UTTAR PRADESH
STATE DISASTER MANAGEMENT PLAN FOR EARTHQUAKES

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List of Acronyms

ADM	-	Additional District Magistrate
BSNL	-	Bharat Sanchar Nigam Limited
BMTPC	-	Building Material & Technology Promotion Council
CDO	-	Chief Development Officer
CPCB	-	Central Pollution Control Board
CWC	-	Central Water Commission
DCR	-	District Control Room
DM	-	District Magistrate
Dy.SP	-	Deputy Superintendent of Police
DMC	-	Disaster Management Cell
EOC	-	Emergency Operations Centre
ESF	-	Emergency Support Function
FCR	-	Field Control Room
GOI	-	Government of India
HPC	-	High Powered Committee
IMD	-	Indian Meteorological Department
NDMP	-	National Disaster Management Plan
ORS	-	Oral Re-hydrated Solution
PAC	-	Provincial Armed Constabulary
RSAC,U.P.	-	Remote Sensing Applications Centre Uttar Pradesh, Lucknow
SDM	-	Sub-Divisional Magistrate
SP	-	Superintendent of Police
SSP	-	Sr. Superintendent of Police
S & R	-	Search and Rescue
STD	-	Subscriber Trunk Dialing
SAR	-	Search and Rescue
SRC	-	State Relief Commissioner
UN	-	United Nations
UNDP	-	United Nations Development Programme
UPSEB	-	Uttar Pradesh State Electricity Board
UPSRTC	-	Uttar Pradesh State Road Transport Corporation

Chapter I
Introduction

1.1 Preface

Disaster

An event natural or man-made, sudden or progressive, which impacts with such severity that the affected community has to respond by taking exceptional measures.

Disaster Management

An applied science which seeks, by the systematic observation and analysis of disasters to improve measures relating to prevention, mitigation, preparedness, emergency response and recovery.

Earthquake

An earthquake is a sudden and temporary vibration set up on the earth's surface, ranging from a faint tremor to a wild motion, due to the sudden release of energy stored in the rocks beneath the earths surface. Earthquake is a form of energy of wave motion which originates in a limited region and then spreads out in all directions from the source of disturbance.

Earthquakes usually last for a few seconds to a minute. Sometimes, the vibrations are so feeble that we can not feel them, whereas the violent earthquakes result in huge material loss and the loss of human lives.

The point within the earth where earthquake-waves originate is called the focus and from the focus the vibrations spread in all directions. They reach the surface first at the point immediately above the focus and this point is called the epicenter. It is at the epicenter where the shock of the earthquake is first experienced.

It is, however, evident that no earthquake can possibly originate at a mere point alone. Earthquakes occur beneath the surface of the earth, where the rocks yield suddenly, of course, after prolonged build-up of stresses. They are often associated with fault-lines, which provide a zone of fracture and easy yielding. Earthquake emerges at various depths, which may be anywhere in the crust or as far as 700 km down into the mantle.

Due to the sudden yielding of rocks to stresses, waves of energy are sent out through the earth. These waves of energy are called seismic waves. The seismic waves emerge in the focus of an earthquake and radiate outward, like ripples produced when a stone is thrown into a pool of water, gradually losing energy.

India has been witnessing disasters since times immemorial. Earthquake has been among the most devastating natural phenomenon. About 56%

area of our country is prone to earthquakes. According to Paul (2002) the earthquakes are un-preventable and unpredictable. The impact of earthquake is sudden with little or no warning. During the last 100 years India has lost about 1,00,000 lives due to earthquakes on an average of about 1000 lives per year. In 1905 Kangra earthquake (of magnitude 8.0) in Himanchal Pradesh 20,000 lives perished within seconds. In 2001 about 13,800 lives were lost in Gujarat due to Bhuj earthquake, together with hundred of thousand of houses collapsed or severely damaged in each event. One can imagine its impact on survivors and the economy of the region affected by earthquake (Arya, 2004).
India is divided into four seismic zones. The Himalaya mountain is particularly vulnerable to high seismicity so are the vast stretch of the plains (Ganga Plain) fronting the mountain are where more than 40% of the Indian population lives.

The Indian sub-continent is subjected to varying degrees of earthquake hazard, which is amply demonstrated by the fact that more than 650 earthquakes in excess of magnitude 5 have been recorded from the Indian territory during the last one century. Majority of these events were located in the Himalayas, seismically the most active continent-continent collision zone which accounts for approximately 15% of global yearly seismic energy release. Four great earthquakes i.e. the 1897 Shillong earthquake, the 1905 Kangra earthquake, the 1934 Bihar-Nepal earthquake and the 1950 Assam earthquake occurred in this belt in a short period of about 53 years. During the period of 1990-2005, India has witnessed six major earthquakes that struck both the Himalayas and the relatively tranquil peninsular shield. These include 1991 Uttarkashi earthquake, 1999 Chamoli earthquake, 1993 Killari earthquake, 1997 Jabalpur earthquake, 2001 Bhuj earthquake and 2005 Pakistan earthquake which caused damage in Jammu & Kashmir as well. Bhuj earthquake in 2001 caused severe damage in Gujarat.

1.2 A Brief Profile of Uttar Pradesh

Most of the state of Uttar Pradesh lies in the Gangetic Plain and has a population of 16,61,98,000 according to 2001 census and has an area of 240,928 sq. km. There are 71 districts, 312 tehsils, 820 blocks and 107452 villages. The State has population density of 690 per sq. km. (as against the national average of 312). Uttar Pradesh is bounded by Nepal and Uttarakhand on the North, Himachal Pradesh on the north west, Haryana on the west, Rajasthan on the south west, Madhya Pradesh on the south and south- west, and Bihar on the east and Jharkhand on the south east. Situated between 23^{o} 52'N and 30^{o} 25'N latitudes and 77^{o} 3' and 84^{o} 39'E longitudes, this is the fourth largest state in the country. A part of Uttar Pradesh has been separated and formed into a new state Uttarakhand on November 9th 2000.

Uttar Pradesh can be divided into two distinct hypsographical regions :

1. The Gangetic plain
2. The Vindya hills and plateau in the south

Geologically this region is a fore-deep, a downwarp of the Himalayan foreland, of variable depth, converted into flat plains by long-vigorous sedimentation.

Earthquakes have occurred in mostly all parts of Uttar Pradesh. Major earthquakes in the neighboring states of New Delhi, Uttarakhand, Bihar and from across the Indo-Nepal border have also shaken many parts of Uttar Pradesh.

Intensification of various developmental activities in earthquake prone areas like rapid urbanization, industrial growth, installation of capital intensive hydel and nuclear power projects etc., have also brought in new challenges before the earth science community. The planners, engineers and technical administrators now require more precise and micro-level data related to earthquake than a few decades back when an earthquake data list for a particular area or a regional seismic zoning map was considered adequate for the purpose.

Although occurrence of an earthquake cannot be predicted precisely in terms of time or place, yet the seismic zones are very well drawn and careful planning, design and the appropriate measures can minimize the damaging effects. Earthquake is an unavoidable unpredictable infrequent phenomenon. Its parameters are its location, its destructive energy and the depth of focus below ground level. Earthquakes destroy buildings and infrastructure with secondary effects, i.e. fires, embankment failure, release of poisonous gases, release of nuclear radiation, liquefaction etc. and the losses may some times be much more than as a direct consequence of earthquake itself. Earthquake disaster mitigation planning must take both the primary and secondary effects into consideration.

For effective earthquake disaster mitigation, the pre-earthquake phase needs to be utilized for planning and implementing preparedness measures on the one hand and working our preparedness activities on the other. Earthquake in itself is not a disaster. Disaster is caused due to failure of man-made structures, lack of preparedness and awareness; so far, earthquake disaster mitigation efforts are mostly reactive. Disaster prevention, mitigation and preparedness are better than disaster response. The first step towards the direction of disaster preparedness is risk assessment. There is a need to proceed from hazard assessment to vulnerability analysis and ultimately generation of earthquake risk maps/figures.

Earthquakes are being monitored by India Meteorological Department, Survey of India, National Geophysical Research Institute, Department of Earthquake Engineering, University of Roorkee and several other academic and research organizations. Macro level map has been prepared which helps in classifying the country into the earthquake hazard zones. The vulnerability Atlas gives State and district-wise hazards to buildings and other infrastructure due to natural disasters. The disaster can be made much worse due to the vulnerability of the community itself. Vulnerability assessment of buildings, structure/infrastructure, lifelines, economy and people shall be undertaken in UP.

Prevention is by permanent protection including engineering and other physical protective measures combined with appropriate non-structural measures for reducing damage, and also legislative measures in controlling land use and urban planning.

The major preparedness activities are developing damage scenario, disaster mitigation cells for selected urban and rural areas, and reducing vulnerability of existing infrastructure.

1.3 Objectives

The objectives of State Disaster Management Plan are given below:

i) To significantly reduce the risks of loss of life, injuries, economic losses and destruction if, in the future a damaging earthquake strikes Uttar Pradesh or near by region with (adverse effects on Uttar Pradesh as well).

ii) To promote a culture of preparedness by ensuring that Disaster Management receives the highest priority at all levels.

iii) To devise appropriate guidelines and strategies for applying existing scientific and technical knowledge and available resources for timely response and recovery.

iv) To improve the capacity of the state to mitigate the effects of an earthquake.

v) To foster scientific and engineering endeavors aimed at addressing critical gaps in knowledge.

vi) To substantially increase public awareness to earthquake disaster risk and about do's and don'ts before, during and after an earthquake.

vii) To ensure that community is the most important stakeholder in the Disaster Management process.

viii) To plan recovery in such a way that it brings back the community to a better and safer level than the pre-disaster stage.

ix) To evolve a coordinated strategy for earthquake disaster risk reduction in U.P. with the involvement of all the stake holders in earthquake disaster management (administration, line departments, scientists, engineers, PRIs, NGO, CBOs and above all the community)

Chapter II
Vulnerability Assessment of the State

2.1 Indian Situation

Facts about Earthquakes in India

A list of some of the significant earthquakes in India and their locations are given below :-

Date	Epicentre	Magnitude
1819 June 16	Kutch, Gujarat	8.0
1869 Jan 10	Near Cachar, Assam	7.5
1885 May 30	Sopore, J&K	7.0
1897 June 12	Shillong Plateau	8.7
1905 April 4	Kangra, Himachal Pradesh	8.0
1918 July 8	Assam	7.6
1930 July 2	Dhubri, Assam	7.1
1934 Jan 15	Bihar Nepal Border	8.3
1941 June 26	Andaman Islands	8.1
1943 Oct 23	Assam	7.2
1950 Aug 15	AP-China Border	8.5
1958 July 21	Anjar, Gujarat	7.0
1957 Dec 10	Koyna, Maharashtra	6.5
1975 Jan 19	Kinnaur, Himachal Pradesh	6.2
1988 Aug 21	Bihar-Nepal Border	6.4
1991 Oct. 20	Uttarkashi	6.6
1993 Sept. 30	Latur-Osmanabad, Maharashtra	6.3
1997 May 22	Jabalpur, MP	6.0
1999 March 29	Chamoli, Uttar Pradesh	6.8
2001 Jan 26	Bhuj, Gujarat	7.9
2004 Dec. 26	West Coast of northern Sumatra in Indonasia & caused tsunami on Indian coast	9.0

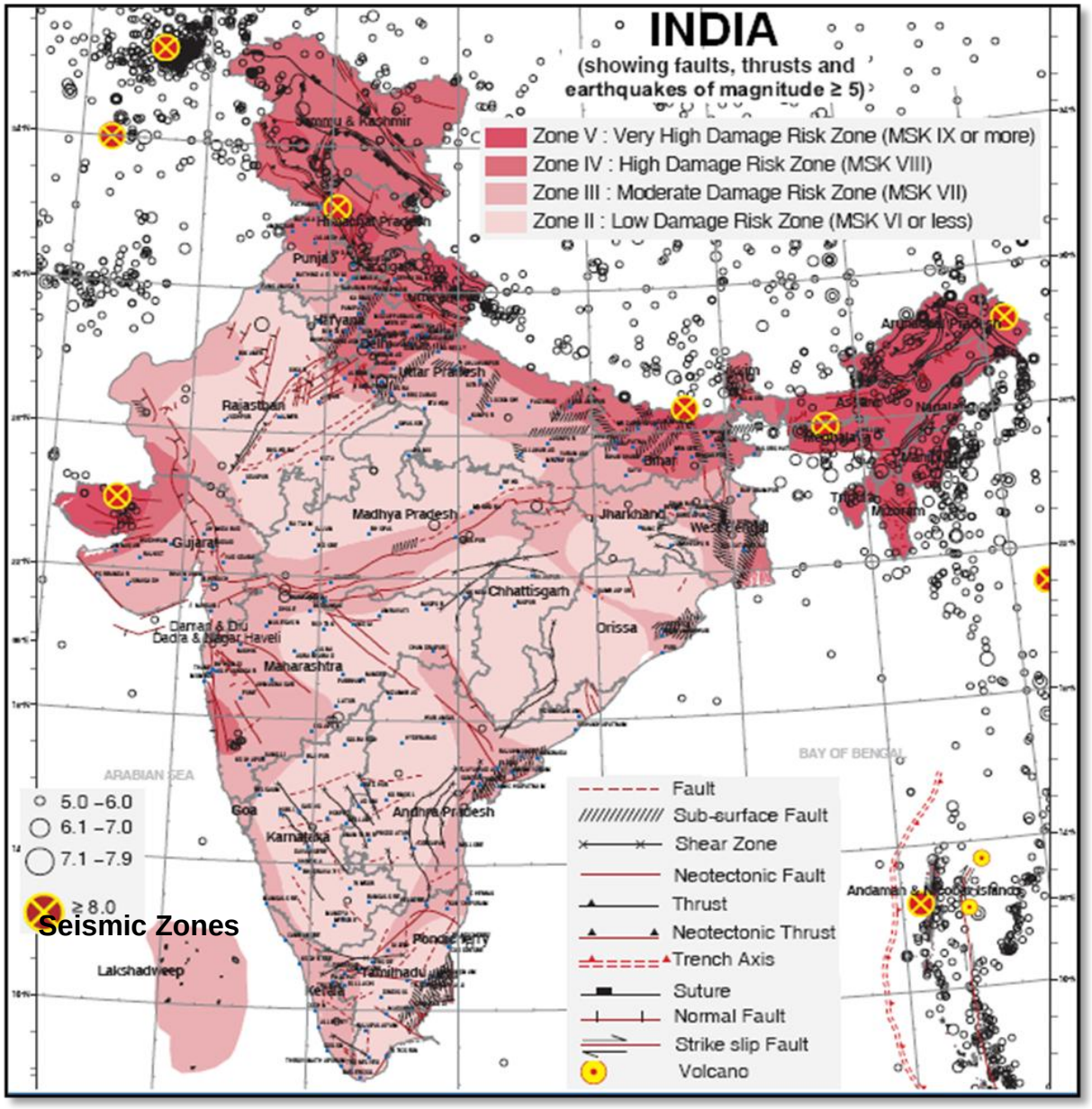
2005	Oct.	08	Muzaffarabad, PoK (Pakistan occupied Kashmir) J & K in India was effected	7.6

Killer Earthquakes in other parts of the world in the current year 2010

2010	Jan.,	12	Port Au Prince, Haiti (Carrabian Nation)	Magnitude 7.0
2010	Feb.,	27	Maule Region,Chile	Magnitude 8.8

Seismic Map of India

(As per Vulnerability Atlas of India by BMTPC)



2.2 State wise Seismic Zonation

States & U.Ts	Intensity MSK	Seismic Zone
Andaman & Nicobar Islands	MSK IX or more	Zone V
Arunachal Pradesh	MSK IX or more	Zone V
Assam	MSK IX or more	Zone V
Bihar	MSK V to IX or more	Zone V
Gujarat	MSK VI to IX or more	Zone II, III & V

Himachal Pradesh	MSK VIII to IX or more	Zone IV & V
Jammu & Kashmir (Jk)	MSK VIII to IX or more	Zone IV & V
Manipur	MSK IX or more	Zone V
Meghalaya	MSK IX or more	Zone V
Mizoram	MSK IX or more	Zone V
Nagaland	MSK IX or more	Zone V
Tripura	MSK IX or more	Zone V
Uttar Pradesh	MSK V to IX or more	Zone II, III, IV & V
West Bengal	MSK VI to IX or more	Zone II, III, IV & V
Chandigarh	MSK VIII	Zone IV
Delhi	MSK VIII	Zone IV
Haryana	MSK VI to VIII	Zone II, III & IV
Maharashtra	MSK V to VIII	Zone II, III & IV
Punjab	MSK VI to VIII	Zone II, III & IV
Rajasthan	MSK V to VIII	Zone II, III & IV
Sikkim	MSK VIII	Zone IV
Andhra Pradesh	MSK V to VII	Zone II & III
Dadra & Nagar Haveli	MSK VII	Zone III
Daman & Diu	MSK VII	Zone III
Goa	MSK VI to VII	Zone II & III
Karnataka	MSK V to VII	Zone II & III
Kerala	MSK VI to VII	Zone II & III
Lakshadweep	MSK VII	Zone III
Madhya Pradesh	MSK V to VII	Zone II & III
Orissa	MSK V to VII	Zone II & III
Pondicherry	MSK VI to VII	Zone II & III
Tamil Nadu	MSK V to VII	Zone II & III

The Maximum Intensity on Modified Mercalli Scale considered for the Five Zones are
MSK IX or more in Zone V
MSK VIII in Zone IV
MSK VII in Zone III
MSK VI in Zone II.

In the revision of the seismic zones in year 2000, the seismic **Zone I has been merged in Zone II** by BIS Seismic Zoning Committee, hence there are now four zones only number II, III, IV & V.

2.3 Earthquake History of Uttar Pradesh

Most of the state of Uttar Pradesh lies in the Gangetic Plain and geologically this region is a fore-deep, a down warp of the Himalayan foreland, of variable depth, converted into flat plains by long-vigorous sedimentation. This Indo-Gangetic Geosyncline has shown considerable amounts of flexure and dislocation at the northern end and is bounded on the north by the Himalayan Frontal Thrust. The floor of the Gangetic trough (if see without all the sediments) is not an even

plain, but shows corrugated inequalities and buried ridges (shelf faults). Beneath Uttar Pradesh, run the Delhi-Haridwar Ridge (DHR), trending NNE-SSW along New Delhi to the Garhwal region. The Delhi-Muzaffarnagar Ridge (DMR), which trends east to west, running from New Delhi to Kathgodam, in Nepal. The last ridge is the Faizabad ridge (FR), which runs in a curved manner, first east to west from Allahabad to Kanpur and then starts to bend towards the north-east towards Lucknow and carries on in this direction towards the Himalayas in Nepal. The depression that forms between the Delhi-Muzaffarnagar Ridge (DMR) and the Faizabad ridge (FR), forms the West Uttar Pradesh shelf in the west and the Sharda Depression in the east. The region to the south of the Faizabad ridge, forms the East Uttar Pradesh shelf. There are several faults in the region, among them the Moradabad Fault which trends NE-SW and the Bhairwan Fault in the vicinity of Allahabad. Apart from these there are east-west running tear faults in the region that control the courses of the main rivers. Earthquakes have occurred in mostly all parts of Uttar Pradesh. Major earthquakes in the neighbouring states of New Delhi, Uttarakhand, Bihar and from across the Indo-Nepal border have also shaken many parts of Uttar Pradesh (Figure 1, 2, 3,4,5). However, the proximity to faults does not necessarily translate into a higher hazard as compared to areas located further away, as damage from earthquakes depends on numerous factors such as subsurface geology as well as adherence to the building codes (http://asc-india.org/seismi/seis-uttar-pradesh.htm).

Since the earthquake database in India is still incomplete, especially with regards to earthquakes prior to the historical period (before 1800 A.D.), these zones offer a rough guide of the earthquake hazard in any particular region and need to be regularly updated.

Largest Instrumented Earthquake in Uttar Pradesh
10 October 1956 –

Bulandshahr District (Uttar Pradesh), 6.2 (IMD)

15 : 31:36 UTC, 28.20N, 77.70E

One of the most powerful earthquakes in Uttar Pradesh struck the districts of western Uttar Pradesh at 21:01 IST on October 10th, 1956. The massive shock was centred near Jehangirpur, in Bulandshahr District. No fatalities were reported. The shock was also strongly felt at Delhi, where there was some minor damage.

Significant Earthquakes in Uttar Pradesh

The following list briefly outlines known earthquakes in this region. General locations are provided for historical events for which "generalized" epicentral co-ordinates are available. Some events which were significant for other reasons are also included (http://asc-india.org/seismi/seis-uttar-pradesh.htm)

Acronyms Used:

D=Depth, **OT**=Origin Time, **Mw**=Moment Magnitude, **Ms**=Surface Wave magnitude, **Mb**=Body Wave Magnitude, **ML**=Local Magnitude, **M?**=Magnitude Type unknown, **SSA**= Seismological Society of America **NEIS**= National earthquake information centre**, IMD**= Indian meteorological department, **HRV**= Harvard University Catalogue, **TS**=Time Series Catalogs

15 July 1720 - New Delhi, Delhi, M7.6 (GSHAP Catalog) 28.66N, 77.25E

The last major earthquake in the New Delhi region. Heavy damage in the city.

1 September 1803 - Northern Garhwal region, Possibly Chamoli district, now in Uttarakhand, M > 7

Epicentral location unknown

This earthquake is believed to be one of the strongest earthquakes in this region. Between 200 - 300 were killed in this shock and several villages were buried by landslides and rock falls. Tremors were felt as far away as Kolkata. Liquefaction was reported at Mathura.

28 August 1916 - Western Nepal, Mw 7.1 (SSA), Ms 7.3 (SSA), 7.5 (TS), 06:29:30 UTC, 30.00N, 81.00E

This major earthquake was centred near Mount Api. It caused damage to some masonry buildings at Dharchula, now in Uttarakhand.

7 October 1920 - NW of Sasaram, Rothas District (Bihar-U.P. Border region), 5.5 (KISS) 23.00N, 83.80E

6 November 1925 - Rae Bareili-Sultanpur District border, 6.0 (TS) 19:20:45 UTC, 26.50N, 81.50E

15th January 1934 - India-Nepal Border Region, Mw 8.0 14:21 IST / 08:43 UTC, 26.50N, 86.50E

Among the deadliest earthquakes in Indian history. Close to 10,500 were killed in Bihar. Damage occurred in eastern Uttar Pradesh, at Allahabad, Lucknow, Varanasi and many other places.

8 November 1952 - Indo-Nepal Border region (Bahraich-Gonda Districts), 6.0 (TS)

10:41:54 UTC, 27.90N, 82.20E

29 August 1953 - Indo-Nepal Border region (Bahraich-Gonda Districts), 6.0 (TS)
01:58:25 UTC, 27.90N, 82.20E

4 September 1954 - West of Pokhara, Central Nepal, 6.75 (TS)
06:45:14 UTC, 28.30N, 83.80E

10 October 1956 - Bulandshahr District (Uttar Pradesh), 6.2 (IMD)
15:31:36 UTC, 28.20N, 77.70E

One of the most powerful earthquakes in Uttar Pradesh struck the districts of western Uttar Pradesh at 21:01 IST on October 10th, 1956. The massive shock was centred near Jehangirpur, in Bulandshahr District. No fatalities were reported. The shock was also strongly felt at Delhi, where there was some minor damage.

27 August 1960 - Gurgaon-Faridabad Districts (Haryana), 6.0 (TS)
15:58:59.20UTC, 28.20N, 77.40E

Damage from this earthquake extended into New Delhi where at least 50 people were injured. Structural damage was reported in Karol Bagh and cracks in houses in R.K.Puram.

24 December 1961 - Indo-Nepal Border region (Pilibhit, Nainital, Kheri Districts), 6.0 (TS)
07:13:30 UTC, 28.80N, 81.50E

1 June 1965 - West of Gorakhpur, (Gorakhpur-Basti Districts), 5.7 (TS)
07:52:30 UTC, 27.00N, 83.00E

15 September 1966 - South of Moradabad, (Moradabad-Rampur Districts), 5.8 (TS)

02:15:33.80 UTC, 28.70N, 78.90E

29 July 1980 - Western Nepal, Mw 6.8 (HRV)

14:58:40 UTC, 29.60N, 81.09E

Between 150 - 200 persons were killed and hundreds injured. Extensive damage in several towns in western Nepal. The quake also caused damage in Pithoragarh area, nearly 50 kilometres away from the epicentre. 13 persons were killed here and 40 were injured. The quake was felt as far away as Kathmandu and New Delhi.

21 October 1991 - Near Pilang, Uttarkashi District (now in Uttarakhand), Mw 6.8 (NEIC)

21:23:14 UTC / 02:53:14 IST, 30.78N, 78.77E

Between 750 to 2000 people killed in the Garhwal region. It was also felt very strongly in Uttar Pradesh, Chandigarh, Delhi, Haryana and Punjab. Some minor damage was reported in Chandigarh and New Delhi.

29th March 1999 - Near Gopeshwar, Chamoli District (now in Uttarakhand), Mw 6.5 (HRV)
19:05:11 UTC, 30.492N, 79.288E

115 people killed in the Garhwal region. The quake was felt very strongly in Uttar Pradesh, Chandigarh, Delhi and Haryana. In Haryana, one person was killed in the city of Ambala and 2 at Nakodar in the neighbouring state of Punjab. Minor damage to buildings in New Delhi, most significantly in **Patpatganj.** Minor damage also reported from Chandigarh.

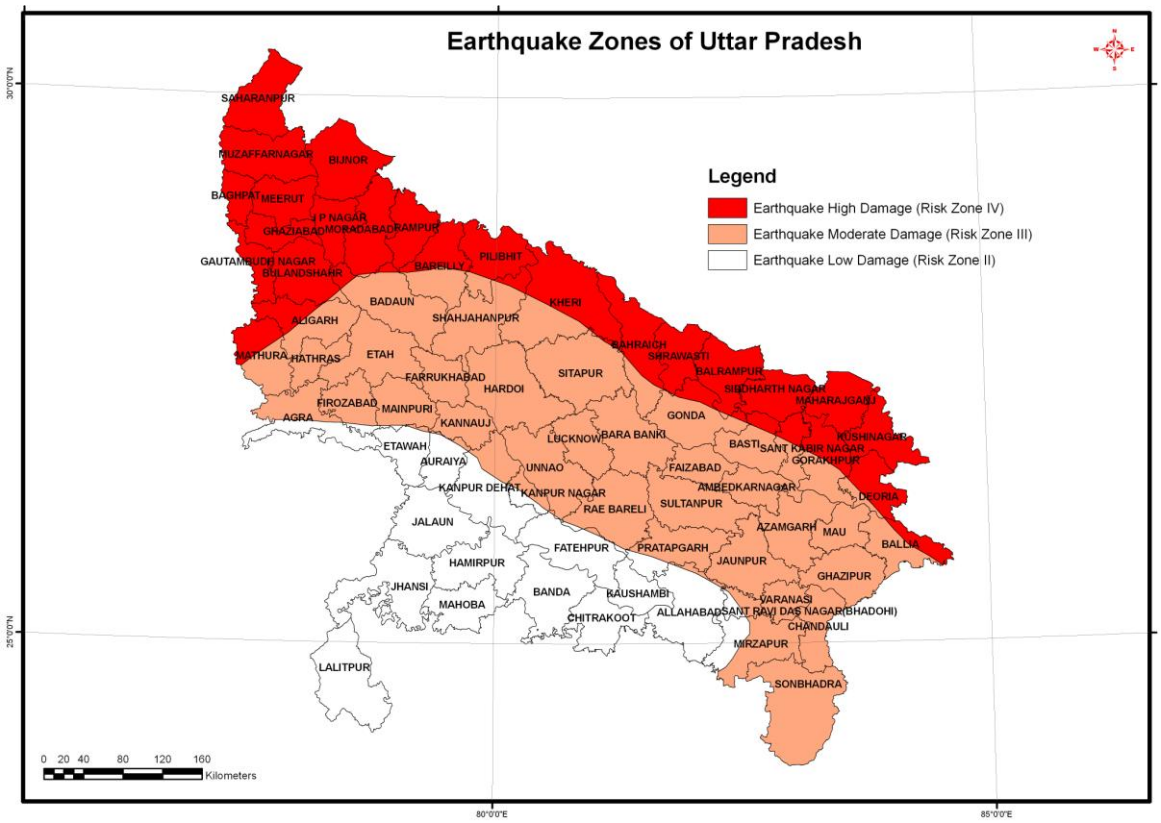
18 October 2007 - Gautambudhnagar, Uttar Pradesh, M 3.6

05:54:41 UTC, 28.300 N, 77.600 E

A mild earthquake struck the district of Gautambudhnagar in western Uttar Pradesh, India, on 18 October 2007 at 11:24 AM local time. It had a magnitude of M?=3.6 and caused minor damage in the epicentral region.

2.4 Vulnerability of Uttar Pradesh to Seismic Hazard

Uttar Pradesh is India's most populous state, quite and a large part of this state lies in Earthquake High Damage Risk Zones IV and III.



