incentives for disaster reduction are often more effective than passive measures that works on laws and controls.

Disaster Preparedness- Structural Framework

Preparedness in many respects before any disaster substantially checks its impact. Some of the steps are very common and not related to the genetic parameters, while others are coherent with genetic parameters. Preparedness with respect to timing, location and intensity prior to disaster becomes very effective. The pre disaster preparedness is equipped with the systems like Disaster Prediction System (DPS), Disaster Warning System (DWS), Disaster Communication System (PCS), Motivation and Evacuation System (MES) (Beura et al., 2002). The disaster preparedness framework is functional with the activity chart given in fig-3.

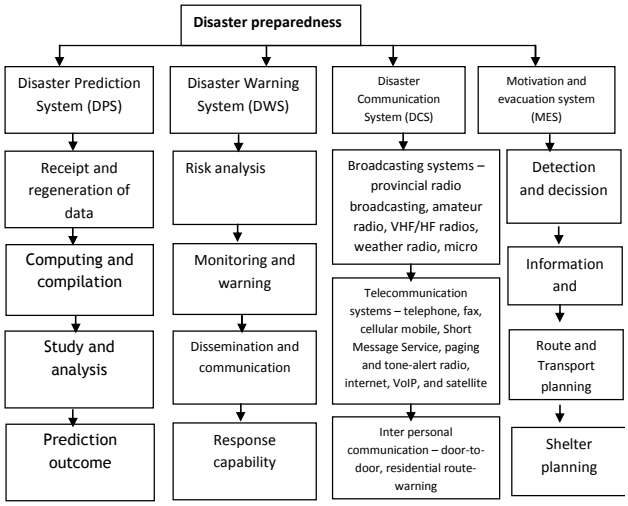

Fig-3 Disaster preparedness framework

Disaster Prediction System (DPS)

Predicting the possibility of a disaster is a great weapon for preparedness programme. Excepting a few geo-hazards like earthquake, volcanic eruption etc., others can be well predicted by sophisticated instruments and technologies. It includes collection, monitoring and interpretation of the data related to severe natural phenomena. An unambiguous DPS may help people to remain alert and prepared for the disastrous in the event. It supports timely forecasting and an effective warning of a disaster. The DPS involves the process of receipt and regeneration of data from various primary and secondary sources respectively and proper compilation, critical study and

analysis to get accurate prediction. Parameters responsible for any extreme event can be studied precisely under the domain of Disaster Prediction Information System (DPIS) and then analyzed by the AI (fuzzy logic) software to produce the contents of forecasting (Fig 4) (Beura, 2009). DPIS is a subset of decision support system in which current and historical data are comprehensively analyzed and explored, creating summaries of the data, in order to support high level decision-making.

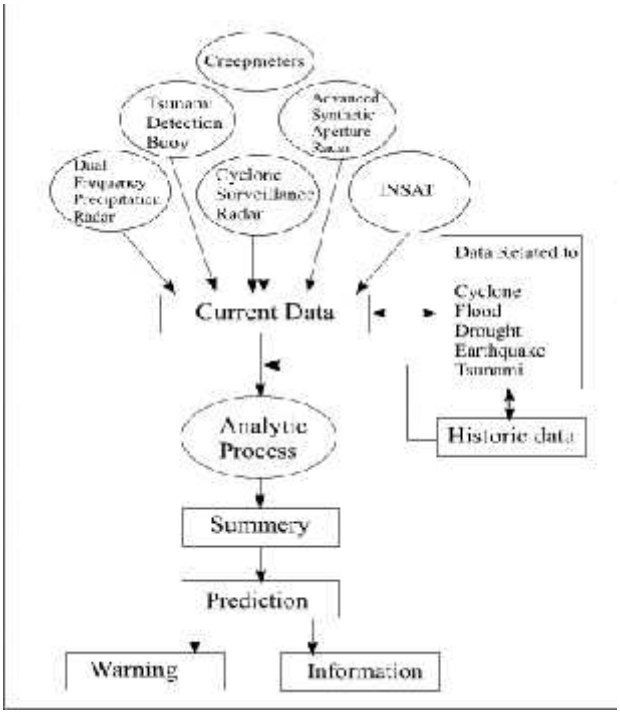

Figure 4 Schematic diagram of Disaster Prediction Information System (DPIS)

Disaster Warning System (DWS)

Warning in advance in disaster management can accelerate the preparedness program to deal with the havoc. An early disaster warning system can facilitate the infrastructural readiness to effectively undertake the evacuation, rescue and relief operation (Beura, 2009). Early warning systems have to actively involve the communities at risk, facilitate public education and awareness of risks, effectively disseminate alerts and warnings, and ensure the constant state of preparedness (Wiltshire, 2006). The two components of early warning system, the effective forecasting techniques and the effective communication scheme are required to disseminate the disaster information. The early warning system comprising of sensors, event detection, decision support, and message broker subsystems can be implemented as a chain of information communication systems (Waidyanatha, 2010). For the disasters whose warning can be made few days or even few hours before are tackled better in terms of awareness, evacuation and rescue operation.

