CHAPTER 1 INTRODUCTION

1.1 Background

The Great Gujarat Earthquake in India in January 2001 revealed the vulnerability of "non-earthquake-proof" cities and villages. The earthquake killed approximately 20,000 people and destroyed over 300,000 houses.

Nepal lies closer than Gujarat to the subduction zone, where the Indian plate passes under the Himalayas, and may actually be susceptible to even larger-scale earthquakes. Very recently, the American scientific journal Science (2001) introduced the theory that predicts a great earthquake of magnitude 8.1-8.3 would occur "very soon", affecting up to 50 million people along the front of the Himalayan Mountains. In 1934, an earthquake of magnitude 8.4 caused serious damages to 60% of the buildings in the Kathmandu Valley. It is a cause for much concern that the next great earthquake may occur at any time. Earthquakes are an inevitability for the Kathmandu Valley, and people have to find ways of coping with earthquake disasters.

The Kathmandu Valley is the exclusive centre of Nepal for politics, the economy, and a society of about 1.5 million people in an area of 667 km^2. The Valley is particularly vulnerable to earthquake disaster because of the rapid increase of population, unplanned development, and poor subsoil.

Should a major earthquake occur, Kathmandu would suffer immense losses of life and property and would be unlikely to be able to function as the capital of Nepal. The disaster would create a tremendous number of poor people, contrary to the national goal and key theme of the next (Tenth) National Five-Year Plan, "Poverty Alleviation."

It is foreseeable that the adverse effects of the earthquake will be felt throughout Nepal and cause long-term stagnation of its development. Earthquakes, and the lack of earthquake awareness and preparedness, are the biggest obstacles for sustainable development in the Kathmandu Valley and Nepal as a whole. Without proper planning, today's development will be tomorrow's mounds of debris.

The government of Nepal, international societies, and NGOs have developed many systems for disaster management and the cooperation of relevant organisations. Through these efforts, great improvements in disaster mitigation have been achieved in Nepal. Nevertheless, this does not mean that the capability for managing an earthquake disaster, especially in the Kathmandu Valley, has improved, because major earthquakes create extremely difficult conditions requiring special

planning and preparedness. For other kinds of natural disasters, such as floods and landslides, emergency management is certainly implemented under difficult conditions. Those affected will be able to make full use of surviving infrastructure such as communications, information and transportation systems, and service facilities such as hospitals and public buildings, even if some elements of these may have been destroyed or damaged to some extent. But in an earthquake, the infrastructure will be destroyed to a degree and extent that no other type of disaster would ever cause, resulting in great obstacles to relief, rescue and rehabilitation works.

Statistics show that the most frequent disasters in Nepal are water-induced disasters rather than great earthquakes. Therefore, current natural disaster management and the present legal framework focus mainly on rural water-induced disasters and give inadequate attention to earthquake disasters in the highly urbanised Kathmandu Valley. The Kathmandu Valley has been considered free from disasters other than from earthquakes witha long recurrence interval. Nonetheless, a major earthquake in the Valley's urban areas, where most houses are multi-storied, the population density is very high, and everyday life depends heavily on various lifelines, will result in a tragic disaster. This disaster will threaten the fabric of society and the mental condition of people in both the affected and the surrounding areas. Above all, such an earthquake would be catastrophic to the entire society in Nepal.

His Majesty's Government of Nepal (HMG) has been concerned about earthquake disaster management and requested the Government of Japan to implement the Study on Earthquake Disaster Mitigation in the Kathmandu Valley. The Government of Japan and Japan International Cooperation Agency (JICA), the official implementing agency for Official Technical Cooperation, dispatched a preliminary survey team to Kathmandu in August 2000 and exchanged the Scope of Work and Minutes of meeting with HMG. Nippon Koei Co., Ltd. and OYO Corporation entered into a contract with JICA and conducted this study from January 2001 to March 2002.

1.2 Goals, Concept and Objectives

1.2.1 Goals

This study is an urgent attempt to establish a holistic plan for earthquake disaster management in the Kathmandu Valley. The goals shall be focused on;

a) Protecting the life and property of the people in the Kathmandu Valley,
b) Strengthening socio-economic systems, and

c) Protecting the stability of governance even in the event of earthquakes.

The goals mentioned above, however, represent tasks too great to be accomplished in a short period. Approaching these goals as closely as possible, this Study forms one milestone in a long process.

1.2.2 Concepts

In order that the goals are more clearly focused, the causes of earthquake disasters, the relation between earthquake disaster management and other policies and priorities, and the need for a balance between mitigation and preparedness will be discussed.

(1) Identifying the Root Causes of Earthquake Disasters

Earthquake disasters are a society-based phenomenon. A good example is that hikers staying in tents are not likely to suffer injury or damage, even in great earthquakes. Loss of life or property in earthquake disasters generally occurs due to poorly built structures in vulnerable locations or improper social reactions to the quakes. Whether an earthquake will cause a disaster or not is dependent on the natural and human-affected environment, the preservation and improvement of which will be closely related to the current system for the management of earthquake disasters.

The poor and disadvantaged will suffer the most from earthquake disasters, because they live in poorer housing on more vulnerable sites, and they have less ability to adapt to the tragic circumstances by themselves. In contrast, more affluent people can usually afford, even in a tragic disaster, to purchase price-inflated food, move to a safer place, construct a new house, and obtain useful information, by using their economic reserves. Therefore a disaster may disproportionately hit the most poor and disadvantaged elements of society.

(2) Realisation of Sustainable Development

Any country, especially a developing country, has to maintain steady, sustainable development in order to eliminate poverty. Explosive growth of the population, escalation of the gap between rich and poor, deterioration of the environment, and social instability occur as chain phenomena in developing countries, very often resulting in a vicious cycle. Disasters accelerate these phenomena and act as great obstacles for sustainable development unless disaster mitigation and preparedness succeed in stopping the vicious cycle.

Sustainable development attempts to meet the needs of present generations without compromising the ability of future generations to meet their own needs. It stresses inter- and intra-generational equity and strives for an adequate standard of living for all people. Working toward sustainable development is natural and necessary when working toward effective earthquake disaster management. This is because the ability to deal with earthquake disasters is highly dependent upon the fundamentals of society, economic growth and social stability, all of which are the fruits of sustainable development.

(3) Emphasising Strategic Management

Sustainable development, then, is both a condition and a consequence of an earthquake resistant society. Hence, earthquake disaster management has to focus not only on investment for emergency management in the narrow sense (i.e. planning and preparedness for response and relief) but also in a broader and more strategic sense, focusing on development policy as the foundation for a healthy sustainable society and the accumulation of economic surplus.

Any projects to improve the everyday life of people, assure fundamental human rights, and alleviate poverty, being planned and implemented in and around the Kathmandu Valley, need to be recognised as related closely to earthquake disaster management. Therefore, this study analyses and evaluates the planned and existing projects from a disaster mitigation point of view. As many of these projects were planned independently, it may be desirable to integrate some for strategic management reasons, and this may, therefore, necessitate new, previously unplanned projects. This study proposes such a scheme of integrating existing and new projects.

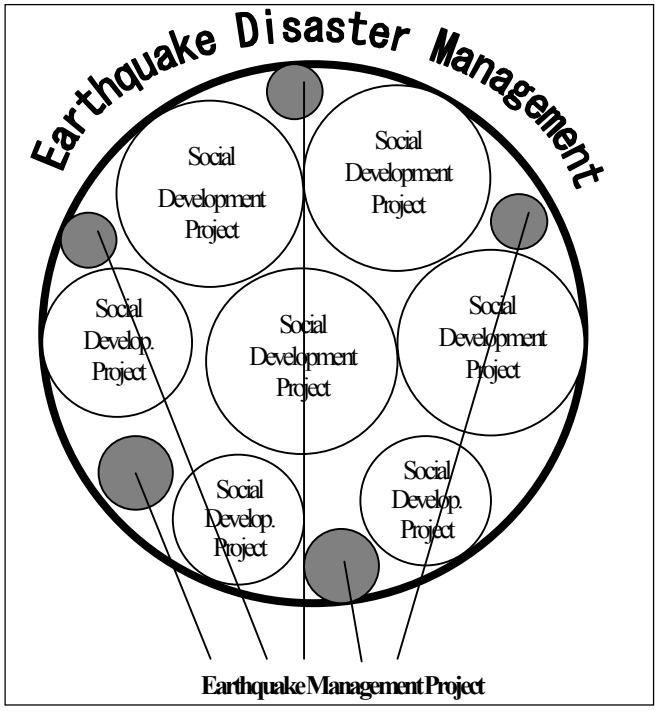


Figure 1.2.1 Mitigation System of Earthquake Disaster

(4) Importance of the Kathmandu Valley

The Kathmandu Valley is the exclusive centre of economic activity, politics, administration and culture in Nepal and is the mainstay of the entire country. The adverse influence on all Nepalese society from major earthquakes needs to be reduced as much as possible. The great risk posed by the current concentration of development in the Kathmandu Valley leads this study to adopt and develop a policy of decentralisation.

(5) Realisation by Multi-sectoral Decentralisation and Cooperation

Decentralisation is very important in earthquake disaster management. A great number of people, not only in the public sector but also citizens, have to be involved in disaster management because the project is more successful if there is mutual cooperation among all the related personnel and agencies, including central/local governments, public agencies, NGOs, and inhabitants. The usual hierarchical top-down approach (national government - municipality – community) does not work well in disaster time due to the chaos in society and deficiency of communication systems etc. For effective disaster management, a flexible and cooperative society will be required. It is a society with greater emphasis on municipalities, communities and NGO's, etc., rather than the national government.

Nevertheless, we cannot forget that decentralisation of administration is still at an early stage in Nepal. We cannot overemphasise the importance of the national

government for disaster management. In this regard, the present administrative and legal framework of the national government may not be satisfactory. The Ministry of Home Affairs (MOHA) is the officially designated agency responsible for disaster mitigation in Nepal. However, it seems difficult for MOHA to undertake cooperative measures with other agencies, because a comprehensive regulation stipulating cooperation among the related agencies does not exist. In addition, a proper foundation must be established for the exercise of leadership, during a disaster, by the Prime Minister with the backing of a proper support system. Both of these issues must be addressed.

(6) Balancing Mitigation and Preparedness

The destructive power of earthquakes is sometimes so strong that no countermeasures can provide total resistance. Earthquake disaster management must set an earthquake intensity limit within which we can expect to prevent disaster. Beyond this we must accept the real risk of damages. This limit can be called the mitigation limit.

Measures to prevent damages below the mitigation limit or to raise the mitigation limit as high as possible, for example by introducing seismic provisions to architecture and civil engineering design, are called mitigation or risk reduction. The preparations taken to cope with earthquake disasters before they happen, acknowledging their inevitability, shall be called preparedness. The aim of preparedness is to control the consequences of the earthquake beyond the mitigation limit in such a way that the losses will be minimised as much as possible. Preparedness will be concerned with response and relief, for just after the earthquake, and rehabilitation/reconstruction, for the longer term. Mitigation and preparedness, emergency response and relief, and rehabilitation/reconstruction correspond to the three stages in the emergency management cycle as shown in Figure 1.2.2.

Although wealthy countries such as Japan can set the mitigation limit at a high level, many developing countries need to set it lower due to the deficiency of economic surplus, and Nepal is unfortunately not the exception. Hence, this study places more emphasis on preparedness although all aspects of risk management including mitigation will be covered.