(As per Vulnerability Atlas of India by BMTPC)

Table I: List of districts of Uttar Pradesh falling in Earthquake Damage Risk Zones (on the basis of Vulnerability Atlas of India by BMTPC)

Districts completely falling in Earthquake Damage Risk Zone IV		Districts partly falling in Earthquake Damage Risk Zones IV & III		Districts completely falling in Earthquake Damage Risk Zone III		Districts partly falling in Earthquake Damage Risk Zone III & II		Districts completely falling in Earthquake Damage Risk Zone II	
Sl. No.	District Name	Sl. No	District Name	Sl. No.	District Name	Sl. No.	District Name	Sl. No	District Name
1.	Baghpat	1.	Aligarh	1.	Ambedkar Nagar	1.	Agra	1.	Banda
2.	Bijnor	2.	Bahraich	2.	Azamgarh	2.	Allahabad	2.	Chitrakoot
3.	G.B. Nagar	3.	Ballia	3.	Barabanki	3.	Auriya	3.	Hamirpur
4.	Ghaziabad	4.	Balrampur	4.	Chandauli	4.	Etawah	4.	Jalaun
5.	J.P. Nagar	5.	Bareilly	5.	Etah	5.	Firozabad	5.	Jhansi
6.	Kushinagar	6.	Basti	6.	Faizabad	6.	Fatehpur	6.	Kaushambi
7.	Maharajganj	7.	Budaun	7.	Farrukhabad	7.	Kanpur (Deha	7.	Lalitpur
8.	Meerut	8.	Bulandshahar	8.	Kashiram Nagar	8.	Kanpur (Naga	8.	Mahoba
9.	Muzaffarnagar	9.	Deoria	9.	Hardoi	9.	Mainpuri		
10.	Rampur	10.	Gonda	10.	Lucknow	10.	Mirzapur		
11.	Saharanpur	11.	Gorakhpur	11.	Ghazipur	11.	Pratapgarh		
12.	Siddharth Nagar	12.	Pilibhit	12.	Jaunpur	12.	Raebareli		
		13.	Lakhimpur Khiri	13.	Kannauj	13.	St. Ravi Das Ngr.		
		14.	Mathura	14.	Mahamaya Nagar	14.	Unnao		
		15.	Moradabad	15.	Mau				
		16.	Shahjahanpur	16.	Sonbhadra				
		17.	Shravasti	17.	Sultanpur				
		18.	Sitapur	18.	Varanasi				
		19.	St. Kabir Nagar						

2.5 Risk and Vulnerability Assessment and Microzonation

Risk is a technical concept aimed at estimation of losses in the event a disaster and the expected probability of its occurrence. The probability of harmful consequences, or expected losses resulting from interactions between natural hazards (e.g. earthquake) or human induced hazards and vulnerable conditions". Threat is a more abstract concept while risk is an expression of perceived threat in specific terms.

The risk assessment includes an evaluation of all elements that are relevant to an understanding of the existing hazards and their effect on specific environment. There are several steps in risk assessment based on the related processes of hazard mapping vulnerability analysis. They establish- nature, location and scale of risks to society and its assets. This information can assist decision makers in decision what can and should be protected and up to what level.

Vulnerability assessment is a subset of risk assessment, which analyses differential vulnerability of communities in differential areas of disaster impact (such as increasing or decreasing degree of hazard proneness).

Seismic microzonation

Seismic microzonation is defined as the process of subdividing a potential seismic or earthquake prone area into zones with respect to some geological and geophysical characteristics of the sites such as ground shaking, liquefaction susceptibility, landslide and rock fall hazard, earthquake-related flooding, so that seismic hazards at different locations within the area can correctly be identified. Microzonation provides the basis for site-specific risk analysis, which can assist in the mitigation of earthquake damages. In most general terms, seismic microzonation is the process of estimating the response of soil layers under earthquake excitations and thus the variation of earthquake characteristics on the ground surface.

Regional geology can have a large effect on the characteristics of ground motion.The site response of the ground motion may vary in different locations of the city according to the local geology. A seismic zonation map for a whole country may, therefore, be inadequate for detailed seismic hazard assessment of the cities. This necessitates the development of microzonation maps for big cities for detailed seismic hazard analysis. Microzonation maps can serve as a basis for evaluating site-specific risk analysis, which is essential for critical structures like nuclear power plants, subways, bridges, elevated highways, sky trains and dam sites. Seismic microzonation can be

considered as the preliminary phase of earthquake risk mitigation studies. It requires multi-disciplinary contributions as well as comprehensive understanding of the effects of earthquake generated ground motions on man made structures. Many large cities around the world have put effort into developing microzonation maps for the better understanding of earthquake. hazard within the cities.

GSI, University of Allahabad, Banaras Hindu University and IIT Kanpur, IIT, Roorkee, RSAC-UP, Lucknow should be involved for carrying out seismic microzonation of the city and towns of Uttar Pradesh falling in Earthquake Damage Risk Zones IV & III.

2.5.1 Remote Sensing

Remote sensing based studies can provide following inputs for seismic zonation work and

(i) Remote sensing data can be utilized for detection, delineation, characterization and demarcation of the regional extent of the major faults and other tectonic features.

(ii) Identification of geological and topographical conditions can also be done using Remote sensing data, which could enhance the motion characteristics.

(iii) Remote sensing data can also help in recognizing the discrete tectonic surfaces along which neotectonic activity has been recorded/interpreted. This input is necessary because any adjustment along these features in the event of a future earthquake would enhance the hazard level because of the ground rupture and its effects on constructions which are directly located on these surfaces.

(iv) High resolution satellite images of Cartosat1, Cartosat 2, Ikonos, Quickbird ,Worldview1 & 2 satellites can also be interpreted and analyzed for detailed infrastructure mapping including identification and demarcation of road infrastructure This spatial information (in the form of maps) will be of immense utility in identifying the pockets of high rise buildings, highly congested, moderately congested and least congested areas of the city. This information can be used for microzonation and vulnerability analysis.

2.5.2 Geographical Information System

GIS based database can be an important input for District Disaster Management Action Plan. In the event of a disaster in an area the decision makers can utilize the health facility database for knowing the location of nearest hospitals and their connectivity to the affected area and available paramedical staff, number of ambulances, equipments and other resources in these hospitals. This kind of database can certainly help the decision makers/ disaster managers in enlisting the medical aid and mobilizing paramedical

workers within a relatively short span of time. Stockpiling the food grains received from various sources (for distribution among disaster affected community) remains a big problem for relief workers. Here, the disaster managers can utilize the GIS based database for immediately identifying the warehouses in the vicinity of disaster affected area. Food grains received (as relief) from various agencies can be transported and stored in these warehouses as per their capacity. The attribute data in GIS database about the capacity (in number of bags) of these warehouses and their distance from the base warehouse can be further utilized in better managing the transportation, storage and distributions of food stocks in disaster affected area (Uniyal, 2007).

2.5.3 Seismic Zonation Studies: International Status

Seismic zonation studies have been carried out in Japan, Mexico, California (USA) etc. The natural period of the soil was the parameter considered in order to distinguish seismic zones in Mexico and design coefficients have been suggested accordingly.

The Berkeley Digital Seismic Network (BDSN) is a regional network of very broadband and strong motion seismic stations spanning northern California and linked to UC Berkeley through continuous telemetry. This network is designed to monitor regional seismic activity at the magnitude M 3 level as well as to provide high quality data for various research projects in regional and global broadband seismology. As noted above, all BDSN sites are equipped with three-component broadband sensors and three-component strong motion accelerometers. (Wielandt and Streckeisen, 1982; Wielandt and Steim, 1986). In general, the BDSN stations record continuous data at .01, 0.1, 1.0, and 20.0 samples per second and triggered data at either 80 or 100 samples per second using the Murdock, Hutt, and Halbert event detection algorithm (Murdock and Hutt, 1983). In addition to the 6-channels of seismic data, signals from thermometers and barometers are recorded at nearly every site.

Dorostion (2007) analysed the relationship between the seismicity and tectonics of Afganistan and discussed earthquakes in an area bounded by 29^{o} -38^{o} N and 37^{o} -58^{0} E, including Afghanistan, the eastern Iran, Western Baluchistan, North-western Pakistan, Southern Turkmenistan, Uzbekistan and Tajikistan. Based on earthquakes that occurred from 819AD to 2004, the seismicity maps are provided. By overlapping different informations on the regional fault map a seismotectonic map for the area is constructed. Therefore there are microzones with different seismic activity not uniformly distributed; this could be due to the different structures and history of their tectonic developments.

2.5.4 Seismological Observatories, Seismic Zonation Studies: National status

Indian Metrological Department (IMD) operates a network of seismological observatories spread all over the country. There are 45 national seismological stations and 13 special purpose observatories. The network is being strengthened and upgraded to the standards of Global Seismograph. As far as the issue of seismic zonation studies in India is concerned it can be said that only a few studies have been carried out for seismic zonation. After Jabalpur earthquake, GSI has carried out seismic zonation study in Jabalpur, Microzonation studies in Dehradun is in progress. Digital telemetric seismic Network has been setup in Kumaun Himalaya by Department of Geology, Kumaun University, Nainital for determination of accurate hypo central parameters for local and regional earthquakes, evaluation of earthquake source mechanisms, identification and mapping of faults, lineaments and seismotectonic elements and finally for the estimation of seismic hazards in the region.

Central Building Research Institute, Roorkee has setup a strong motion seismograph network for Delhi. They have carried out site studies.
Seismic zonation of the Delhi region for bedrock ground have been carried out by Sharma et.al (2004). Liquefaction studies for seismic microzonation of Delhi region have been carried out by Rao et.al (2007). Centre for Earth Science, Indian Institute of Science, Banglore & NGRI, Hyderabad is also carrying out seismological studies in various parts of India. NGRI, Hyderabad Faculty of Engineering and Technology of RBS College, Bichpuri, Agra and Department of Applied Science & Humanities, GLA Institute of Technical and Managment, Mathura are also carrying out seismological studies in Agra-Mathura area of Uttar Pradesh.

2.5.5 Urgent Need for Seismological Observations and Microzonation Studies for the cities and townships of Uttar Pradesh

About 52 districts of Uttar Pradesh are completely or partly falling in Earthquake Damage Risk Zone IV and or III. I view of this there is an urgent need to take up the work of risk, hazard & vulnerability assessment and microzonation in Uttar Pradesh. The existing old seismological observatories of IMD in various locations of Uttar Pradesh should be modernized and be replaced with a new state of the art Digital Seismic Telemetric Network.
Microzonation Studies for the following cities and townships of Uttar Pradesh should be taken up on priority basis through the direct involvement of a consortium of research institutions and scientific organization based in Uttar Pradesh and elsewhere in the country.

Table II: List of districts of Uttar Pradesh completely falling in Earthquake Damage Risk Zones IV and partly falling in Earthquake Damage Risk Zones IV & III

Districts completely falling in Earthquake Damage Risk Zone IV		Districts partly falling in Earthquake Damage Risk Zones IV & III		Districts completely falling in Earthquake Damage Risk Zone III	
Sl. No.	District Name	Sl. No	District Name	Sl. No.	District Name
1.	Baghpat	1.	Aligarh	1.	Ambedkar Nagar
2.	Bijnor	2.	Bahraich	2.	Azamgarh
3.	G.B. Nagar	3.	Ballia	3.	Barabanki
4.	Ghaziabad	4.	Balrampur	4.	Chandauli
5.	J.P. Nagar	5.	Bareilly	5.	Etah
6.	Kushinagar	6.	Basti	6.	Faizabad
7.	Maharajganj	7.	Budaun	7.	Farrukhabad
8.	Meerut	8.	Bulandshahar	8.	Kashiram Nagar
9.	Muzaffarnagar	9.	Deoria	9.	Hardoi
10.	Rampur	10.	Gonda	10.	Lucknow
11.	Saharanpur	11.	Gorakhpur	11.	Ghazipur
12.	Siddharth Nagar	12.	Pilibhit	12.	Jaunpur
		13.	Lakhimpur Khiri	13.	Kannauj
		14.	Mathura	14.	Mahamaya Nagar
		15.	Moradabad	15.	Mau
		16.	Shahjahanpur	16.	Sonbhadra
		17.	Shravasti	17.	Sultanpur
		18.	Sitapur	18.	Varanasi
		19.	St. Kabir Nagar		

Microzonation studies for above mentioned areas should be taken up by providing funds to a consortium of GSI Lucknow, IMD New Delhi; Deptt. of Earth and Planetary Sciences University of Allahabad, Deptt. of Geophysics, Banaras Hindu Universit;, Deptt. of Earthquake Engineering IIT Roorkee Deptt. of Civil Engineering IIT Kanpur; NGRI, Hyderabad and Remote Sensing Applications Centre-U.P. Lucknow.

2.6 Forecasting, warning and alert system

Till date forecasting and warning has not become possible in the case of earthquakes. More precisely speaking, we can't predict the exact timing of an earthquake. However the Earthquake Damage Risk Zones are well defined for the state of Uttar Pradesh. Detailed Seismological Observations and Microzonation studies can help researchers to take up advanced studies to better understand the pattern of earthquakes. Furthermore, the database generated through such studies will certainly be valuable for the future researchers who may work on developing the forecasting, warning and alert system for earthquakes.

2.7 Access to Information

Earthquake hazard, vulnerability and risk related information should be made available on state website. Website to be converted to emergency website within x hours of declaration of warning or disaster. Regular updates to be given thereafter. Information pertaining to earthquake hazard, vulnerability and risk should be provided even to the concerned Village and Ward Disaster Management Committees. General public should also be sensitized about it through TV / Radio programs and print media.

2.8 Indigenous Knowledge

Traditional knowledge of earthquake resistant housing should also be acknowledged and be combined with the modern technical know how. Peculiarities of local food, clothing, socio-cultural habits, sanitary habits for different areas of the state should be included in the state website.

Chapter III

Preventive Measures

Disaster prevention covers measures aimed at impeding the occurrence of a disaster event and/ or preventing such an occurrence having harmful effects on communities. It is important to note here that the occurrence of an earthquake can't be impeded. However the harmful effects of an earthquake on population can be minimized through a number of measures.

3.1 Action taken by the State Government after 1991 Uttarkashi Earthquake

Uttarkashi (Uttarakhand) was a part of U.P. in 1991 and the State Govt. after 1991 Uttarkashi earthquake disaster decided that all the completely damaged houses should be reconstructed with earthquake resistance provisions and to achieve it manuals of earthquake resistance provisions were prepared by Roorkee University. Public Works Department. Rural Development, Housing-Board of U.P. Govt., BMTPC(Building Material Promotion Council), Urban Development Govt. of India., & HUDCO, and were distributed and the people / masons were trained to adopt earthquake resistance technique. Not only this video presentations and pamphlets distribution were made in the affected areas to educate the masses and the masons.

3.2 Prevention and Mitigation Strategy

The problem of protecting the population is intimately related to the safety of buildings whether for housing, education, health, recreation, religious activities, business or industries. The risk is indeed High for northern, and northeastern districts of Uttar Pradesh. The strategy for protection can be divided into sensitization of planners and decision makers, strengthening of existing stock of buildings and second, that of the new ones to be constructed for additional population or as replacements, or for development of facilities and awareness generation among masses.

3.2.1 Sensitization of Disaster Managers, Planners and Decision Makers

Sensitization of planners and Decision Makers can immensely help in minimizing the harmful effects of earthquake on communities. The first and foremost is creating proper awareness to the policy makers, administrators, engineers, architects as well as the general public the main elements of which are the following:

All concerned persons, authorities, officers and public should be sensitized about the following:

i) Names of districts completely and or partially falling in Earthquake Damage risk Zones IV and III and tehsils and blocks of some of the districts which are partially falling in the above earthquake damage risk

zones. The present house types in the Earthquake Damage Risk Zones IV and III (as per Table II) need to be surveyed in detail and retrofitting of such houses should be taken up.

ii) All the new houses to be constructed in the future particularly in the areas falling in the Earthquake Damage Risk Zones IV or III, should be constructed with elements of earthquake resistance without exception. The additional expenditure in building new houses with earthquake resistant design (to avoid collapse during earthquake) may not exceed about 4 to 10 percent. But to make them earthquake resistant after construction will be very much more costly. And not to make them earthquake resistant at any time may lead to total loss including deaths and injuries of the occupants during a future earthquake. Furthermore, simple methods of making buildings earthquake resistant need to be illustrated and models/prototypes should be built as examples and be displayed during local fairs.

Following should be the Specific target groups to be included under the Programme for Sensitization of planners and Decision Makers:

- Members of State, District and Tehsil Crisis Management Committees, PRIs, municipal bodies and Village Disaster Management Committees should be sensitized about the need to adopt earthquake resistance measures and modalities to implement it. They should also be made aware of the measures, provisions and techniques for earthquake resilience. (**Implementing Authority/Departments: Relief Commissioner, Divisional and District Administration).**

- Specific skill development programmes on earthquake resistant design of buildings and civil engineering structures should be organized for the engineers of PWD, Irrigation Department, State Bridge Corporation, Nagar Vikas, Uttar Pradesh Avas Vikas Parishad, Rural Develoment, Nagar Nigam and Jal Nigam.

- Awareness regarding adoption of earthquake resistance design of buildings could be created through training programs for BDO's village level workers and through display of earthquake resistance design wherever it is adopted.

<u>It should be made mandatory to adopt earthquake resistant design in all the buildings constructed either by the government through subsidies such as Indira Awas Yojanas, or HUDCO loans etc.</u> In such constructions, the seismic 'bands' may be kept visible in finished buildings so that the people could see them and learn. (**Implementing Departments: Disaster Management Cell, Aliganj Lucknow, Housing & Urban Development, Uttar Pradesh Avas Vikas Parishad, Rural Develoment, Nagar Nigam).**

Details pertaining to the location being seismically active or not, and the nature of the threat

Building Material and Technology Promotion Council (BMTPC), GoI has published a 'Vulnerability Atlas of India' which provides district wise information on

- Monitoring of Hazards
- Hazard Mapping
- Disaster Risk Assessment and Mapping
- Prediction and Forecasting
- Building Guidelines
- Retrofitting of Existing unsafe Buildings

The cost of the Atlas is Rs.3000/- and can be obtained by sending a demand draft for Rs.3000/- plus Rs.200/- as postage to the BMTPC.

3.2.2 Earthquake resistant construction:

(a) Construction of buildings without earthquake resistance provisions in seismically hazardous areas falling in seismic zones IV & III is suicidal. Killari-Usmanabad disaster is the glaring example. Codes of Bureau of Indian Standards covering different aspects of earthquake resistant design of buildings are now available for earthquake resistant construction. The relevant codes shall be given a vide circulation among public, various organisations, departments and agencies involved in building construction. One set of such standards should be made available in each division, district and sub-division permanently. Show-How manuals should be widely circulated and distributed. **(Implementing Authority/Department:- Relief Commissioner, Divisional and District Administration, Housing)**

(b) Not only buildings but other constructions such as bridges, culverts, retaining walls, bundhs , dams, overhead tanks, spurs etc. must have earthquake resistance provisions. (**Implementing Departments: Irrigation, State Bridge Corporation, Nagar Vikas ,Uttar Pradesh Avas Vikas Parishad, Rural Develoment, Nagar Nigam, Jal Nigam, PWD,)**

3.2.3 Ownership wise Responsibility of Earthquake Resistant Construction

Another type of subdivision could be ownership wise i. e. government buildings, buildings of public sector undertakings and projects and private buildings A proper strategy has to be worked out for the above which should be effective in terms of safety and efficient in terms of cost.

(i) Government Buildings

All buildings and bridges to be constructed under government sector in the districts or parts of districts falling in the Earthquake Damage Risk Zones IV & III (Table II) should follow the Indian standers listed in along with relevant construction codes **(Annexure I & II)**. The Chief Engineers (of PWD, Irrigation and other state government departments involved in civil engineering constructions) looking after the districts falling in of the Earthquake Damage Risk Zones IV & III should have a design cell each with staff trained in earthquake resistant design and construction so as to incorporate the appropriate earthquake safety measures in all buildings and other civil engineering structures.

Existing government buildings and bridges without earthquake resistant design should be examined afresh and retrofitted to avoid serious damage or collapse in case of future earthquakes. Technical assistance in this regard may be obtained from Central Building Research Institute Roorkee, Department of Earthquake Engineering Roorkee, Department of Civil engineering IIT Kanpur. Special funds will be needed for retrofitting existing buildings and structures but for all new constructions (in Earthquake Damage Risk Zone IV & III) provision of funds for elements of earthquake resilience should be made in their original estimates only.

(ii) Public Sector, Projects, Semi Government Buildings

It should be made incumbent upon them, by legislation if found necessary to do so, to construct all their new buildings in Earthquake Damage Risk Zones IV & III to be earthquake resistant as per the codes or **Bureau of Indian Standards** (BIS) and also ensure safety of existing building by proper retrofitting within a certain time limit, say 5 years.

(iii) Private Housing

Public should be encouraged to build new houses or buildings with earthquake resistant design right in the beginning so that the stock of unsafe buildings does not increase any further. This can be done by giving incentives and through awareness. Concessional loans for earthquake resistant construction can be one such measure. Municipal byelaws should be suitably amended for the towns following in Earthquake Damage Risk Zone IV & III to ensure strict adherence to earthquake resistant design of new buildings incorporate earthquake resisting requirements. Also the people

should be encouraged to use at least minimum retrofitting measures to make their homes collapse proof. Good amount of literature in the people language in simple illustrated form will have to be produced for this purpose and buildings centres may have to be established at district headquarters under the P.W.D. or Rural Engineering Department for the proper working of such centres, these officers should be made personally responsible.

(Implementing Departments : PWD, Rural Engineering Housing and Urban Development, Nagar Nigam, Banks, Literature distribution work by Relief Commissioner's office)

3.2.4 Prioritization of Upgrading of Seismic Resistance

Retrofitting of existing buildings and structures for their seismic resistance upgrading will be a time consuming and costly process in view of the large stock of unsafe ones. Therefore the work shall better be taken up according to certain priorities which may be based on the consideration of seismicity and the use-importance of the buildings or the structure.

i. Following priority order may be followed fist in the districts falling in the districts or parts of districts falling in the Earthquake Damage Zone IV followed by those districts falling in the zone Earthquake Damage Zones III (Table II)

ii. Hospitals; educational and telecommunication buildings; water supply installations; Bridges of strategic and/or economic importance; Dharmshalas and other community buildings where people gather in large numbers and which could act as shelters in times of need and should essentially be retrofitted by the departments which own them.

iii. Fire Brigade Office, Police Station, State Emergency Operations Centre, District and Tehsil Control rooms, District and sub Divisional officers, and living quarters of administrative, medical and police officers who should survive the earthquake to keep the moral high and serve the people in need in post earthquake period; other bridges and civil structures in the area.

A program on early identification earthquake unsafe buildings should be carried out in each district for assigning priorities to the buildings for retrofitting and estimating the retrofitting costs in all the sectors and providing the budgets.

3.2.5 Mitigation Plans on the basis of Risk

Earthquake resistance measures should be included in existing Master-Plan for the cities and towns of seismic zone IV and zone III, with help of **Housing Development, Urban Development, P.W.D. & Irrigation Deptt.**

Country Town Planner will provide all the help for the preparation of the Master Plan, and amendments of existing Master plan where ever they exist. The main focus in the Master Plan should be on the earthquake disaster mitigation but the hazard of floods should also not be ignored. The Commissioner will be the Chairman of Disaster Mitigation Authority in his Mandal & the District Magistrate will be Deputy Chairman. The authority should be responsible for the planned development in the field of all types of constructions such as housing, roads, bridges, tanks any type of structure in the area covered by the Master-Plan. The step shall be taken to provide legal validity to the creation of Disaster Reduction Authority to the Master- Plan.

(Implementing authorities: Deptt. of Housing, P.W.D., Irrigation, Country & Town Planner the Relief Commissioner & Divisional Commissioner.)

For Urban centres lying in zones IV, III and II the bye-laws for mandatory earthquake provisions will be framed. Classifications of blocks & urban areas in the seismic zones shall be done and mandatory earthquake provisions will be applied in rural areas also. The building regulation must contain the mandatory earthquake provisions and technique in building construction. The vulnerable sites shall not be allowed to be the place for developmental activities or housing activities. No building plan shall be passed if the building plan violates the provisions regarding earthquake disaster reduction & earthquake resistant technique.

(Implementing authorities: Deptts. of Housing, Rural & Urban Development.)

Earthquake resistant measures will be made applicable in all the constructional activities by persuasion, motivation & where need be by laws and penal action. The Indian Standard Code shall be translated into Hindi & show-how manuals regarding earthquake resistant provisions will be prepared. The technology cell at the Mandal level may also include local cultural need and sensitivity in home design. It will be the responsibility of Relief Commissioner to intimate the technique and provisions of earthquake resistant design & also the developments research finding in earthquake resistance technique. Architectural planning considering resistance quality of construction & maintenance & six IS codes shall form the basis. **(Implementing authorities: Relief commissioner & District Magistrate.)**

The State Govt. will take action to strengthen communication network

of police radio, hot-line, telephone, teleprinter, NIC, etc. Over & above this the communication network needs further expansion. The block office, PHCs, CHCs, district hospitals & tehsil offices, military establishment and hospitals in the vulnerable areas will be connected on the state information network. Reliable communication network capable of working on a stand alone may be established for speedy communication in a disaster situation. Feasibility study for providing HAM radio network in the citizen band linking remote villages within block head quarters & subsequently with the district Headquarters shall be carried.

All the districts are having disaster-plans. The districts of seismic zone IV & III need to immediately amend/add paras concerning earthquake disaster mitigation on the basis of the literature provided to them and the findings & exchanges of ideas in the workshop & other training material. Every year the disaster plan should be updated.

It will be ensured whenever a new District. Magistrate takes charge of the district he shall immediately familiarise with the district disaster management plan & organise a districts. level exercise, rehearsal & drill involving all concerned including NGOs to update preparedness. The Relief Commissioner office will ensure its compliance in all strictness. Every year District Magistrate will give the certificate to Relief Commissioner that they have updated the disaster plan & made exercises, rehearsal & the drill. There should be a disaster plan at the village level also. The total village population participation shall be there. The emphasis will be on the villagers themselves preparing & equipping to meet any eventuality in the time bf disaster in the most vulnerable areas. They shall be equipped with necessary first aid medicines & debris-removal-implements. The District Magistrate shall urge the village community & Panchayats to make plan from themselves with the help of geologists & professionals available in the district.

Sub-centres & PHCs shall be activated for strengthening pre-hospital management. Brick system used by Armed Forces (in which everything including medicine etc. required for ten patients are kept) shall be accepted by the State Govt. The district plan will include the total number of beds available and beds to be made available in case of death, in civil & army hospitals, & also the use of ambulances & medical services available, with the Civil & the Army in close cooperation during the disaster.

A clear itinerary or map will be available at block & tehsil level indicating vulnerable villages and their route so that medical team could reach easily at the destination. There will be introduction of

information desk in civil and military hospital at intermediate & base level to provide all essential information to govt., relatives of the injured & dead. Only at base hospital in case of army hospital & district hospital, blood transfusion facilities shall be made available. The district medical officer of health shall start a campaign to register voluntary donors.

3.2.6 Earthquakes and Technology

It is not a question of numbers – how many died is not the issue. That people did die is the issue.

The issue is not even that of technology. The fact that many buildings have survived intact while those around them fell like ninepins is enough to demonstrate that given sound construction, the tragedy could have been avoided.

Who is to blame for this system? Each one of us – the builder, the engineer, the architect; the politician, the official; the media, the media managers; and even those who lived in these buildings that collapsed have contributed to sustaining this system. Just as equally are to blame those of us who had the know-how and now blame the system, but do not raise voice against it.

Earthquake proof structures

Structures can be designed and constructed to withstand a particular intensity of earthquake. The cost of making structures earthquake proof is high. Therefore, only some specific types of structures such as atomic power stations, dams, refineries where consequences of a damage to the structures are serious need be designed to make them earthquake proof, normal residential building can be made earthquake resistant.

Earthquake resistant structure

It is a structure that does not collapse during an earthquake though, at times, it may suffer damage. The idea is to prevent the structure from collapsing so that lives and valuable kept in the structure are saved. The damaged part can be repaired at a fraction of the cost that one would have to incur in making the structures earthquake proof. In extreme circumstances

The exact method depends upon the type of the building being designed, however there are some general principles, which are followed.

These are :

- Structures should not be brittle. It should not collapse suddenly. Rather it should be tough and should be able to deflect or deform considerably.
- Resisting elements such as bracing or shear walls must be provided evenly throughout the building, in both directions, side-to-side as well as top to bottom
- All elements such as walls and the roof are tied together to retain integrity of the structure during shaking of the structure because of the earthquake. Pathways are provided in the building to enable forces to get transmitted across connections and thereby separation of parts is prevented.
- Special care is taken of the foundation. It is tied together well as well tied firmly with the walls.
- Material used during construction should be of good quality and should be protected from debilitating effects of rain, sun, insects etc.

Process of making existing structure earthquake resistant

This process is called retrofitting.

B.I.S. Standards on making structures earthquakes resistant

There are 9 nos. of such standards and one companion special publication issued by Bureau of Indian Standards. (Annexure-II)

Effects of Earthquakes Multi-Storied Buildings

It is sad that false rumors are being spread that Multi Storied Buildings are unsafe in Seismic zones. This is far from the truth and Multi Storied Buildings could be made safe in Earthquake zone as well. (The catch is that they must be designed for appropriate level of intensities and properly analysed, designed and constructed). We should recall that even in San Fransisco and Tokyo, which are as severely, seismic as India, Multi Storied Buildings' thrive.

If the Building Industry has not adopted proper procedures in the architecture, analysis, and design and detailing, it was mainly because they did not read/interpret the warning clauses of the IS 1893 code properly. Also majority of people in construction industry are not even aware of appropriate earthquake engineering analysis. Therefore the damages seen due to Bhuj earthquake need not be only due to poor materials or avarice, though they must have played their part in contributing to the damages, but could also be due to sheer ignorance.