Disaster Communication System (DCS)

Effective early warning and its proper communication empower individuals and communities to respond appropriately to reduce the risk of death, injury and property loss, and damage. Communications in a clear, simple language and timely delivery for the recipient may help in taking necessary action. Communication prior, during and immediately after a disaster situation is an important component of preparedness, response and recovery that connects affected people support systems. Disaster Communication System (DCS) enables the disaster forecasting and warning to reach the community and individual level (Fig 5). This is a disseminating network operated between the feeding device and receiving ends. The new communication and information technologies have integrated different communication systems existed over last two decades. Communication systems including internet, mobile phones, fax, e-mail, radio and television are increasingly becoming functional in disaster management. The DCS availing all the modern communicating facilities exchange and access the time-to-time information for preparedness. Based on wireless digital communication, Wireless Application Protocol (WAP) enables the usage of mobile phones to empower the DCS when the print and electronic media get paralyzed. General Packet Radio Service (GPRS), an internet protocol based packet database system enables virtual connections to services, eliminates long dialup delays and allows information such as e-mail without any dependence on major infrastructure. Telecommunications can be used as a major tool in DCS for information dissemination in taking the necessary precautions to mitigate the impact of hazards. Remote sensing and global positioning system (GPS) have critical roles to play in tracking hazards, alerting authorities, coordinating relief operations, assessing damages and mobilizing support for reconstruction.

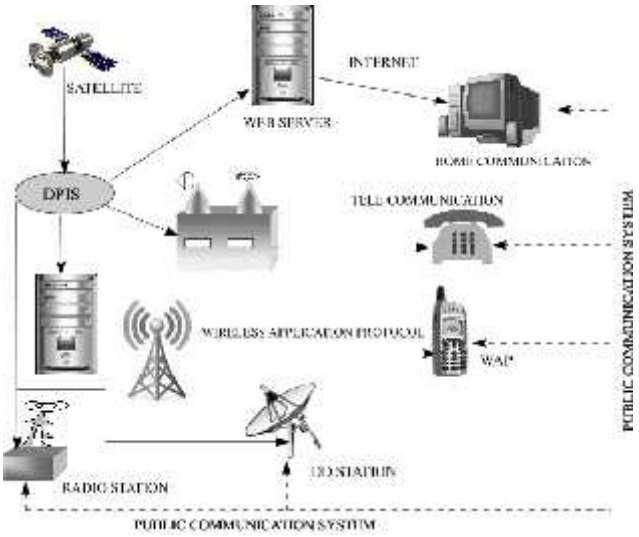

Figure 5 IT based integrated Disaster Communication System

Motivation and Evacuation System (MES)

Evacuation is a very important task in the disaster preparedness program. It is well operated with the infrastructural readiness with respect to information system and structural and equipment set-ups. Online GIS assisted with GPS and advanced communication system help the system to locate the segregated patches of risk with shortest route of approach. Evacuating team should avail all sorts of alternate means in terms of vehicle, equipments and shelters etc to accommodate the displaced ones.

A prompt warning system may not, in most cases, able to expedite self-evacuation process to safer places. Unprecedented detachment from the place of life and livelihood protect

common people not to leave their houses. They require effective counseling by the team of local volunteers. The volunteers should be trained with the art of risk time motivation, which they can impart it upon people successfully. For community evacuations local disaster managers provide information to the public through the media. In some circumstances, warning methods like sirens or telephone calls are also used. The amount of time required is dependent on the hazard type. If it is a cyclone or flood, there may be some hours or days in hand to get ready for evacuation. However, many disasters do not allow the people to avail some minutes to evacuate. Evacuation plans are structured considering the efficient evacuation time, full, fast and complete evacuation, and alternate location for temporary settlement (Fig 6).

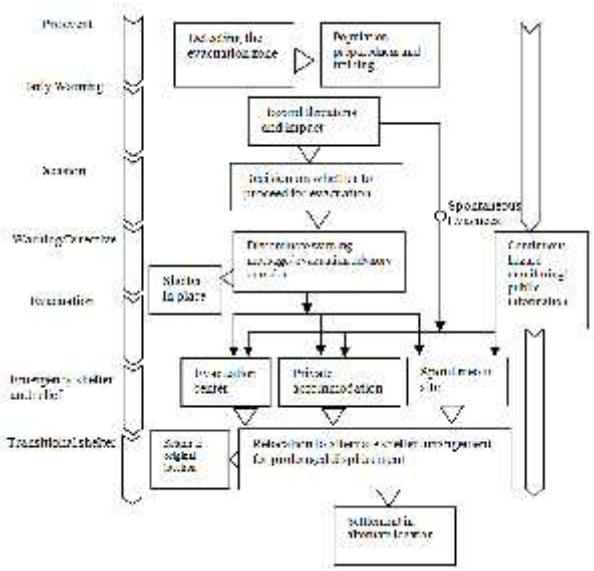

Fig-6 Evacuation flow chart (Modified after IDMC)

CONCLUSION

Preparedness programme in disaster management is just like a preventive measure for consequences. It is a framework of readiness to tackle the effects of a forecasted disastrous event to minimize loss of life, injury and property. A sound preparedness may also handle the post disaster distresses through rescue, relief and rehabilitation operations, and other services in the aftermath of the disaster. Disaster preparedness works in a domain of prediction, prevention of disasters and mitigates their impact on vulnerable populations.

Embedded with risk reduction measures it can check disastrous situations and also save maximum lives and livelihoods during any disaster situation. Disaster preparedness is a continuous and integrated process resulting from a wide range of risk reduction activities and resources rather than from a distinct sectoral activity by itself. It requires the contributions of many different areas ranging from training and logistics, to health care, recovery, livelihood to institutional development.

A good preparedness outline depends upon thorough disaster risk assessment that in true sense delivers accurate disaster information about individual locations and their vulnerability to hazard types. A compressive disaster preparedness programme (CDPP) can be empowered by the proper disaster risk assessment to facilitate decision making followed by planning and execution of readiness. Operated in two stages, pre disaster and post disaster; the preparedness programme functions in the structural framework of Disaster Prediction System (DPS), Disaster Warning System (DWS), Disaster Communication System (PCS), Motivation and evacuation system (MES).

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