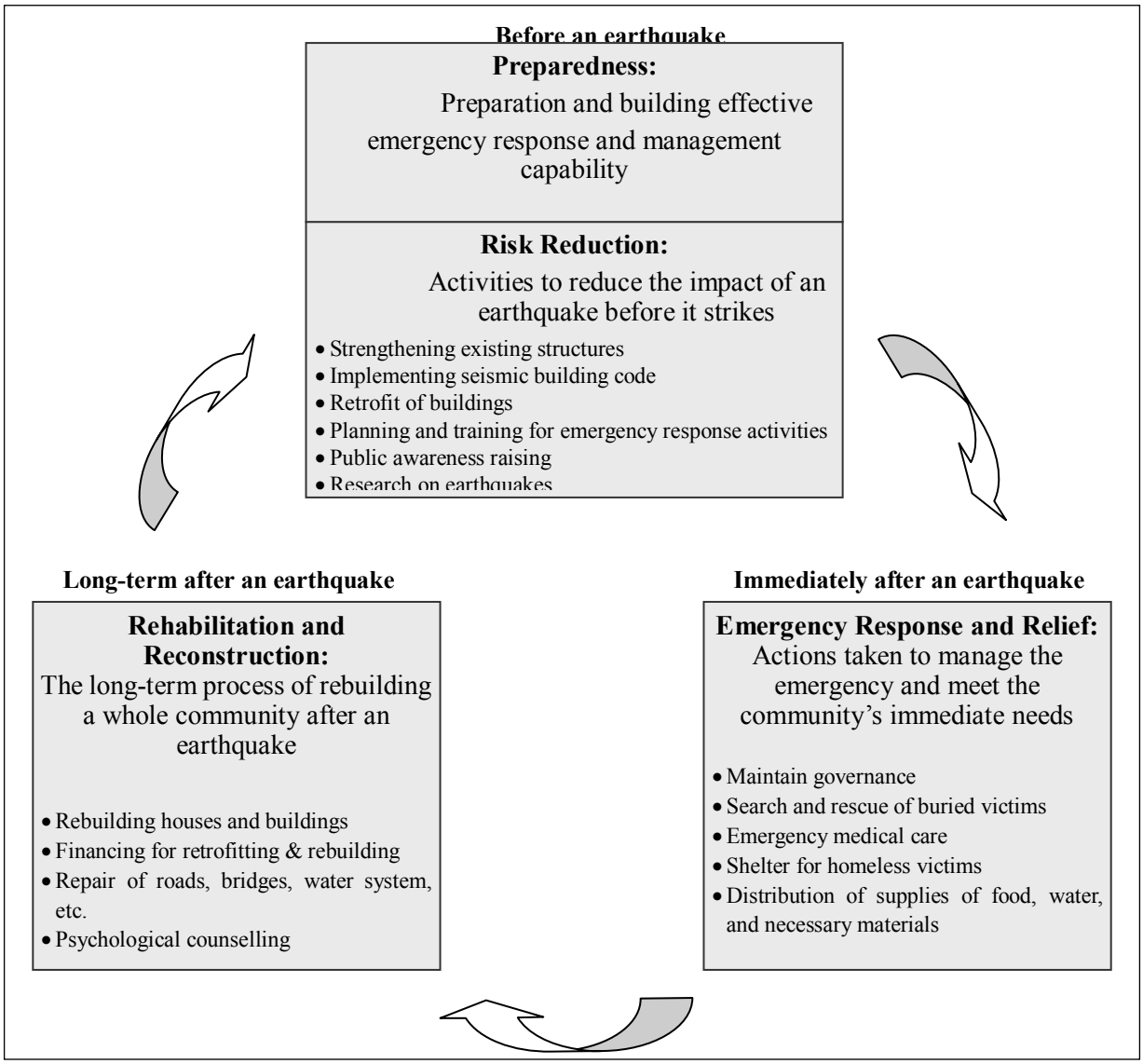


Figure 1.2.2 Disaster Management Cycle

(After NSET-Nepal and GeoHazards International with some modifications)

(7) Presupposing International Cooperation

Great earthquakes hit suddenly without warning and are so catastrophic that any country will have a hard time to manage the crisis by itself. Even wealthy countries like the USA and Japan have been supported in times of earthquake disaster by international societies and other countries, including developing countries.

The project team's planning recommendations keep in mind that the management of an earthquake disaster is a matter for international cooperation.

1.2.3 Objectives

The objectives of the Study set by the Team, following its goals and concepts, are;

a) to formulate a plan for earthquake disaster mitigation in the Kathmandu Valley.

b) to carry out technology transfer to Nepalese counterpart personnel and formulation of a plan encouraging them to undertake emergency actions in the course of the Study, and

c) to create a database on earthquakes and an earthquake disaster estimation and scenario, for sharing understanding of earthquake disaster management among all stakeholders.

This study is an important milestone in establishing a comprehensive plan for earthquake disaster mitigation in the Kathmandu Valley. It needs a tremendous amount of study because an earthquake disaster affects almost all human activities, most of which need to be included in the analysis and the consequent plan. Therefore, the plan must be established through participatory and sequential processes which will take a certain period of time and resources. In addition, an Earthquake Disaster Mitigation Plan cannot be independent from other plans or projects or land use or development activities, as discussed earlier, though many of the related plans have not yet been prepared nor authorised.

As a consequence of restricted time and lack of related plans, this plan covers the general issues to be included in a holistic management plan covering the three stages of earthquake disasters and on which the succeeding solid plan will be based. We also introduce the mechanisms for developing sustainable inter- and intra-organisational cooperation. Meanwhile, an earthquake can hit the Kathmandu Valley at any time. Urgent and practicable emergency management must be implemented as soon as possible. Therefore, the plan also identifies and proposes urgent projects based on evaluations of the vulnerability of present systems and structures.

1.2.4 Study Area

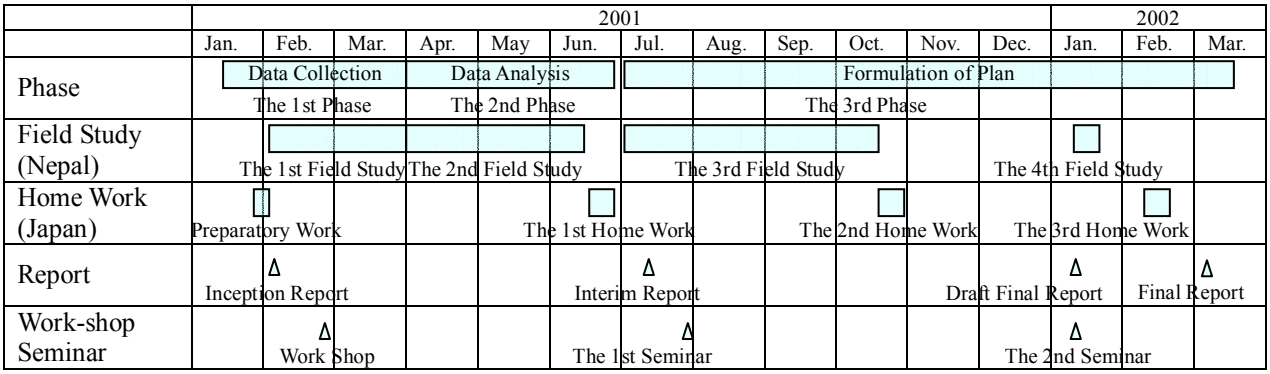
The study area covers the Kathmandu Valley, consisting of three Districts of Kathmandu, Lalitpur and Baktapur, including five Municipalities, namely, Kathmandu, Lalitpur, Baktapur, Madhyapur-Thimi and Kirtipur.

1.2.5 Schedule

The study is carried out for about 14 months, from January 2001 to March 2002,

dividing into three phases as shown in Table 1.2.1.

Table 1.2.1 Overall Schedule



1.2.6 Study Team Members

The study team consists of 14 members as shown in Table 1.2.2.

Table 1.2.2 List of Study Team Members

Expertise	Name
Team Leader	Egawa Yoshitake
Deputy Team Leader/Disaster Management Planning	Kaneko Fumio
Earthquake and Seismic Analysis	Segawa Syukyo
Ground	Yano Kenji
Building Structure	Ohsumi Tsuneo
Infrastructure (Road, Bridge, Lifeline)	Sthapit Naresh
Information, Communication	Kurono Muneo
GIS Database	Toyama Nobuhiko
City and regional Planning	Watanabe Jiro
Public Awareness and Education	Shaw Tomoko
Public Health and Sanitation	Komura Takashi
Structure, Institution and System	Mattingly Shirley
Building Structure	Kagawa Hideo
Assistant	Taguchi Hiroyuki

The Nepalese counterpart organisation is the Department of Narcotics Control and Disaster Management, Ministry of Home Affairs (MOHA). Counterparts were designated from MOHA and other concerned Ministries as shown in Table 1.2.3.

Table 1.2.3 List of Counterparts

Name	Designation	Office
Dr. Min Bahadur Paudyal Chhetri	Director	Ministry of Home Affairs, Dept. of NDC & Disaster Management
Mr. Pravakar Adhikari	1st Class Officer	Ministry of Information & Communication
Mr. Laba Prasad Tripathi	Director	Ministry of Education & Sports, Department of Education
Mr. Durgendra Man Kayastha	Chief Survey Officer	Ministry of Land Reform & Management, Survey Department
Mr. Sudhir Rajoure	Seismologist	Ministry of Industry, Department of Mines & Geology
Mr. Gyani Raja Chitrakar	Geologist	Ministry of Industry, Department of Mines & Geology
Mr. Amrit Man Tuladhar	Engineer	Ministry of Physical Planning & Works, Department of Urban Planning & Building Construction

Based on the Scope of Work, a Steering Committee was formulated by Nepalese government to carry out the Study smoothly. A list of the members is shown in Table 1.2.4.

Table 1.2.4 List of Steering Committee Members

Name	Designation	Office
Mr. Tulsi Prasad Bhattarai	Chief District Officer	Kathmandu District
Mr. M. K. Adhikari	Deputy Chief District Officer	Lalitpur District
Mr. Ram Prasad Khatiwada	Chief District Officer	Bhaktpur District
Mr. Keshab Sthapit	Mayor	Kathmandu Metropolitan City
Mr. Buddhiraj Bajracharya	Mayor	Lalitpur Municipality
Mr. Prem Suwal	Mayor	Bhaktpur Municipality
Mr. Madankrishna Shrestha	Mayor	Madhyapur Municipality
Mr. Hirakaji Maharjan	Mayor	Kirtipur Municipality
Mr. Balananda Paudel	Under Secretary	Ministry of Finance
Mr. Mohan Bahadur Karki	Under Secretary	Ministry of Science and Technology
Mr. Padam Lal Shrestha	1st Class Officer (Technical Officer)	Ministry of Physical Planning & Works
Dr. Shyam Prasad Bhattarai		Ministry of Health
Mr. Narebdra B. Amatya	Under Secretary	National Planning Commission, Administration Section
Mr. Nanda R. Sthapit	Director General	Department of Mines and Geology
(Chair) Mr. Shree K. Regmi	Secretary	Ministry of Home Affairs

1.2.7 Characteristics and Structure of the Report

Since Nepal's great flood in 1993, international cooperation entities in Nepal have been planning and preparing to cope with disasters, and these efforts were even more stimulated by the Gujarat Earthquake in 2001. Agencies of the United Nations in Nepal established a High Level Committee in May 2001, reactivated the Sectoral Working Groups, and formulated UN Nepal's Inter-Agency Disaster Response Preparedness Plan, designed principally to cope with the anticipated great earthquake in the Kathmandu Valley.

This study and the UNDP's efforts are complementary but different in focus; this report deals with how to mobilise and strengthen government and the private sector

internally to the country, while UNDP strives to prepare for fast and efficient cooperation from international agencies and outside sources, realising His Majesty's Government (HMG) would be the host and partner for implementing the countermeasures.

The report comprises: Volume I -English Summary, Volume II –Main Report (1/2) Earthquake Disaster Mitigation Plan, Volume III –Main Report (2/2) Damage Estimation, and Volume IV -Appendix. All of these are in English. A second summary, Volume V -Summary is in Japanese.

Among these, Volume I is intended to be as compact as possible for the convenience of users, targeting only planning and management. The structure of Volume I is principally based on the three individual goals of the project, but some modifications are made for the ease of users.

What this report suggests or recommends may not necessarily be consistent with the position of HMG; however, the team believes that even if this is the case, it is worthwhile to present these ideas as the basis for productive discussion.

CHAPTER 2 EARTHQUAKE SCENARIOS

Though the detailed earthquake disaster estimation is described in Volume III (Main Report 2/2), this chapter summarises the scenario earthquakes to serve as the basis for earthquake disaster mitigation planning.

2.1 Scenario Earthquakes

Based on the historical earthquake catalogue, recent seismicity, and tectonic aspects in and around Nepal and the Kathmandu Valley, the following four "Scenario Earthquakes" have been set as shown in Figure 2.1.1.

a) Reoccurrence of 1934 Bihar-Nepal Earthquake; referred hereafter as "the 1934 Earthquake" (magnitude 8.4)
   In the morning of January 15, 1934, a huge earthquake occurred in the eastern part of Nepal. The cities in the Valley suffered severe damage from this earthquake. The reoccurrence of a similar earthquake is modelled for effective comparison with the following three potential earthquakes because many people in the Valley have memory of this earthquake. The damage was estimated for both cases –the earthquake in 1934 and at present.

b) Mid Nepal Earthquake (magnitude 8.0)
   This earthquake has been set based on the seismic gap in the middle of Nepal. Several researchers have pointed out that a huge earthquake may occur in the near future in this gap. This is regarded as a great earthquake. Magnitude 7 class aftershocks may follow.

c) North Bagmati Earthquake (magnitude 6.0)
   As shown in Figure 2.1.1, magnitude five class earthquakes frequently occur just north of the Kathmandu Valley. This scenario earthquake model has been set based on this earthquake cluster. This is regarded as a moderate[1] earthquake.

d) KV Local Earthquake (magnitude 5.7)
   This earthquake model has been set based on a distinct lineament in the Valley. This is regarded as a local earthquake underfoot.

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[1] In this report, "moderate earthquake" means earthquake with the strength of seismic ground motion of MMI VI to VII, and "great earthquake" means MMI VIII or more

[4] "octrois": a tax on commodities brought into a town or city, especially in certain European countries.