The architectural design of Multi Storied Buildings with the open parking space for vehicles at ground floor could be the main culprit followed by inappropriate method of modeling for analysis. Such buildings are termed as Systems with Flexible First Storey in earthquake engineering parlance. They would be subjected to torsion movements with the exterior corner columns subject to a lot of distress as earthquake produces motion in all directions (usually assumed as two perpendicular components in horizontal direction plus one in vertical direction).

Remedy

- The districts of Uttar Pradesh falling in the Earthquake High Damage Risk Zone IV following remedial measures should be taken:

  Important and Special Structures would anyway be handled by experts as is being done already. It is the case of most Buildings which cannot be handled individually by experts, we should lay out clear guidelines.

- Use the provisions of Draft revision of IS 1893 as a minimum
- Use proper modeling to do analysis of a three dimensional system to take care of torsion. Architects should better minimize torsion.
- Provide ductility in the system so that complete collapse is avoided
- Starting with important structures, make a scientific study to check whether they need strengthening. This is a must in priority regions like Gauhati and Shillong.

3.2.7 Indian Standards in the fields of Earthquake Engineering are (Annexure I & Annexure II, III & IV)

1. IS 1893 (Part 1): 2002 'Criteria for Earthquake Resistant Design of Structures'

This standard (Part 1) deals with assessment of seismic loads on various structures and earthquake resistant design of buildings**.** Its basic provisions are applicable to buildings; elevated structures; industrial and stack like structures; bridges; concrete masonry and earth dams; embankments and retaining walls and other structures. Temporary elements such as scaffolding, temporary excavations need not be designed for earthquake forces. This standard does not deal with the construction features relating to earthquake resistant design in buildings and other structures (**Annexure-I**).

2. IS 4326:1993 'Earthquake Resistant Design and Construction of Buildings – Code of Practice'

The standard provides guidance in selection of materials, special features of design and construction for earthquake resistant buildings including masonry construction, timber construction, prefabricated construction etc. (**Annexure-II**).

3. IS 13827: 1993 'Improving Earthquake Resistance of Earthen Buildings – Guidelines.

The guidelines covered in this standard deal with the design and construction aspects for improving earthquake resistance of earthen houses, without the use of lime, cement asphalt etc. (**Annexure-III**).

4. IS 13828: 1993 'Improving Earthquake Resistance of Low Strength Masonry Buildings – Guidelines

This standard covers the special features of design and construction for improving earthquake resistance of buildings of low-strength masonry (**Annexure-IV**).

5. IS 13920: 1993 'Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces-Code of Practice'

This standard covers the requirements for designing and detailing of monolithic reinforced concrete buildings so as to give them adequate toughness and ductility to resist severe earthquake shocks without collapse (**Annexure-V**).

6. IS 13935: 1993 'Repair and Seismic Strengthening of Buildings – Guidelines'

This standard covers the selection and materials and techniques to be used for repair and seismic strengthening of the buildings damaged during earthquake.

In addition to these standards, there is a special publication of BIS numbered SP 22: 1962. Explanatory Handbook on Codes for Earthquake Engineering (IS 1893: 1975 and IS 4326 : 1976), which provides information on the source interpretation/explanation to certain clauses and worked out examples to illustrate the application of codal provisions whenever required.

Detailed criteria for earthquake resistant design of buildings is given in **Annexure II.**

Performance of Geogrid Reinforced Soil (GRS) Wall in earthquake prone area

GRS wall is a flexible structure, which retains the vertical soil filling with the slab weight of the soil mass reinforced with layers of Geogrid. The facia is either segmentally connected RCC precast panels or PCC Blocks, acting as a hinged structure with tongue and groove connection. The facia is not an integral part of the structure and is provided to prevent soil erosion only. Whereas, RCC retaining wall is a rigid structure, which retains vertical soil fill between two rigid RCC cantilever slab, kept in equilibrium against overturning / tilting.

During an earthquake, the tectonic force express itself on the ground through an accelerated horizontal ground movement associated with heaving or subsidence depending on the frequency of the quake. This rapid shake is most effectively adopted within a gravity structure if the same is flexible soil mass, following a sieve shaker model, allowing greater compaction, and reduced dilation of soil due to presence of confining membrane, such as Geogrids.

Whereas, with a rigid structure like RCC walls, the threshold stress increase dramatically setting in rupture of the slab, as well as inducing overturning of the entire system, since they are not self adjusting due to rigidity.

In particular reference to a Flyover approach or Railway Over Bridge structure having twin parallel Walls, the behavior of RCC and GRS Retaining wall structures under seismic load can be analysed as follows :

GRS wall is a flexible structure constructed using compacted soil fill and reinforced with layers of Geogrid. In the case Geogrid is used as reinforcement having an open mesh structure, which allows interlocking of constituent and surrounding soil mass. Therefore the immediate vicinity of soil mass undergoes a confinement expressed by a Pseudo-cohesive forces. The stress-strain behavior of Geogrids shows that they are also non-linear visco-elastic material and the stress-strain characteristics of Geogrids with the soil bound aggregates is found compatible at about 2-5% strain level, whereas the Geogrid failure strain may be as high as 13-15%. As a result the reinforced soil mass and the retained soil form a monolithic structure and exhibit similar geotechnical strain compatible characteristics. Since both are constructed using compacted soil fill they behave as a ‘Tuned structure’ under seismic load. Under vertical and horizontal vibration load the soil get even more compacted, as a result of which the structure reverberates but becomes horizontally stable. The increased horizontal force effect is taken care during designing based on the known care during designing based on the known potential of earthquake records (i.e. zone of quake, etc).

In all GRS wall foundations, treatment with a load distribution mattress is a standard practice. Due to the presence of this oriented Geogrids reinforced

foundation (flexible foundation) the vertical heaving and/or subsidence may be controlled substantially due to readjustment of load vectors within the stress absorption level of the overall structures.

These aspects are amply illustrated from experience of Kobe earthquake and Great Hanshin Earthquake on January 17, 1995. Due to the effect of devastating Kobe earthquake, only the performance of GRS-RW structures was satisfactory after the, while all other unreinforced conventional RCC / Masonry structures were damaged extensively. Besides, the above several structures completed using TENAX Geogrids have withstood the effects of earthquake successfully. A few of the projects are shown below:

Rehabilitation of Koyna Bridge abutment (Maharashtra) located on SH 78 at km 84/800 in seismic Zone-IV is using TENAX GRS wall technique encapsulating the cracked return wall. The project was completed in Yr.1996 and its performance in seismic Zone-IV, which is vulnerable to frequent earthquake, is very satisfactory in spite of repeated after shocks, including recent ones.

Many Flyovers and Railway Over Bridges have been built and are being built in Uttar Pradesh in seismically active zones, using TENAX geogrid reinforced soil system more and more, especially considering that India lies in a highly seismically active zone. The flexibility of reinforced soil structure provides resistance to the structure, even under high intensity earthquakes, while preventing any collapse of structures.

Variables

Variables need to be considered while designing structures are such as.

- Shape of the building. Different shaped buildings behave differently. Geometric shapes such as a square or rectangle usually perform better than buildings in the shape of an L,T,U, H, +, O, or a combination of these.
- Various materials used to construct the buildings can be used. Each material behaves differently. Ductile materials perform better than brittle ones. Examples of ductile materials include steel and aluminum. Examples of brittle materials include brick, stone and unstrengthened construction material.
- Height of the building. Different heights shake at different frequencies
- Soil beneath the building
- Regional topography
- Magnitude/duration of the quake
- Direction and frequency of shaking

- The number of earthquakes the building has previously had and the kinds of damage suffered, if any
- Proximity to other buildings
- Intended function of the building (e.g. hospital, fire station, office building).

3.2.8 Awareness generation among masses:

Public awareness and education is most needed aspect as well as sensitive. The following action is to be taken :-

(I) The district media campaign must include disaster mitigation and contingency plan education with special focus on earthquake. Adequate fund may be considered to be provided to actively pursue this activity.

(II) At the time of melas, fares, exhibitions specially at the village level posters, audio-visual presentations brochures etc. shall be made available in simple local language. Special leaflets be prepared in various aspects like do's and don't's beore, during and after an earthquake, epidemics, general hygiene and primary health, family planning etc. and be made available to such places/ events.

(III) There shall be regular talk / presentation on Radio/TV to increase general awareness regarding earthquake hazards and investigation. Relief Commissioner may also instruct local radio stations and TV channels to broadcast /television programme on do's and don't's beore, during and after an earthquake.

(IV) Disaster mitigation shall be included as a component in urban based and rural based special programmes such as universal-literacy, education for all, family planning programme, ICDS etc. Since the functionaries working under these plans visit villages regularly & have good rapport with the villagers, their active involvement in the disaster mitigation programme will increase its effectiveness.

(V) After the members of Crisis Management Groups at the state, district, tehsil and village level the other government officials, NGOs, CBOs and PRI members shall also be given training at the at state, district, tehsil and municipality e various line departments such as Rural Development , Health & Family Planning, Social Welfare, Women & Child Development, Education. etc. The training and awareness literature shall be provided by the Relief commissioner and DMC to the District Magistrate.

(Implementing authorities are Relief Commissioner, Govt. of U.P., various line deptt. & District Magistrate.)

(V) The students and children are the harbinger of new idea & change because of their scientific temper. If the School curriculum at the middle school, high school & intermediate level include lessons on the natural phenomenon & disaster mitigation. The message will go to every house.

(Implementing authorities Relief Commissioner, Deptt. of Education)

Do's during an earthquake

Earthquake do not cause death – buildings do. Falling heavy objects or collapsing of walls and roofs hurt people. The collapsing walls and the vibrations can cause short circuiting of live electric wires and cause electric fires. A burning gas stove left to itself too can cause fire. Hence the following steps are advised :

- Keep calm
- Keep away from windows, doors, almirahs, mirrors, balconies etc.
- Stay away from falling bricks or stones and try to get under a study table or a cot to avoid getting hurt by falling objects
- Switch off electric connections and gas connections
- If in open space avoid going near a tall building, street light lamppost, chimney, hoardings etc. These may fall upon you.

Chapter IV
Integration of Mitigation Measures with the Development Plan

The best way to Integrate the Mitigation Measures with the Development Plan can be through adoption of disaster resistant construction technologies specific to the kind of hazards in different areas. More precisely, it can be stated that for a particular hazard e.g. earthquake the earthquake resistant design should be incorporated in all the new buildings and civil engineering buildings in Uttar Pradesh to be constructed by government and private agencies or individuals particularly in the areas falling in Earthquake Damage Risk Zones IV & III (Table II). Adoption of earthquake resistant design technology in the planning of all the new civil engineering constructions will certainly mitigate the impact of earthquakes.
There is a harsh need to adopt earthquake resistant designs in various housing schemes presently being implemented in the state by different departments. **Rural Development Department shall ensure that earthquake resistant designs are incorporated into its following schemes.**

i. Indira Awas Yojna
ii. Mahamaya Awas Yojna
iii. Mahamaya Sarvajan Yojna

Uttar Pradesh Awas Vikas Parishad is following earthquake resistant designs in their housing schemes but they should ensure strict adherence to earthquake resistant designs in their various housing schemes including Kanshiram Shahari Awas Yojna being implemented in various city i.e. of Uttar Pradesh.

4.1 Adoption and Implementation of New Technologies in Earthquake Resistant Design of buildings

Now a days many new earthquake resistance design technologies are available. Such technologies should be adopted and implemented in the construction of new buildings and other civil engineering projects. Few such techniques are elaborated below:

4.1.1 Base Isolation Technology

Reducing the forces transmitted to the building from the ground by placing the building atop a mechanical system of isolators, sliders and dampers is

called 'base isolation technology'. This dampens the violent movements of the earth during a seismic event. By using isolators and dampers, the building is 'decoupled' from the ground motion of any earthquake and the transmission of seismic energy to the building is dampened.
This is done by lowering the vibrational frequency, allowing the building to move or displace. It is also done by lowering the shock acceleration thus reducing the tendency for the upper floors to move faster than the lower floors. In general, buildings that have been isolated in this way are subjected to $1/3^{rd}$ to $1/5^{th}$ of the horizontal acceleration to that of conventional structures during a seismic event. The isolator is a sand which of alternating layers of $1/4^{th}$ inch steel plate and $1/4^{th}$ inch rubber, which are valcanised to form a single integrated unit. It is able to displace horizontally in any direction by 24 inches from the centre.

4.1.2 Reinforcing Concrete

Reinforcing concrete to prevent it from cracking (to a certain extent) is nothing new. There are records to show that ancient civilizations used to make use of natural fibers to inhibit cracking in structure. Today, synthetic-fiber reinforcement is available to reinforce non-structural concrete applications with superior results. Currently, the most widely accepted form of reinforcement is Welded Wire Fabirc (WWF). It is a mesh of thick steel wires that is placed in concrete. However, synthetic fiber reinforcement avoids the increased labour, costs and difficulty in placement that are associated with WWF.

Small diameter synthetic fibres (nylon and polypropylene) are now being added to concrete in order reduce shrinkage and cracking by >80%, according to certain independent laboratory tests.

4.1.3 Disaster Resistant Pier System

A good foundation of the house is of immense help in making it disaster resistant. For manufactured houses, one option is a disaster resistant pier system, with stout members rigidly connecting the house's chassis to a slab, grade beam, or array of pads. Some systems incorporate lateral or diagonal bracing for greater resistance. Though often referred to as Earthquake Resistant Bracing (ERB) systems, these also resist high winds, frost heaves and floods. Not only are these systems cost-effective in reducing structural movement (compared to conventionally manufactured housing foundations) but they can even save lives and property.

4.2 Some measures for Integrating Development Schemes with Disaster Management Schemes

- Adoption of earthquake resistance measures in the construction of buildings shall be made compulsory in rural as well as urban areas falling in Earthquake Damage Risk Zones IV & III. Suitable provisions shall be made so that developmental authorities and local bodies shall approve building plans only when it confirms the adoption of earthquake resistance measures.
- Suitable action shall be taken for ensuring adoption of earthquake resistant design in the construction of govt. buildings. This may require only 5% to 10% additional cost (approximately). The earthquake resistance provisions are being applied broadly but its proper & complete implementation shall be ensured. It shall be specially looked into that no hospital, fire brigade, police and school buildings are constructed without earthquake resistance provision. Suitable instructions be issued in this regard to the departments of Health, Home, Primary Education, Secondary Education and Higher Education. School buildings can be used as shelter houses in the event of an earthquake. The govt. shall also consider for the enhancement of the construction cost of these schools according to the cost fixed for the construction of school buildings under the World Bank scheme.
- The Forest Department shall consider seriously the demand for the allotment / sale of the trees uprooted due to natural calamities like earthquake etc. to the people of the affected locality on the recommendation of Patwari & Gram Pradhan for making timber available for the construction/reconstruction of the houses with earthquake resistance measures.

Chapter V
Preparedness Measures

5.0 Preparedness Activities

The lessons learnt from various earthquakes in India regarding rescue and relief work and the shortcomings experienced in the process should be carefully and honestly noted and brought out, including such as the following:
Lack of communication and transportation, lack of personnel in terms of quantity and quality of training, deployment for V.I.P. visits, lack of motivation among the staff involved, political interference by various political parties and individuals, lack of professional help and non-availability of readymade shelter designs and shelter materials, lack of medical and engineering personnel etc.
Relief material, medical items, search and rescue equipments and shelter material are kept in readiness at various district headquarters and the concerned staff is well trained in their use. In times of need the manpower and material available within the district and also from the adjoining districts should be deployed immediately through telephonic contacts between the district authorities. The hierarchical structure for execution needs to be formalized for better coordinated. Coordination of all relief distribution is as important as its quantity and timely delivery; otherwise some places may receive it in duplicate and triplicate and some places remain completely starved.

To check on the preparedness once in a year say April 4, (the day of great Kangra earthquake), may be observed as 'the earthquake disaster prevention day' when drills may be conducted by the various line departments using the tools and equipment for rescue and sheltering and the public may be made aware of the preparedness by various departments and also about its responsibilities in a disaster situation. Participation of the people in such a preparedness program will be the key to its success (Arya, 1990).

The occurrence of an earthquake is a natural hazard over which man has no control at present. Its prediction with respect to precise time, place or intensity of occurrence is still not feasible. But this natural hazard gets converted into a disaster to the society only when the society fails to take care of its consequence. Enough experience has been gained world wide and researches carried out in India which give us confidence to construct earthquake resistant buildings and houses in the Earthquake High Damage Risk Zones. Computer based District wise GIS database of manpower and resources of various line departments and other agencies (government and

or private, NGO) should be prepared for effective and fast response in the event of an earthquake. Remote Sensing Applications, U.P. Lucknow should be provided funds to prepare GIS based database of manpower, available resources, urban congestion, critical facilities and road network of the districts headquarters and tehsil headquarters of U.P. falling in Earthquake Damage Risk Zones IV & III.

The necessary preparedness to face earthquake disaster, can be organized under the following heads :-

5.1 Technical Preparedness

This will include the following :.

a) Regulation for land use and building construction bye-laws.

b) Dissemination of information regarding appropriate technology for building construction and retrofitting in earthquake prone areas.

c) Formation of technical committee.

5.2 Social Preparedness

This will include following :

a) Training of the people in the vulnerable areas and NGO's and volunteers for generating awareness about earthquakes, health, hygiene and secondary hazards and other aspects such as response, rescue and adoption of earthquake resistant techniques for construction of buildings and retrofitting of existing buildings.

b) Identification, enlistment and registration of NGO's who can be entrusted with the earthquake disaster relief operations.

c) Identification and mobilization of resources including money for disaster relief from the people themselves.

5.3 Organization and administrative preparedness.

This will include the following :-

5.3.1 Formation of Crisis Management Groups/Disaster Management Committees at Regional, Macro and Micro Level

Formation of District Crisis Management Group (DCMG) at the district level, Tehsil Crisis Management Group (TCMG) at sub-division/ tehsil level and Village Disaster Management Committee (VDMC) at village level for disaster management.

5.3.2 Emergency Expansion Plan for Hospitals and Health Centres Emergency expansion plan for hospitals and health centres in earthquake

prone areas including, schemes for mobile medical teams for post-disaster situation.

Identification of hospitals in the vulnerable areas owned by Army, Govt. (both Centre and State), private hospitals and nursing homes, where earthquake victims shall be treated (**Action/Implementation: District Crisis Management Group**).

Prior reservation for earthquake victims must be done in all the nearby hospitals and nursing homes after receipt of first information about casualties due to earthquake. Oxygen, saline water, OT and life-saving drugs and medicines should be kept ready. Doctors and Para medical staff should be identified and posted in the hospitals located in Earthquake Damage Risk Zone IV & III. Training of Doctors and Para medical staff on earthquake incidence must be done. So far as earthquake is concerned, a trauma center should be developed in each of the district headquarter of those districts which fall in Earthquake Damage Risk Zones IV & III. Assessing the nature and number of injuries the bed facility, medicines, oxygen, bottles of saline water, life-saving drugs and medical expertise should be made available at the time of need. Contact numbers of local Air-force station should be available for carrying the seriously injured victims which require more care in Medical Colleges, Command Hospitals, AIMS and PGIs through helicopters. (**Action/Implementation: Health Department/District Crisis Management Group**).

5.3.3 Identification of Warehouses Identification of water houses of Supply Department as centres for storage of relief material and its distribution. (**Action/Implementation: Department of Civil Supplies)**

5.3.4 Emergency Communication Syatems Planning, updation and

.mobilization of existing radio communication resources in emergency and acquisitation of satellite phones to make them available at the district and tehsil headquarters which fall in Earthquake Damage Risk Zone IV.

5.3.5 Establishment of Building Centres

Building Centres should be established to train masons on earthquake resistant construction and techniques etc.

Earthquake brings in great devastation and is much different from other natural calamities. We can reduce the suffering at the time of disaster if prior preparation, both physically and psychologically, has been done.

5.3.6 Training of Functionaries

- The state administration should arrange periodical training programme for all concern functionaries and should also give instruction to all the District Administration for arranging training programmes for the concern department at their respective places. The trained officials should be interested to train other lower level officers and Panchayat representatives. Experts in different field may be invited to train the state and district level functionaries.
- Disaster Management Cell of UP Academy of Administration and Management, Lucknow shall train the State and District level officers on various aspects of disaster management.
- Rural Development department shall train the members of PRIs and sub-divisional, block, and village level functionaries and masses .
- Engineering colleges shall train Government Engineers at different level in Earthquake resistant techniques in construction and retrofitting of existing constructions. The foundation/professional courses of IAS officers allotted to the State cadre, PCS and other State services must be trained in all the relevant IS Codes and Earthquake resistant techniques.
- In every district in the vulnerable areas and building centers in the block headquarters should develop earthquake resistant techniques and they should in turn train the masons in this techniques.

5.3.7 Simulation exercises

- Periodic simulation exercises may be carried out to test the preparedness of the concerned stake holders. Drills may be carried out at various sites and levels. The shortcoming and weakness must be identified during exercises and eradicated with proper and timely action. PRIs or the Block or Village administration must be included in the hierarchy of Disaster Management. Past experiences have proved that people's participation can do miracles in Disaster Management. Zila, Khetra and Gram Panchayat should be motivated, and provided with basic necessary infrastructure and sufficient training in Disaster Management.
- Earthquake Disaster management techniques must be imbedded in all development schemes of the areas falling in Earthquake Damage Risk Zone IV & III.

5.4 Inventory of human resources :

Inventory of human resources may consist the following:

- Names and addresses of principal functionaries of all the concerned departments at the district level are to be kept in the State Emergency Operation Centre and District Control Room (DCR).
- Names and addresses of all key functionaries of all concerned departments at the district to be kept with the principal functionary of the department.
- List of available equipments and stores for rescue and relief operations for earthquake and their availability at various places-private and government be prepared and kept in the State Emergency Operation Centre and District Control Room (DCR) with the concerned department at the district level.
- Preparation of list of members of the community, NGOs and their members and elected representatives who could be helpful in management of the disaster.
- Construction of District Control Room (DCR) in or near the Collector's office with earthquake resistant design and due publicity to it.
- Setting up of similar control rooms in the offices of the principal functionaries of concerned department for coordination and action at their level.
- In the districts falling in Earthquake Damage Risk Zone IV and III the sites for setting up Site Operation Centres (SOC) for rescue and relief operation should be identified near the thickly populated areas where majority of houses are not having earthquake resistant design.
- Establishing a coordination mechanism for incoming relief material and teams from outside at their possible places of disembarkation and deploying them in affected areas in a planned manner.
- Preparation of alternate communication arrangements in case of conventional communication channels fail.
- Inventory of transport – public and private - available for deployment in times of emergency including names and addresses of owners, drivers, mechanics and repair workshops and fuel depots.
- Preparation of the community especially in the disaster prone areas.
- Identification of manpower for manning the District Control Room and allocation of duties.
- Arrangement for training of all identified functionaries and periodic upgrading of their knowledge.
- Periodic simulation exercises as a test preparedness for all the functionaries and the community.

5.5 Role of State Government Departments/Agencies in Disaster Management

General Preparedness

Each Department and Govt. agency involved in Disaster Management and mitigation will:

- Designate a Nodal officer for emergency response who will act as the contact person for that department / agency.
- Ensure establishment of failsafe two-way communication with the State, District and other emergency control rooms and within the organisation
- Work under the overall supervision of the State Relief Commissioner / the District Magistrate during emergencies.

5.5.1 Role and Responsibilities of Fire Services in Earthquake Disaster Management

Preparedness Activities

- Modernisation of fire-fighting equipments and strengthening infrastructure.
- Procurement of search and rescue equipments viz. gas cutters, drillers and human sensors etc.
- Development /enforcement of relevant legislations and regulations to enhance adoption of fire safety measures.
- Identification of pockets of industrial, commercial or residential area which are highly susceptible to fire accidents in the event of building collapse due to earthquake.
- Educate people to adopt fire safety measures in the immediate aftermath of earthquakes.
- Conduct training and drills for use of various fire protection and preventive systems in order to ensure higher level preparedness in the community.
- Training the communities to handle fire emergencies more effectively.

Response Activities:

- Rescue of persons trapped in burning, collapsed or damaged buildings, damaged vehicles, including motor vehicles, trains and industries, boilers, trenches and tunnels
- Control fires and minimize the resultant damages.
- Protection of property and the environment from fire damage.
- Support to other agencies in the response to emergencies.
- Investigation into the causes of fire and assist in damage assessment

5.5.2 Role and Responsibilities of Police Department in Earthquake Disaster Management

Preparedness Activities

- Keep the force in general and the PAC in particular fighting fit for search, rescue, evacuation and other emergency operations at all times through regular trainings and mock drills.
- Procurement and deployment of modern emergency equipments while modernising existing infrastructure and equipments for disaster response along with regular training and drills for effective handling of these equipments
- Ensure that all communication equipments including wireless are regularly functioning and deployment of extra wireless units in vulnerable pockets
- Keeping close contact with the District Administration & District Control Room.
- Organise training programmes on search, rescue and evacuation for the members of the Ward and Village Disaster Management Committees and NGOs of the areas falling in the Eathquake Damage Risk Zone IV & III.

Response Plan:

- To take up search, rescue and evacuation operations in coordination with the administration, locals, NGOs and volunteers.
- Security arrangements for relief materials in transit and in camps etc.
- Emergency traffic management particularly the arrangement for the safe passage to the ambulances carrying the injured persons.
- Maintenance of law and order in the affected areas.
- Assist administration in taking necessary action against hoarders black marketers etc.

5.5.3 Role and Responsibilities of Health Department in Earthquake Disaster Management

Preparedness Activities

- Assess preparedness levels at State, Distict and Block and village level.
- Formation of adequate number of mobile units with trained personnel, testing facilities, communication systems and emergency treatment facilities
- Identification of locations in probable disaster sites for emergency operation camps
- Strengthening of Primary Health Centres with network of para-professionals to improve the capacity of surveillance and control of epidemics.
- Identification of areas prone to endemic and epidemics in the aftermath of earthquakes.
- Awareness generation about do's and don'ts regarding first aid to earthquake victims in the immediate aftermath of an earthquake
- Training of members of Village Disaster Management Committees (VDMCs)and NGOs of the villages (falling in Earthquake Damage Risk Zone IV & III) on first aid of earthquake victims.
- Training of field personnel, Traditional Birth Attendants, community leaders, volunteers, NGOs and CBOs in first aid, measures to be taken to control outbreak of epidemics during and after a disaster, etc.
- Arrangement of standby generators for every hospital.
- Listing of vehicles, repair of departmental vehicles that will be requisitioned during emergencies for transport of injured.
- Listing and networking with private health facilities

Response activities:

- Ensure adequate availability of personnel at disaster site
- Planning for making prior arrangement for early transfer of patients who need specialised care/treatment
- Opening up of site operation camps in the affected areas
- Immunisation and Quarantine, if necessary
- Early transfer of patients who need specialised care/treatment
- Establishment of public information centres with appropriate and modern means of communication, to assist the patients, their

families, other people living in epidemic affected areas regarding vaccination, Do's and Don'ts treatment facilities, etc.

- Monitoring of water and food quality and disposal of waste in transit and relief camps, feeding centres and affected areas
- Stock piling of life-saving drugs, de-toxicants, anaesthesia, Halogen tablets in vulnerable areas
- Situational assessment and reviewing the status of response mechanisms in known vulnerable pockets
- Regular reporting to control rooms
- Review and update precautionary measures and procedures, and apprise the personnel who will be implementing those.
- Disinfection of water bodies and drinking water sources.
- Immunization against infectious diseases
- Ensure continuous flow of information

Recovery Activities

- Identification of appropriate locations and setting up of site operation camps for combating epidemics.
- Continuation of disease surveillance and monitoring
- Continuation of treatment, monitoring and other epidemic control activities till the situation is brought under control and the epidemic eradicated
- Trauma counseling.
- Treatment and socio-medical rehabilitation of injured or disabled persons
- Immunization and nutritional surveillance
- Long term plans to progressively reduce various factors that contribute to high level of vulnerability of disaster affected population to diseases..
- Establishing procedures and methods of coordination with the Health Department, other local authorities/departments, NGOs to ensure that adequate prevention and preparedness measures have been taken to prevent and /or minimise the probable outbreak of epidemics.