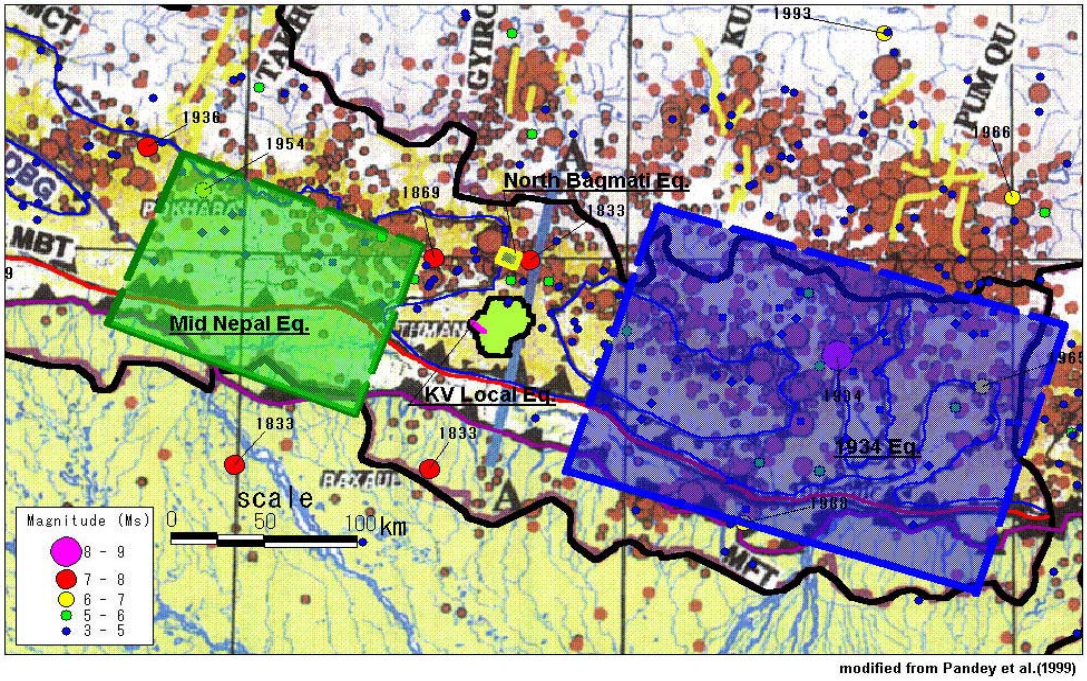


Figure 2.1.1 Scenario Earthquake Fault Model

2.1.1 The 1934 Earthquake

The seismic intensity and liquefaction potential are calculated based on the earthquake model and subsurface ground properties in the Valley.

(1) Seismic Intensity

The seismic intensity in Modified Mercalli Intensity (MMI) scale is shown in attached Figure 2.1.2. Of the four scenario earthquakes, the Valley would experience the largest intensity in this one. Most parts of the Valley would experience MMI VIII. Some areas in the eastern part would suffer MMI IX because this earthquake fault model is located east of the Valley.

(2) Liquefaction Potential

The ground water level affects the liquefaction potential. The liquefaction potential distribution in the rainy season is shown in attached Figure 2.1.2. The liquefaction potential is very low in most of the Valley. Moderate potential was identified in some areas along the Bagmati river.

(3) Slope Stability

Steep slopes, which have the high possibility of slope failure, show linear distribution in limited areas. No large-scale hazard would occur due to slope failure.

2.1.2 Potential Earthquakes (Mid Nepal, North Bagmati and KV Local Earthquake)

The seismic intensity and liquefaction potential are shown in attached Figures 2.1.3 and 2.1.4, respectively.

(1) Seismic Intensity

a) Mid Nepal Earthquake: Except in mountainous areas, MMI VIII would be experienced in the Valley. If an aftershock of magnitude 7 were to occur at the nearest position in the main rupture zone, the Kathmandu Valley would suffer MMI VII.

b) North Bagmati Earthquake: Except in mountainous areas, the Valley would experience MMI VI or VII.

c) KV Local Earthquake: The area along the fault would experience MMI IX. Other parts of the Valley, except the mountainous areas, would experience MMI VII or VIII.

(2) Liquefaction Potential

a) Mid Nepal Earthquake: Moderate potential was identified in some areas along the Bagmati river.

b) North Bagmati Earthquake: No part of the Valley would be liquefied due to very low liquefaction potential.

c) KV Local Earthquake: A few grid cells close to the fault were judged to be high potential. Along the Bagmati river, there are some grid cells with moderate potential.

2.2 Earthquake Disaster Scenario

The heavily damaged building and death toll density distributions are shown in attached Figures 2.2.1 and 2.2.2. The term “heavily damaged building” means totally collapsed or unrepairable and uninhabitable, even for temporary purposes.

The death toll by the collapse of buildings is counted. The number of deaths by disease after the catastrophe is not included.

2.2.1 Disasters due to the 1934 Earthquake

(1) Earthquake in 1934

The total number of heavily damaged buildings was counted at 19,000 in the Kathmandu Valley. The heavily damaged ratio is 36%. The number of damaged buildings was relatively large in the central areas of Kathmandu, Lalitpur and Bhaktapur municipalities, and the death toll was high in the core areas of these three municipalities. The death toll was counted as 3,800 and the seriously injured number about 11,000.

(2) A 1934 Earthquake in the Present

If the same earthquake occurs much more damage would be induced due to growth in population and the number of buildings. The total number of heavily damaged buildings is estimated at 59,000 in the Kathmandu Valley. The heavily damaged ratio is 23%. The distribution of damaged buildings is almost the same as that of the Mid Nepal earthquake. The damage ratio in the eastern part of the Valley is relatively high for the same reason mentioned above.

The death toll is estimated as 20,000, i.e. 1.4% of the total people in the Valley. The seriously injured will be about 59,000. The number of fatalities in Ward/VDC is largest in Kathmandu municipality. The death toll density is large in the core areas of the five municipalities. The Valley would suffer the largest damage in this one of the four scenario earthquakes.

2.2.2 Disaster due to Mid Nepal Earthquake

The total number of heavily damaged buildings in the Kathmandu Valley is estimated at 53,000. The heavily damaged ratio is 21%. The number of damaged buildings is large in the core areas in Kathmandu, Lalitpur and Bhaktapur municipalities. The primary reason for the large number would seem to be due to the high density of buildings in these core areas. On the other hand, the damage ratio is larger in rural areas than in urban areas. The larger ratio seems to be due to the type of buildings, i.e., comparatively stiff RC buildings are dominant in urban areas, while weak stone or adobe buildings dominate in rural areas.

The death toll is estimated at 18,000, i.e. 1.3% of the total people in the Valley. The seriously injured people are about 53,000. The number of fatalities in Ward/VDC is largest in Kathmandu municipality. The density of both death toll and total casualties is large in the core areas in Kathmandu, Lalitpur and Bhaktapur municipalities.

The severely damaged ratio of public schools will be almost the same as that of residential buildings. If this earthquake were to occur during school hours, many children would lose their lives. The number is not included in the causality estimation mentioned before. The damage ratio to hospitals will be lower than that of residential buildings. Several bridges will collapse, and the national highway, which is the sole road to other parts of the nation, may not be useable after the earthquake because of slope failure.

The water supply pipelines will fracture at many points. Electric power cables will be severed at many points also, although their recovery will be quicker than pipelines. If an aftershock of magnitude 7 class were to occur, the facilities that were weakened by the main shock might collapse.

2.3 Consequence Scenario

Note that this scenario is an overall scenario, and detailed portions are sometimes described in other sections.

(1) Presumption

This scenario outlines the various impacts if a disastrous earthquake were to hit the Kathmandu Valley in the daytime in the winter month of January in the year 200X, just after the Earthquake Safety Day in Nepal.

The purpose of this scenario is to try to figure out the phenomena that can be expected based on this JICA project. The scenario intends to show the weak points that currently exist in the Kathmandu Valley and to present fundamental information for earthquake disaster management planning in order to improve the strength of the whole Valley against an earthquake disaster.

Note: Scenarios and damage assessments are drawn for earthquake disaster management planning purposes:

a) They are based on a chain of hypotheses with a technical point of view:

- A specific plausible disastrous earthquake occurs,

- The target area of the Kathmandu Valley would experience the estimated ground shaking and ground failure,
- Most of the facilities and human beings would be affected by the ground shaking and related damage and phenomena, and
- Countermeasures proposed in this report have not been implemented.

b) Earthquakes of different sources and magnitudes or on any other faults in the area will result in different patterns of damages and impacts.

The scenario is not an exact reality but shows weaknesses in the current situation in order to consider what improvements should be made before the next earthquake.

(2) Nobody Understood What Happened

A very strong earthquake has occurred, followed by many aftershocks. It takes several hours, however, before most of the concerned officials know how large an area suffered damages and what areas were most affected. The Control Room in MOHA could not receive any information due to the dysfunction of the communication facility and congestion of lines, although it was supposed to receive urgent information from 75 Chief District Officers (CDOs). Department of Mines of Geology (DMG), the responsible institution for seismological observation, decided the epicentre, depth and magnitude of the earthquake within 30 minutes, though DMG failed to transfer the information to the government due to the failure of communication systems.

(3) Realised Mid-Nepal Earthquake

The Royal Nepal Army (RNA) and police were trying to realise the extent of the affected area, though their intelligence function had decreased substantially from normal times, resulting in a big delay in collecting information. The reason why was that some of the facilities suffered damages, and staff dispatched to sites for intelligence could not report back the detailed information to their headquarters quickly, due to their urgent engagement in rescue works. However, fragmentary information and observation from aeroplanes was revealing that Pokhara and its surrounding area may have suffered worst damages, and the earthquake was the anticipated “Mid-Nepal Earthquake”.

(4) Confusion due to Aftershocks

Many aftershocks occurred frequently. One of them recorded big seismic intensity, VII. The rumour that an even bigger earthquake would occur spread extensively, inducing the people to worry even more. A comment about coming aftershocks by one expert was reported in exaggerated form and resulted in further confusion among the public.

(5) King's Action

The King anticipated the great earthquake and had prepared several policies in advance. At first, he declared the State of Emergency based on the Constitution in order to establish his Emergency Powers, and subsequently he closed the Parliament, which had been in session at the time. Then, he ordered the meeting of the National Defence Council of Nepal, chaired by the Prime Minister, and instructed the mobilisation of the Royal Army of Nepal and all police to implement the following:

a) Assessment of the disaster situation.
b) Maintenance of public peace.
c) Mobilisation of public officers.
d) Rescue/relief of victims.

The Council decided to mobilise the aeroplanes of the Army and private sector for Kathmandu and to take the similar measures for army vehicles and corps as possible, considering the importance of the Kathmandu Valley.

Subsequently, the King ordered the immediate activation of a tentative Emergency Control Board comprised of Ministers, Mayors in the Kathmandu Valley and the Commander-in Chief to oversee and coordinate emergency response and the release of public information, and to request appropriate aid from overseas.

(6) Confusion at the Central Government

The Emergency Control Board did not meet until the evening of same day. This was because the relevant staff in the Prime Minister's Office failed to prepare the agenda and to arrange the bureaucratic procedures promptly due to the lack of practice and drills. At the meeting, only a few valuable reports on the onsite situation and countermeasures taken were presented by the ministries, due to lack of preparedness, but with some exceptions. The only decision of the Board was that

the tasks of respective ministries and organisations coping with the disaster should be related to their regular functions.

The Royal Army was the most disciplined organisation in Nepal, though the power to be mobilised instantaneously was limited to around 1,500 troops with few machines, because the main forces were in rural areas outside the Kathmandu Valley.

(7) Dysfunction of Current Disaster Management System

As for the Central Disaster Relief Committee, there was no movement at all to convene it, because the higher level organisations were established, and thus its reason for existence faded. A CDO had been expected to perform direction and control at the time of a disaster based on the Local Administration Act. In the Kathmandu Valley there are 3 CDOs for individual districts. However, in individual CDO Offices, most of the staff, excluding a few, were lost, because they returned to their home to confirm the safety of their families. Also the anticipated counterparts for the CDO, the Corps Office of the Army, District Offices of the Ministries and even the police were too busy to respond to the CDO's requests under these circumstances.

(8) King's Appeal

The King made a direct appeal to the people on Radio Nepal. He said that the cause of the disaster was the earthquake occurred in the Pokhara area, aftershocks were expected to decrease gradually, the King and the government were taking all measures to cope with the disaster and requested people to take it easy instead of being upset. This appeal by the King produced a big effect in stabilising the public mind, though, few citizens heard his appeal, because people were not accustomed to turn on the radio immediately after a disaster for hot news. Nevertheless, disappointment was spreading gradually, for the message contents were not updated although the appeal was carried several times even after that. Radio Nepal appealed only for calmness and did not report the updated status of the disaster, rescue operations, etc.

(9) Cooperation and Confusion in Communities

During several days after the earthquake, site-based cooperation among inhabitants for emergency rescue and relief was carried out without prejudice against different

castes, and people felt the feeling of solidarity, congratulating each other for having survived the tragedy. However, anxiety about the future increased gradually, raising social unrest. Plunder occurred in many places as in 1934. Price increases in shops to get a big profit were extensively seen. In some cases, the behaviour was reduced as a result of mass protests. Disquieting rumours began to spread. One of the rumours was that poison was put into wells, as was rumoured after the Royal massacre in 2001.

Accurate information was not transmitted smoothly to the people. Most people could not watch television or listen to the radio, because they did not have battery-operated models, and most information was disseminated by oral communication, during which the contents changed considerably.