5.5.4 Role and Responsibilities of Animal Husbandry Department in Earthquake Disaster Management

Preparedness Activities

- Listing of animal population with category
- Stock piling of emergency medicines and medical equipments
- Listing and identification of vehicles to be requisitioned for transport of injured animals
- Vaccination of the animals and identification of campsites in the probable sites
- Promotion of animal insurance
- Tagging of animals
- Arrangement of standby generators for veterinary hospitals
- Provision in each hospital for receiving large number of livestock at a time
- Training of community members in carcasses disposal
- Stock piling of water, fodder and animal feed
- Stock-piling of surgical packets
- Construction of mounds for safe shelter of animals.
- Identification of various water sources to be used by animals in case of prolonged hot and dry spells

Response Activities

- Ensure adequate availability of personnel and mobile teams
- Eradication and control of animal diseases, treatment of injured animals
- Protection of abandoned and lost cattle
- Supply of medicines and fodder to affected areas
- Disposal of carcasses ensuring proper sanitation to avoid outbreak of epidemics
- Establishment of public information centre with a means of communication, to assist in providing an organised source of information.
- Mobilising community participation for carcass disposal

Recovery Activities

- Assess losses of animals assets and needs of persons and communities

- Play a facilitating role for early approval of soft loans for buying animals and ensuring insurance coverage and disaster-proof housing or alternative shelters/mounds for animals for future emergencies
- Establishment of animal disease surveillance system

5.5.5 Role and Responsibilities of Jal Sansthan (Jal Sansthan, Nagar Nigam/ Municipality, Gram Panchayat) in Earthquake Disaster Management

Preparedness Activities

- Provision of safe water to all habitats
- Prior arrangement of water tankers and other means of distribution and storage of water
- Prior arrangement of stand by generators
- Adequate prior arrangements to provide water and halogen tablets at identified sites to be used as relief camps or in areas with high probability to be affected by natural calamities
- Raising of tube-well platforms, improvement in sanitation structures and other infrastructural measures to ensure least damages during future disasters
- Clearance of drains and sewerage systems, particularly in the urban areas

Response Activities:

- Disinfections and continuous monitoring of water bodies
- Ensuring provision of water to hospitals and other vital installations
- Provision to acquire tankers and establish other temporary means of distributing water on an emergency basis
- Arrangement and distribution of emergency tool kits for equipments required to dismantle and assemble tubewells, etc.
- Carrying out emergency repairs of damaged water supply systems

Recovery Activities:

- Strengthening of infrastructure
- Review and documentation
- Sharing of experiences and lessons learnt
- Training to staff
- Development of checklists and contingency plans

5.5.6 Role and Responsibilities of Food & Civil Supplies Department in Earthquake Disaster Management

Preparedness Activities

- Construction and maintenance of storage go downs/ warehouses at strategic locations.
- Stock piling of food reserves and essential commodities in anticipation of disaster.
- Details of each of the warehouse connected to the base warehouse and its distance from the base warehouse, capacity in number of bags. Similarly detailed database of all the public distribution shops connected to each of the warehouse including distance of each of the public distribution shop from the warehouse and capacity in number of bags. As this information can be utilized for safely stockpiling the food gains received from various sources in the immediate aftermath of a disaster e. g. earthquake.
- Take appropriate preservative measures to ensure that food and other relief stocks are not damaged during storage, especial precautions against moisture, rodents and fungus infestation.

Response Activities

- Management of procurement
- Management of material movement in close coordination with Transport department and Railways for transportation of relief supplies.
- Inventory management

5.5.7 Roles and Responsibilities of Civil Defence in Earthquake Preparedness Disaster Management

Prevention Activities

- Organise training programmes on first aid, search, rescue and evacuation for its personnel to improve their skills.
- Preparation and demonstration of first aid, search and rescue service plans for major disasters e.g. earthquakes.
- Remain fit and prepared through regular drills and exercises at all times.
- Organise training programmes on search, rescue and evacuation for the members of the Ward and Village Disaster Management Committees and NGOs of the areas falling in the Eathquake Damage Risk Zone IV & III.

Response Activities

- Act as support agency for provision of first aid, search and rescue services to other emergency service agencies and the public
- Act as support agency for movement of relief items

- Provide first aid for injured
- Triage of casualties
- Work in coordination with medical assistance team
- Help the Police for traffic management and law and order

5.5.7 Role and Responsibilities of Public Works Department in Earthquake Disaster Management

Preparedness Activities

- Keep a list of earth moving and clearing vehicles/equipments (available with Govt. Departments including the near by project site of National Highway Authority , PSUs, and private contractors, etc.) and formulate a plan to mobilize those at the earliest.
- Inspection and emergency repair of roads/ bridges, public utilities and buildings
- To prepare inventory of equipments available with the class 1 contractors of PWD so that these can be timely identified acquired and mobilised to the disaster site for search and rescue work in the immediate aftermath of an earthquake.
- Acquisition of hi-tech equipments such as gas cutters etc. from class 1 contractors (PWD) for using such equipments in search and rescue of the people stranded under the fallen roofs and walls of houses due to earthquake.

Response Activities

- Clearing of roads and establish connectivity. Restore roads, bridges and where necessary make alternate arrangements to open the roads to traffic at the earliest.
- Mobilisation of community assistance for clearing blocked roads
- Facilitate movement of heavy vehicles carrying equipments and materials.
- Identification and notification of alternative routes to strategic locations.
- Filling of ditches, disposal of debris, and cutting of uprooted trees along the road.
- Arrangement of emergency tool kit for every section at the divisional levels for activities like clearance (power saws), debris clearance (fork lifter) and other tools for repair and maintenance of all disaster response equipments.
- Development of checklists and contingency plans.

Recovery Activities

- Strengthening and restoration of infrastructure with an objective to eliminate the factor(s) which caused the damage
- Review and documentation
- Sharing of experiences and lessons learnt

5.5.8 Role and Responsibilities of Energy Department in Earthquake Disaster Management

Preparedness Activities

- Identification of materials/tool kits required for emergency response
- Ensure the minimum safety standards to be adopted for electrical installation and equipments and organise training of electricians.
- Develop and administer regulations to ensure safety of electrical accessories and electrical installations.
- Preparation of a contingency plan to ensure early electricity supply to essential services during emergencies and restoration of electric supply at an earliest.
- Develop and administer code of practice for power line clearance to avoid electrocution due to broken / fallen wires.
- Strengthen high-tension cable towers, modernise electric installation, strengthen electric distribution system to ensure minimum damages during an earthquake
- Conduct public/industry awareness campaigns to prevent electrical accidents during normal times and during and after a natural disaster

Response Activities:

- Disconnect electricity after receipt of warning
- Attend sites of electrical accidents and assist in undertaking damage assessment
- Standby arrangements to ensure temporary electricity supply
- Inspection and repair of high tension lines /substations/transformers/poles etc
- Ensure the public and other agencies are safeguarded from any hazards, which may have occurred because of damage to electricity distribution systems
- Restore electricity to the affected area as quickly as possible

- Replacement / restoration of damaged poles/ salvaging of conductors and insulators

5.5.9 Role and Responsibilities of Irrigation Department in Earthquake Disaster Management

Preparedness Activities

- Identify flood prone rivers and segments of embankments along them which can witness cracks or seepage in the event of an earthquake. Strengthening of such segments of embankments and formulation of emergency plans for such areas.
- Identification and maintenance of materials/tool kits required for emergency response cracking or breaching of embankments in the event of an earthquake.
- Stock-piling of sand bags and other necessary items for breach closure.
- Development of checklists and contingency plans

Response Activities

- Inspection of bunds of dams, irrigation channels, bridges, culverts, control gates and overflow channels in the immediate aftermath of an earthquake.
- Monitoring and protection of irrigation infrastructures
- Monitoring flood situation in the immediate aftermath of an earthquake and dissemination of flood warning
- Inspection and repair of pumps, generators, motor equipments and station buildings
- Community mobilization in breach closure

Recovery Activities

- Strengthening of infrastructure and human resources
- Review and documentation
- Sharing of experiences and lessons learnt

5.5.10 Role and Responsibilities of Transport Department in Earthquake Disaster Management

Preparedness Activities

- Listing of vehicles which can be used for emergency operation especially for carrying the rescue teams and relief supplies.
- Safety accreditation, enforcement and compliance

- Ensuring vehicles follow accepted safety standards
- Build awareness on road safety and traffic rules through awareness campaign, use of different IEC strategies and training to school children.
- Ensure proper enforcement of safety regulations

Response Activities

- Requisition of vehicles, trucks especially for carrying the rescue teams and relief supplies.
- Coordination with railway authorities for carrying the rescue teams and relief supplies.

5.5.11 Role and Responsibilities of Panchayati Raj in Earthquake Disaster Management

Preparedness Activities

Develop strategies for risk reduction at community level by following measures:

- Training of elected representatives on various aspects of disaster management.
- Public awareness on various aspects of disaster management through training programs to be organized at the Gram Panchayat level on pre during and post earthquake do's and dont's.
- Organize mock drills to respond to the earthquake disaster in the areas of Earthquake Damage Risk Zone IV & III.
- Facilitate the Village Disaster Management Committees of the areas falling in the (Earthquake Damage Risk Zone IV & III) in preparing their community disaster management plan.
- Support strengthening response mechanisms at the Gram Panchayat level (e.g. better communication, local storage, search & rescue equipments, etc.)
- Ensure alternative routes/means of communication for movement of relief materials and personnel to marooned areas or areas likely to be marooned.
- Time to time cleaning of blocked drains.
- Assist all the government departments to plan and prioritize prevention and preparedness activities while ensuring active community participation.

Response Activities

- Encourage Gram Panchayat Members and facilitate timely and appropriate delivery of warning to the community.
- Clearance of blocked drains and roads, including tree removal in the villages.
- Construct alternative temporary roads to restore communication to the villages.
- Identify the school building, community centres and operationalise them into emergency relief centres and emergency shelters.
- Make necessary arrangements for sanitation, drinking water and medical aid.
- Participate in post impact assessment of emergency situation
- Support in search, rescue and first aid activities.

Recovery Activities

- Provision of personal support services e.g. counseling
- Repair/ restoration of infrastructure e.g. roads, bridges, public amenities
- Supporting the Gram Panchayats in development of storage houses for food stocks.
- Coordination for distribution of relief and rehabilitation materials.
- The Panchayat Samity and Gram Panchayat members to be trained to act as an effective interface between the community, NGOs, and other developmental organizations
- Provide training so that the elected representatives can act as key functionaries for reconstruction and recovery activities.

5.5.12 Role and Responsibilities of Information & Public Relations Department in Earthquake Disaster Management

Preparedness Activities

- Creation of public awareness regarding various types of disasters (including earthquakes) through media propagation .
- Dissemination of information to public and others concerned regarding do's and don'ts of various disasters including earthquakes.

Response Activities

- Setting up of a control room to provide authentic information to public regarding impending emergencies
- Keep the public informed about the updates on emergency situation (area affected, lives lost etc.)
- Keep the public informed about various post disaster assistances and recovery programmes

5.5.13 Role and Responsibilities of Forest Department in Earthquake Disaster Management

Preparedness Activities

- Promotion of shelter belt plantation.
- Provision of seedling to the community and encourage plantation activities, promoting nurseries for providing seedlings in case of destruction of trees during natural disasters.
- Information, Education and communication (IEC) activities for greater awareness regarding the role of trees and forests for protection during emergencies and eco-friendly utilisation of trees for rehabilitationactivities in the aftermath of an earthquake.
- Increasing involvement of the community, NGOs and CBOs in plantation, protection and other forest protection, rejuvenation and restoration activities.

Response Activities

- Assist in road clearance
- Provide of tree cutting equipments
- Provide of building materials such as bamboos etc for construction of shelters

Recovery Activities

- Take up plantation to repair the damage caused to tree cover and provide employment to the members of affected families.

5.6 Community Based Disaster Preparedness Plan

Preparedness in disaster management requires systematic and comprehensive planning at the national, state, district and village levels. *Uniyal (2003),* emphasized the need for community involvement and participation in disaster management and further explained that the mitigation strategies will have to be concentrated more towards socially and economically backward communities, since they are more vulnerable to disasters. It is important to reach out to the community at the grass roots level and hence community-based disaster preparedness plans are being

advocated to strengthen the capacities of people and institutions at community level to cope up with disasters. The plans are prepared with the involvement of community as they can better identify the existing resources, hazards they are exposed to, prevailing infrastructure, resources, copying mechanisms etc. Hence preparedness plan needs to take cognizance of different types of activities needed at various stages of disaster management. The community-based disaster preparedness requires performance of several types of activities at three different stages i.e. pre-disaster, during-disaster and post-disaster. Those activities are to be identified which can be reflected in the preparedness plan.

5.6.1 Community-based Preparedness in Pre-disaster Phase

a) Orienting the community towards the nature and effects of the disasters to which they are vulnerable.

b) Taking stock of the resources of the community such as manpower trained in disaster management and infrastructure viz. schools, Panchayat Bhawan or community centre (to be used as shelter houses in the event of a disaster), primary health centres, , communication facilities, roads and other infrastructure etc.

c) Assessing the risks and vulnerabilities of the community. The various elements at risk that include the physical structures, as well as the vulnerable sections of the community such as women, children, physically challenged, old, etc. need to be examined so that the preparedness measures are appropriately planned.

d) Formulating preparedness plan at the community level that takes into congnisance the community needs, measures to be taken by the community before, during and after the disaster strikes, resources available at various places, clear allocation of responsibilities amongst all concenred officials, departments, Panchayati Raj Institutions, NGOs, CBOs etc. A properly prepared plan facilitates the community to effectively execute the plan.

e) Specifying the role of community in handing the disaster.

5.6.2 Community-based Preparedness During –disaster

a) Organising Search, Rescue and Evacuation activities. This includes identifying the disaster victims, bringing them to safer places, provision of first aid, distribution of relief and adhering to evacuation plan etc.

b) Providing shelter for people as well as livestock. This includes arrangements for water supply, sanitation, kitchen, fodder for animals, medical services and first aid etc.

c) Clearing of debris from collapsed buildings, bridges, trees, other structures, restoration of transport and communications services.

d) Moving of injured to the nearby health centres and hospitals.

e) Disposal of dead bodies in order to contain in spread of diseases is another important task. Identification of dead bodies, compliance with police formalities, mobilizing resources for disposal of bodies in accordance with religious and cultural practices are activities which involve the community.

f) Disposal of dead animals is also important as it has effects on human health and environment.

g) Assessing damages immediately on the occurrence of disaster facilitates quick emergency relief. This is to be done with reference to the number of households, population, livestock and area affected etc.

5.6.3 Community-based Disaster Preparedness in Post–disaster Phase

a) Undertaking a detailed damage assessment covering verified number of human lives, identification of live victims as well as the dead, livestock, infrastructure, damage to crops and the estimated value.

b) Drawing up a comprehensive economic rehabilitation plan that includes restoration of agricultural activity through necessary inputs, rehabilitation of artisans, marginal, small scale and business people, those pursuing other occupations, replacement of cattle, agricultural equipments etc.

c) Ensuring social rehabilitation through strengthening of existing health centres, schools, anganwadis, community centres, vocational training centres, psychological counselling to the affected to enable them get back to their normal routine.

d) Building an appropriate monitoring and evaluation mechanism in community based disaster preparedness programme. This is needed to facilitate proper utilization and implementation of resources.

Community-based disaster preparedness is essential to assess the damages arising out of disaster, determine the extent and type of assistance. A community based disaster preparedness plan is a comprehensive action plan which specifies the demographic profile, resources available with the community, measures to be taken before, during and after the occurrence of disaster. It is said to contain an inventory of several types of resources available at the community level, roles and responsibilities of different administrative agencies, Panchayati Raj Institutions, NGOs, CBOs and community.

5. 6.4 Community-based Disaster Preparedness Plan

A Community-based Disaster Preparedness Plan, broadly is to indicate the following aspects:

- Village profile
- Profile/information about the community
- Disaster profile
- Inventory of resources of the community
- Emergency communication procedures
- Specific roles and responsibilities (of different agencies and functionaries)

5.6.5 Components of Community-based Disaster Preparedness Plan

Pre-disaster Phase

- Risk assessment and vulnerability analysis
- Resource analysis and mobilisation
- Organising community response mechanisms
- Construction and maintenance of cyclone/flood shelters
- Mock exercises and drills
- Strengthening of community self-help capacities
- Specification of roles and responsibilities of various functionaries and agencies. (Panchayati Raj Institutions (PRIs), Government functionaries, NGOs, Police, Primary and District Health Centre, Disaster Task Force and Community)

During-disaster Phase

- Search, Rescue and Evacuation
- Shelter for disaster affected (community as well as livestock)
- First aid and other medical support
- Clearance of debris
- Restoration of communication system or use of alternative communication system
- Disposal of Dead
- Relief distribution
- Property security ad public safety
- Immediate damage assessment
- Information, Education and Communication (IEC) and training

- Role of various functionaries and agencies. (PRIs, Government functionaries, NGOs, Police, Primary and District Health Centres, Disaster Task Force and Community)

Post-disaster Phase

- Damage and needs assessment
- Psychological support to the victims
- Restoration of lifeline support
- Agricultural, economic and social rehabilitation
- Information, Education and Communication and training
- Role of various functionaries and agencies.
- (PRIs, Government functionaries, NGOs, Police, Primary and District Health Centres, Disaster Task Force and Community)

The community-based disaster preparedness plan is to reflect the needs, resources and strategies mutually agreed upon by the local people. The activities are to be clearly defined, specified, target-oriented, in consonance with the capacities and capabilities of the community. The plan with its components as discussed above, is comprehensive that provides counter-disaster measures including preparedness and mitigation, provisions for emergency action, ways of creating awareness amongst the community and also indicate the developmental requirements to establish a link between disasters and development.

The plan is an important tool for bringing about coordination between the efforts of various agencies that includes government, private sector, international agencies, NGOs, CBOs, and community. This is of importance as the personnel, resources and organizing capabilities NGOs and government are to be mobilised and coordinated. A plan evolved locally with the involvement of key stakeholders would be useful in reducing the extent of damage and controlling loss of lives. It proves advantageous in undertaking activities such as resource mapping, vulnerability mapping, hazard mapping etc. The High Powered Committee (2001) also recommended the formulation of plans at community, family and individual level and developing individual kits for survival. We have mentioned about this in Unit 10 of this Course.

There are many institutions in our country, which are initiating efforts in this area of community-based disaster preparedness. The government along with NGOs and international agencies are undertaking this activity. The Panchayati Raj Institutions are supplementing the ongoing efforts in this area. For instance in Orissa, Pallisabha or village assembly is an effective mechanism in making CBDP more sustainable. In Indira Gandhi National

Open University, the Faculty of Public Administration, School of Social Sciences, has also made some efforts in this direction. Programme aimed to create awareness on disasters, upgrade information and strengthen the resilience and self-confidence of local communities in select village sponsored by Ministry of Agriculture, Government of India was undertaken during 2000-2002 in 100 villages each in the Five States of Andhra Pradesh, Gujarat, Rajasthan, Orissa and Uttar Pradesh. New initiatives in the form of constitution of Disaster Task Force (DTF), formulating Community Action Plan on Disaster preparedness etc., were introduced. The most important aspect of this effort was to initiate strategies to operationalise community-based preparedness plans.

5.6.6 Operationalisation Community-Based Disaster Preparedness Plan

Key Strategies

The operationalising of community-based disaster preparedness plan requires the active participation of local communities it involves:

- Generating awareness amongst the members of community regarding the vulnerabilities and risks involved in several types of disasters. This also needs the utilisation of traditional wisdom that is already available with the people.
- Propagating community participation vigorously at grass roots levels, as most of the actions are needed at the individual or community levels. The governments have limited resources. Hence participation enables people to strive towards self-reliance instead of excessive dependence. Community participation helps in identification and prioritising problem areas and generates solutions.
- Organising local people in disaster task forces, disaster management committees, and groups for dissemination of warnings, search, rescue and evacuation etc.
- Sensitising the Panchayati Raj Institutions towards formulating community-based disaster preparedness plans and integrating them with the district and State plans.
- Involving development workers in eliciting community participation. The community can identify their formal and non formal leaders with their help and guidance.
- Constituting Disaster Response Organization at the community level. Zubair (2003) suggests formation of such an organization, which can be entrusted the designing and sharing of Counter Disaster Plan with all community members. A Counter Disaster Plan or a Community Level Contingency Plan helps to consolidate the community's efforts to prepare for hazards. The plan provides guidelines for operation

and clarifies the roles and responsibilities of all concerned before, during and after the occurrence of disasters.

- Mobilising local assets, resources etc., of the community. This can include traditional wisdom, folklore, traditional capability of comprehending disaster/hazard warming signals etc. Constitution of Community Disaster Preparedness Team can make a difference in implementation of Disaster Preparedness Plan. For instance, in the 2004 tsunami, training members of local disaster relief committee of Samiyarpettai of Chidambaram Taluk of Cuddalore district, In Tamil Nadu enabled them carrying out rescues operations, giving first aid to victims, organizing distribution of relief materials etc. (The Hindu, 2005).

The operationalising of community based disaster preparedness plan can be entrusted to PRIs, disaster task force members, trained volunteers etc. The community based strategies are yielding significant results. For instance, the Bangladesh Red Crescent has trained village volunteers working in coastal district who are equipped with preparedness skills. In Orissa, a long established NGO, Gram Vikas has been working with tribal people. Its Rural health and Environment Programme (RHEP) premised on community ownership of processes and outputs, focuses on shelter, sanitation and drinking water. Its approach in the wake of Orissa super cyclone created a community able to revive its day to day life within days of the cyclone impact (www.odihpn.org/report).

Community based disaster preparedness goes much further than traditional disaster management in focusing on locally specific vulnerabilities, coping strategies and resilience. However, in practice, CBDP approaches have tended to address the symptoms of vulnerability rather than its root causes. Ensuring that disaster mitigation and preparedness measures are both appropriate and sustainable will require rooting vulnerability reduction within a wider developmental approach. Some recommendations, in this regard, according to International Federation of Red Cross (IFRC), which is based on its field research in the Philippines include:

- Analysing the root causes of vulnerability to disaster
- Understanding the strengths of local livelihoods and capacities
- Listening to community perspectives and priorities
- Including others actors from the start so that the burden of risk reduction can be shared
- Advocating issues that the community itself cannot tackle; and
- Promoting the integration of risk reduction into development planning. (World Disasters Report, 2004).

Joseph Keve and Jonathan Rout (2003) outlined the key ingredients of disaster management with a community perspective. These include:

- Clearly defined and agreed criteria for the identification, selection and verification of the most deserving beneficiaries.
- Emphasis on greater involvement and decision-making by women within the organisation, among volunteers and beneficiaries and in the community.
- Priority for the weakest and most vulnerable people.
- Strong local contribution.
- Focus on livelihood-based programme input provides long-term and sustainable benefits to the community and at the same time increases the commitment and feeling of solidarity between the community and the workers.
- Right inputs to be given at the right time.
- Planned cooperation with all government and non-government agencies whenever such collaboration adds value and increases the effectiveness of the NGOs.
- Strategic planning and coordination to bring together forces and resources to achieve optimum results.
- Using small inputs to achieve big and lasting impact, eg., using food for work programme to rebuild livelihood assets or providing paddy seeds at sowing time so that poor farmers do not fall into the clutches of money lenders.

5.7 Police, Paramilitary Forces, Armed Forces, NGOs & Youth Organisations:

An important aspect of capacity building is updating, training, rehearsals, and mock drills by search & rescue agencies/departments. Police, fire brigade, paramilitary, armed forces and youth organizations, NGOs and CBOs altogether form valuable human resources.

5. 7.1 Police

The responsibility for maintaining law and order, and almost all routine policing is carried out by state-level police forces. The central government participates in police operations and organization by authorizing the maintenance of the Indian Police Service. The Police Act of 1861 established the fundamental principles of organization for police forces in India, and, continues in effect with minor modifications. The state level

police forces are separate but their patterns of organization and operations are similar.

In most states and territories, police forces are functionally divided into civil (unarmed) police and armed contingents. The former staffs are attached to police stations, conduct investigations, answer routine complaints, perform traffic duties, and patrol the streets. Those states that maintain district armed contingents deploy them as a reserve strike force for emergencies. Such units are organized either as a mobile armed force under direct state control or in the case of district armed police as a force directed by district superintendents and generally used for riot-control duty. The provincial Armed constabulary is an armed reserve maintained at key locations in some states. Armed constabulary are assigned to VIP duty or assigned to maintain order during fairs, festivals, athletic events, elections and natural disaster. They may also be sent to control riots; to maintain key guard posts and to participate in antiterrorist operations.

Role of Police in Disaster Response

The police plays a critical role in disaster situations as all incidents are covered by them. Police is mobilized to reach the site of disaster immediately with a view to carry out relief and rescue operations and is the initial coordination agencies. It is also the responsibility of the police to maintain security along with law and order at disaster locations where there might be chaos and miscreants may take advantage of the situation. Police personnel deployed for such relief operations prevent commission of cognisable offences including all offences against property; human body and public tranquility. The police communication system is made available for transmission and receipt of messages in connection with disasters. They also regulate movement of victims, rescue and relief, medical assistance and supplies.

5.7.2 Fire services

Managing fires is more technical than perceived. It needs comprehensive study in risk mapping plans for each zone, study of preparedness level in terms of special equipment and training of personnel, fool proof communication system and periodic mock drills. The role for the fire services is not just limited to fire fighting only but it also plays the role of a disaster management agency especially in urban areas. It can provide basic search and rescue service and can also coordinate in event of a disaster situation with other agencies like the police and health services.

The fire brigade are administered by the states and union territories as fire is a state subject. The Ministry of Home Affairs, GoI renders technical advice to states and union territories and the central ministries on fire

protection, fire prevention and fire legislation. The National Fire Service College, Nagpur conducts different types of courses for the training of fire officer of several countries. There is a standing fire advisory council to examine the technical problems related to the fire services and also to formulate a national fire code. These codes should be based on the laid down technical specification and include the relevant portion of existing fire prevention and fire safety practices that exist in various acts and regulations.

5.7.3 Central Police Forces/ Para Military Forces

The role of para military forces (PMF) is similarly important as they may be called upon for additional assistance in situations requiring greater assistances from outside. Indian Paramilitary Forces are those agencies which act as armed forces auxiliaries. The PMP is made up of the following twelve organizations:

- Central Industrial Security Force
- Central Reserve Police Force
- Rapid Action Force
- Indo Tibetan Border Police
- Rashtriya Rifles
- Defence Security Corps
- Railway Protection Force
- Indian Home Guard
- Civil Defense
- Assam Rifles
- Border Security Force
- State Armed Police
- Special Security Bureau

PMF are subordinate to the Ministry of Home Affairs, Govt. of India whereas the coast Guard organisation and the Defence Security force are subordinate to the Ministry of Defence, Govt. of India. The National Security Guards, a joint anti terrorist contingency force, is charged with protection of high level persons VVIPs and are subordinate to the Office of the Prime Minister. Their personnel are drawn from armed forces the central reserve police force and the border security force. The Special Frontier Force also is subordinate to the office of the Prime Minister. The Railway Protection Force is subordinate to the Ministry of Railways. At the local level there is

the Provincial Armed Constabulary, which is controlled by the governments of the states and territories.

In addition to security and guard duties, paramilitary organizations assist local and state level police forces in maintaining public order in the aftermath of a disaster event.

Civil Defence

The Civil Defence is primarily a voluntary organization, whose resources are mobilized at the time of need through an activation procedure. Civil Defence organization requirements are based on the vulnerability analysis by the states themselves and accordingly are equipped. Their primary work areas include; communication, rescue and transportation and supply service, salvage and corpse disposal along with basic welfare services. The organization has conceptually a strong structure with the capabilities to act in cooperation with the people, police and defence services. It however needs to further build its capacity and its ability and its ability to reach in disaster situations by having substantial support and augmentation.

Civil Defence activities for disaster management include preventive, control and restorative measures as stated below:-

i) **Preparedness**

a) Enrolment and training of volunteers and awareness of general public regarding Civil Defence.
b) Formulate plans evacuation of population from affected areas in a disaster situation.

ii) **Control**

a) Arrangements for accurate damage assessment and risk assessment.
b) Provision for search and rescue of affected people.
c) Provision for an efficient first aid mechanism and transportation of the injured.
d) Effective control and coordination of all services at place of damage.
e) Arranging for clearance of debris and road blocks.
f) Provision for an auxiliary fire fighting setup to augment the resources of fire brigade.

iii) **Restorative**

a) Arrangement for facilities like food shelter, clothing etc. for the affected and homeless.

b) Arrangement for salvage, care and disposal of property from houses destroyed or damaged.

c) Provision to deal with disposal of dead both humans and animals.

d) Provision for a network for dissemination of information on all aspects.

e) Coordination with Municipal health authorities for control of infection and contamination.

f) Restoration of all utility services as early as possible.

5.7.4 Armed Forces

The primary role of the Armed Forces is to defend the country against external aggression and forces are trained for such a task, however, the constitutional and the legal framework provide for the Armed Forces to render assistance during disasters/ calamities when the situation is beyond the capacity of the civil administration to adequately respond. Armed Forces are under the control of Ministry of Defence, Govt. of India. According to IGNOU (2006) the assistance is provided for various internal duties, both in peace and war as expressed under the subject “Aid to Civil Power”. In a restricted sense, “Aid to Civil power” is applied for the maintenance of law and order, but its wider connotation can be applied to any type of assistance for maintenance of essential services; assistance during natural and other calamities such as earthquakes, floods, riots, famine and fires; and, any other type of assistance, including assistance in development projects. Normally, for assistance the State Government may approach the Ministry of Defence through the concerned Central Ministry. Anticipatory action aid to civil in good faith by the military when requested by the local administration, with ex post facto sanction sought as soon as possible. The use of Armed forces in aid to civil authorities must only be requisitioned under a central act and not under a state act e.g. assistance to run an essential service when it has been so declared to be an essential service by the Central Government.

The three wings of the Armed Forces have been involved in different disasters despite their primary commitment for the defence of the country. The Army being the largest is invariably involved with its proficiency and a range of resources. Its manpower is used for providing all kinds of support, control, guard and to restore infrastructure. The Air Force is obviously in the lead for providing aircraft and helicopters during a disaster. The Navy is called upon for providing divers and boats. All have trained and organized manpower for judicious employment during the emergency in quick response. However, all military units may carry out volunteer service in the vicinity of their locations as a development welfare activity and good will mission.

5.7.4.1 Guidelines for employment

The guidelines for calling upon the armed forces for rendering aid would primarily depend on the civilian administration taking a deliberate decision to involve the armed forces in a situation which seems to be getting serious enough so as to call the defence services for aid. The important to be kept in mind while working in aid civil authority during disaster situations are as discussed below.

5.7.4.2 Cooperation :

All agencies involved in disaster management operations must fully cooperate with each other. There would be a need for bring together all available resources at a particular place, understanding each other's capabilities, jointly undertaking all actions from preparation to plans should be ensured to the lowest level of administration and the military. Liaison during aid to civil authorities is essential and could best be achieved by placing headquarters of civil and military authorities together or having a joint control room along with exchange of liaison officers.

5.7.4.3 Planning and Preparation:

Planning is carried out at various echelons i.e. at the national, state and local levels requiring close collaboration. The Ministry of Defence and the service headquarters of the services interact through periodic civil military conferences. It is at the local level that the sub-area/station headquarters and units coordinate with the local administration, police and others. Disasters management planning incorporating all the participants ensures a common agreement for all agencies to pool the resources and to take necessary actions. Full familiarity with the task is only possible by timely preparation. This involves joint planning, reconnaissance and rehearsals leading to constant updating. The State Government having the primary responsibility for disaster management, should involve the Armed Forces in the planning process and to periodically update so as to enable the incorporation of changing operational responsibilities of the Armed Forces. to ensure the success of a plan concerning disaster management, the cooperation between the concerned civil and military authorised is essential and the plan should be issued with the signatures of both these authorities.

5.7.4.4 Humanitarian Ethos:

The needs of the affected population should always be the foremost priority in any disaster-related action. Enforcing humanitarian principles require strict discipline and sacrifice, which the Indian Armed Forces have displayed time and again. While being fully committed at the borders and internal security duties, they have always responded to any disaster where human life is at stake. Special efforts have been made to inculcate humanitarian values amongst the Armed Forces due to their frequent involvement in sensitive and provocative issues. Seeking employment of the army for political or other superfluous expediency would set a dangerous trend and needs to be curbed.

5.7.4.5 Economy:

Armed forces should only be employed as a last resort when a disaster is beyond the coping capability of the civil administration as they are not only

diverted from their paramount operational tasks but also these resources are more expensive than similar ones available in the country due to cost on multi-operational ruggedness and the military readiness. The cost for employing the military is borne by the concerned state government. Minimum essential military resources should be utilised in disaster response and their participation terminated at the earliest practicable time. Also, they must only be used as a last resort when other agencies are unavailable or unable to meet the contingency. For menial and labour intensive tasks, local labour must be utilised as it is cheaper and provide them with income generating opportunities. For minor incidents where local police or volunteers could suffice, calling of the military should be avoided.

5.7.4.6 Principles of Utilising

Involvement of the Armed forces for disaster assistance is guided by agreed principles that are also consistent with general military doctrine and could include the following:

- Armed Forces assistance will be requisitioned only when the situation cannot be handled by civil administration for judicious use;
- When needed, the Armed Forces will provide immediate response.
- Operational requirement of the armed forces will always take priority;
- While responsive to the needs of civil authorities, the military chain of command will remain in place and in force;
- Aid will be requisitioned by civil authorities on task (mission) basis and not on the number of troops;
- Liaison and coordination will be effected throughout the period of the disaster response mission;
- Advance planning and training will be conducted;
- Military (and civilian) resources will be integrated as needed to effectively accomplish tasks;
- The Armed Forces will be derequisitioned earliest i.e. released from the support mission as soon as the civil administration can take control of the situation.

5.7.4.7 Procedures

Armed Forces are always prepared to come to the aid of the disaster stricken population, however, it would be useful in overcoming avoidable difficulties if the civil administration follows the laid down rules and

regulations for seeking their involvement. Assistance is provided by the Armed Forces with the approval of the Central Government, as the use of Armed Forces is a function of the Central Government. Whenever troops are called out for such tasks, the State Government or the civil authority through the state Government, should report the fact to the Central Government (Ministry of Defence and Ministry of Home Affairs) without delay. For grave situations warranting immediate requisitions like maintenance of law and order, magistrate of the highest rank may requisition direct to the nearest military authority located in his jurisdiction. Sufficient information should be given while requisitioning troops so that the military commander can work out the resources required.

In a strike situation, State Goverments may seek for military assistance for the maintenance of essential services. They must furnish information while requesting military assistance whether the strike has been declared illegal, furnishing the number and date of notification in this regard; and whether all civil resources have been explored before any military assistance is sought to run essential services.

Assistance by the Armed Forces during natural calamities would generally be provided on the sanction of the Central Government. In case of immediate necessity when reference to central Government is not practicable, local military authority may, at their discretion, comply with a request from the civil authority and report to the higher military authorities. The requisition should be in writing to avoid subsequent complications. Any assistance given by Armed Forces in these circumstances would be of an unseen or unexpected nature and consequently no previous plans can be made in such cases.

The military units remain under the command of its own commanders and works on the basis of task. The requisitioning of the Armed Forces should not be in terms of quantum but based on identified tasks. If the district and state incorporate the role expected from the Armed Forces and there is continuous flow of information, the procedure for deploying them would be quick and smooth. This would also enable the appropriate local military authorities to take necessary advance sanction of using certain critical resources. Apart from incorporating them in the planning stage itself, there should be a clear understanding of the specific administrative authority that should contact the appropriate military commander. The civil authorities have to ensure that when an Army column is requisitioned, their role is clear and the relief stores for distribution or special stores for a given task are provided to them.

When further aid is not required the troops send a report to their service headquarters include details of number and type of troops employed, equipment used, duration of employment, brief report of work done, result achieved and all additional expenses incurred. All expenditure on the

employment of Armed Forces for maintenance of law and order will be borne by the Central Government. For other aid in maintenance of essential services, assistance during natural calamities or execution of development projects, except for normal pay and allowances, rations clothing, equipment and supervision charges, cost will be met by the State Government/ Union Territory Administration in respect of following:

a) Consumable stores.

b) Non-consumable Stores and Equipment including depreciation cost.

c) Incidental expenditure e.g. cost of move.

d) Hospitalization and treatment of the service personnel injured whilst employed in these duties.

e) Any damage to crops or compensation payable to the local people.

5.7.4.8 Deployment of Armed Forces for Disaster Management

Each service within the Armed Forces would be employed for specific tasks as per its capabilities with the Army being predominantly engaged for assistance. Every service will be independently responsible to render, aid for the maintenance of essential services, during natural and other calamities (e.g. earthquakes) and other type of assistance (e.g. for development projects) when asked by the civil authorities. Coordination will be done in joint meetings of the representatives of the Services and the civil authorities concerned, where resources of more than service are required.

For maintenance of essential services, the assistance provided by the Armed Forces will pertain to the provisioning of technical personnel and specialized equipment. The Corps of Engineers, Corps of Signals, Army Medical Corps and Corps of Electrical and Mechanical Engineers are likely to be called upon to provide such assistance. The Air Force would mainly be used for transportation of stores and personnel by fixed and rotary wing aircraft, while the Navy would best be employed for all activities at sea and provision of divers. Generally, the tasks undertaken would be provisioning of machinery and equipment which is not readily available with civil authorities, provisioning of technical personnel, and provision of supervisory staff who should coordinate and guide the work of civil agencies.

Army assistance should not be called for work mainly involving unskilled or manual labour, which should be provided from other sources like voluntary organisations, paid labour. Home Guards, police or the civilian government

staff. In case troops have to be detailed to save life or on humanitarian grounds at short notice, they should be withdrawn as soon as possible.

Army Formation

A formation is a Headquarter with other subordinate formations and / or units its command. The Area and the Sub Area are the static formation, which are geographically distributed and would also be involved in disaster management planning on a continuous basis. For operational purposes, a Command has a number of Corps, which further has two or three infantry, mountain or armoured Divisions under it. A division is the basis formation employed in war that combines a force of all arms and services for undertaking sustained operations over protracted periods generally having three infantry or armoured brigades and an artillery brigade. It has the combat elements of infantry, armour, artillery, engineers and signals; and also logistics elements of Army Services Corps, Army Medical Corps, Divisional Ordnance Unit, Electrical and Mechanical Engineers Corps of Military Police and Army Postal Service. The Army Aviation Corps and Air Defence Artillery are other combat units under a command.

Each formation has a headquarters with the broadly organised as General Staff Branch (operations, intelligence and training), Adjutant General's Branch (personal administration, discipline, medical service pay, welfare, etc.) and Quarter Master General's Brach (supply of all material need, accommodation and move of troops). The General Staff Brach would coordinate all aspects of disaster management where as the others would provide support as required.

Unit

A unit would be generally a battalion or a regiment of an arm or service under the independent command generally of a Colonel. These further have sub-units called company, squadron or battery which form a column for aid to civil authorities. The number of columns that a typical unit could provide is generally three to four. There are some minor units that may be able to provide only one column. The units are integrated into the disaster management plan and respond as per the need and situation.

Typical Army Column

Generally the Army is employed in self contains, self sufficient and mobile columns when taking action whether it is during a natural calamity or in restoring law and order. A column may be built around an administratively self contained company of about a hundred men with additional resources attached of signal detachment, medical team, repair and recovery element and other functional requirements like boats during floods. These columns may functions independently for limited role or a number of them may

function under a designated headquarters. The role assigned could be one or a combination of evacuation, medical, distribution, security, search, rescue, clearance, shelter, or any other, but the material required to be expended for the affected population should be provided by the local administration authority.

Ex-serviceman

A large number of disciplined and trained men are available in all parts of the country after having retired from the Armed Forces. Amongst these men are people trained and experienced in different aspects who could be the key persons at local for disaster management. They have qualities of leadership, skills, expertise and dedication for community work. The Director General Resettlement formulates and implements scheme for their resettlement with the Soldiers, and Airmen Board functioning under it and having its branches in all states and districts of the country. The ex-servicemen must be involved at the local in the planning and implementation of disaster management activities within a district.

Type of Assistance

From the above it is clear that the armed forces could be generally considered for the following type of assistance:

a) Command & Control infrastructure including of relief.

b) Medical Aid.

c) Logistics backup for transport of relief.

d) Relief camp establishing

e) Construction/repair of roads & bridges

f) Maintenance of essential services.

g) Evacuation

h) Diving effort.

i) Handling of international relief.

j) Aerial reconnaissance.

The catastrophic impact of disasters can be reduced only if there is coordination and cooperation from all sections of the society belonging to varies sectors. The Indian armed forces are one of the most dedicated and professional organization with a rich tradition of being involved in the social-development roles of nation building. Their services should be utilised as a last resort and be called upon to intervene and take on specific tasks only when the situation is beyond the coping capability of civil administration as it involves high costs.

5.7.4.9 Recommendations by High Powered Committee (on Disaster Management) for Armed Forces

The High Powered Committee of Disaster Management had included the following recommendations for Armed Forces related to disaster management:

1) The Armed Forces should have a dedicated component of personnel and equipment at the battalion level for disaster management.
2) All five army commands may have fully equipped centres in each of the command regions at appropriate locations that may have heavy equipment necessary to carry out relief and rescue activities in the region at short notice.
3) Use of Technical Army to be incorporated in disaster management plans. In highly disaster prone states, it could be considered raising specialised Disaster Management Battalions similar to Ecological Battalions.
4) Border Road Organisation, where available be suitably incorporated in disaster management plans.
5) A Military Coordinating Officer should be part of the disaster management team at the national and state level.
6) The potential of ex-servicemen available throughout the country be tapped for disaster management. They should be employed for creating disaster task force at the local level.

Their role in providing the Emergency Support Functions such as communications, search and rescue operations, health and medical facilities to the victims, transportation, power, food and civil supplies, public works, engineering support, information and planning at the time of disaster is extremely beneficial. Since various agencies operating in the field of disaster management rely on the armed forces for timely assistance it is to be ensured that disaster specific training be provided to the personnel and incorporated into their training programmes. Each disaster management plan may incorporate the available assistance that could be provided by the armed forces (IGNOU, 2006).

5.7.5 Youth Organizations

Youth movement is critical component of the education system that can play an important role in the area of disaster management. The following

institutions have capability potential, and are very suitable for disaster management.

i) The National Cadet Corps (NCC)

ii) Bharat Scouts & Guides

iii) National Service Scheme (NSS)

iv) Nehru Yuvak Kendra (NYK)

NCC, boy scouts and the Girl Guides, NSS and such organized youth should include Disaster Management as one of their main activities. They could be incorporated into the local level relief and awareness programme. NYK, Youth Clubs and Mahila Mandals at the grass root level to be organized for creating a mass movement for disaster preparedness.

5.7.5.1 National Cadet Corps

The NCC came into existence on the 16th July, 1948 under the NCC Act XXI of 1948 under the Ministry of Defence with the following objectives:

i) To develop character, comradeship, ideals of service and capacity for leadership in the youth of the country.

ii) To stimulate interest in the defence of the country by providing service training to youth; and

iii) To build up a reserve to enable the Armed Forces to expand rapidly in a national emergency.

The NCC curriculum was extended to include community development as part of the NCC syllabus. Its broad activities are institutional training, community development, youth exchange programme, sports and adventure training. All the activities of NCC tend to develop a trained and disciplined manpower to help the country in the eventuality of disaster emergency. NCC can play an important role in Disaster Management as their physical fitness, including their participation in adventure, sports and games makes them proficient for assisting the country in emergency situation.

i) As armed forces are sometimes required to work in disaster management area, the NCC also tries to give some similar inputs to NCC Cadets

ii) NCC Cadets should also be trained in search and rescue, first aid and relief during disaster situation i.e. earthquake.

iii) NCC Cadets shall also be trained to conduct mock drills on earthquake disaster response in various schools and local fairs particularly in those districts of the state which fall in Earthquake Damage Risk Zone IV & III

5.7.5.2 Bharat Scouts & Guides

The Boys scouting and the girls guiding as movement started in India in 1909 and 1910 respectively. Now they are known as the Bharat Scouts & Guides with the objectives to:

i) Make boy scouts and girl guides resourceful, self reliant and ever helpful towards others.

ii) Enable them discover their latent faculties and talents.

iii) Enable them to express them creatively.

iv) Promote character building spirit of adventure and spirit of service amongst the youth.

These activities are not only recreational to students but also develop endurance, build competencies to survive in difficult situations and provide opportunities to serve the society. Thus, it is seen that major emphasis in their training is on resourcefulness, self reliance, character building and service to the community. Since the age of the scouts and guides is usually below 16, they can develop right type of attitudes and also some skills such as first aid, providing relief, especially when it comes to distribution of food and other relief material to the victims of disaster. However there is a need to focus on those activities that enable them to become effective disaster management volunteers specially in strengthening communication network and in certain cases even in the rescue work.

5.7.5.3 National Service Scheme

National Service scheme was introduced in India in a formal way in 1969 with the central theme the students should always keep before them their responsibility. The Nationality policy on education 1986 has recognized the role of NSS in serving the community. The main objectives of NSS are:

i) Understand the community in which they work

ii) Understand themselves in relation to their community

iii) Identify the needs and problems of the community and involve themselves in problem solving process.

iv) Develop among them a sense of social and civic responsibility.

v) Utilize their knowledge in finding practical solution to individual and community problems

vi) Develop competence required for group living and sharing of responsibility.

vii) Gain skills in mobilizing community participation

viii) Acquire leadership qualities and democratic thoughts

ix) Develop capacity to meet emergencies and natural disasters, and

The NSS programme may be classified into regular NSS activities and special programmes. Broad areas of activities are:

i) Environment enrichment and conservation

ii) Health, family welfare and nutrition programme

iii) Programmes aimed at creating an awareness for improvement of the status of women

iv) Social service programmes

v) Production oriented programmes

vi) Relief and rehabilitation work during natural calamities

vii) Education and recreation

5.7.5.4 Nehru Yuvak Kendra Sangathan (NYKS)

Now one of the largest grass root level organization of its kind in the world, NYKS was established to harness and channelise the power of youth on the principles of voluntarism, self help and participation. On the present reckoning youth in India forms nearly 35% of the total population which has already crossed 1 billion mark. Indian youth also account for 35.8 per cent of the world's total youth population. This is a vital vibrant and dynamic human resources having bearing on the future state of not only India but the also the entire world.

The Nehru Yuva Kendra Sangathan has 500 district offices, 46 regional offices, 18 zones, 1000 youth development centers and over 181 thousand village based youth clubs enrolled under it. The purpose behind these clubs at the grass root level is to form village level voluntary action groups of youth that may come together with concern for the poorest of the poor.

The strength of NYKS lies in 5000 national service volunteers and nearly 8 million youth volunteers through a vast network of Youth clubs and Mahila Mandals at the grass root level. Through NYKS these village based organizations have become local pressure groups as well as catalytic agents for socia-economic, cultural, political and environmental transformation. These groups have in fact become functional action groups with rural sustainability and self reliance as their hallmark. When viewed in these terms, the role of NYKS could be defined as that of not merely an ogranization but a mass movement that can play an important role in disaster management (IGNOU, 2006).

5.7.6 Media

Reducing the losses of life and property caused by disasters, is a compelling objective now receiving worldwide attention. Scientists and engineers now believe that, the knowledge and technology base potentially

applicable to the mitigation of hazards, has grown so dramatically in recent years that, it would be possible, through a concerted co-operative international effort, to save many lives and reduce human suffering, dislocation and economic losses. Communications are central to this effort for public education, early warning, evacuation, and post-disaster relief.

The media acts as the link between the common man and technical information about the risk and the hazards. They absorb and transform technical information provided by either experts or mediators and relay the information to the public in a simple manner.

The strengths of the mass media lie partly in their independence from governments or other agencies, and partly in their ability to attract large audiences who regard them as reasonably credible information sources.

The capabilities of communications, data-gathering, and data-management technology have leaped forward with our increasing knowledge about the origins and behaviour of disasters and the mitigation of their effects. Indeed, advances in telecommunications and computer sciences are among the major contributors to the recognition that technology can do much to blunt the effects of hazards.

Mass communication is inextricably entwined with disasters and hazard mitigation. The electronic and print media, reflecting great public interest and concern, provide extensive coverage of disasters, particularly those with strong visual impact. The media have significantly improved the level and sophistication of search & rescue and relief coverage in recent years by using new technology.

The print media, too, have benefited from advanced technology. Facsimile transmission and closer linkages between reporters and specialists in government and academia have deepened understanding of the causes and impacts of these disastrous events, and, no doubt, have had some effect in reducing long-term exposure and risk.

Clearly, mass communications technology already has had a significant impact on how the public learns of and perceives the impact of disasters. And as the costs are further reduced and the capabilities of these technologies improve, the level and sophistication of information presented to the public will also be enhanced.

In addition to the vastly improved opportunities that telecommunications technologies have provided, to report on prospective, ongoing and recent disasters and relief efforts, their capabilities have slowly shifted our thoughts from post-disaster relief to more effective means of coping with sudden disasters.

Better linkages between the public media and the community of disaster mitigation researchers and practitioners including scientific, technological, or service-oriented can make disaster management efforts more effective and more important, can accelerate the shift in both the public's and the administration's thoughts towards effective pre-disaster initiatives.

To this end, the electronic and print media could embark on a two-step process to enhance the quality of its hazard-related services.

5.7.7 NGOs

NGOs are loosely termed as various organisations from other then the government sector. There are many more NGOs working with deep commitment, dedication and transparency by involving the people and people's resources but they should be well directed. The NGOs are in a position where they can play a very important role not only in identifying and prioritising challenges of the local areas but could also examine and disseminate effectively lessons for action. NGOs working in the following areas can be involved in disaster management activities.

i) Economic and semi-economic development
ii) Health and mass media
iii) Educational development
iv) Training research
v) Rural/block development
vi) Entrepreneurial-women empowerment

NGOs, due to their proximity to the people, society, environment etc. are in a better position to take effective steps for proper monitoring of various parameters of success. Voluntary agencies are essentially non-profit and non-partisan organization. The criteria for identifying voluntary agencies for enlisting help in relation to the disaster management programme should be as follows:

i) The organization should be a legal entity

ii) It should be based in a rural area or area of intervention and be working there for a minimum of 3 years.

iii) It should have broad-based objectives serving the social and economic needs of the community as a whole and mainly the weaker sections. It must not work for profit but on 'no profit and no loss basis.

iv) Its activities should be open to all citizens of India irrespective of religion, caste, creed, sex or race.

v) It should have the necessary flexibility, professional competence and organizational skills to implement programmes.

vi) Its office-bearers should not be elected members of any political party.

vii) It declares that it will adopt constitutional and non-violent means for development purposes.

viii) It is committed to secular and democratic concepts and methods of functioning.

5.8 Peoples participation & Protection of the weaker section, women and children

The old, the children, the infirm, the physically handicapped & the person suffering from diseases should be included in the weaker section in the society. The following action should be taken to ensure more active & meaningful people's participation & for the protection of the weaker section of the society.

A. In natural disaster situation adequate preparedness & relief is not possible only with the help of government servants. All the natural calamities specially the earthquake which is catastrophic & destructive requiring and quick rescue of trapped people in debris of the damaged & collapsed houses, response is required for providing first aid to injured, remedial identification area disposing dead bodies "through funeral/burial, providing food, safe drinking water & shelter to the victims etc. These are such huge tasks which cannot be handled properly only by government. machinery and proper rescue, evacuation & relief work needs more meaningful & active participation of the local community as well as NGOs & Panchayat Raj Institutions. The district wise list of volunteers and NGOs who have already worked in the calamity situation & earned appreciation must be prepared and they should be assigned major role in public awareness, education, relief distribution & even in long term rehabilitation. The community members, NGOs & Panchayati Raj Institutions shall also be invited for sharing their views & experiences through media such as TV, Radio & also in seminars & workshops etc.

B. Village will be the focal point of the whole disaster management activities for ensuring continuous awareness & attention towards the need of better management of the catastrophic disaster & for continuous flow of information.

C. The public awareness programme shall also include cultural programmes & Cultural Affair Department.

D. The inclusion of natural calamities & disaster in school & collage curriculum / textbooks is necessary but only this will not achieve the purpose. Hence on the lines of NSS training camps one-week camp should be organized to give practical exposure to the students as

well as community members. The concerned deptts. of the Govt. will immediately take action for the implementation.

E. Adult education is a very affective measure to create awareness among the rural masses & the Higher Education department shall immediately include the important points of earthquake disaster preparedness & community participation in disaster management.

F. Yuwak Mangal Dal, Mahila Mangal Dal & Anganbaris shall share their responsibility towards the awareness programme & in a disaster situation they shall be actively involved in rescue work. The Youth Deptt. & Women Welfare deptt. shall evolve a suitable mechanism and implement it as early as possible.

G. The govt. officials visiting & touring villages regarding their departmental task must arrange people contact programmes & disseminate information concerning natural calamities & disaster & must pursue the awareness programmes along with their departmental programmes. The officials of Revenue, Rural Development, Health Irrigation, Social Welfare, Police, Agriculture, Civil Supply, Animal Husbandry, Electricity, Jal Nigam, Jal Sansthan, Nagar Vikas will be very helpful in spreading the message. All the deptts. will issue G.Os & instructions in this regard.

5.9 General Education and Awareness Regarding Vulnerability and Mitigation Measures, Microzonation and Related Problems

Realizing that a large part of the State of Uttar Pradesh falls in the Earthquake High Damage Risk Zones IV and III, hence there is an urgent and strong need for creating greater awareness and education regarding seismic vulnerability and mitigation measures, seismological research, seismic microzonation and other related problems for effective earthquake mitigation. It is hence strongly recommended that :

Special capsules on the subject of disaster mitigation with special reference to earthquake be introduced at the U.P. Academy of Administration and Management, Lucknow for the administrative officers of the State.

- A permanent mechanism be evolved at the district Level on a continuing basis for disaster mitigation & management. Furthermore, NGOs working in the area be included in this mechanism and all the districts should have a upto date District plan for Disaster Management Action Plan with special reference to earthquake.
- Special workshops for masons, carpenters, artisans, village level functionaries and NGOs be organized at block level to provide specific training in different areas of specialization and their role in disaster mitigation.

- While formulating land use plans, developmental plans and other large scale construction plans, earth scientists be actively involved to help disaster mitigation.
- Vulnerability study for special structures should be carried out in the high risk area, specially for structures like dams and irrigation projects, bridges, water storage systems, hospitals and schools and special re-enforcement or disaster mitigation plans be prepared. Microzonation and seismological studies be taken up in selected area to delineate high-risk zones. Adequate funds required for the purpose be made available.
- Reliable communication network capable of working on stand-alone basis may be established for speedy communication. A feasibility study for providing Ham Radio network in the citizens band linking remote villages with block headquarters and subsequently with the district Headquarters by carried out.
- At the State level the setup of the Relief Commissioner be so strengthened that it acts as a nodal point and agency for collection and exchange of information and keeping abreast with the knowledge and constant interaction with the professionals be maintained for making and updating mitigation plans. A suitable mechanism be involved for continuous flow of information from the state to district level for effective implementation of disaster mitigation plan.
- The state govt. should ensure that whenever a new D.M. takes charge of the district he/she should immediately familiarize with the disaster management plan and organize a district level exercise involving all concerned, including NGOs, to update preparedness. The Relief Commissioner's office should follow this up on a regular basis.
- Traditional technologies and their role in disaster mitigation be studied and as far as possible be adopted for disaster mitigation.
- Village level plan for disaster mitigation with total village population participation be evolved and encouraged. The emphasis should be on the fact that the villages themselves prepare. The village Disaster Management Action Plan (VDMAP) and government departments and agencies should act as facilitators. Such a VDMAP will have the acceptability among the village community as it will be owned by them and would be area specific and practical plan not imposed by the government.

Chapter VI
Response

6.1 Institutional Arrangements

This multi-disaster action plan proposes that all the agencies and departments with their disaster specific functions come under a single umbrella of control and direction, to attend to all kinds of disasters.

Institutional Arrangements		
Disaster Management System of Uttar Pradesh involves three focal layers of participating organisations		
Agency	**Institution**	**Instrument**
Govt. of Uttar Pradesh	State Crisis Management Group (SCMG)	State Disaster Management Action Plan (SDMAP)
District Administration	District Crisis Management Group (DCMG)	District Disaster Management Action Plan (DDMAP)
Tehsil Administration	Tehsil Crisis Management Group (TCMG)	Tehsil Disaster Management Action Plan (TDMAP)
Village Panchayat	Village Disaster Management Committee (VDMC)	Village Disaster Management Action Plan (VDMAP)
Disaster Site	Site Operations Centre Relief Camp, Transit Camp, Cattle Camp, Food Camp	Standard Operations Procedures (SOPs)
There are other players also like CBOs, NGOs, Research Institutions, Experts and above all the Community		

6.1.1 Institutional Arrangements at State Level

6.1.1.1 State Disaster Management Authority (SDMA)

State Disaster Management Authority (SDMA) is headed by the Chief Minister of the state and consisting of such other members to be nominated by the Chief Minister. The SDMA will be responsible for laying down policies and plans for disaster management in the state and will approve the state plans prepared in accordance with the guidelines laid down by the National Disaster Management Authority (NDMA). The SDMA will also approve the disaster management plans prepared by the state government departments and facilitate implementation by recommending provision of necessary funds.

6.1.1.2 State Crisis Management Group (SCMG)

State Crisis Management Group (SCMG) is headed by the Chief Secretary the state and consisting of concerned secretaries to the state government. The SCMG will assist the SDMA in the implementing the National Plan and State Plan and act as the coordinating and monitoring body for disaster management in the state.

6.1.1.3 State Emergency Operations Centre

The Emergency Operations Centre (EOC) is proposed as the hub of activity during a disaster. The structure of the EOC can expand or contract depending on the situation. The existing arrangements, therefore, will be strengthened by this administrative arrangement at the time of emergency or disaster, which proposes to have the Chief Secretary as the team leader supported by the Relief Commissioner with branch arrangements at the Emergency Operations Centre (EOC). The objective is to have a simplified and uncluttered system of disaster response.

The primary function of an EOC is to implement the SDMAP which includes coordination, policy-making operation management, data collection, record keeping, public information and resource management.

The EOC, its system and procedures are designed in such a way that information can be assessed and relayed to concerned parties. Rapid dissemination contributes to quick response and effective decision-making during an emergency. As the master coordination and control point for all counter- disaster efforts, the EOC is the centre for decision- making under a unified command.

In a disaster situation, the EOC will come under the direct control of the Chief Secretary or any other person designated by him as the Chief of Operations.

The EOC, under normal circumstances, will work under the supervision of the Relief Commissioner. It is the nerve centre to support, co-ordinate and monitor disaster management activities in the State.

Under normal circumstances, the activities of EOC are primarily the responsibility of Relief Commissioner's office, along with training and research.

The usual activities of the EOC will be to

(i) Ensure that all districts continue to regularly update the District Disaster Management Action Plan and encourage districts to prepare area-specific plans for areas prone to specific disaster;

(ii) Identify and interact with central laboratories, research institutions and NGOs to evolve mitigation strategies and setup study groups and task forces for specific vulnerability studies;

(iii) Serve as a data bank and ensure that due consideration is given to mitigation strategies in the planning process; identify agencies and institutions for locating inventory items;

(iv) Upgrade and update the State Disaster Management Plan according to changing situations in the state;

(v) Disseminate information about the State Disaster Management Plan to other departments of the government of Uttar Pradesh and state level agencies;

(vi) Monitor the training imparted to state level officials, private sector and NGOs

(vii) Organise post- disaster evaluation and update the state DMAP accordingly.

(viii) Ensure that the warning and communication systems and instruments in the EOC are in working condition.