(10) Municipality Offices

Although municipality offices should play a big role at the time of disaster, their ability to function decreased tremendously like the central government. However, executives began to organise systematic rescue and relief works because they realised their task is to serve the citizens, and they had a better feeling for cooperation among departments due to the smaller scale of organisation than the central government.

The citizens' distrust of government and municipal offices was very widespread. However, the institution where citizens visited at last for official relief was Ward offices. Many Ward offices were so poor in building quality and severely damaged, that Ward Committee members set up temporary offices in front of or near collapsed official ones. Ward Committee members made their efforts to serve refugees. The Wards required the help of the city headquarters and the headquarters also needed the cooperation of the Ward offices. This way, the line of refugees - Ward offices- city headquarters began to be established gradually and transferred the needs of each level along the route to the upper level, and also the rescue and relief reached the refugees.

(11) International Rescue Teams

Two days have passed before many rescue teams and abundant relief materials began to arrive from overseas. International organisations with ongoing operations in Nepal, like the UN with its EOC in PulChok, could begin to provide relief at almost the same time, because their initial response had been to respond to the needs of their staff stationed all over Nepal. Although prioritisation and supply

routes had to be established, the response of administrative organisations was far from the expectation of the international organisations. Therefore the international teams began providing relief as needed to sites by themselves rather than through administrative organisations, as at the time of the large flood of 1993.

For coordination among governmental and non-governmental entities and collection and dissemination of disaster information, an Emergency Operations Centre (EOC) was activated near Ratna Park, to support the Emergency Control Board. For cooperation among rescue teams and among the teams and victims, and for distribution of materials, staging areas were required to be established. For Kathmandu and Lalitpur, a joint staging area was established in the International Conference Centre, where major roads reached from the airport, and it was close to Singha Durbar and the Royal Palace.

A system of cooperation between refugees and municipal authorities through the Ward offices was beginning to form, as the staging areas were about to begin operations after preparation of tents, field toilets and generators. Ward offices dispatched liaisons to the staging area, and wards that carried out correct prioritisation were able to receive more relief than others.

(12) The Role of the Central Government

Ten days have passed since the earthquake occurred. The army, international relief teams and municipalities had implemented rescue and relief works after the earthquake. It was quite natural that these operational organisations played a more major role than the national administrative ones. Nevertheless, it became obvious that there were many tasks for which the national government had to take the lead:

a) Management of initial response, because as a nation it is critical to maintain public peace and subsequent rescue/ relief actions either domestic or international,
b) Establishment of a hierarchical structure for disaster management,
c) Prioritisation of districts and/or areas for rescue work,
d) Regional administration, for example, for disposal sites for debris from collapsed houses and urban planning for reconstruction,
e) Recovery of infrastructure such as roads, especially to India, and electric power, communications, water supply and drainage, etc.,
f) Allocation of funds to Municipalities and victims,
g) Establishment of housing policy such as the Building Code, and
h) Preservation of traditional houses.

(13) Optimism

One hundred days have passed since the earthquake.

The property of the Kathmandu basin that was built-up a long time before was lost to the level of tens of years before. The people who have been in charge of development projects realised that the biggest obstacle for sustainable development was an earthquake disaster. It was believed before that "Nepal was so poor that what it needed was development projects rather than disaster mitigation", but now it was obvious that both have to be implemented concurrently without regarding any conflict between them.

The quality of life was gradually deteriorating. The deficiency of goods and increase of monetary supply and international relief brought about a violent inflation and the decrease in the exchange rate promoted this still more. Differentials between the rich and the poor were growing wider. The government was being forced to conduct difficult economic operations. Even public peace was deteriorating in some places.

On the other hand, a wonderful optimism for the future was emerging among people. Through the hard times, a sense of cooperation and responsibility in various sectors has developed more than ever before, expecting society to be better than before the earthquake disaster.

CHAPTER 3 SUSTAINABLE MECHANISMS FOR DEVELOPMENT OF DISASTER MANAGEMENT

No single ministry or two ministries can begin to handle effectively all aspects of managing earthquake risk or managing an earthquake disaster. All ministries, local governments, and other sectors of society must participate individually and collectively. The framework for an updated institutional system for disaster management in Nepal comprises three major elements:

a) Clear assignment of responsibilities to ministries, local governments, and other institutions.
b) Creation and strengthening of sustainable mechanisms for cooperation.
c) Development and implementation of policies and plans.

It is clear that the following steps must be taken to improve the capacity for disaster management in Nepal:

a) Establish a strong legal base for a comprehensive risk management system, involving each level of government and the community. Ascribe responsibility for leadership to all levels of government, and charge agencies at each level with responsibilities for preparedness and mitigation work in accordance with their assigned functions.
b) Create sustainable mechanisms for inter-governmental and inter-institutional coordination of mitigation, preparedness, response, relief, and recovery activities. The proposed National Disaster Management Council (NDMC) would be responsible for formulating national disaster management policies and overseeing their implementation through disaster management plans and programs throughout Nepal. The Kathmandú Valley Disaster Management Council (KVDMC) would be responsible for disaster management policies, plans, and programs to meet the specific needs of the Kathmandu Valley.
c) Ensure that the Tenth National Five-Year Plan includes plans and funding for firm disaster mitigation measures.

Among the public service sectors in any country, local bodies fulfil a major role in rescue and relief for victims, because they know the extent and characteristics of the disaster situation and needs of the people. Of course, local bodies should be supported by the central government. Nevertheless, in Nepal, the central government's Ministry of Home Affairs (MOHA) is mandated not only as a guiding and supportive organisation for local bodies but also a key entity for disaster operations. Insofar as the area affected by a disaster is a rural area governed by a

Chief District Officer (CDO), it may be rational for MOHA to be in charge of disaster operations, because the CDO is the local agent of the ministry. In the Kathmandu Valley, however, local bodies including the five municipalities represent more than the CDOs as far as public services are concerned.

The structure of the central government and the roles and responsibilities of local governments have changed widely since the Natural Disaster (Calamity) Relief Act was enacted in 1982, establishing MOHA as the responsible ministry for disaster management. In 1999 the Local Self-Governance Act provided clearly that municipalities and VDCs have responsibilities that encompass disaster management functions. The Act charged the Ministry of Local Development (MOLD) with responsibility as the guiding and initiating institution for local bodies. This Ministry is in the position to facilitate and instruct local bodies to prepare for disaster management, and also to lead HMG in the support of local bodies on their behalf. Therefore, MOLD is the responsible central government organisation today for disaster management as well as MOHA.

Sustainable disaster mitigation also requires citizens to be aware and active. For effective disaster education activities, the common target groups are local administrators and citizens, but in the Kathmandu Valley it is also necessary to target school children and local masons. This is due to the poor construction and maintenance of schools and non-engineered buildings. Consequently, four target groups are recognised: citizens, school children, public administrators and local masons. Citizens are the first to respond to disasters, and existing or new local organisations can act as a catalyst for community-based preparedness and disaster mitigation. For school children, an earthquake response manual for school safety should be prepared together with earthquake mitigation activities in school curricula and earthquake drills. Capacity-building to prepare public administrators for emergency response duties is recommended, as well as establishment of an Emergency Control Board at the municipality level to coordinate emergency information and response. For improvement of building construction, a training and certification program for masons and creation of a Mason Training Centre are proposed.

3.1 Institutional System

3.1.1 Principles

No single organisation can effectively manage earthquake risk or manage an earthquake disaster. Various ministries, local governments, and other sectors of society must participate individually and collectively in an inter-institutional, open planning process that includes:

a) Assignment of responsibilities,
b) Creation and strengthening of sustainable mechanisms for cooperation, and
c) Development and implementation of policies and plans.

These must be based on a solid understanding of the characteristics of the earthquake hazard in the Valley, the activities and structures that are at risk, and the existing legal and institutional frameworks for the roles and responsibility of the government and society in regard to disaster management.

(1) Assignment of Responsibilities

Inter-agency and inter-institutional coordination must be based on clear assignments of functions and tasks and the establishment and utilisation of mechanisms for inter-agency communication of information and coordination of activities. Clear delineation of authorities and responsibilities to carry out functions provides accountability and enhances the exercise of leadership.

His Majesty's Government's Rules on allocation of functions (1996) assigns to the Ministry of Home Affairs responsibility for "natural disaster relief" and for "all other functions of HMG which have not been specifically prescribed for any other Ministry or Department." While the various other Ministries are not allocated *disaster-specific* responsibilities in the Rules, their normal functions designated in the Rules could guide the proposed assignments of duties related to managing earthquake risk and carrying out emergency preparedness, mitigation, response and recovery functions. Such assignments of functions among ministries and other organisations would need to be validated through new disaster legislation, implementing regulations, or a national emergency management plan that carries the rule of law. This is particularly important in light of the assignment to MOHA of "all other functions of HMG which have not been specifically prescribed for any other Ministry or Department" as noted above.

It has been recognised in Nepal that "The main theme behind fixing responsibilities to key disaster actors is that they will prepare appropriate plans, according to their

responsibilities and will arrange the financial resources to fulfil desired objectives." (Preliminary Draft of National Action Plan on Disaster Management, HMG, 1995).

The following general principles should guide the assignment of functions and tasks to various organisations:

a) Organisations are assigned tasks which relate to their regular functions.
b) Primary responsibility of a task is assigned to one organisation.
c) Responsibility to support or assist another agency in carrying out a task may be assigned to several organisations.
d) Tasks requiring activities in the field are assigned to organisations which normally conduct field activities.
e) Each organisation is responsible for effective utilisation and safeguarding of its resources.
f) All major foreseeable tasks should be assigned.

With the decentralisation of authority established by the Local Self-Governance Act of 1999, it is necessary to establish roles, responsibilities, and capabilities at community and municipal levels as well as district and central government levels.

(2) Sustainable Mechanisms for Cooperation

Collaboration among entities that have different missions, capabilities, and outlooks is generally not a natural and comfortable mode of operation. It never comes automatically; it must be nurtured over time and constantly reinforced. One proven solution to the need for interagency coordination to cope with complex problems is to create a standing interagency committee or council that meets regularly and pursues an action in the agenda. For success, the committee or council should have:

a) Indisputable legal basis and mandate,
b) Top-level (executive) support from within the institutions,
c) Proactive leadership,
d) Strong core group and secretariat, and
e) Incentives for action.

In the absence of any of the above, an interagency committee or council may be doomed to a reactive and ineffectual role.

(3) Current Situation and Potential Models

Several inter-institutional panels presently or formerly active in Nepal provide experience on which to base a new mechanism for sustainable inter-institutional coordination, for example:

a) Central Disaster Relief Committee (CDRC).
b) IDNDR National Committee and task force.
c) National Disaster Management Council (NDMC) (proposed in National Action Plan).
d) Kathmandu Valley Town Development Council (KVTDC).

a) Central Disaster Relief Committee (CDRC)

The Natural Calamity Relief Act empowers the CDRC to formulate national policy regarding relief, rehabilitation, reconstruction, control, prevention, and preparation (subsection 6b) and to prepare and submit to HMG/N programs in accordance with the policy. The CDRC, chaired by the Home Minister, is active during emergency operations, with primary responsibility for coordinating the provision of relief. Nevertheless, the post-impact activation of the Central Disaster Relief Committee is not an adequate institutional mechanism for coordination of *all* risk management efforts, especially mitigation. Mechanisms are especially needed for tying risk management into ongoing physical and economic development processes, environmental review, and land use and construction decisions.

b) IDNDR National Committee and Task Force

Nepal's National Committee for the International Decade for Natural Disaster Reduction was instrumental in preparing a preliminary version of the National Action Plan on Disaster Management and presenting the Plan at the IDNDR World Conference in Yokohama, 1994. The Committee, chaired by the Minister of Home, included representatives of various institutions. In 1995 the National Committee constituted a task force to incorporate the Yokohama Strategy in the National Plan and simplify the plan in terms of its practicability and implementability. The task force was coordinated by the National Planning Commission Joint Secretary.

c) National Disaster Management Council (NDMC)

The need for a national coordinating council for disaster management was recognised by the IDNDR National Committee and task force. The National Action Plan (1996) developed by the Committee and its task force was subsequently accepted by HMG, and it included a proposal to create a National Disaster Management Council at the policy level to oversee disaster management in Nepal.

d) Kathmandu Valley Town Development Council (KVTDC)

The Kathmandu Valley Town Development Council (KVTDC) was created to meet the need for coordination among agencies of HMG and local bodies for systematic and sustainable development of the Valley. The Minister or the State Minister for Housing and Physical Planning chairs the Council, and the Vice-Chairman of the National Planning Commission serves as vice-chair. Additional members include representatives of other ministries, mayors, chairmen of district and village level committees, and others.

The KVTDC is significant because it can potentially play a big role in reducing seismic risk in the Kathmandu Valley and it is composed of representatives of each level of government. It provides a potential model for inter-governmental and inter-institutional collaboration, as it unites diverse institutions toward a common goal and is attuned to a decentralising mode of government. It is empowered to coordinate, implement and enforce land use and development planning and to regulate construction.