(ix) On the receipt of the information from IMD or on the basis of basis of reports from Divisional Commissioner/District Collector of the occurrence of an earthquake all the community preparedness measures including counter- disaster measures will be put into

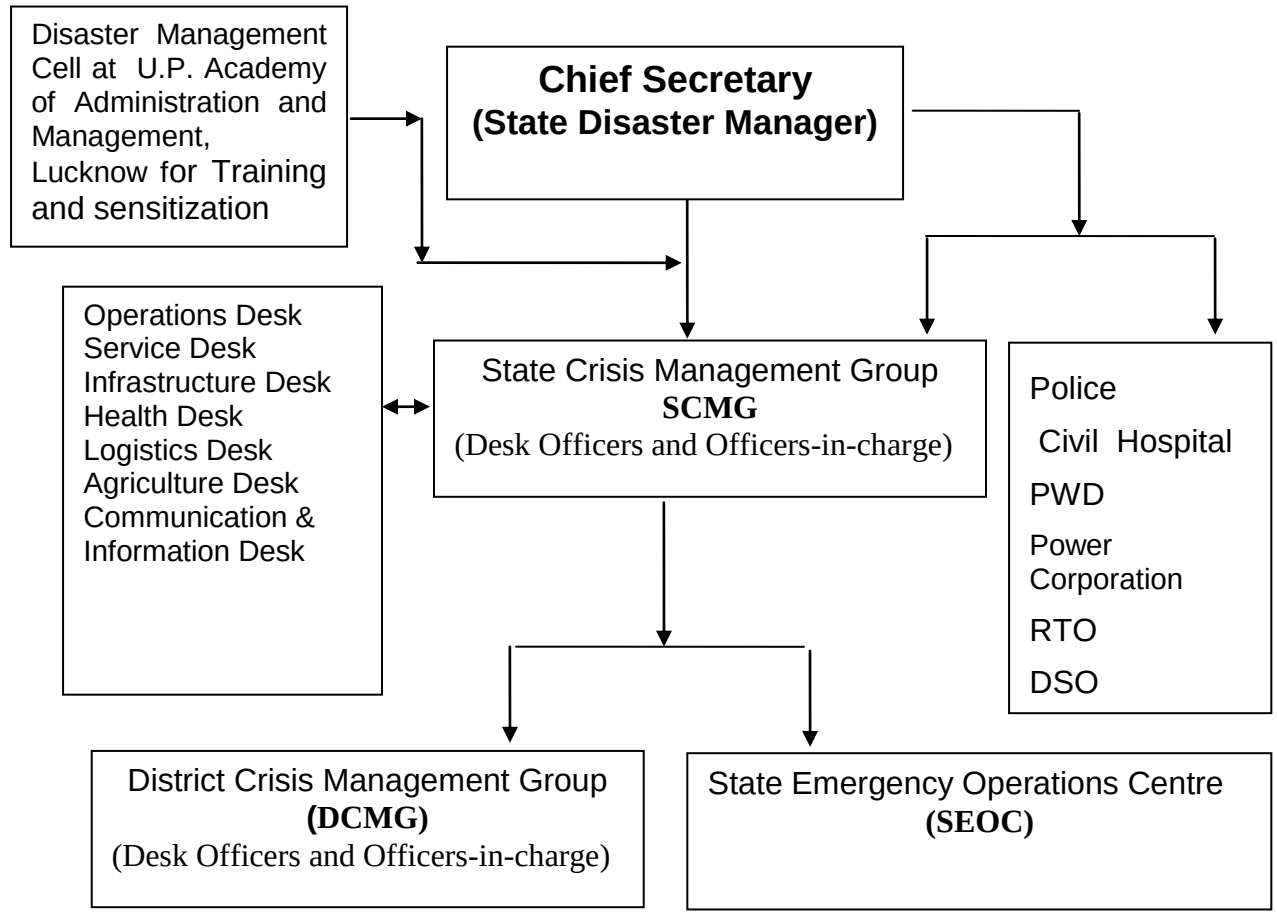
operation. The Chief Secretary/Relief Commissioner will assume the role or the Chief of Operations for Disaster Management.

(x) The occurrence of disaster would essentially bring into force the following:

(xi) The EOC will be on full alert. The EOC can be expanded to include branches with responsibilities for specific tasks.

(xii) An on- going VSAT, wireless communication and hotline contact with the Divisional Commissioner and District Magistrates and SSPs of the affected districts.

Diagrammatic Representation of Institutional Arrangements at State Level



6.1.1.4 Response Structure at State Level on occurrence of disaster

In a disaster situation various line departments and agencies will act as per the priorities defined by the Chief of Operations (Chief Secretary). Policy guidelines of State Disaster Management Action Plan will also help various stake holders in this regard. Relief Commissioner will coordinate services of various departments and agencies including national and international aid agencies, and central government agencies. The State Emergency Operations Centre (EOC) in its expanded form will continue to operate as long as the need for emergency relief operations is there and till the long-term plans for rehabilitation are finalised.

Housing, Urban Development, PWD and Rural Development departments will be responsible for managing long-term rehabilitation programmes. This will enable the State Emergency Operations Centre (EOC) to attend to other disaster situations, if need be.

The main branches in the State EOC during a disaster situation will be operation, services, resources, infrastructure, health, logistics, communication and information management. Each branch will have specific tasks to perform with a branch officer of the rank of joint Secretary. The capacity of the various braches to coordinate amongst themselves and with the field units will ultimately decide the quality or response.

The facilities and amenities to be provided in the State Emergency Operations Centre (EOC) include well-designed control room and workstations for the branch and nodal officers equipped with VAST, wireless communication, hotlines, and intercoms. The State EOC as a data bank shall keep all district and state level disaster management action plans and maps. Provision of a car with wireless communication shall be made for the State EOC during normal times.

Three categories of staff are being suggested for the control room; regular, staff, on-call and staff on disaster response duty. Regular staff will consist of an officer of the rank of additional Secretary/ deputy secretary as the branch officer- in control room. The manager will be a technical person thoroughly conversant with computer technology. Two deputy secretaries will make up the staff-on-call. Staff on disaster duty will be the additional staff who will shoulder additional responsibility in case of a disaster and may be drawn from the various departments experienced in control room and EOC operations.

In disaster management, there is a need for coordination between different levels of the government to have a unified command system for coordinated action by all the agencies. The objective is to ensure that the states action is organized in a disaster situation to:

- effectively and efficiently meet the needs;
- avoid waste and-duplication of effort; and
- ensure that resources are distributed equitably and to the areas greatest need.

6.1.1.5 List of Departments to be consulted

Given below is the list of State and Central government departments and other autonomous organizations to be consulted with regards to the Earthquake disaster management.

Central Government Departments

- Home Affairs
- Health & Family Welfare
- IMD
- Surface Transport
- Defence
- Power
- Communication
- Water Resources
- Railways
- Civil Aviation
- NDM Division
- NCDM
- Central Warehousing Corporation (CWC)
- Building Materials & Technology Promotion Council (BMTPC)
- Central Pollution Control Board (CPCB),
- Urban Development
- Agriculture

State Government Departments

- Home Department.
- Medical & Health Department
- Urban Development
- Rural Development Department
- Food & Civil Supplies Department
- Animal Husbandry Department
- Energy Department
- Irrigation Department
- Public Works Department
- Education Department

- Revenue Department
- Forest Department.
- Agriculture Department
- Cooperative Department
- Horticulture Department
- Industries Department
- Supporting Services

In addition to above support and services of local, national and international voluntary organisations (NGOs) and World Organisations are welcome.

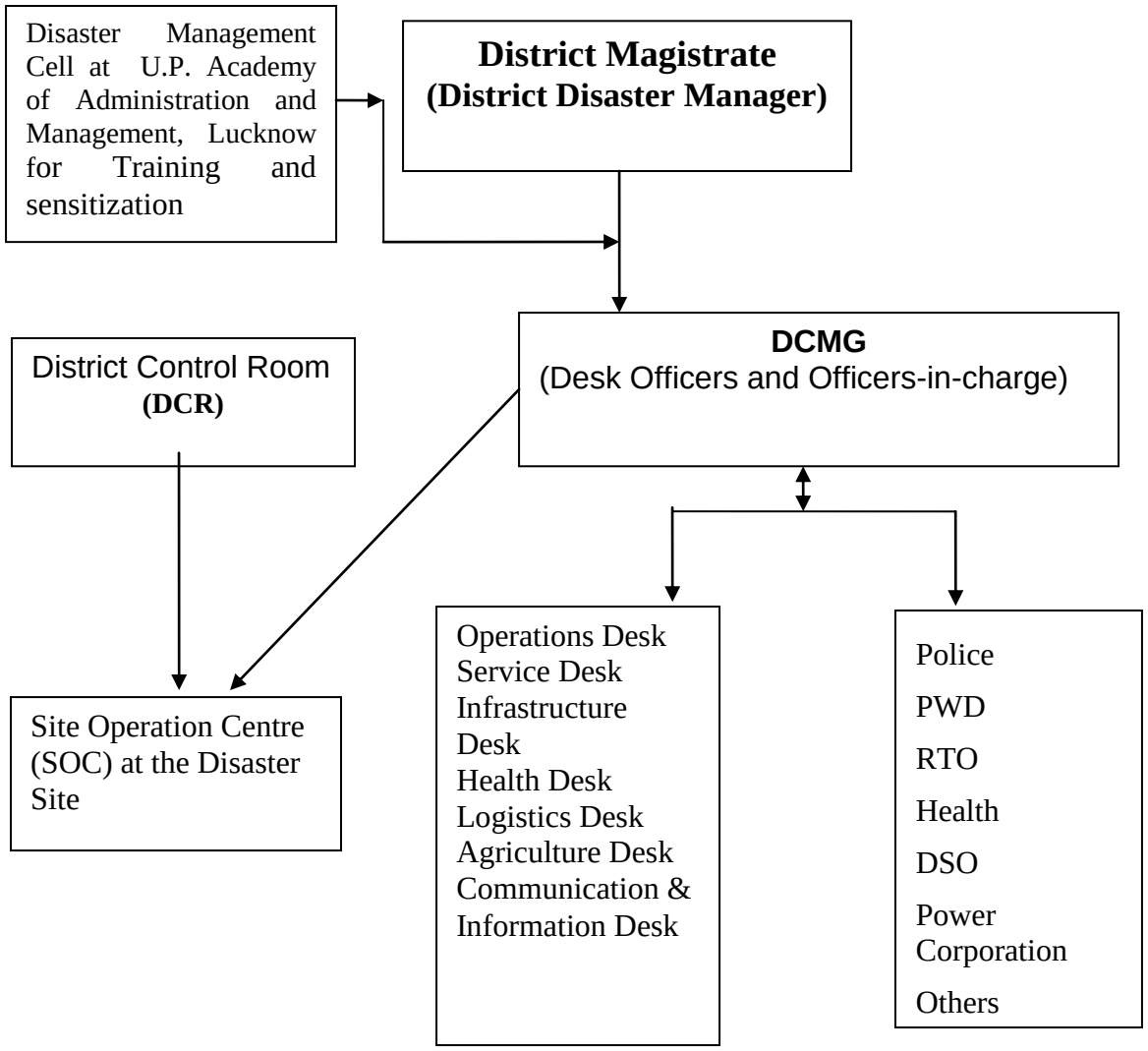
6.1.2 Institutional Arrangements at District Level

6.1.2.1 District Disaster Management Authority (DDMA)

District Disaster Management Authority (DDMA) should be constituted for every district in the state under the co-chairmanship of the District Collectors and Chairperson of the Zilla Parishads. The DDMA will act as the district planning, coordinating and implementing body for disaster management at the district level in accordance with the guidelines laid down by the NDMA and the SDMA. The DDMA will identify the areas vulnerable to disaster, prepare the district disaster management plan and initiate measures for the prevention of disasters and the mitigation of their effects through the state government departments at the district level and the local bodies. The DDMA will further give directions to different authorities at district level and the local bodies to take such other measures for the prevention and mitigation of disasters as may be necessary.

The local authorities such as the Panchayati Raj institutions, municipalities, district board, cantonment board, town planning authority etc. will be actively associated with disaster management and shall closely work with the vulnerable communities. All construction projects undertaken by the local authorities will be conforming to the standards and specification laid down for disaster prevention and mitigation. The local authorities will be responsible to carry out relief, rehabilitation and reconstruction activities in the affected areas in accordance with the state plan and district plan.

Diagrammatic Representation of Institutional Arrangements at District Level



6.1.2.2 District Crisis Management Group (DCMG)

Operations Desk

- Search and rescue operations for the victims stranded inside collapsed structures buildings, bridges etc. in the event of an earthquake.
- Transportation of injured to the nearest medical facility
- Establishment of Site Operations Centre in the vicinity of disaster site or area specific Site Operations Centre (SOCs) if the devastation is at many areas

Service Desk

- S&R requirements as per information.
- Relief requirements.
- Cash Compensation requirements as per information available.

Service Desk will also organise and Coordinate the following:

- Relief Camps
- Cattle Camps.
- Relief Supplies
- Law & Order.
- Welfare Services

Coordination of NGO Activities by the Service Desk

- Establish Coordination at inter district levels, NGO & other state societies which will help State/ Distt. agencies in a disaster.
- Identification & mobilizing of State NGO's as per priority of situation.
- Assign well-defined area of operations & report to EOG
- Reporting & documentation on procurement & disbursement of relief materials received through governmental & non- governmental channels.

Infrastructure Desk

- Ensure- Organization & clearance of debris on the major and minor roads.

- Temporary Repairs of Damaged Infrastructure viz. power/ water/ transport/ telecommunication roads/ cannels/ bridges/ public buildings.
- Construction of temporary shelters/ storage / medical facilities/ helipads.

Logistics Desk

- Assessment of reinforcement needs including manpower & deployment of resources.
- Requirement & availability of depots, transportation of wood for mass cremation.
- Location identification for mass cremation/burial, manpower & transport for the same.
- Request for additional resources from other states/ center/ Mil-Para mil forces.
- Carcasses disposal- location, manpower, transport.
- Ensuring continuous fuel supplies for vehicles.
- Storage & safety of Relief Supplies.
- Maintenance of vehicles & equipment.
- Coordination for proper usage & maximum utilization of relief supplies received from various NGO's/ Central & International Voluntary agencies

Health Desk

Organize & Maintain records on:

- Disposal of dead bodies.
- Disposal of carcasses.
- Treatment of injured & sick.
- Preventive medicine & anti-epidemic actions.
- Report on food, water supplies, sanitation & disposal of waste

To assess the following requirements:

- Number of ambulances required.
- Medical equipments & medicines required, stocking of medicines etc.
- Any other info. If chances of epidemic spread are there.

- Medical relief for the injured.
- Establishment of Trauma Centers or Psychological counseling.

Resource Desk

- Books of accounts- Cash Receipt.
- Books of accounts- Cash disbursement.
- Stock register-relief Materials.
- Issue register- relief Materials.
- Dead Stock registers for non-consumables.
- Record of personnel TA/DA daily wages etc.
- Record of expenses on disaster management, administration.
- Record of transfer of funds (as advances) to other govt. departments (suspense a/c)
- Record –cash Voucher & credit Voucher
- Record of all gratuitous relief.
- Record of all compensation paid.
- Preparation of records for F& A.

Communication and Management Desk

(Essentially away from State Emergency Operations Centre for security of information & prevention of rumors).

- Setting up information Center to organize sharing of information with mass media and community.

- Coordination with IMD, NGRI and GSI for further information on after shocks (under normal circumstances as well 24*7) and regular collection on weather rainfall in particular in the aftermath of earthquake to assess its impact on relief operations

Agriculture Desk

- Rehabilitation of agricultural production.

- Ensure interim crop production through supply of seeds & other essentials.

- Provide services of technically qualified staff.

6.1.2.3 District Control Room (DCR)

The District Control Room (DCR) has been organized in a fashion to similar the State Emergency Operations Centre (State EOC).

During disaster situation the flow of information between the State EOC and the DCR has to be systematic, updated and on regular interval. Effort is made to evolve a system by which the DCR can set-up site operations centres. The DCR will report all the field activities to the State EOC.

In case of disasters which have an impact on more than one district in a division, the role of the Divisional Commissioner comes into prominence. The commissioner's responsibilities shall include exercising general supervision over the contingency plan and work undertaken by the collectors in his division as also on the relief and rehabilitation operations in those districts.

Emergency Telephone & Address Directory
(to be prepared and updated by functionaries of State Emergency Operations Centre at the state level and District Control Room at the district level)

S.No.	Name of key functionaries	Office Address	Residential Address	Mobile No.	Office Phone No.	Residential Phone No.

6.1.3 Institutional Arrangement at Tehsil Level

Tehsil Crisis Management Group (TCMG) shall be constituted at the Tehsil level to be headed by the SDM or Tehsildar (in those tehsils where SDM is not there) with officers from all the line departments as members which include Dy.SP/CO, Fire station Officer, In charge of community Health Centre/PHC, Asstt. Engineer PWD, Asstt. Engineer Irrigation etc.

6.2 Identifying Response Level

6.2.1. Alerts Mechanisms

Since earthquake cannot be predicted, a mechanism should be in place wherein as soon as the information about earthquake damage reaches District Control Room the first responders (police and fire brigade) and other line departments such as health, PWD etc. are immediately alerted to dispatch their teams to the disaster affected area and keep backup teams and primary and secondary treatment area ready in case of hospitals.
It is not possible to completely do away with the devastation of natural hazards like earthquake. However, experience has shown that destruction from natural hazards can be minimized by the presence of a well – functioning warning system, combined with preparedness on the part of the vulnerable community/society. Warning systems and preparedness measures reduce and modify the scale of disasters.

A community that is prepared to face disasters receives and understands warnings of impending hazards and has taken precautionary and mitigatory measures will be able to cope better and resume their normal life sooner.

The prediction of exact timing of earthquake is not possible. However, where and what size are supposed to be predicted by Codes on the basis of Vulnerability Atlas of India by BMTPC and also by experts of Seismology. From its very first version in 1962 to all subsequent revisions in 1966,1970,1975,1984 and the latest draft revision in 2000, the IS 1893 has shown Kutch region in addition to NE India and some regions of Himalayas in the severest zone. However IS 1893 could not predict the activities in Peninsular India. Before the Koyna event, that region was considered as practically non-seismic and the code had to be revised in 1970. Similarly, Latur-Khillari event could not be predicted by the code and only after the event the site was upgraded. Now it is thought no region in India could be deemed to be non-seismic and even Chennai has been upgraded to that of Mumbai.

The new draft revision in 2000 of IS 1893 has tried to predict intensities for Maximum Credible Earthquakes in India which is now divided into Four (not Five as earlier) zones. There is a major philosophical change in the Prediction as compared to versions up to 1984 (which is unfortunately the one being quoted even now by most in Government and the media). For example, the basic seismic coefficient for Bhuj was only 0.08 (this could correspond to a horizontal ground acceleration corresponding to the

maximum credible earthquake is 0.3 g (9 times). Of course, a lot of reduction is specified to this value based on some parameters, to arrive at design value but it would be definitely higher as compared to 1984 version. For Chennai, the corresponding values are 0.01 g and 0.16 g (16 times) (the reason that Chennai has been taken as an example is that so far due to very low values till date, earthquakes were not considered as a Hazard). Now it cannot be ignored. In other words earthquake engineering cannot be ignored anymore, anywhere in India. Most importantly, the structures cannot Run Away-we can only make these more safe than what they presently are, using the insights obtained through the systematic studies of the effects of the earthquakes as well as innovations made in construction technology.

IMD should be indentified as the Nodal agency to sound Alerts in case of Earthquake as soon as it occurs.

It is the responsibility of IMD to provide information about the magnitude and epicentre of the earthquake as soon as the earthquake occurs, and in case no information about the epicenter and the after effects such as micro-seismicity etc. is received the district or the state administration can itself contact the IMD, New Delhi regarding the details of earthquake.

The most important information regarding earthquake is its magnitude and epicenter.

If the earthquake is less than magnitude 5 on Richter scale the probability of damage is low. If the earthquake lies between 5-6 on Richter scale it is a moderate earthquake. There would be a considerable damages in the areas close to the epicenter. An earthquake of magnitude more than six on Richter scale will cause damage.

Earthquake	**Magnitude 5**	**Level 1 Disaster**
Earthquake	**Magnitude 5 and Magnitude 6**	**Level 2 Disaster**
Earthquake	**Magnitude 6 and above**	**Level 3 Disaster**

6.2.2 First Information Reports

First Information Reports need to be the trigger point for those disasters for which forecasting is not feasible, or where the time window between warning and occurrence of disaster is very narrow. This is concerned mostly with disasters such as earthquake and accidents, etc.

A copy of the reporting format is appended below;

REPORTING FORMATS

District	**:**
Date of Report	**:**
Nature of Calamity	**:**
Date and Time of Occurrence	**:**
Number and Names of the	**:**
Tehsils Affected	
Number of villages Affected	**:**
Number of Persons	
Died	**:**
Missing	**:**
Injured	**:**
(Incapacitated)	
Animals	
Affected	**:**
Lost	**:**
Crops Affected	**:**
Number of houses damaged	:
Damage to Public Properties	:
Roads	:
Buildings	
Police Station	
Fire Brigade Stations	
Hospitals	:
Schools	:
Panchayat Ghars	:
Community Halls	:

Bridges	:
Etc	:

6.2.3 Criteria for Level Definitions

Severity of Damage / Expected Damage

Damage reports and/or damage simulations may be used.

Extent of Damage

Geographical and functional spread of damage

Need for Direct Involvement of Central Government Departments

Thresholds beyond which involvement of Central Government is automatically warranted.

The above criteria is applicable solely on the findings and recommendations on the basis the factual position by the District Magistrate / local district administration.

It is impossible to predict or forecast an earthquake. However, the seismic activities in the state can be monitored through deployment of seismometers and ground motion accelerographs. Indian meteorological Department is the lead agency for monitoring earthquake. It is the responsibility of IMD to provide information about the magnitude of the earthquake.

The most important information regarding earthquake is its magnitudes and epicenter.

If the earthquake is less than magnitude 50 of Richter scale the probability of damage is low. If the earthquake lies between 5-6 on Richter scale, it is a moderate earthquake. There would be a considerable damages in the areas closed to the epicenter. An earthquake of magnitude more than six on Richter scale is a big earthquake and will cause damage.

Earthquake	Magnitude 5	Level 1 Disaster
Earthquake	Magnitude 5 and Magnitude 6	Level 2 Disaster
Earthquake	Magnitude 6 and above	Level 3 Disaster

L 1: A District Level disaster, within the capabilities of the District Administration to deal with.

L2: A State Level disaster, within the capabilities of the State Government to deal with.

L3: A National Level disaster, requiring direct intervention of the Central Government.

In addition to the disaster situations, the following 'peace-time' situation has also been identified:

L0: A 'no-disaster' situation. This is the level at which surveillance ; preparedness and mitigation activities must be focused on.

6.3 Emergency Response : First 24 Hours

The concept of trigger mechanism has been incorporated as an enough quick response mechanism, which would spontaneously set the vehicle of management into motion. The trigger mechanism has been envisaged as preparedness plan where by the receipt of a signal of impending disaster would simultaneously energise and activate the mechanism for response and mitigation without loss of time.

(i) State Relief Commissioner is the competent authority to press the trigger.

(ii) Conditions under which trigger may be pressed are specified such as a request from District Magistrate to upscale L1. Similarly declaration of L1 in number of districts, occurrences requiring direct intervention are declared by the State Relief Commissioner.

(iii) State Emergency Operations Centre located at Bapu Bhavan, Lucknow shall become operational full-time within an hour and establish direct contact with the concerned District Disaster Manager (District Magistrate) of the effected district with the Chief Secretary as well.

(iv) District Disaster Manager/Managers are asked to immediately set up Control Rooms at district level in case if the district doesn't have control room and deploy manpower for round the clock flow of information.

(v) If district already has a District Control room it must be activated for round the clock functioning.

(vi) EOC should immediately contact IMD about the magnitude and epicenter of the earthquake. Information can also be obtained from Geological Survey of India, Ghaziabad and Wadia Institute of Himalayan Geology, Dehradun.

(vii) District Disaster Manager be instructed by the Chief Secretary/ State Relief Commissioner to immediately set up the Site Operations Centers (SOCs) at or in the vicinity of the disaster site and send the requirement for additional resources required for the purpose of Search and Rescue, and as medical, water and food relief.

(viii) Quick Response Teams to be dispatched to affected area. Time, strength, list of members, person in charge, infrastructure specifications for teams etc. is communicated to all concerned.

(ix) Quick Response Teams shall comprise two sets of officials:

Line Officers Team, and

Area Officers` Pool.

(x) All the Head of the Departments of line departments viz. Health, Police and Fire Service, Food and Civil supplies, PWD, Jalsansthan, Panchayati Raj, Irrigation, Animal Husbandry, Civil Defense be asked to keep their human resources, material and equipments in a state of high readiness for rushing to the Site Operations Center as per the further instructions.

Immediate Requirements :

Once earthquake strikes a particular area, damage is caused due to destruction of existing structures, buildings, houses and resultant fire, destruction of bridges, collapsing and snapping of telephone and electric lines. All this causes great loss of life and property and a general chaos prevails in the area. Immediate measures which are required to mitigate the sufferings are given below:

Human Services

ESFs requiring direct intervention with affected population, such as health, food, SAR to be activated as a first line of response.

Highly Vulnerable Groups including children, aged, pregnant and lactating women, people with disabilities to be given priority attention. Special team

to be constituted to monitor this and special vulnerable group functions to be made mandatory under all ESFs.

Communication :

There will be a need, both of road and tele-communication while effort to restore this will be to move mobile radio detachments with Civil Officials at block and sub division level to assess the extent of damage and requirement of relief material. This team should also be tasked to mobilize the locals in providing immediate rescue, first aid and evacuation of wounded personnel to hospitals.

Medical Aid :

A proper plan for medical assistance should be worked out and incorporated in the disaster manual. Another Group whose recommendation should be included is preparing this part of work.

Retrieval of dead bodies and their cremation :

This will involve the following :

i) Mobilization of local help including voluntary organization for retrieval of bodies.

ii) Procurement of firewood for cremation and planks for digging graves. Availability of firewood should be ensured.

iii) Mobilizations of other forces in case dead bodies are buried under deep debris.

iv) Retrieval of all available food stocks locally.

v) Identification of places for temporary camps.

vi) Activation of relief scheme as worked out at block, sub-division and district level including information of relief collection points and their coordination for efficient distribution.

Organisation of Relief Centres

Depending upon the damage caused, relief centres (camps) shall be established at an appropriate place which should be accessible by road and also to a water source. Detailed organization and functioning of such relief centres should be explained in a separated Manual which should include the following :-

a) Nomination of a Govt. official for the relief camp.

b) Selection of a committee from amongst the local population, which can be based on the panchayat/NGO.

c) Necessary temporary shelter, food, milk clothing, utensils and water management.

d) Regulation of relief material received through different agencies.

e) Arrangements for helping orphans and infants.

f) Hygiene and sanitation of the camp.

Storage and availability of clean drinking water

If natural sources are disrupted adequate arrangement of water tankers for storage and supply of water will have to be organised. Here again the purification of water should be attended to avoid spread of any epidemic.

Food

Initially an arrangement for cooked food will have to be made for which plans should be made for movement of food-grains, utensils, volunteers for cooking food and its supply to the victims, Subsequently efforts should be made to make the individual and families cook their own food within a period of one week. For this necessary utensil, rations and fuel will have to be provided.

Communications

Restoration of communication at the fastest pace is essential, both from the point of view of reaching the victims, assessing damage as also to render necessary assistance. Plan should include the following:

a) Restoration of telecommunication and deployment of mobile radio detachments till normal communication systems are restored.

b) Reconstruction of damaged bridges, clearance of roads and paths inside the villages/ towns for speedy movement of men and material for rescue and relief work

Line Officers Team

Officials from line departments, led by nodal control officer to give feedback to DCR, DCMG and and State Relief Commissioner & State EOC.

Line Officer Team shall rush immediately for quick assessment and quick response.

Their roles and framework shall be specified in advance with self contained operational framework, protocol briefs and instructions.

The organizational structure has already been mentioned in detail in the main manual.

Area Officers' Pool

Officers belonging to the affected area, those officers who have served in affected districts as DMs or SPs, if needed should be sent to the affected area and stay there till the local administration stabilizes.

Their roles and framework should be specified in advance with self contained operational framework, protocol briefs and instructions.

Assistance Teams

Assistance Teams from Communications, Medical, Power, Armed Forces are to be activated depending on the feedback of the concerned person in the QRT.

Search, Rescue, Evacuation, Relief Operations shall commence immediately.
Mobilization procedure of SAR teams. The details of the SAR teams both at the State and District level are as under :

Setting of Search and Rescue Team for immediate response during Disaster under Additional Commissioner Search and Rescue . At State level the proposed team and Infrastructure are as under :

Team

a.	Team Commander	1
b.	Deputy team Commander	1
c.	Operations group 3 each comprising of 8 fire and police personnel specialized in Search & Rescue	24
d.	Technical support comprising of technical people drawn from IT communication and Engineering.	4
e.	Medical support comprising of 1 doctor also expert in trauma and 1 male plus 1 female multi-purpose Para medical staff.	3
f.	Administrative support I Admin. Officer with 2 support staff.	3

Rest volunteer	64
Total =	**100 (Approx.)**

Infrastructure

The team for Search and Rescue will be working for Relief during Building collapse, Fire, Chemical/Gas leak, Rail/Road accidents and Air crash disasters.