(4) Development and implementation of policies and plans

Decision-makers in the Kathmandu Valley, in both public and private sectors, constantly face conflicting priorities and competing demands, and many seemingly unrelated decisions may impact risk. Heightening awareness of risk throughout the community and among community leaders in particular can make a difference in thousands of decisions that cumulatively can make the Valley safer. Heightened awareness grows out of participation in the development and implementation of policies and plans to manage earthquake risks.

First, it is essential that clear and well-conceived government policies in regard to earthquake risk management be developed through a participatory process. The policies should take into account other issues, priorities, and programs facing government and the society of the Kathmandu Valley. The policies should facilitate integration of earthquake risk management with other social, economic, and development programs, activities, and priorities at work in the Valley.

Earthquake risk management policies that reflect the goals and objectives of the government and society form the basis for earthquake risk management plans. The policies provide guidance, and the plans implement the policies. Both must be tailored to the Valley and well grounded in its political, social, and economic realities. The process of developing both should involve as many stakeholders as possible.

The planning process must also recognise the existing legal and institutional framework, as well as existing policies, at each governmental level, national to local. Existing national and local policies related to hazards management, environmental protection, land use, devolution of powers, and other topics such as housing are the context for the planning effort. The process and the plan should take into account the protection of environmental quality and quality of life, the economic vitality and resilience of the Valley's businesses and population, and ensuring inter- and intra-generational equity in decision-making.

Key planning principles that must be followed include:

a) Involve a broad range of stakeholders,
b) Focus first on policies, objectives, and goals, which should be reached by consensus and clearly articulated,
c) Integrate with existing strategies, programs, and decision processes, and
d) Those agencies and organisations who will carry out the plans should prepare them.

The real objective of the planning process is to develop not a document but an effective system for managing risk and for well-coordinated response at the time of disaster. The focus is on process and developing lines of communication and coordination among institutions, not on plans as a product**.** The involvement of representatives from different organisations provides critical education and training that will help to ensure the efficient use of the plans before, during, and after a disaster occurs.

Local government needs to play a role in planning, working with communities to prepare for, respond to, and recover from an emergency or disaster. The responsibilities and capabilities of each department and agency should be identified and linkages established with other organisations and levels of government. Local government plans need to provide a basis for assured continuity of government, i.e., assurance that government is capable of continuing to function during and following a crisis. Local governments should work with local non-governmental organisations, community and business groups, schools, and ward and village leaders.

In the case of the Kathmandu Municipality (KMC), its development strategy recognises that its responsibilities exceed its institutional capacity. It operates with a limited bureaucratic machinery. However, there are several ongoing initiatives aimed at strengthening KMC's institutional development and municipal services. It is likely that other local governments in the Valley face a similar reality.

3.1.2 Current Institutional System

(1) Legal Basis for Disaster Management

The existing legal framework for roles and responsibilities related to disaster management is provided by the following:

a) Constitution of the Kingdom of Nepal, 1990.
b) Natural Calamity Relief Act, 1982.
c) Local Administration Act, 1971.
d) HMG (Allocation of Functions) (Second Amendment) Rules, 1996.
e) Local Self-Governance Act, 1999.
f) Kathmandu Valley Town Development Act, 2000
g) Buildings Act, 1998 (also see Draft Building Council Act, 1994).

a) The Constitution of the Kingdom of Nepal, 1990

His Majesty the King is the Supreme Commander of the Royal Nepal Army, but he shall operate and use the Royal Nepal Army on the recommendation of the National Defence Council, comprised by the Prime Minister (Chairman), the Defence Minister, and the Commander-in-Chief.

His Majesty the King may proclaim a State of Emergency "if a grave crisis arises in regard to the sovereignty or integrity of the Kingdom of Nepal or the security of any part thereof, whether by war, external aggression, armed rebellion or extreme economic disarray." With the proclamation, His Majesty may issue such orders as are necessary, which operate with the same force and effect as law, as long as the State of Emergency is in force. The State of Emergency must be approved by a 2/3 majority of the members present of the House of Representatives within its first three months. The maximum duration of the Emergency is one year. The Constitution (Article 115) allows for broad suspensions of citizens' rights during the State of Emergency.

The circumstances under which His Majesty the King is empowered to proclaim a State of Emergency do not specifically include the existence or threatened existence of a natural or technological disaster.

b) The Natural Disaster (Calamity) Relief Act, 1982

"Natural Calamity" refers to natural and technological disasters "and any other kinds of disaster." His Majesty's Government (HMG) may declare a Disaster Area

for a specified period of time and may give orders to anyone concerned to undertake relief work such as evacuations, requisitioning equipment and supplies, trying to save significant objects and places from destruction, constituting aid groups, and taking other necessary security measures to safeguard the life and property of the people. The law does not specify which officials or institutions of HMG may give such orders.

HMG may constitute the Central Disaster Relief Committee (CDRC) by publishing a notice thereof. The CDRC is responsible for formulating the national policy and programs for relief work including advance preparation, prevention, relief, and rehabilitation of victims, and for submitting the policy and programs to HMG. After approval by HMG, the CDRC is to implement or cause to be implemented the policy and programs. The Home Minister chairs the CDRC, comprised of central government representatives plus a representative of the Nepal Red Cross Society, Nepal Scouts, and two additional persons. The Committee may constitute two subcommittees to advise it, help execute its policies, and carry out relief and rehabilitation operations:

- Relief and Treatment Subcommittee, coordinated by the Health Minister.
- Shelter and Rehabilitation Subcommittee, coordinated by the Housing and Physical Planning Minister.

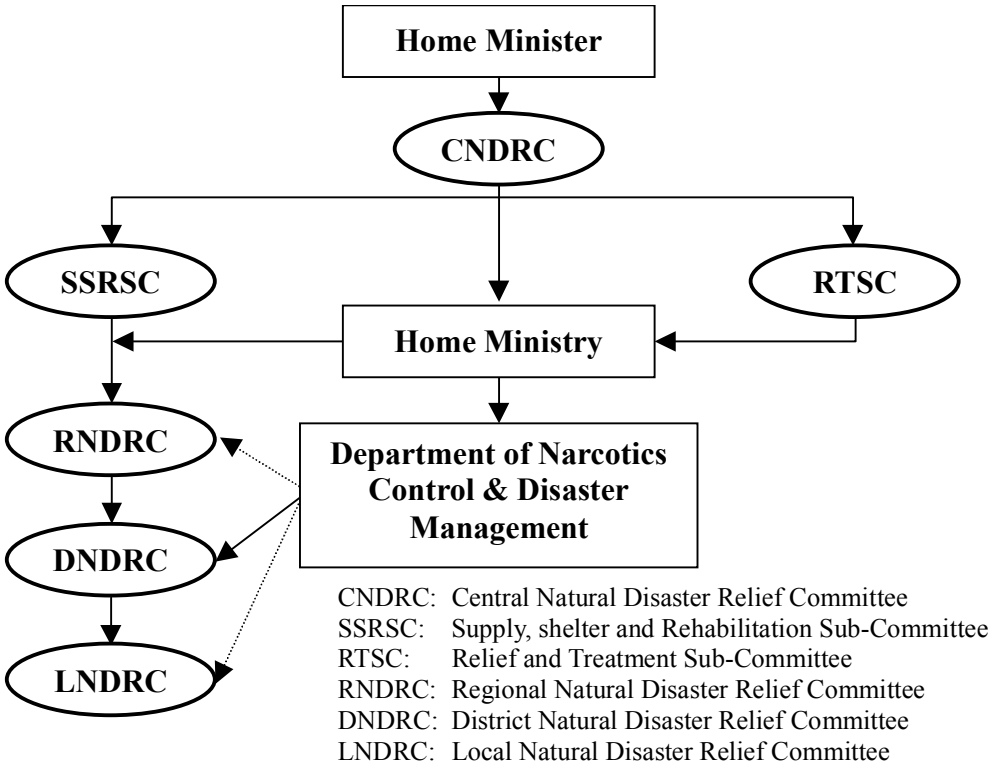
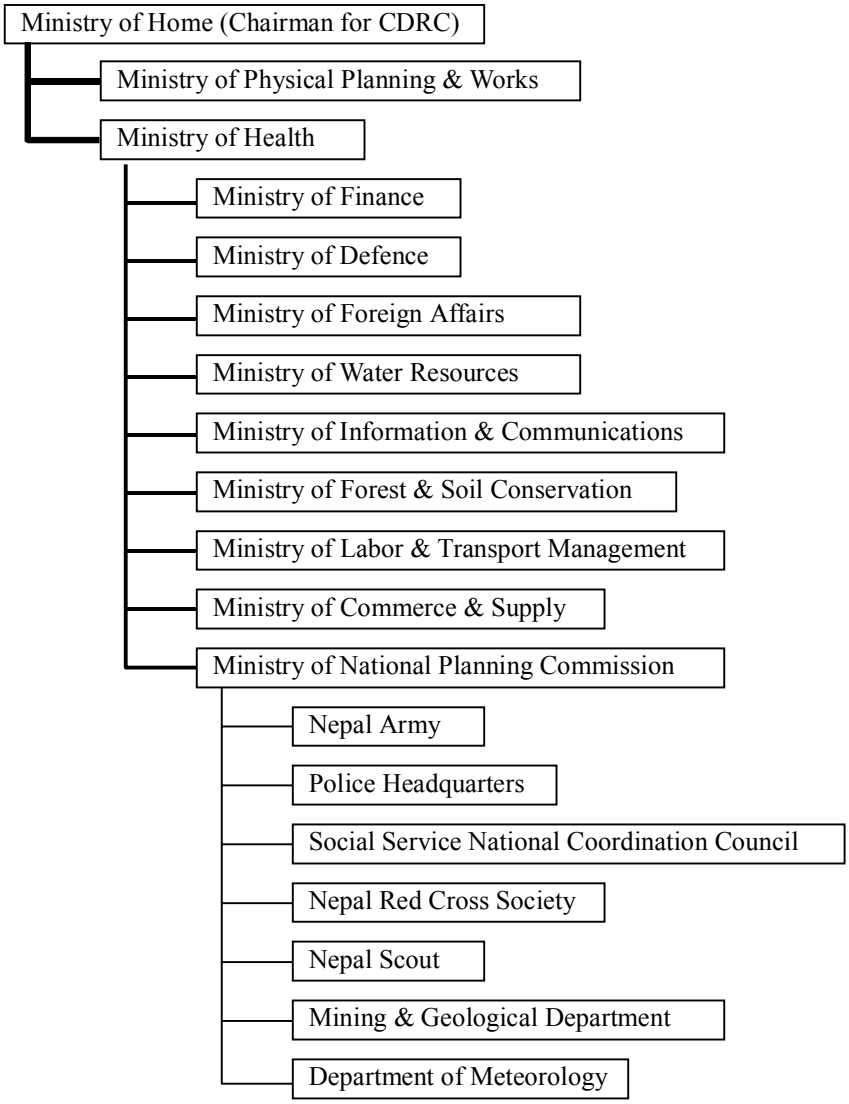


Figure 3.1.1 Nepal Institutions for Natural Disaster Management



Thick Line; Minister Connection, Middle Thick Line; Secretary Connection
Thin Line; DG Class Connection

No Membership
Prime Minister,
Council of Ministers Secretariat
Ministry of Local Development,
Ministry of Law, Justice & Parliamentary Affairs
Ministry of Industry, Ministry of Agriculture & Cooperative,
Ministry of Population & Environment
Ministry of Culture, Tourism & Civil Aviation,
Ministry of Women, Children & Social Welfare, Ministry of Education & Sports
5 Municipalities,
3 District Development Committees, 3 District Administration Offices
National Companies, Association of Businesses, Other Relevant Organisations

Figure 3.1.2 Membership of the Central Disaster Relief Committee in Natural Calamity Act

The CDRC also manages donations and directs the work of Regional, District and Local Committees, which are constituted "according to need" by action of HMG. The Act does not specify the membership or chairmanship of the Regional, District, or Local Committees. If constituted, the Regional Committees would give suggestions to the CDRC regarding regional level policy on relief work and would coordinate between District Committees. The District Committees would formulate district level relief plans, provide information to the Regional Committee, and coordinate and monitor the work of the Local Committees. The Local Committees are responsible for preparing estimates of losses and needs, organising volunteers, arranging for evacuations and transportation of the injured, distributing donations, and conducting public awareness programs.

The Central Committee (CDRC) comprises almost exclusively, central government representatives, and it includes no local government members. The CDRC is specifically empowered by the Act to give directions to the District Committees and Local Committees (without mention of the Regional Committees) on matters relating to Relief Work.

The Act also provides for the establishment of a Central Aid Fund and Regional, District, and Local Aid Funds.

The Aid Funds

The Central Calamity Aid Fund is prescribed by the Natural Calamity Act of 1982. The amount budgeted was 25 million Rupees in 2001 fiscal year which has been spent only for victim relief, based on clear norms of expenditure. Meanwhile, another much larger fund called the Prime Minister Disaster Fund was founded in 1993 when one of the worst floods occurred. The fund is not prescribed by any act; it amounted to 150 million Rupees in 2001 fiscal year, and it has been spent for not only victim relief but also rehabilitation and reconstruction. Expenditures from the fund are made through verbal procedures, without any clear norms or regulations. There is no adjustment between the two funds, and duplication of payments to the same victims has been sometimes observed.

In 2000, many water induced disasters occurred, and ministries made donations of budgeted funds to the Prime Minister Disaster Fund totalling 15 million Rupees. In order to allocate the fund in a proper way, the Vice Chairman of National Planning Commission has organised and chairs an ad hoc committee or Disaster Management Committee which still exists.

c) The Local Administration Act, 1971 (as amended through 1991)

This Act establishes the powers and authorities of the Chief District Officer (CDO), who is appointed by HMG and serves as the Chief Administrative Officer of each district. The CDO's primary functions and duties are to:

- Maintain order, tranquillity and security, and
- Extend cooperation in development activities undertaken by HMG, the District or Village Development Committee, or the Municipality.

The CDO exercises broad powers in regard to maintaining order and security, and in doing so, controls the District Police and may demand the assistance of the Royal Nepali Army. It can be expected that during a major disaster the CDO will exercise these powers. However, these appear to be the only duties specified to be carried out by the CDO in case of disaster by either the Local Administration Act or the National Calamity Relief Act.

d) HMG (Allocation of Functions) (Second Amendment) Rules, 1996

These rules regarding allocation of functions established the 26 ministries (since reduced to 21) and their functions. Key assignments of functions with implications for disaster management include:

Council of Ministers Secretariat

- Supervises, coordinates and controls the functions of the different ministries.
- Responsible for matters relating to the National Planning Commission.

Ministry of Home (Affairs)

- Peace and security.
- Police.
- Traffic control.
- Natural disaster relief.
- Control over the collection of public contributions.
- Fire-fighting.
- "All other functions of HMG which have not been specifically prescribed for any other Ministry or Department".

Ministry of Defence

- Royal Nepali Army.
- Military training, facilities, operations.
- Military hospitals.

- Cooperation in administrative and development activities, and natural disaster relief operations.

Ministry of Housing and Physical Planning

- Policies, plans and programs for housing, urbanisation and town development.
- Building construction standards.
- Environmental conservation.
- Water, sewerage, sanitation and pollution control.
- Supervision of town development committees regarding governmental housing construction.

Ministry of Local Development

- Mobilisation of local manpower and people's cooperation.
- Implementation of decentralisation.

While *disaster-specific* responsibilities have been enumerated only for the Ministries of Home and Defence, the normal functions allocated by the 1996 Rules can serve as the basis for assignment of responsibilities in regard to disaster preparedness, mitigation, response and recovery.

e) The Local Self-Governance Act, 1999

This Act is based on the guidelines on decentralisation set forth in the 1990 Constitution. The Act focuses on the devolution of powers, responsibilities, means and resources to make local bodies capable and efficient in self-governance, with emphasis on public participation and accountability.

The Act establishes District, Municipal, and Village Development Areas, each with a Council and Development Committee to oversee and carry out their functions which include formulating and executing plans, budgets and programs within their areas. Provision is also made in the Act for a Ward structure in villages and municipalities.

HMG may give necessary directions to local bodies, and it is the duty of local bodies to abide by those directions. Normal contact with HMG is through the Ministry of Local Development. HMG shall provide annual grants to local bodies and the concerned Ministries shall provide necessary assistance to make the local bodies technically capable of carrying out the programs. Local bodies may also request and receive the assistance of the local police, political parties, and district-level offices. HMG will appoint a Secretary to carry out the day-to-day functions of the local body.

The Local Self-Governance Act significantly broadened the role of local bodies, for instance empowering them to make and implement town planning and to prescribe construction standards in their respective areas. As there are five municipalities and 100 village development committees in the Kathmandu Valley, having separate town plans and construction standards for each was considered unworkable, thus resulting in the Kathmandu Valley Town Development Act, 2000, to provide for the development of a single set of standards that would be acceptable to all.

f) The Kathmandu Valley Town Development Act, 2000

This Act creates the Kathmandu Valley Town Development Council (KVTDC) for the purpose of achieving sustainable development of the Valley. The Council was created to meet the need for coordination among agencies of HMG and local bodies. The Minister or State Minister for Housing and Physical Planning chairs the Council, and the Vice-Chairman of the National Planning Commission serves as vice-chair.

The primary powers and duties of the Council are to:

- Formulate town planning to develop the Valley in a systematic and planned manner,
- Implement the town planning after it is approved by His Majesty's Government. Such approved planning shall have the binding force of law,
- Issue guidelines for standards of construction,
- Regulate, control or prohibit various acts regarding land use and construction,
- Enforce land development planning,
- Inspect and monitor the compliance with town planning and issued guidelines, and
- Approve housing programs.

g) The Buildings Act, 1998 (and Draft Building Council Act, 1994)

The intent of the Buildings Act is to make arrangements for regulating building construction works so as to protect buildings, as far as possible, from earthquakes, fire, and other natural calamities.

The Act provides that HMG must publish the Building Code. A Draft Building Council Act has been prepared to enable the formulation and implementation of the Nepal National Building Code and to regulate the construction of buildings. The Code would set minimum standards applicable to various categories of buildings, and their compliance would be mandatory. The Code would be implemented and

compliance would be monitored through the local authorities and other appropriate agencies.

(2) National Public Sector Institutions

a) Ministry of Home Affairs

MOHA is defined as “the apex body in relation to disaster management in Nepal” (Chhetni, 2000). It regards the scope of its responsibilities to include coordination of preparedness, rescue, relief, mitigation, and rehabilitation and reconstruction. Its overall disaster management capabilities have not been tested in recent years by a major earthquake. However it is active, through its Department of Narcotics Control and Disaster Management, in disaster awareness raising and planning efforts.

MOHA acts as the secretariat for the CDRC, which coordinates relief to communities affected by disaster. Chief District Officers (CDOs), who are part of MOHA, act as the "field commanders" in their districts. In case of disaster; they conduct situation assessments, communicate with MOHA and convene District Disaster Relief Committees. Nevertheless, the personnel resources of MOHA’s Department of Narcotics Control and Disaster Management and the CDOs’ Offices are inadequate to endow MOHA with the complete capacity and capability to manage all aspects of risk management. MOHA is not well-equipped to manage disaster mitigation programs such as land use and construction control or to assume post-disaster responsibility for rehabilitation and housing reconstruction (assumed by the Ministry of Housing and Physical Planning, MHPP, after the 1988 earthquake).

Nevertheless, MOHA will remain at least for the time being to be one of the focal institutions for disaster management. For outside the Kathmandu Valley, MOHA will remain a major player, because the Chief District Officers (CDOs) act essentially as governors in their districts, even though the Local Self Governance Act defines the responsibilities of local bodies. (see Figure 3.1.3)

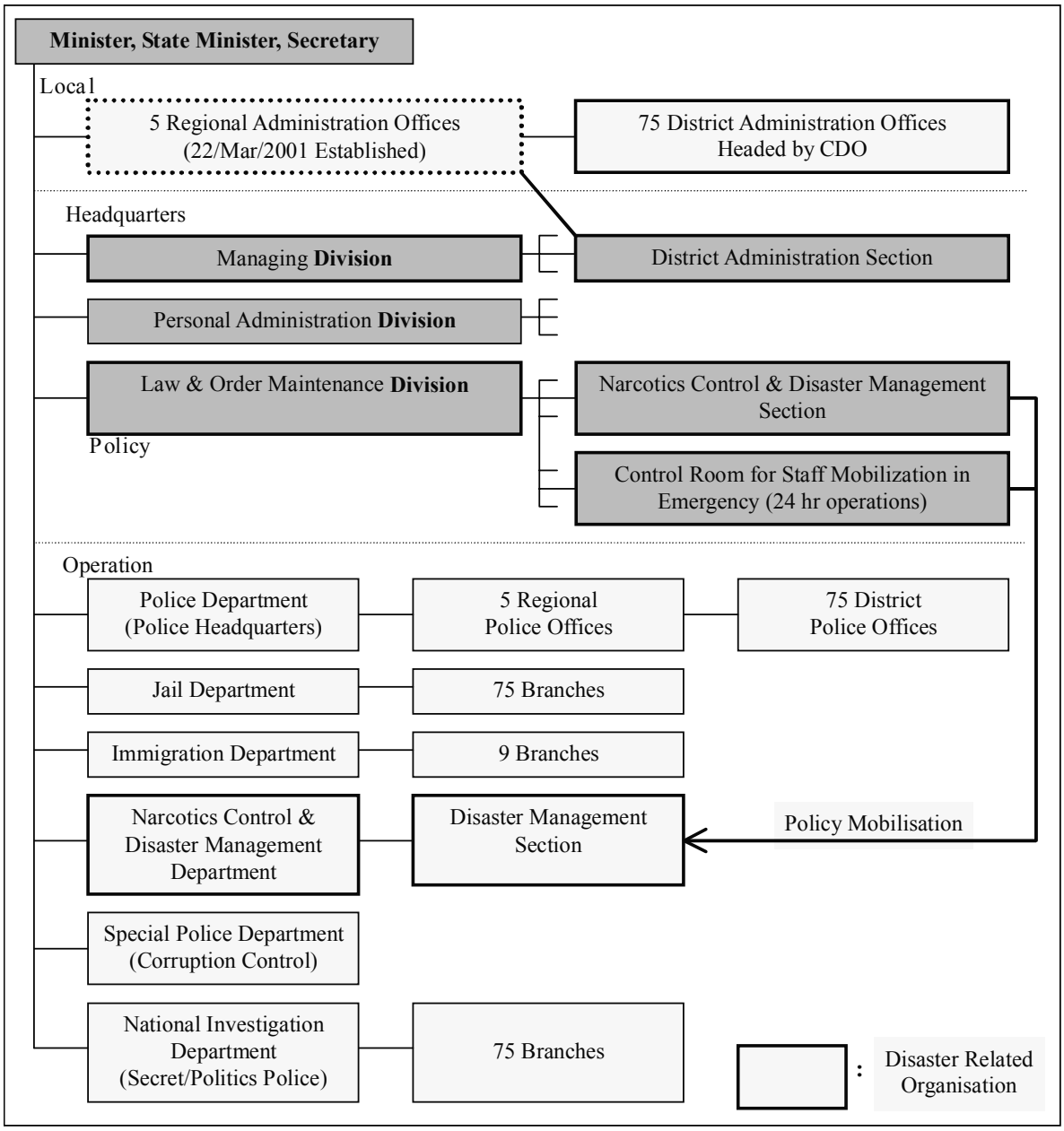


Figure 3.1.3 Organisation Chart for MOHA

b) The Royal Nepal Army

The Royal Nepal Army (RNA) has been regarded as an important key institution of the country for disaster rescue operations. They mobilise troops almost every year for earthquakes, water-induced disasters, air, bus and Everest expedition accidents. Among these, the following were notable records of the RNA:

- Earthquake: They provided medical services, evacuated trapped people from collapsed houses, recovered dead bodies, and performed reconstruction works and transport, etc. in 1988.

- Flood and Landslide: They evacuated people, provided medical services, carried out reconstruction work, construction of many detours including placing Bailey bridges in 1993.

The RNA can make several contributions based on these characteristics:

- Skilled, resourceful and adequate manpower.
- Organised institution/knowledge and experience in the tasks.
- Disciplined command structure.
- Immediate availability of required manpower.
- Trained to work under adverse weather conditions.
- Organised and efficient management.
- High standard of physical fitness and endurance.
- Prevalence all over the country.
- Equipped with technical manpower, communication, transport and medical facilities.
- Quick response and emergency services.

In the event of disasters, the Ministry of Home Affairs at the central level and the District Administration Office at the district level request the assistance of the RNA for rescue operations and providing relief to the disaster affected population. Whatever unit present at or closest to the location will act and then will seek permission from the Directorate of Military Operations (DMO) for the employment of its troops for immediate rescue and relief operations.

The Army so far does not have a separate department for disaster management operations. However, the DMO is the authority that details the brigades and coordinates all rescue and relief tasks.

The RNA has assisted the government with regard to disaster management in various ways, some of which are as follows:

- Advise the central committee on mobilisation of RNA.
- Conduct search and rescue missions.
- Provide medical services, airplane/helicopter services for rescue and evacuation, communication services, supply of relief materials, engineering services, and storage facilities.
- Assist in reconstruction.

The RNA has service support units and the various departments of the Army Headquarters for the above tasks. For instance, the engineering brigade is tasked to provide engineering support, and the signal brigade is responsible to provide efficient communication system to the personnel involved in rescue works. The aviation brigade is responsible to provide helicopters and airplanes for the transportation of rescue/relief troops, materials and medical services. The medical department is responsible to provide additional support to the field ambulances, keep the doctors, nurses and other equipment ready, and manage the evacuation of casualties. The RNA establishes mobile hospitals, as and when necessary.

The RNA is the best-disciplined and experienced human resources for disaster management in Nepal. However, the mobility of the troops is sometimes hindered due not only to lack of transportation equipment, but also the poor road conditions, and they depend on locally available resources and the manpower available at the disaster site for support.