- The team has to have a Uniform, special fluorescent colour and helmets with in-build visor and each person should have a safety belt.
- Each team should have the following vehicles at their disposal ; (all vehicles with 4 wheel drive)
- Emergency Rescue vehicle with following equipments
    - Small Fire Tender with inbuilt high pressure pump (150 LPM at 100 bar). Two 60 metres house reels and fog guns. Aluminum book ladder.
    - Water tanker (11,000 litres) with inbuilt pump (2250 LPM at 8 bar) and monitor (60 metres throw).
    - Hydraulic platform 45 metres 8.
    - Ambulance (Immobilization stretcher, defibrillator, splints, medicine chest, resuscitator, rescue combo tool, communication facility).
    - Caravan (Mobile Control room air conditioned) with a Generator and UPS, 1 nos. Laptop Computers, 1 nos. Lazer printers, 01 nos. mini Satellite phones, 1 GPS, 2 cell phones, 4 Trunked radios with spare batteries and chargers, Digital Camera, Digital Video Camera, Tents, Trunked radio repeaters and telescope portable antenas.
    - The Emergency Rescue vehicle should have the following equipment.
    - 20 Kw inbuilt generator.
- 6 metres high reaching Pneumatic Telescopic light mast with Halogen lamps.
- 10.5 metres Extension ladder.
- Submersible (elec) pump 800 LPM at 1 to 2 bar.
- Gas cutter set.
- Roll Glass with tripod.
- Breathing Apparatus 8 nos. each with spare cylinders.
- Air the equipment with attachment for 1 or 2 men use.

- Breathing air compressor 330 bar / 200 LPM
- Chemical suits (Trellchem HPS) 4 nos.
- Hydraulic Rescue tools I set.
- Pneumatic high pressure lifting bags. 1 set.
- Hydraulic concrete saw 1 set
- IC engine operated concrete saw 1 set.
- Chain saw (wood cutting) IC engine 2 nos. Elec. Motor 2 nos.
- Concrete/Iron cutter 14 disc IC engine 1 no.
- Concrete/Iron cutter 12 disc engine 2 nos. elec, Motor 2 nos.
- Concrete breaker (elec) 10kg 1 no.
- Concrete breaker (elec) 30 kg, 2 nos.
- Fire axe 2 nos.
- Sledge hammer 3 nos.
- Mechanical jack 50 ton 1 no.
- Hydraulic jack 50 ton 1 no.
- Life jackets 10 nos.
- Leather gloves 10 pairs.
- Safety belts with ' D ' rings and carabina 10 nos.
- Poly propylene ropes 4 nos.
- Disposable masks 40 nos.
- Disposable surgical gloves 40 nos.
- Decontamination shower 1 no.
- Decontamination spray 2 nos.
- Ultra sonic life detector (5 prop type) 1 no.
- Search cam 1 no.
- Rope ladder 3 nos.
- Portable halogen lamps 2 nos.
- 100 metres 80 x 20 three core wire on rolls 4 nos.
- Uniform from DUPONT
- Well equipped Emergency rescue vehicle (4 wheel)
- Camera
- Fax, Telephone
- First Aid box

Evacuation plans with maps and list of available and accessible infrastructure. Relief distribution plans with list, types, quantities, and locations, movement and distribution details of pre-stocked relief material.

Role of State Crisis Management Committee (SCMG)

If approached by the district administration for help the State Crisis Management Committee can meet.

Role of State Technical Committee

This committee is mainly for planning during L0 phase, but needed here as standby for clarifications and contingencies.

Quick Reaction Teams at state and district level.

Quick Reaction Teams (QRTs) for search and rescue and medical assistance should be raised at state as well as at the district level.

6.4 First 48 Hours : State Control Room

Information, Planning & Reporting
Instruments, Contacts etc.

Relief Coordination
Local for district and Panchayati ULB levels.
From Outside the State

Impact Assessment
External/Military Support

If damage due to earthquake is severe and it calls for L2 level response i.e. State Level Intervention is required on the request of district administration. In this case State Crisis Management Committee and State Technical Committee can meet to work out the relief and recovery strategy.

Emergency support Function and Agency Responsible:
Infrastructure restoration

Preparedness	Responsibility
Formation of task force with specific equipments and assigning responsibilities for specific areas.	Relief Commissioner
Coordinate road-cleaning activities to assist local relief work	PWD, NH authorities
Begin clearing roads, assemble casual labour, provide a work team carrying emergency tool kits.	PWD, NH authorities, Municipal Corporation/ Municipality
Towing vehicles, Earth moving equipments, cranes, construct temporary roads	NH authorities, PWD, Irrigation
Keep National & other Highways clear from	NH authorities

disaster effects. Damage assessment Monitoring	 All Tahasildars and all BDOs

Emergency Support Function

The ESFs, compromising of various coordinating agencies, will manage and coordinate specific kinds of assistance, which are common to all types of disasters. For each ESF there will be a lead department or agency responsible for the delivery of goods and services to the disaster area. These lead agencies will be supported by a number of other departments/agencies. The ESFs form an integral part of EOC.

In the State response plan, the proposed ESFs will identify requirements, mobilise and deploy resources to the affected areas and assist the districts in their response action under thirteen ESFs. The ESFs will come into operation only on either receipt of warning of an expected calamity or in the event of a sudden emergency.

The ESF will coordinate directly with their functional counterparts at the district level (L2) and also with central government agencies or ministries (L2 &L3). The only situation where the State government will contact the central government for L2 level emergencies will be for situations/ emergencies for which there is either no past experience (e.g. earthquake) or in situations where the experience and expertise available is inadequate.

The details of the primary and secondary agencies for each type of ESF are given below in Table-A. The responsibilities, initial activities on receipt of warning and minimum standards for each ESFs are given in Table-B. Checklists of ESF requirements are given in Table-C.

Table-A

ESF No.	Service Function	Primary Agency	Support Agencies
1	Communication	Relief Commissioner	• IMD • Doordarshan • All India Radio • Department of Telecommunication • S.P. Signals • Department of Science & Technology • Department of Fisheries & Animal Husbandry • Department of Energy • Department of Agriculture • Ministry of Civil Aviation
2	Public Health and Sanitation/ Animal Health	Departments of Health and Family Welfare/Municipality/ Animal Resource	• Home Department • Department of Energy • Health NGOs • Department of Transport

		Development	
3	Transport	Transport Department	• Home Department • Revenue Department • Railways • Dept. Telecommunication • Army • Ministry of Civil Aviation, GOI
4	Power	Department of Energy	• Subsidiary Companies • Army • Department of commerce & Transport
5	Search and Rescue	Home Department	• Fire brigade • Civil Defence • Army • Department of Transport • Department of Health and Family welfare • NGOs
6	Public Works and Engineering	Rural Development Department	• Metropolitan Council/Municipality • Panchayati Raj Department
7	Relief Supplies	Revenue Department	• SRC • District Administration • Department of Transport • Food & Civil Supplies Department • NGOs
8	Information and Planning	EOC	• Information Department
9	Food	Civil Supplies	• District Administration • Transport Department • Railways
10	Drinking Water	Jal Sansthan & Metropolitan Council /Municipality	• Health and Family Welfare Dept. • NGOs
11	Shelter	Housing and Urban Development, Awas Vikas Parishad, Rural Development Deptt.	• Revenue Department • Department of energy • NGOs
12	Media	Department of Information and Public Relations	• Department of Agriculture • Department of Health and Family Welfare
13	Help Line	EOC	• Department of Health and Family Welfare

			• Police

Table – B

ESF No	Service Function	Activities on receipt of information about the occurrence of an earthquake	Responsibility
1	Communication	• Establishment of radio communication with the District, Tehsil and affected areas • Designation of a nodal officer • Review of existing precautionary measures to be taken to protect equipments • Designing an emergency tool kit • Identification of functional telecommunication facilities in the area • Establishment of Site Operations Centres (SOCs) at the affected areas • Provision of temporary communication facilities to vital installations • Damage assessment • Opening of temporary facilities for public use	• Ensuring two way telecommunication link from State to District, Tehsil and affected site • Establishment of temporary communication in the affected area
2	Public Health and Sanitation	• Designation of a nodal officer • Assessment of injuries, illnesses, medical items and medicines • Ensuring supply of essential medicines and medical items • Dissemination of information to all hospitals in the affected area to gear up to the task of receiving large number of patients	• Meet medical and sanitation requirements of affected people • Coordination in evacuation of injured/sick • Coordination of the movement of mobile health teams • Checking of drugs and equipments most needed to tackle emergencies
3	Transport	• Designation of a nodal officer • Arrangement of emergency	• Provision transport support to departments/

		transport for the affected areas for assisting in evacuation, transportation of injured, provision of emergently relief etc. • Stockpiling of adequate fuel for emergency operations	agencies involved in emergency operation
4	Power	• Designation of a nodal officer • Stock pilling of equipments likely to be needed after a disaster • Checking of emergency tool kits • Ensure continuous power supply to vital installation • Advance Deployment of emergency teams in the areas likely to be affected by disaster	• Restoration of power supplies
5	Search and Rescue	• Designation of a Nodal officer • Assessment and arrangement of specialized equipments and manpower to conduct Search and Rescue Operation in the areas likely to be affected by disaster • Carry out search and rescue operations in coordination with local NGOs and trained volunteers etc.	• Provision of Search & Rescue assistance including locating, extricating and providing on-site medical treatment to trapped victims
6	Public Works and Engineering	• Designation of a nodal officer • Keeping alert all the technical staff • Review and updation of precautionary measures necessary to protect equipments from the impact of impending disasters • Inspection and emergency repair of roads, bridges, building structures of vital installations • Assembling of emergency tool kits	• Provide technical advice and evaluation of roads, bridges and other installations to minimize the damage following disaster

7	Relief Supplies	• Designation of a nodal officer • Documentation of all response activities • Maintaining communication with all the agencies/departments to expedite response activities • Coordinate all planning procedures	• Collection and dissemination of information about potential disasters to facilitate and coordinate activities of various departments/ agencies
8	Information and Planning	• Designation of a nodal office • Advance planning for stockpiling and movement of relief to the area likely to be affected by disaster • Identification of locations for establishing temporary shelters, free kitchens etc.	• Coordination of activities related to temporary shelters and emergency relief distribution
9	Food	• Designation of a nodal officer • Advance assessment of food needs of the area likely to be affected • Resourcing suppliers • Identification of locations for air dropping • Preparation, Stockpiling and ensuring quality control of the food aid	• Identify the needs of food in the areas, obtaining supplies and transportation of food to the areas affected by disaster
10	Drinking Water	• Designation of a nodal officer • Advance setting up of water points in the areas likely to be affected by disaster and advance planning for transportation of water • Stockpiling and movement of water purifiers and other emergency equipments to the area likely to be affected by a disaster	• Provision of safe drinking water and minimising spread of epidemics in the area
11	Shelter	• Designation of a nodal officer • Preparation of earmarked shelters to receive evacuees • Movement of temporary shelter materials to the areas likely to be	• Meet the shelter needs of the evacuees

		affected by disaster • Identification and preparation of areas to be used for housing evacuees and relief camps	
12	Media	• Designation of a nodal officer • Immediate dissemination of the information through appropriate media about do's and don'ts in the immediate aftermath of disaster • Cautioning the population likely to be affected abut the do's and don'ts about the impending disaster	• Collection and dissemination of reliable information
13	Help Line	• Designation of a nodal officer • Collection of information from each ESF response activities • Managing public queries	• Management of the flow of information to ensure accuracy as well a easy and appropriate access

Table-C

Emergency support function		Requirements
1	***Communication*** ♦ **Assess damage and reinstall facilities** ♦ Establish two-way communication at the earliest ♦ Warn people against areas that are likely to get affected ♦ Special care on security matters	VSATs, battery charged communication equipment, HAM radios, Inventory of mobile communication facilities
2	**Health and sanitation** ♦ Assess extent and type of injuries ♦ Special care for epidemic outbreaks ♦ Distribute chlorine and halogen tablets and ORS ♦ Supply of contamination free drinking water ♦ Provide medications for water borne diseases ♦ Special care for injured and traumatized people	Specialised medical team to handle head and bone injuries and also the epidemics, Mobile Teams/ Units
3	***Transport*** ♦ Ensure provision of transport for relief supplies ♦ Coordinate with other ESF for clearing of roads and other means of transport ♦ Provide appropriate transport for easy access	Inventory of transport / water way facilities in the area
4	***Power*** ♦ Assess damage to electric poles and stations etc. ♦ Back up power supply ♦ Prevent short circuiting and accidents ♦ Restore facilities at local and state level ♦ Salvaging	Inventory of power installations of the area, Emergency tool kit, Extra manpower and equipments i.e., generators etc
5	**Search and Rescue** ♦ Aerial survey for victims ♦ Specialised sniffer dogs ♦ Search and rescue experts particularly in Collapsed structure	Equipments cache
6	**Public Works Department** ♦ Clear areas for relief camps ♦ Clear roads for easy movement of relief and transport vehicles ♦ Seal areas and buildings that are likely to	Specialised equipments for large debris Specialised equipments for bridges and other temporary structures

	cause further damage ♦ Provide temporary bridges and alternate roads	Emergency tool kit
7	**Information and planning** ♦ Release flood related information to all ESF ♦ Provide access to resource inventories and document all situation-reports and procedures	Information networking Inventories
8	**Relief Supplies** ♦ Provide basic logistic materials required for local administration ♦ Provide other relief materials such as batteries, flash lights etc to victims and rescue workers ♦ Compile information on the specific needs of the people and relief requirements ♦ Distribute relief by means of air dropping and boats to marooned/trapped victims	Inventory of relief supplies Socio economic needs Cultural needs
9	**Food** ♦ Provide food packs that contain dry and non-perishable food items and packaged water	Inventory of non-perishable food items and packaged water
10	**Drinking water** ♦ Provide clean drinking water ♦ Ration existing water supplies for even distribution ♦ Warn people against contamination ♦ Isolate contaminated sources of water	Inventory of water sources of the area
11	**Shelter** ♦ Provide weather resistant shelter ♦ Place shelters in a safe area	Inventory of specific type of shelters for earthquakes
12	**Media** ♦ Information on current status	
13	**Help lines** ♦ Provide information on marooned victims ♦ Hospitals ♦ Receive messages of victims and forward them to their relatives outside the disaster area ♦ Provide emergency phone lines	Inventory of emergency phone numbers

Chapter-VII

Partnership with other stakeholders

Effective Disaster Management in Uttar Pradesh can only be achieved through partnership and networking with various organizations involved in research and development work on hazard zonation, disaster forecasting and development of early warning systems for natural disasters. Partnership with the following stakeholders can certainly enhance the earthquake disaster management mechanism in Uttar Pradesh.

1. Academic Institutions of Govt. of Uttar Pradesh and Govt. of India

2. Scientific Institutes of Govt. of Uttar Pradesh and Govt. of India

7.1 Role and responsibility of Academic Institutions of Govt. of Uttar Pradesh and Govt. of India:

Sl. No.	Name of Academic Institution	Role and responsibility
1. 2. 3.	Department of Civil Engineering, I.I.T., Kanpur Department of Earthquake Engineering, I.I.T., Roorkee Central Building Research Institute, Roorkee	(i) Knowledge networking with other institutions and organizations within and outside Uttar Pradesh for micro zonation of major townships of Uttar Pradesh falling in Earthquake Damage Risk Zone-IV. (ii) Training of Civil Engineers of PWD, Irrigation, Awas Vikas Parishad and Rural Development Department of Govt. of U.P. on low cost retrofitting techniques for existing buildings.
4.	Department of Earth and Planetary Sciences, University of Allahabad, (Central University)	Knowledge networking with other institutions and organizations within and outside Uttar Pradesh for micro zonation of major townships of Uttar Pradesh falling in Earthquake Damage Risk Zone IV.
5.	Department of Geophysics, Banaras Hindu University (Central University)	Knowledge networking with other institutions and organizations within and outside Uttar Pradesh for micro zonation of major townships of Uttar Pradesh falling in Earthquake Damage Risk Zone IV.

6.	Social Work/ Sociology & Education and Civil Engineering Departments of all the Universities/ Technical Universities established with the territory of Uttar Pradesh*	Sensitization, awareness of masses of the populace of the districts falling in Earthquake Damage Risk Zone IV & III for earthquake disaster risk mitigations.

* Disaster Management Cell of U.P. Academy of Administration and Management, Lucknow can start some specific skill development courses for master trainers nominated by the Departments of Social Work/Sociology, Education & Civil Engineering of all the Universities /Technical Universities established with in the territory of Uttar Pradesh, who will in turn impart trainings at block and village level on various aspects of earthquake disaster mitigations for sensitization and awareness among masses.

7.2 Role and Responsibility of various Scientific Institutes of Govt. of Uttar Pradesh and Govt. of India

Sl. No.	Name of Scientific Institute /Department	Central Govt./State Govt.	Role and responsibility
1.	India Meteorological Department (IMD), Lucknow/Delhi	Central Govt.	(i) Establishment of Digital Seismic Telemetric Network in the State and replacement of old seismic observatories with new State of the art field stations and direct networking of Digital Seismic Telemetric Network with the State emergency operation centre for getting up to date information about micro seismicity and strong motions.
2.	Geological Survey of India, Lucknow	Central Govt.	(i) Knowledge networking with other institutions and organizations within and outside Uttar Pradesh for micro zonation of major townships of Uttar Pradesh falling in Earthquake Damage Risk Zone IV.

			(ii)Sensitization, awareness of masses for earthquake disaster risk reduction. (iii)To provide necessary inputs to IMD for establishing Digital Seismic Telemetric Network in the State.
3.	Remote Sensing Applications Centre-Uttar Pradesh, (Department of Science & Technology)	Govt. of U.P.	(i)Knowledge networking with other institutions and organizations within and outside Uttar Pradesh for micro zonation of major townships of Uttar Pradesh falling in Earthquake Damage Risk Zone IV & III. (ii) GIS based database creation for all the major townships and cities of Uttar Pradesh falling in earthquake damage risk zone-IV & III.
4.	Council of Science & Technology, (Department of Science & Technology)	Govt. of U.P.	Sensitization, awareness of masses for disaster risk mitigations for various disasters including earthquake disaster mitigations in the northern and north eastern districts of Uttar Pradesh through exhibitions, demonstration of earthquake resistance constructions techniques (with the help of invited structural engineers) at village level and by organizing elocution contest in various schools and colleges in those districts of U.P. which fall in Earthquake Damage Risk Zone IV & III.

7.3 Need for Constitution of High Powered Technical Committee at the state Level

A high powered technical committee should be constituted under the Chairmanship of Relief Commissioner for initiating, implementing and monitoring all the activities pertaining to microzonation,, retrofitting and earthquake design incorporation related activities. Nominated Nodal Officers named by various agencies, academic institutions, state and Central Govt. departments can be nominated as the members of this committee. **This committee may comprise following members-**

1. Dy. Director General, GSI, Govt. of India, Lucknow
2. Head of the Department/Professor from Department of Civil Engineering, IIT, Kanpur,.

3. Director, IMD, Govt. of India, Lucknow
4. Head of the Department/Professor from Department of Geophysics Banaras Hindu University
5. Head of the Department/Professor from Department Earth and Planetary Sciences, University of Allahabad
6. Head, Department of Geology, University of Lucknow
7. Nodal Officer of Housing and Urban Development Department, Govt. of U.P.(not below the rank of Chief Engineer)
8. Nodal Officer from Uttar Pradesh Awas Vikas Parishad (not below the rank of Chief Engineer), Govt. of U.P.
9. Nodal Officer from Department of Rural Development, Govt. of U.P. (not below the rank of Additional Commissioner).
10. Nodal Officer from Uttar Pradesh PWD (not below the rank of Chief Engineer), Govt. of U.P.
11. Director, Remote Sensing Applications Centre, U.P., Lucknow
12. Principal Chief Town Planner, Lucknow

Special invited members of this committee may be from Institutions or Organisations (working in the field of earthquake studies) based out side Uttar Pradesh. These may include the following-

1. Director, Central Building Research Institute, Roorkee.
2. Head of the Department/Professor from Department of Earthquake Engineering, IIT, Roorkee.
3. Representative of IMD, Govt. of India New Delhi
4. Representative of National Geophysical Research Institute (NGRI), Govt. of India, Hyderabad
5. Director, Wadia Institute of Himalayan Geology, Dehradun
6. Head, Department of Geology, Kumaon University, Uttrakhand

Chapter-VIII
Financial Arrangement

In a disaster situation the important action points are immediate rescue, relief, reconstruction and rehabilitation of the victims. Funding for the immediate relief is short term, while reconstruction and rehabilitation require long term funding. There are sources for both. For example, National Calamity Contingency Fund provides assistance for immediate relief only and Calamity Relief Funds of various states are used for long term funding. Similarly, voluntary donations are usually short term, while international organisations like UN agencies provide support over a period of time, sometimes extending up to 15 years. Apparently, there are governmental sources as well as non-governmental sources for both types of funding. A brief account of funds available from Central Government and State Government sources is given below-

8.1 Central Government sources

8.1.1 National Calamity Contingency Fund (NCCF)

Set up on the recommendation of the Eleventh Finance Commission, the manner and extent of assistance required to be provided to the states from NCCF for immediate relief and rehabilitation is decided by a High level Committee constituted by the Ministry of Home Affairs. This Committee is serviced by the Disaster Management Division of the Ministry and consists of Deputy Prime Minister, Agriculture Minister, Finance Minister and Deputy Chairman, Planning Commission. The procedure is that the states submit the memorandum for central assistance. The committee takes into account the recommendation of the central teams to assess the requirements and thereafter as per the decision, the release to the state governments are made by the Ministry of Finance.

Currently, the period of operation of this Fund is from the financial year 2000-01 till the end of the financial year 2004-05. National calamities of cyclone, drought, earthquake, fire, flood and hailstorm, considered to be of severe nature requiring expenditure by the state governments in excess of the balances available in their respective CRFs qualify for relief assistance. The corpus of the Fund is Rs. 500 crore. The assistance is only for immediate relief and rehabilitation. Expenditure on reconstruction of assets or restoration of damage is not covered under the scheme, which is to be financial through reallocation of plan funds. Any assistance provided by the Centre from this Fund is to be accompanied by imposition of the special surcharge so that it is immediately recouped.

At the state level, the committee constituted by the state government to administer the CRF is responsible for incurring the expenditure as decided

by High Level Committee. The responsible of monitoring the scheme is now vested in the Ministry of Home Affairs, Government of India.

8.1.2 Calamity Relief Fund (CRF)

This fund was created as per the recommendation of the Ninth Finance Commission. Constituted by each state, it is to be used for meeting the expenditure for providing immediate relief to the victims of earthquake, cyclone, drought, fire, flood and hailstorm. **Of the total contribution, 75% is contributed by Central Government and the remaining amount comes from state governments' own resources.** This amount is contributed on annual basis. Share of Central Government is in the form of Grants-in-aid and is remitted to state government in two installments on 1st May and 1st November in each financial year.

There are certain conditions attached for the funds release-

i) Fund has been duly constituted by the state government as prescribed and creation is certified by the Accountant General of the State.

ii) Furnishing certificate to the Ministry of Finance indicating that the amount received earlier has been credited to the fund along with the state's share and a statement giving the up-to-date expenditure.

iii) Annual Report on Natural Calamities is submitted to the Ministry of Home Affairs, which communicates the same to the Ministry of Finance.

iv) The release of both the installments is made by the Ministry of Finance subject to the above mentioned conditions being satisfied unless advised by Ministry of Home Affairs for withholding of release to any state.

8.2 State Government Sources

The primary responsibility of relief and rescue in the event of a disaster is that of the concerned state government. In view of the resource constraints of the state governments they have been provided with the additional support of funds set up at national level. However, they also make provision for funding relief. As, mentioned above, they contribute to CRF. Besides that, at the state level we find two more resources-

8.2.1 Chief Minister's Relief Fund

Set up on the pattern of Prime Minister Relief fund, this fund becomes handy to provide immediate relief to the victims of disaster. For example, Gujarat government provided death relief to the next of kin of elders, minors, government employees and school children falling victim to the earthquake. Contributions to this fund are and can be made directly by the people.

8.2.2 State Government Fund

The concerned state government sanctions expenditure to meet relief expenditure from its resources, which include its share of various developmental and employment generation programmes. To take example again from Gujarat earthquake, cash doles for people who lost their houses, expenditure on providing household kits etc., were met from this Fund. Though this Fund is not exclusively for the benefit of disaster victims, it is an important and immediate source of finance for providing relief.

Allocation of Funds for research activities like microzonation and GIS database creation for Earthquake Disaster Risk Mitigation

Microzonation of earthquake hazard prone townships of U.P. will require not only knowledge networking among various Central Govt. Departments, State Govt. Departments, agencies viz. IMD, GSI, RSAC-U.P. and Academic Institutions but would also require additional funds. Financial resources of this purpose can be pooled from the newly created Department of Earth Sciences, Ministry of Earth Sciences, Govt. of India, New Delhi. Planning Department, Govt. of UP can allocate some funds for this purpose.

Funds will also be required for computer aided GIS based data base creation of available resources (man and material) for the northern and north eastern towns/cities and district of Uttar Pradesh falling in Earthquake Damage Risk Zone-IV. Here again National Disaster Management Authority, New Delhi and Department of Planning, Govt. of U.P. can provide some funds to RSAC-U.P. for GIS database creation.

8.3 International Agencies

Government of India follows the policy of not issuing a formal appeal on its behalf, either directly or through any other agency, to attract relief. However, relief donated on a voluntary basis is accepted and acknowledged as a sign of international solidarity. Some important international agencies are mentioned below:

The UN System

The United Nations, through the organization under its aegis, coordinates international cooperation in the field of disaster management and mitigation. A disaster Management Team (UN-DMT) is convened and chaired by the UN resident coordinator in each disaster prone country. Composition of the Team depends on the types of disasters to which a country is prone and the organization which are present in that country, working towards disaster relief.

The primary purpose of UN-DMT is to ensure a prompt, effective and concerted response by the UN system at country level in the event of a disaster. It also provides support in post-disaster rehabilitation and reconstruction process in addition to long-term disaster mitigation measures.

8.4 Need for Creation of Department of Disaster Management under Govt. of U.P.

A separate Department of Disaster Management under Govt. of U.P. and separate allocation of budget for pre and post disaster activities for various disasters would be the best option for stream lining the disaster management initiative and activities

Chapter- IX
Earthquake Disaster Specific Action Plan

9.1 Earthquake response plan

The emergency measures of evacuation, search, rescue and relief form important action point in disaster management. Once disaster occurs, disaster management machinery should plunge into action for rescue and relief operations. The Trigger Mechanism is a vital part of preparedness plan whereby the receipt of first information about the occurrence of an earthquake simultaneously energies and activates the mechanism of response and mitigation without loss of crucial time. Other aspects are Rapid Damage/ Loss Assessment for Emergency relief, documentation of damages and losses and reconstruction.

A strong R & D base of earthquake engineering in the country is required with research infrastructure and trained and highly skilled manpower. The gaps can be filled by honest evaluation of the status of earthquake engineering in the country vis-à-vis other countries prone to earthquakes. A significant improvement in R & D activities and additional manpower in teaching and research institutions in the area of earthquake engineering is required. This will enable us to be in a position where in a strong earthquake risk reduction programme can be launched. The strategies for disaster prevention and mitigation need to focus on :

- Creating policy supports at national, state and local levels.
- Improving public awareness and human resource development.
- Strengthening of institutional infrastructure.
- Developing and implementing engineering interventions and improving regulatory mechanisms for effective response.
- Strengthening of R & D and technology transfer.
- Creating financial supports for retrofitting of existing building and earthquake resistant designing of new buildings.

9.1.1 Quick Response

On the receipt of information about the occurrence of an earthquake from IMD, Divisional Commissioner/District Magistrate all counter-disaster measures will be put into operation. The occurrence of disaster would essentially bring into force the following:

Activation of District and Tehsil Disaster Response Plan

First Information Reports from villages, blocks and tehsils will be the trigger point for activation of District and Tehsil Disaster Response Plan.

Activation of District Crisis Management Group and Tehsil Crisis Management Group

Activation of District Crisis Management Group and Tehsil Crisis Management Group to **immediately dispatch the Quick Reaction Teams/Search and Rescue Teams and Medical Teams to the effected area.**

Establishment of Site Operations Centres

District disaster Manager will immediately ensure the establishment of Site Operations Centre (SOC) at or near the site of disaster. SOC will comprise Relief Camp, Medical Camp, Transit Camp and Cattle camp at some distance.

Establishing Emergency Communication

An on- going wireless communication between District Control Room and office of Divisional Commissioner and District Control Room and State Emergency Operations Centre, Lucknow.

Alerting the Hospitals

Hospitals of the area should be alerted by the district magistrate's office and hospitals of the surrounding districts should be alerted by the State Relief Commissioner to keep their doctors and paramedical staff in readiness and to ensure the availability of bed facility, medicines, oxygen, bottles of saline water, life-saving drugs and medical expertise for persons injured due to collapse of houses and other structures. The concept of Golden hour should be imbedded into the doctrine of Quick Reaction Teams and Medical team.

9.2 Recovery and Post Disaster Measures

Strict adherence by authorities to standards in water supply sanitation, excreta disposal, vector control, drainage stands, hygiene promotion standards and minimum standards in nutrition are is must for recovery of the community which has been rendered homeless or is severely affected by the earthquake. **A brief account of these various standards for post disaster recovery of the affected community is given below..**

9.2.1 Infrastructure Support

Temporary shelter to be provided to affected people. Staggered response to be designed based on nature and scale of disaster, as well as response

capacity. Priority to be given to individual household level shelter provision, upgradable to permanent houses through long-term rehabilitation phase. Relief camps to be established where individual household coverage not possible.