According to the "Military Balance/ 1999-2000" by the International Institute for Strategic Studies, the RNA has 46,000 troops mobilised, though most of them are deployed in rural areas. Therefore, available forces to be mobilised instantly in the Kathmandu Valley at the time of disaster are said to be only 1,000 to 2,000.

c) The Police

The Kathmandu Valley has three jurisdictions of National Police; Kathmandu District Police□Bhaktapur District Police and Lalitpur District Police. Besides these, there are Armed Police Forces mainly for the Maoist insurgency.

Table 3.1.1 Numerical Force of National Police

Jurisdictions	Kathmandu	Lalitpur	Bhaktapur	Armed Police	Police Headquarter	Total
	1,600	500	300	1,000	+	3,400+

Each jurisdiction is headed by a Deputy Inspector General and is commanded by the Police Headquarters. It is said that the CDO controls the police in disaster time, though, in the Kathmandu Valley, it is more accurate to say that MOHA controls the police through the CDO. MOHA currently has plans to integrate these three districts into one unit commanded by a commission headed by Additional Inspector General of Police (AIGP), taking over the CDOs' authority in this regard.

The District Police maintain a stock of ropes, shovels, pickaxes and tents, but they do not have light rescue equipment such as power saws, rock drills or heavy rescue equipment like bulldozers or backhoes. The Police have participated in the rescue

training, presented by international donors and also have been advised on how to cope with disasters by the UK Department for International Development. The UK Department suggested the functions of the police in disaster time should be to;

- save life and property,
- coordinate response,
- collect and collate information, e.g. casualties,
- deal with and identify the dead,
- deal with evacuation and displaced persons,
- provide information to the Government and others,
- prevent crime, secure and protect the scene,
- investigate the incident,
- assist in the restoration of normality,
- encourage community self help,
- maintain the confidence of the Nepalese people, and
- maintain the confidence of the international community.

The UK department also instructed that the four key services areas of policing should be as follows:

- Community safety.
- Crime.
- Public order.
- Traffic and transport.

It is clear that the Police should play a very significant role in cooperating with the Royal Nepal Army in a great earthquake disaster, though the reality is that the tasks mentioned above have not been implemented effectively, even in normal times. The present priority for the police would be first to improve its capabilities, discipline, and performance in normal times.

Besides the National Police, Nepal also has Municipality Police. Whereas the National Police are in charge of maintaining law and order, including traffic control, the Municipality Police work for the Mayors on overseeing of civil affairs such as illegal housing, garbage management or illegal road occupation etc. Persons arrested by Municipality Police are transferred to the National Police.

The Municipality police officers are fewer in numbers than the National Police; in general they are temporary employees and are said to be less disciplined than the National Police. Both National and Municipality Police should be involved in disaster management.

Table 3.1.2 Numerical Force of Municipality Police

Municipality	Kathmandu	Lalitpur	Bhaktapur	Madiapur
Inspector	1	1	1	0
Sub Inspect. Etc	61	5	4	0
Police	48	23	20	0
Total	110	29	25	0

d) The National Planning Commission

The National Planning Commission (NPC) performs strategic planning and plays a critically important role in setting priorities for Nepal. The NPC is the responsible entity for coordination and preparation of Nepal's Five Year Development Plan. It has a major role in deciding what goes into the Government's budget proposal. For instance, the NPC can recommend that a designated percentage of the budget be dedicated to a particular purpose. Support from the NPC, then, is crucial to setting risk reduction policy and ensuring implementation of preparedness and disaster mitigation measures. Strengthening the NPC's capacity and expertise in earthquake risk management could lead to a greater focus on mitigation in the Government's investment decisions.

e) The Ministry of Local Development

Inter-Ministerial cooperation in HMG is said to be extremely poor on any issue, and disaster management is not an exception. One official in charge of disaster management in MOHA confessed in his open paper, "It is obvious that there is a dearth of cooperation and coordination among the various disaster management related agencies" (Chhetri, M.B. Poudyal, 1998).

A lack of cooperation among ministries can relate primarily to two factors: one is due to hostile competition in order to get an exclusive mandate among relevant ministries, the other is because either no one is interested or everyone has an attitude of avoiding the responsibility or duty. The lack of cooperation for disaster management would largely reflect the latter case. In these circumstances, creating a competitive ministry to MOHA could be beneficial not only to HMG but also MOHA, as long as the two ministries maintain friendly and cooperative relations.

The Local Self-Governance Act of 1999 provides clearly that municipalities and VDCs have responsibilities for the areas under their jurisdiction that including disaster management functions. The Ministry of Local Development is in the position to facilitate and instruct these local bodies to prepare for the issue, and also to lead HMG in the support of local bodies on their behalf. Though, it should be

kept in mind that the Ministry of Local Development does not have membership in the current Central Disaster Relief Committee, and this legal situation must be corrected.

Japan may present one example. Japan's Ministry of Public Management is an analogous institution to the Ministry of Local Development in Nepal, for being in charge of local bodies. It has the Fire and Disaster Management Agency to lead local bodies of the operational sector in disaster management. The Cabinet Office in Japan has the Central Disaster Management Council headed by the Prime Minister, which is in charge of disaster management policy. (See Figure 3.1.4)

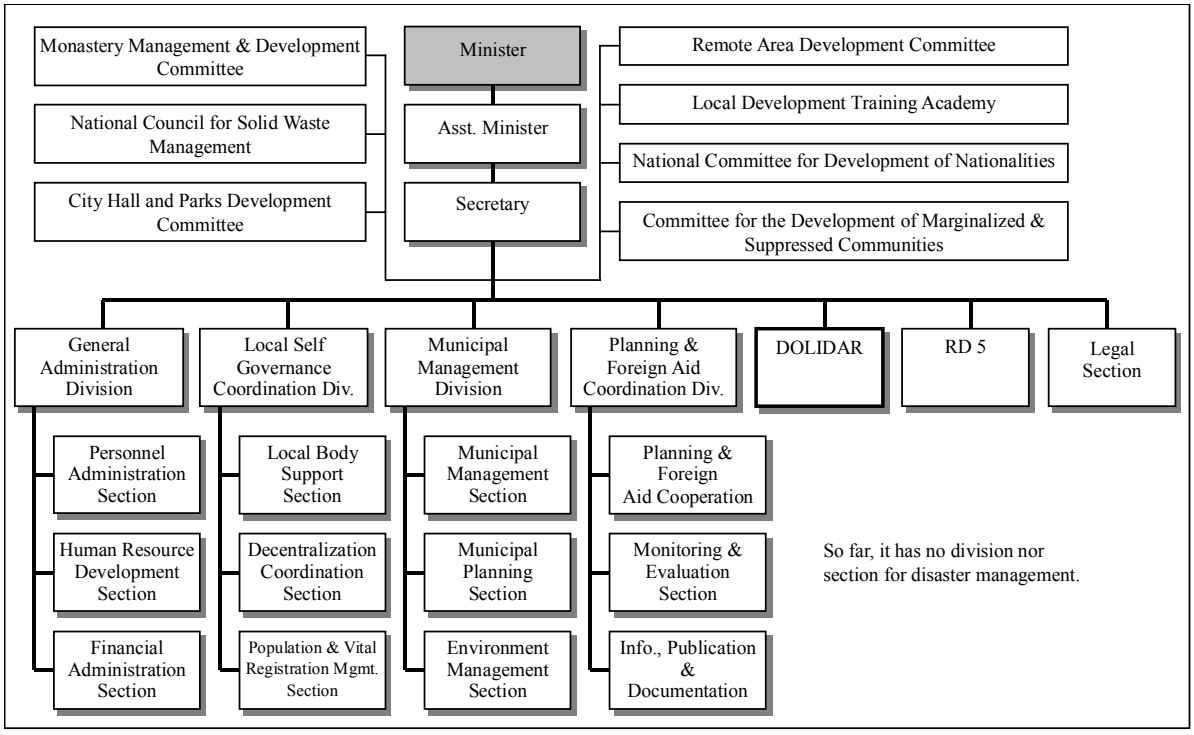


Figure 3.1.4 Organisation Chart of the Ministry of Local Development

(3) Local level institutions

a) Municipality

After adoption of democracy in 1990, in 1999 the Local Self-Governance Act was enacted, which enables local governments in Nepal to independently enact by-laws and taxation. There are five municipalities in Kathmandu Valley, i.e. Kathmandu Metropolitan City, Lalitpur Sub-Metropolitan City, Bhaktapur, Kirtipur and Madhyapur-Thimi Municipalities. Except for Madhyapur, the other four were based on the places the kingdom used to be. The smallest official administrative

unit is the "Ward," which is mainly divided by the boundaries of topography and settlements. An even smaller division is the so called "Tole," corresponding to town or "Aza" in Japan, but some are uncertain and others are certain where old settlements are clear. The population of the Kathmandu Municipality is around 500 thousand, and the others are 40 to 150 thousand each. The total population of the five municipalities is around a million, and 1.5 million for the entire Valley.

As shown in Figure 3.1.5 of Lalitpur Municipality, the Municipality Council manages administration and legislation. The Council discusses the budget and main bills twice a year. The Board members of the Council consist of the Mayor, Deputy Mayor and five members from each ward and the Executive Officer dispatched from the Ministry of Local Development. Since the power of the Mayor is so influential, the selection of the Mayor every five years leads to a drastic change in municipal policies.

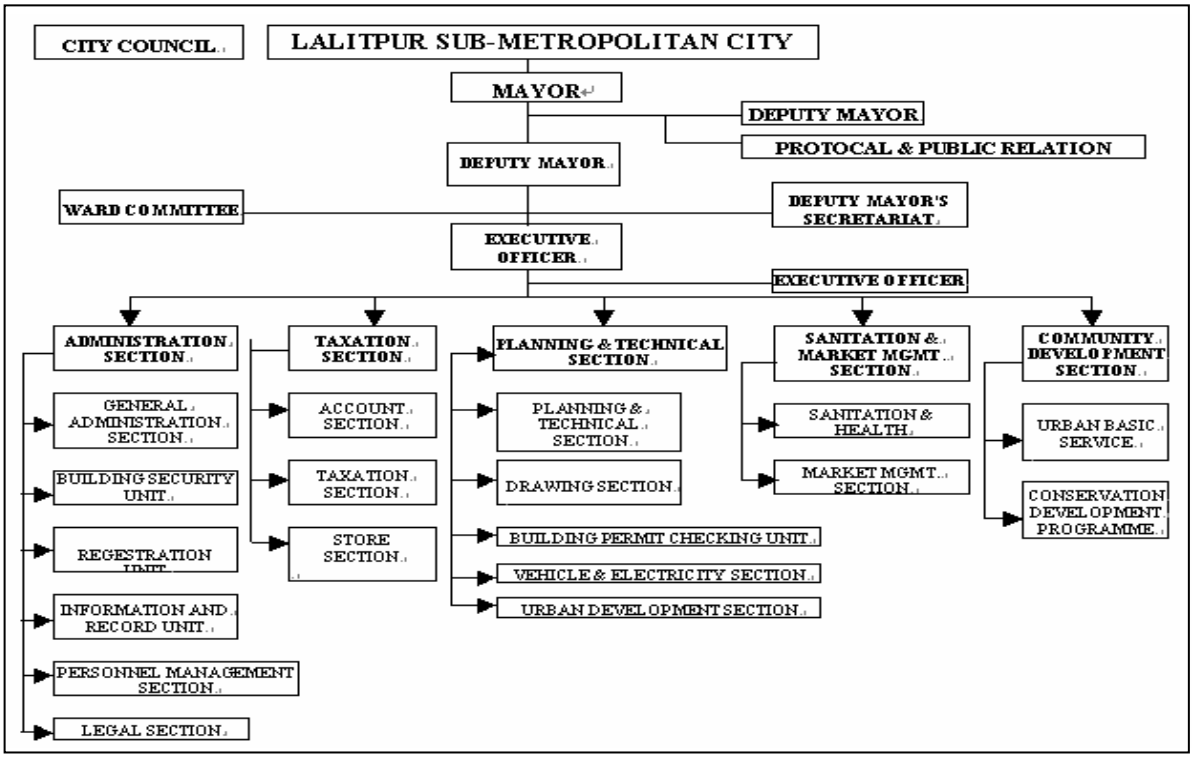


Figure 3.1.5 Organisation Chart of Lalitpur Municipality

The number of employees in Kathmandu Municipality exceeds 2,000. However, around 30 executive employees in 12 Departments, and 33 Sections under the Departments, manage the main administration as shown in Figure 3.1.6. Most of the executive employees are not permanent but rather are contracted employees recommended by the Mayor. This phenomenon makes more numbers of active employees, but on the other hand, since the election every five years means

replacing the key personnel, the policies and measures are not likely to be sustainable. Further, as most of the executive employees are elected or recommended, it is natural that municipal affairs are quite political. Each department and section is located separately in many different small buildings. This separation creates difficulties in implementing combined and unified administration activities; thus, Kathmandu Municipality is reviewing the plan for a unified building. The representatives of the wards conduct their administrative work in direct contact with the citizens. A typical example is that the ward offices receive building permit applications from citizens and forward them to the Urban Development Department of the Municipality.