9.2.2 Minimum standards in water supply and sanitation

In disaster situation, the people are affected by diseases related to inadequate sanitation and water supply. The aim would be to provide a minimum quantity of clean drinking water and to reduce faeco-oral diseases or exposure to vectors causing disease. Also, the responsibility for procuring water mostly falls on the women and children and safe and easy access to these services are essential. These standards are for water supply, excreta disposal, vector control, solid waster management, drainage and hygiene promotion.

Water Supply Standards

1. **Access and Water Quantity**: All people have safe access to a sufficient quantity of water for drinking, cooking and personal and domestic hygiene. Public water points are sufficiently close to shelters to allow use of the minimum water requirement.

Key indicators being:

- At least 15 liters of water per person per day is collected.
- Flow at each water collection point is at least 0.125 liters per second.
- There is at least 1 water point per 250 people.
- The maximum distance from any shelter to the nearest water point is 500 meters.

2. **Water Quality**: Water at the point of collection is palatable, and of sufficient quality to be drunk and used for personal and domestic hygiene without causing significant risk to health due to water-bome disease, or to chemical or radiological contamination from short term use. Key indicators being:

- There are no more than 10 faecal coliforms per 100 ml at the point of delivery for undisinfected supplies.
- Sanitary survey indicates low risk of faecal contamination.
- For piped water supplies to populations over 10,000 people, or for all water supplies at times of risk or presence of diarrhoea epidemic, water is treated with a residual disinfectant to an acceptable standard (e.g. residual free chlorine at the tap is 0.2-0.5 mg per litre and turbidity is below 5 NTU).
- Total dissolved solids are no more than 1,000 mg per litre (approximately 2,000 ms/cm electrical conductivity for simple field measurement), and water is palatable to users.
- No significant negative health effect due to chemical or radiological contamination from short term use, or from the planned duration of use of the

water source is detected (including carry-over of treatment chemicals), and assessment should be made to monitor the significant probability of such an effect.

Water Use Facilities and goods: People have adequate facilities and supplies to collect, store and use sufficient quantities of water for drinking, cooking and personal hygiene, and to ensure that drinking water remains sufficiently safe until it is consumed. Key indicators being:

1. Each household has two water collecting vessels of 10-20 liters, pulse water storage vessels of 20 liters. Water collection and storage vessels have narrow necks and/or covers.
2. There is 250 g of soap available per person per month.
3. Where community bathing facilities are necessary, there are sufficient bathing cubicles for bathing at an acceptable frequency and at an acceptable time, with separated cubicles for men and for women..
4. Where community laundry facilities are necessary, there is 1 washing basin per 100 people; provide laundering areas are available for women to wash and dry undergarments and sanitary cloths.

9.2.3 Excreta Disposal Standards

1. Access to, and number of toilets: People have sufficient numbers of toilets, sufficiently close to their dwellings to allow them rapid, safe and acceptable access, at all times of the day and might. Key indicators being:
2. Maximum of 20 people per toilet.
3. use of toilets is arranged by household(s) and/or segregated by sex.
4. Toilets are no more than 50 metres from dwellings, or no more than one minute's walk.
5. Separate toilets for women and men are available in public places (markets, distribution centres, health centres etc.)
6. Design and Construction: People have access to toilets which are designed, constructed and maintained in such a way as to be comfortable, hygienic and safe to use. Key indicators being:
7. Technically sound design and construction specifications, approved by the intended users, are used for all forms of household and public toilets.
8. Cleaning and maintenance routines for public toilets are in place and function correctly.
9. Toilets are designed, built and located to have the following features:
10. They are easy to keep clean enough to invite use and not to present a health hazard.

11. They are accessible and easy to use by all sections of the population including children, old people, pregnant women and physically and mentally disabled people.
12. They are lit at night if necessary for security or convenience.
13. Hand washing facilities are close by.
14. They minimize fly and mosquito breeding.
15. They allow for the disposal of women's sanitary protection, or provide women with the necessary privacy for washing and drying sanitary protection cloths.
16. They provide a degree of privacy in line with the norms of the users.
17. Latrines and soakaways in most soils are at least 30 metres from any groundwater source and the bottom of any latrine is at least 1.5 metres above the water table. Drainage or spillage from defecation systems does not run towards any surface water source or shallow groundwater source.
18. People are provided with tools and materials for constructing, maintaining and cleaning their own toilets if appropriate.

9.2.4 Vector Control Standards

1. Individual and Family Protection: People have the means to protect themselves from disease vectors and nuisance pests when they are estimated to be a significant risk to health or well-being. Key indicators being:

- All populations associated with a vector-borne disease risk have access to shelters equipped with insect control.
- Control of human lice is carried out to an agreed standard where louse-borne typhus or relapsing fever are a threat.

2. **Physical, Environmental and Chemical protection Measures:** The number of disease-bearing vectors and nuisance animals that pose a risk to people's health and well-being are kept to an acceptable level. Key indicators being:

- Vulnerable populations are settled outside the malarial zone.
- The population of malaria-bearing mosquitoes is kept low enough to avoid the risk of excessive malaria infection.
- Vector breeding or resting sites are modified where necessary and practicable.
- Rates, flies and other mechanical and nuisance pests are kept within acceptable levels.
- Intensive fly control is carried out in high-density settlements when there is a risk or presence of diarrhoea epidemic.

Good Practice in the use of Chemical Vector Control Methods: Vector control measures that make use of pesticides are carried out in accordance with agreed

international norms to ensure that staffs, the people affected by the disaster and the local environment are adequately protected, and to avoid creating resistance to pesticides. Key indicators being:

- Personnel are protected by the provision of training, protective clothing, supervision and a restriction on the number of hours handling pesticides.
- The purchase, transport, storage and disposal of pesticides and application equipment follow international norms, and can be accounted for at all times.
- People are informed about the potential risks of pesticides and about the schedule for application. They are protected during and after the application pesticides according to internationally agreed procedures.
- The choice of pesticide and applicant method conforms to national and international protocols.
- The quality of pesticide and of treated bed nets conforms to international norms.

9.2.5 Solid Waste Management Standard

1) **Solid Waste collection and Disposal:** People have an environment that is acceptably free of solid waste contamination, including medical wastes. Key indicators being:

- Domestic refuse is removed from the settlement or buried on site before it becomes a nuisance or a health risk.
- There are no contaminated or dangerous medical wastes (needles, glass, dressings drugs etc.) at any time in the living area or public space.
- There is a correctly designed, constructed and operated incinerator with deep ash pit within the boundaries of each health facility.
- There are refuse pits, bins or specified areas at markets and slaughtering areas, with a daily collection system.
- Final disposal of solid waste is carried out in such a place and in such a way as to avoid creating health and environmental problems

2) **Solid Waste Containers/Pits:** People have the means to dispose of their domestic waste conveniently and effectively. Key indicators being:

- No dwelling is more than 15 metres from a refuse container or household refuse pit, or 100 metres from a communal refuse pit.
- One 100 litre refuse container is available per 10 families, where domestic refuse is not buried on site.

9.2.6 Drainage Standards

1) **Drainage Works:** People have an environment that is acceptably free from risk of water erosion and from standing water, including strom water, flood water, domestic wastewater and wastewater from medical facilities. Key indicators being:

- There is no standing wastewater around water points or elsewhere in the settlement.
- Storm water flows away.
- Shelters, paths and water and sanitation facilities are not flooded or eroded by water.

2) **Installations and Tools**: People have the means (installations, tools etc.) to dispose of domestic wastewater and water point wastewater conveniently and effectively, and to protect their shelters and other family or communal facilities from flooding and erosion. Key indicators being:

- Sufficient numbers of appropriately designed tools are provided to people for small drainage works and maintenance where necessary.
- Water point drainage is well planned, built and maintained. This includes drainage from washing and bathing areas as well as water collection points.

9.2.7 Hygiene Promotion Standards

Hygiene behaviour and use of facilities: All sections of the affected population are aware of priority hygiene practices that create the greatest risk to health and are able to change them. They have adequate information and resources for the use of water and sanitation facilities to protect their health and dignity. Key indicators being:

b) Water supply

- People use the highest quality of readily available water.
- Public hygience facilities (showers, laundry basins etc.) are used appropriately ad equitably.
- Average water use for drinking, cooking and personal hygiene in any household is at least 15 litres per person per day.
- Covers (where provided) are placed on water containers.
- Mean faecal contamination in potable water containers is indicated by less than 50 faecal coliforms per 100 ml.

c) Vector control

- Bedding and clothing is aired and washed regularly.
- In malaria-endemic areas:

9.2.8 People with treated mosquito nets keep, use and retreat them correctly.

9.2.9 People avoid exposure to mosquitoes during biting times using the means available to them.

9.2.10 Containers which may be mosquito breeding sites are removed, emptied of water regularly or covered.

d) Solid waste management

- Waste is put in containers daily for collection, or buried in a specified refuse pit.
- Parents, other caregivers and children are aware of the danger of touching needles and dressings from medical facilities, in cases where the minimum standard for the disposal of medical waste is not met.

e) Drainage

- Areas around shelters and water points are free of standing wastewater, and local storm water drains are kept clear.
- There is a demand for tools for drainage works.
- People avoid entering water bodies where there is a schistosomiasis risk .

f) Funerals

- People have the resources and information necessary to carry out funerals in a manner which respects their culture and does not create a risk to health.

9.2.8 Minimum Standards in Nutrition

General Nutritional Support to the Population standards

- **Nutrient Supply:** The nutritional needs of the population are met. Key indicators:
- Levels of moderate malnutrition are stable at, or declining to, acceptable levels.
- There are no cases of scurvy, pellagra or beriberi.
- There is access to a range of foods-stable (cereal or tuber), pules (or animal products) fat sources etc.
- There is access to vitamin C rich or fortified foods or appropriate supplements.
- There is access to iodised salt for the majority (>90%) of households where iodine deficiency disorders are endemic.
- There is access to vitamin A rich or fortified foods or appropriate supplements.
- There is access to additional sources of niacin (e.g. pulses, nuts, offal) if the staple is maize or sorghum.
- There is access to additional sources of thiamine (e.g. pules, nuts, eggs) if the staple is polished rice.
- Infants under six months have access to breast milk (or appropriate substitute).

- Childern aged from about six months have access to nutirtious energy-dense foods.
- There is no indication that the extra nutritional needs of pregnant and breastfeeding women and adolescents are not being met.

2) **Food Quality and Safety:** Food that is distributed is of sufficient quality and is safely handled so as to be fit for human consumption. Key indicators

- There are no out breaks of food-borne diseases caused by distributed food,.
- There are no unreasonable complaints about the quality of foods distributed from recipients or programme staff.
- Suppliers of food commodities carry out regular quality control and produce commodities that meet the official government standards or Codex Alimentrarius Standards (e.g. with regard to packaging, labeling, shelf life etc.).
- All foods supplied are systematically checked by independent quality surveyors.
- Adequate storage structure is in place and proper management of store is conducted.
- Staff has adequate knowledge about potential health hazard caused by improper handling, storage and distribution of food.
- Food Acceptability:

  Foods that are provided are appropriate and acceptable to the population.

9.2.9 Donations: Material and Fund Mobilisation

Set-up of donation coordination team.

Specifications for types, condition, packaging of donation material to be disseminated to donors and aid agencies. This information to be based on local conditions and practices as well as nature and scale of disaster. Information to be kept in readiness during L0 stage for immediate availability on onset of emergency.
Prepackaging of relief kits to avoid inconvenience at distribution point. Packaging units to be specified. Package colour codes to be specified. Loading plan of material in trucks to be specified to enable direct downloading and distribution at distribution site.

9.3 Relief Coordination

a. Entry Points: Air, Road, Water, Rail

All entry points to be manned by extension teams of ESFs that need to provide immediate exposure and guidance to personnel and material entering the area. Control rooms, information kiosks, briefing venues to be established at major points of entry in the affected area.

b. Decentralized Material Storage Points

Material storage points to be planned in consideration of points of entry as well as points/channels of distribution.

Distribution logistics, time and distance functions, and storage security to be considered for location of material storage points.

c. Relief Material : Type & Quality

Immediate dissemination of information regarding type, quality and packaging system of relief material should be carried out to educate the donors and aid agencies.

This information should be based on local conditions and practices, as well as the nature of the disaster. The information should be kept in readiness during L0 stage.

d. Distribution Modes

Government

Public distribution systems to be strengthened where operational, and activated where non-operational.

Non-Government Organisation

Coordination to be ensured in NGO distribution systems to avoid duplication of efforts.

NGO to play this role through NGO control rooms and information centers.

e. Information Management

Disaggregated information management system to be established to provide sector specific information based on ESF functions.

Information system to be operated through feeder links from ESFs to Central Control Room.

Assimilated, processed and appropriately packaged information to flow from Central Control through control rooms and information desks to all concerned information seekers.

f. Media Management

Media management to be done through designated media management team within the Control Room.
Media releases to be issued at periodic intervals. Media teams to be briefed and provided orientation at points of entry.

Deactivation of L2 (back to L0)

Once the situation improves, the local administration should make all necessary efforts and extend all possible support and encouragement to the locals to settle down properly, as in the pre disaster stage.

9.4 Recovery

a. Rehabilitation

Shelter

Criteria laid out for temporary, semi-permanent and permanent shelter construction.

Relief camps to operate only for minimum possible time (3 months to 1 year depending on nature and scale of disaster).

Emphasis on disaster-resistant shelter. Specifications to be laid down and widely disseminated.

Infrastructure

Infrastructure provision to be carried out as per basic minimum standards of infrastructure services.

Staggered infrastructure development plan: permanent infrastructure building and stop-gap infrastructure need fulfillment.

Emphasis on disaster-resistant shelter. Specifications to be laid down.

Livelihoods

Household livelihood restoration through mid-term and long-term rehabilitation packages.

Mid-term packages may need to be supported through work generated by State. Long-term livelihoods to be strengthened through widened livelihood options.

Livelihood strategy to be in place during L0 stage.

For rehabilitation of the sufferers all possible efforts and support shall be arranged by the concerned district administration with regards to shelter, infrastructure and livelihood support.

Permanent Rehabilitation:

This is a long known process which requires time and response. At the time of national disaster, assistance from Govt. and Non-Govt. agencies will be needed. The devastation caused by earthquake should be utilized as an opportunity to rebuild the area with modern facilities so as to give the people a better quality of life. Plans for rehabilitation should include :

a) Physical Rehabilitation

Provision of living accommodation, civic health, water supply and communication on a permanent basis. Here the emphasis should be on constructing buildings which are earthquake – proof.

b) Psychological Rehabilitation

Getting over the shock effect of the disaster. Apart from providing the necessities, effort should be to restore their normal life at the earliest.

c) Social Rehabilitation

Job opportunities, opening of school and colleges, rehabilitation of orphans and infants should form part of the plan for social rehabilitation.

Earthquake as a disaster brings in great suffering and tremendous loss of life and property. A well throughout and properly documented plan for disaster management will come very handy at the time of such a disaster. This plan should be thorough and based on the problem, the resources and should include check-list for various functionaries so that no time is lost in thinking and planning. This will enable effective assistance in a coordinated manner to minimize the suffering of the victims. Early medical aid through coordinated efforts is a vital factor to minimize the health risks. To provide prompt and adequate medical relief, information about the site, extent and the magnitude of the damage are to be assessed for comprehensive and effective action plan.

b. Deactivation of L2 (back to L0)

Once the situation improves, the local administration should make all necessary efforts and extend all possible support and encouragement to the locals to settle down properly, as in the pre disaster stage.

Specification of conditions to be met for L2 to be called off.

The State Relief Commissioner shall deactivate the L2 state vide the format of L2 deactivation notification.

9.5 L3 Response

(Subject to State's request for central intervention, or special case requiring direct central intervention)

a. Direct Communication between State EOC and Central Control Room New Delhi

Direct Communication between State EOC and Central Control Room New Delhi **has** to be established.

b. Structure of EOC

The structure of the EOC at the State headquarters has already been mentioned in the chapter VI (6.1.1.3)

c. Coordination Hub

The central or the key person who operates as the coordination hub for activities with regards to the disasters is the State Relief Commissioner and which too has already been mentioned earlier.

Chapter- X
Review and Updation of Plan

10.1 Important Dates

Date on which the Plan was last revised :

Date on which the Plan was last rehearsed :

Due dates for revision and rehearsal :

The above schedule, as decided should be strictly adhered to by all the districts and they shall send timely feed back to the SRC regularly.

In order to make the state DMAP effective it must be disseminated at three levels :

1. To the central government departments, multilateral agencies (aid agencies), defence services, state level officials;
2. To the district authorities, government departments, NGOs, other agencies and institutions within the state; and
3. To the general public through mass media.

The responsibility for dissemination of the plan should be vested with the Relief Commissioner, as well as through awareness programmes organised by each of the agencies participating in disaster management. The Relief Commissioner should also involve state-level NGOs in preparing suitable public awareness material to be distributed to the public.

In addition to dissemination of literature related to the state DMAP, the Relief Commissioner should ensure that disaster response drills are conducted by the district authorities and other agencies on a regular basis especially in the disaster prone areas.

10.2 Plan Evaluation

The purpose of evaluation of the state DMAP is to determine the adequacy of resources, coordination between various agencies, community participation and partnership with NGOs.

The plan be updated when shortcomings are observed in organisational structures or when technological changes render it obsolete. The plan can also be updated following reports on drills or exercises carried out.

Annual evaluation of State Disaster Management Plan for Earthquakes should be done in order to assess the nature of state intervention and support, adequacy of the organization structure, institutional arrangements, operating procedures, monitoring mechanisms, information tools, equipment and communication systems. The number of critical facilities viz. hospitals, school, community centre retrofitted so far and during the last financial year should be assessed.

Impact studies on the above operations for long-term preventive and mitigation efforts are to be undertaken.

At the community level, evaluation exercises may be undertaken to assess the reactions of the community members at various stages in the disaster management cycle and to understand their perceptions about disaster response.

10.3 Plan Update

The State Disaster Management Plan is a "living document" and should be updated every year by the office of the Relief Commissioner in consultation with the State Crisis Management Group and Technical Committee. An annual conference for State Disaster Management Plan update shall be organised by Relief Commissioner's office. Participation of all the concerned departments / agencies and earthquake disaster management experts from various parts of the India should be ensured by Relief Commissioner's office for their opinion and recommendations on specific issues pertaining to earthquake disaster risk reduction.

Annual Summary of Resource Inventory and Events

Government

Response Machinery

Emergency services-medical, fire, police

Armed forces, para military, home guards, NCC, S&G

State Technical Committee

Non Government

NSS, Civil Defence

Universities, colleges, schools

Contact Addresses, Phones
PSUs

Corporate Sector

b. Events

Retrofitting of buildings
Mock Drills
Seminars, Conferences
Training Programmes at state, district, tehsil, block and village level updation of Surveillance Reports,District and State Disaster Management Plan

c. Material & Equipment (with specifications & rates)

Search & Rescue equipments
Mobile Communication
Mobile medical vans
Road Clearing equipments
Water Treatment
Power Generators
Medical Facilities
Basic Relief Material
Blankets, tents, utensils, food, water

Chapter XI
Coordination and Implementation

Many organizations play a very useful role in disaster management and can offer rapid response and a willingness to adjust to the situation prevailing on site. They offer immediately available communications within the disaster affected community, technical services, manpower, and financial support. On the basis of their operating behaviour and fields of expertise such organizations can be categorized as:

11.1 NGOs with large resources, Occupation Groups, Residents' Association etc.

NGOs with large resources

They have international support and can respond quickly with large amounts of supplies and services.

Registered local organizations

They are run by social workers addressing local issues related to development, agriculture, education children and women etc.

Religious bodies They band on their faith and also organize aid for community, offering capabilities for shelter and mass feeding.

Development Technology Related:

These are usually in their own commercial research and development, but their equipment and expertise can be used in time of need in such areas as sanitation building technology etc.

Occupation Groups Groups such as medical association provide specialized services and generate specialized resources.

Residents' Association

These are important means of mobilizing the local community. They generate community participation in disaster relief as well as planning and disaster mitigation efforts.

Educational Institutions

Private and government educational institutions play a critical role in reaching large parts of the population with information about preparing for and recovering from disasters.

Interest groups

Groups such as the Rotary Club or the Lions Club make resource contribution during disaster events.

11.2 Religion Based Organizations

A large number of NGOs are religion based and have a very committed work force. The groups working at the community level usually get financial support from parent organizations. Religious beliefs and commitments make these groups very effective in rescue and relief operations. These religious groups generally own institutes / places of worship that are “Pucca” buildings, usually slightly away from the core habitation which can be used as shelters during disasters. These groups also often have necessary infrastructure and resources for mass feeding.

Some international and national religious institutions have a mandate on active social action and disaster management irrespective of caste, creed and language. These missions have a large number of followers in the society and have an established identity and they also provide services like social counseling and promote communal harmony. During disaster they, not only, come for relief operations, but also undertake reconstruction and restoration activities. Some of these organisations have technical professionals associated with them and have good training and other infrastructure. The services, technical professional expertise and training infrastructure could be fruitfully used for all disaster management activities.

The religious Organisations can play crucial role in planning and preparedness through

- Creation of contingent funds for disaster management and generate resource from other agencies, patrons and individuals.
- Organising congregations and other cultural functions and in raising community consciousness on disaster preparedness.
- Organising awareness and skill development trainings on various aspects of disaster management

11.3 Bilateral Organisations

Bilateral agencies play a major roles role in disaster management and work through government as well as NGOs and other partner agencies. They provide resources for preparedness, research, networking and institution development, relief, reconstruction and rehabilitation. They can assist in making suggestions for possible changes in policies by sharing of disaster management applications in other parts of the world. In addition they can provide technical expertise and give support by mobilizing advanced rescue and evacuation teams from other countries during the time of extreme emergencies. These organisations carry out responsibilities in coordination with the Government of the affected country, other donor Governments, international organisations, UN agencies and NGOs.

11.4 Corporate Bodies

So far the role of corporate sector has been limited to relief and reconstruction activities following emergencies. Some business centers and corporate houses have special cells to take up relief activities. After super cyclone of Orissa many PSUs and corporate houses like NALCO, ONGC, SAIL, and TATA constructed dwelling houses for the affected families and the various business houses which are having industrial units power plants are engaged in other business activities with in the territory of Uttar Pradesh shall be encouraged to become an important stakeholder in the Disaster Management.

- The corporate sector can play an active role in preparedness and planning through raising community awareness in their project areas on various aspects of disaster preparedness
- Providing specialised equipments (earthmoving equipments, and safety equipments etc) for disaster response
- Mobilisation and creation of contingency fund for relief and recovery activities
- Provision of technical know-how to manage disasters (especially industrial accidents, fire etc in the aftermath of an earthquake.

11.5 UN Agencies:

The UN resolution affirms that the humanitarian assistance must be provided in accordance with the principles of humanity, neutrality and impartiality. The UN has a central and unique role through the organizations under its aegis to coordinate, international co-operation in the field of disaster management and mitigation. Even though disaster management and mitigation rests on the National Government, the UN agencies are responsible for providing advice and assistance to the government and responsible to mobilize and provide technical and material assistance according to its mandate and resources.

- A mandate issued by the UN general assembly ensued in setting up of United Nations Disaster Management Teams (UN-DMT) to be convened and chaired by UN resident coordinators in each disaster prone nation. Essentially the composition of UN-DMT is determined by taking into account the types of disasters to which a country is prone to and capability of the organizations present in the country working in the area of disaster mitigation and relief. The primary purpose of UN-DMT is to ensure a prompt effective and concerted response in the event of a disaster
- Coordinate UN assistance to the Government in post disaster rehabilitation and reconstruction process
- Undertake long-term disaster mitigation measures

11.5.1 UNICEF (United Nations International Children's Emergency Fund)

UNICEF, assists in child health, sanitation and nutrition especially in emergency situations and has done creditable work at the time of many disaster in India and elsewhere in the world.

- Provision of emergency relief to the affected communities
- Immunization
- Restoration of health infrastructures
- Supply of educational and other infrastructures to the affected schools
- Restoration and augmentation of sanitation and drinking water facilities
- Establishment of child labour prevention school
- Supporting NGOs in disaster mitigation and preparedness activities
- Supply of boats to the State Government

The key areas of UNICEF's involvement in disaster mitigation will be

- Post disaster situation and needs assessment with the help of NGOs or Govt. machinery.
- Promoting & guiding disease surveillance
- Training support for medical personnel for control of epidemics (a secondary hazard after earthquake)
- Provision of relief support to the affected community as per its mandate.
- Supply of emergent food aid relief, medicine and study materials for children of the affected communities.
- Allocate/generate financial assistance for restoration and rehabilitation activities in the affected areas.
- Restoration of drinking water and sanitation facilities in post disaster period.
- Incorporation of disaster preparedness aspects in its ongoing programs.
- Special programmes for child and mother health

11.5.2 UNDP (United Nations Development Programme)

- UNDP is mandated to promote incorporation of disaster mitigation in development planning and provide financial support and technical assistance for different facets of disaster management. Assistance is also provided in the planning and implementation of post disaster rehabilitation and reconstruction and incorporation of risk reduction techniques in the affected areas.
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- Following the Super-cyclone in 1999, UNDP took a lead in coordinating and facilitating relief and rehabilitation efforts of various agencies.
- UNDP plays the role of convener of the UN's DMT which is an inter-agency working group and works on disaster management in collaboration with Govt. and NGOs.

- The activities of UNDP in the State are
- Supporting the State and district administration in distribution of relief
  - Co-ordination of NGO activities in the affected areas
  - Promotion of alternative housing techniques in the affected areas
  - Strengthening of disease surveillance
  - Supporting Disaster Preparedness initiatives in the State through organizing workshops, training programmes for various stake holders
  - Supporting in disaster mitigation aspects
  - Initiating community based disaster preparedness programme in the State
  - Initiation of sustainable livelihood programmes, agro service centers
  - Provision on agricultural inputs immediately after emergencies
  - Provision of tents, family relief kits

UNDP can play the following roles in a disaster management;

- Incorporation of disaster mitigation in development planning.
- Support and can get involved in planning and implementation of relief and rehabilitation activities of the Govt.
- Propagation disaster preparedness at community level through NGOs, CBOs, PRIs and Govt. machinery.
- Play a vital role in preparing Disaster Management Action Plans at state, district, block and community levels.
- Play a vital role in designing early warning systems.

11.5.3 WFP (World Food Programme)

World Food Program provides targeted food aid to vulnerable community for humanitarian relief and supports rehabilitation, reconstruction and risk reducing development programmes. WFP in collaboration with State Govt. provides food support under the ICDS scheme. Immediately after the Super Cyclone 1999, WFP supported food for work programmes in the state in collaboration with NGOs and Government as a part of its relief, reconstruction and rehabilitation activities. WFP also extends its support for increasing the food security aspects of disaster victims.

11.5.4 FAO (Food and Agriculture Organisation)

FAO provides technical advice in reducing vulnerability and helps in the rehabilitation of agriculture, livestock, fisheries and local food production. It also monitors food production and forecasts any requirements of exceptional food assistance.

11.5.5 WHO (World Health Programme)

WHO provides advice and assistance in various aspects of preventive and curative health care including preparedness of health services for rapid disaster response in the past. WHO has played a major role in initiating and strengthening the disease surveillance system in some of the disaster affected areas of India.

Integration of the Media into Disaster Mitigation Activities and during disasters

1. The important step in building links with the news organizations is to more effectively link the media into an intensified effort in disaster mitigation, including activities such as:

   - Risk assessment
   - Avoidance measures
   - Early warning and evacuation
   - Public awareness and education
   - Organization for self-help and effective response to risk.

2. The media is seen as disseminators of official information and measures, which the citizens are expected to undertake immediately and at the same time media conduit for relaying information through inter-governmental structures and channels, to bring the citizens, concerns to official attention.
3. In the event of a disaster, media has a responsibility of reporting the same on a day-to-day basis. Such reporting can contribute to
4. • Bringing true stories of disaster to public

   • Stimulating public response to needs and sufferings caused by disaster
   • Creating tremendous pressure on agencies and government to get involved
   • Injecting efficiency by reducing response time

   • Motivating public and generating disaster assistance and resources.

5. However, care should be taken to safeguard the authenticity of the information and the credibility of the media. This can be done by

- Avoiding reinforcing stereotypes that the people carry about disaster "victims"

- Promoting sensitivity as against sensationalism

- Highlighting both the positive and the negative aspects of disaster management

- Cross-checking information from the disaster site as well as the official sources.

6. During disasters, it is important to organize regular press meetings and issue press releases. The importance of the efforts of various non-governmental agencies engaged in relief operations, specific problems should be highlighted through such briefings. This will ensure highlighted transparency in all operations, concern, and commitments to those affected.

7. A rational approach to media involvement in disaster management would depend on the fact that the media is familiarized (as a part of preparedness) with the disaster management action plans, roles, responsibilities, strengths and limitations with respect to administrative capabilities. This will prepare the ground for utilising the technological and human resources available with mass media. Tapping the media's capabilities can and will improve the preparedness and response to disasters. Conversely, the study and application of disaster mitigation techniques can enhance the quality media reporting. The media have the definitive opportunity to play a leadership role in the transition in thinking and action away from post-disaster relief and towards, preparedness and disaster mitigation.

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Feedback Form

1. **About you :**

2. **Your Experience on using this Plan :**

3. **Comments :**

4. **Suggestions for improvement :**

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5. **Send this form to :** **The Director,**
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   Lucknow – 226024