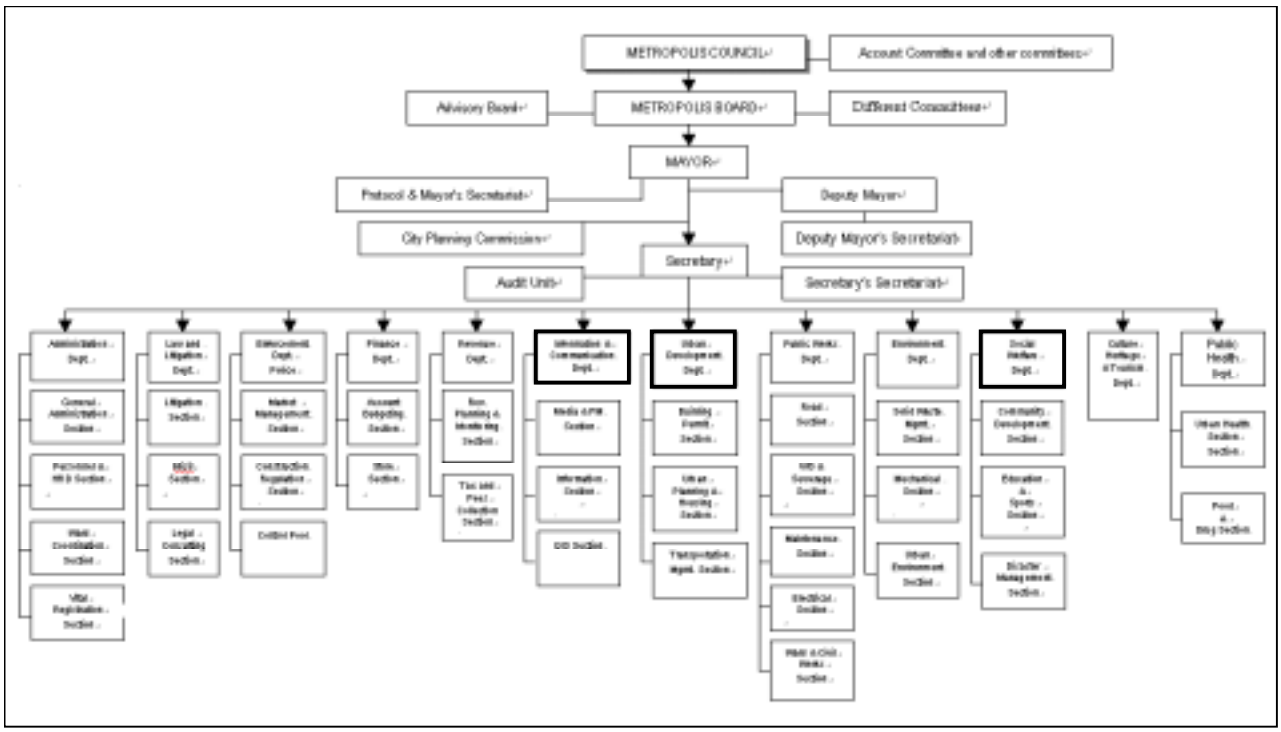


Figure 3.1.6 Organisation Chart of Kathmandu Municipality

The current main sources of income for the municipalities are octrois[4], taxes on cars, building permit fees, etc., in addition to grants from the national government. The total annual budget for Kathmandu Municipality is around 15 BNRs (25 BJPY). Each ward has its budget of around 10 MNRs (17 MJPY). These budgets are mostly used for garbage collection and cleaning, and repairs to sewage facilities or

[4] "octrois": a tax on commodities brought into a town or city, especially in certain European countries.

city roads. In contrast, the budget for disaster management is less than 1% of the total budget. At the ward level, disaster management may need to compete with departments for funding. Wards' personnel are small in number and their budgets are also inadequate. Moreover, it is a serious problem that large numbers of grants from international donors accelerate the trend of municipality people to rely on outsiders. However, the Local Self-Governance Act and the movement towards local government independence have been providing a process of divesting various authorities and rights to the local governments. Thus, greater independence and increasing budgets are the trends in municipalities.

In the four municipalities except Kathmandu, the number of personnel and amount of the budget are so small that they are evolving more slowly than the Kathmandu Municipality, though they have an inclination toward independence.

b) Disaster management in municipalities

Many buildings constructed without an urban plan and without engineering consideration exist in the core and fringe areas that have a population density of 500 to 1,000/square km. Further, since agricultural plots are decreasing in urban areas and immigrants from rural areas are increasing, the number of urban citizens is increasing significantly. These tendencies exacerbate the vulnerability of the entire Valley to earthquakes.

The four municipalities other than Kathmandu have no section for disaster management but their Urban Development Section or Community Development Section have responded besides doing their primary job. On the contrary, Kathmandu Municipality has three sections working in disaster management, along with cooperation among the various departments as shown in Figure 3.1.6.

The first one is the Disaster Management Section of the Social Welfare Department, a unique section in the Valley for disaster management, established over three years ago. The section has only three employees, whose work is mainly related to raising awareness of citizens, such as vulnerability assessments for earthquake, epidemic, and fire, information dissemination to schools and citizens, and preparedness for emergency response. It is clear that this section is active but is largely dependent on grants from international donors, rather than carrying out more systematic and independent activities. For instance, they have prepared hazard maps, displayed on GIS (Geographical Information System), with uncertain criteria and utilisation purposes.

The second entity relating to disaster management is the Urban Development

Department, which coordinates land use and traffic management and also checks the building permits. The urban plans drafted by the Kathmandu Valley Town Development Committee (KVTDC) will become the responsibility of this department.

The third one is the Information and Communication Department. It has its own FM radio station. Every week disaster related programming is broadcasted. This Department together with the GIS Section is arranging the municipality's demographic information. The Kathmandu Valley Mapping Project (KVMP), supported by the European Community (EU), is producing 1:2,000 scale digital maps covering the entire municipality and is planning to put the municipality's demographic data onto GIS maps in order to assist the municipal administration. These activities have been promoted since the days of the former administration. The consciousness for disaster management has motivated the municipality.

On July 16th, 2001, an earthquake occurred in the Ghorkha area, about 70 km west of Kathmandu. It caused damage to several tens of houses. Also, this August, a geologist from the United States presented a paper in the scientific magazine Nature Science which stated that, "in the near future of geologic age, the Himalayan area will be affected by a big scale earthquake and a tragic disaster will be generated". These events have made the Kathmandu people become more concerned about earthquake disasters. Then the Mayor of Kathmandu Municipality held a meeting on September 7th to gather opinions from citizens. The Municipality presented its activities and plans for earthquake disaster management, including the results of this JICA study. Though some of the participants criticised the Municipality's low level of activities so far, most of the participants presented constructive and active opinions and were co-operative with the Municipality. The Municipality concluded to proceed with disaster management, actively cooperating with citizens and formulating four forums for gathering opinions from the outside. The four forums were Awareness, Rescue and Relief, Building Codes and Information. Already, the Social Welfare, Urban Development, and Information and Communication Departments have begun preparations on each item. Now is the time for vulnerability assessment as well as how to prepare and respond to future earthquakes.

Finally, the effect of the Pilot Community Meeting in this JICA Study should be mentioned. The JICA team introduced of the technique of Disaster Imagination Games (DIG). In the process of DIG, at first, the miserable disasters caused by the Mid Nepal Earthquake, as estimated by the JICA Team, were presented. Based on that, the participants thought by themselves about such issues as what would happen, what they should do, how to reduce disasters, and how to formulate plans

for what has to be done. This method of DIG was highly appreciated by the people of the wards, municipalities and NGOs, because its cost is cheap (about the same as only for a meeting), but effective, and motivation will result. The Social Welfare Department has already started its own program of applying DIG to school children with its own budget. Also, following the Ward 34 community watching session and experimentally conducted DIG in Ward 20, Ward disaster management committees were established and their activities for disaster reduction with citizen participation were initiated. The Mayor and Ward 16 chairman of Lalitpur Municipality participated in the activities of the JICA Study Team and admitted their effectiveness. They immediately directed other Wards to begin similar activities.

(4) Private Sector Institutions

a) Civil aviation

Aeroplanes and helicopters are very powerful tools in emergency time for reconnaissance, communication, transportation and rescue work, etc. For immediate assessment of damages in a major earthquake time, air survey cameras are quite a good tool, but no aircraft operating in Nepal are currently equipped with them.

In Nepal the market for sightseeing or transportation services for climbers is so big that 18 civil aviation companies exist, with 16 airplanes and 14 helicopters, excluding the Royal Nepal Airline Company.

Civil aviation in Nepal is conducted under the Civil Aviation Act, but there is no mention about disaster management in the Act, and no company has ever contributed to cope with any disaster except search and rescue for climbers in high mountainous area. The Act specifies that companies must submit a flight plan to the Civil Aviation Authority of Nepal before flight operations, and if a pilot wants to land at a non-registered airport, an application would be also included in the flight plan. Without it, neither helicopter nor airplane is allowed to operate even in disaster time. However, there is no registered heliport in the core area of Kathmandu and its surroundings.

These companies are integrated into the Airlines Operations Association of Nepal. It is recommended that HMG establish a contract with the Association to cooperate in a tragic disaster times. The Act should also consider possible amendments to clarify the role of civil aviation in disaster management.

b) Truck corporation

Truck corporation

The "Federation of Nepal Truck Entrepreneur's Association" is an association of the private truck companies in Nepal. There are 13 branches of this association in Nepal based on the 14 zones except Mokanpul. This association was established in the 1980s to improve the collective benefits of truck entrepreneurs, following the separation of an association of the general heavy vehicles of buses, trucks, and tankers. In the charter of this association, it is clearly stated that they provide services in natural calamities. This association has worked for social and public benefits, establishing insurance for the drivers and distributing relief goods and medical supplies in the 1988 earthquake. The board members of Narayani Transport Entrepreneurs Association, one of the 13 branch offices in Hetauda, which covers one of the major trunk lines between Kathmandu and India, are very positive in fulfilling their mission as a representative body of the distributors.

It shall be recommended that the Ministry of Home Affairs request the "Federation of Nepal Truck Entrepreneur's Association" and its branch organisations in Nepal to cooperate in distributing relief goods in emergency situations. Assessments of their distribution capacities and previous agreements on emergency distribution between HMG and such associations be undertaken.

(5) Prior Studies and Plans

Many documents and papers by government officials and other stakeholders have commented on existing shortcomings, issues and priorities for improving disaster management in Nepal. The Country Report of Nepal on Disaster Reduction (1995) noted that disaster management in Nepal has been and continues to be mainly concerned with post-disaster relief. The Report stated that the Natural Calamity Relief Act, 1982 "seems to be insufficient to encompass all the aspects of disaster management", also noting a vital need for "fixing of responsibilities to key disaster actors and firm policy on disaster management". The Report also pointed out problems of coordination, resource mobilisation, communications and transportation.

The Nepal Country Study (by Nicholas Russell, Madhu Rarman Acharya, and Shree Ram Pant) discussed the need for a mitigation policy and for a focal point authority to coordinate and facilitate all aspects of disaster mitigation. The Study also pointed to the need for a national plan incorporating prevention, mitigation, preparedness and response, incorporating disaster mitigation and preparedness

plans at sectoral, regional and district levels and recommending a bottom-up approach to planning.

In spite of increases in disaster awareness due to such events as the Gujarat earthquake in neighbouring India and various local efforts to strengthen disaster management practices, it appears that the observations of the past decade still fairly accurately describe the situation in Nepal. No single authority is responsible for promoting and monitoring disaster mitigation activities. There is no central coordinating body for mitigation. While there are certainly examples of mitigation practices being undertaken, the approach has generally been haphazard and uncoordinated. Coherent mitigation policies and strategies for incorporating mitigation in the national development plan and local development efforts are needed.

The need for providing an adequate legal framework for disaster management in Nepal has often been noted, including in the National Action Plan on Disaster Management in Nepal (1996), prepared by Nepal's National Committee for the International Decade for Natural Disaster Reduction (IDNDR). The National Action Plan proposed, among other actions:

a) providing the proper legal framework by;
   - reviewing existing laws,
   - identifying and finalising the needed changes, and
   - drafting new laws and by-laws on disaster management.
b) conducting a study on constituting the National Disaster Management Council.
c) finalising the organisational structure for Disaster Management Committees at the central, regional, district and village levels.
d) incorporating disaster management as a multi-sectoral activity in the next Five Year Development Plan.

The National Action Plan is one of two existing plans which now form a solid foundation for the development of a national earthquake risk management plan intended to guide domestic and international investment and risk reduction activities over the coming years. The National Action Plan was prepared to guide disaster management efforts for the remainder of the 1990s.

The Kathmandu Valley Earthquake Risk Management Action Plan (1998) was prepared through a participatory process involving many stakeholder organisations in the Kathmandu Valley. It includes consensus-based initiatives and strategies for their implementation. For instance, the Plan's first initiative is to request HMG to constitute the National Disaster Management Council (NDMC) headed by the

Prime Minister, and to direct the NDMC to define an integrated national disaster management system that describes the roles and reporting relationships of each involved agency at the national, district, municipal or village, and ward levels of government. The Plan also calls for the NDMC to provide guidance for the preparation of emergency response plans for all responsible organisations. These and other initiatives in both plans are still valid, so current and future risk management planning efforts should reflect the work that went into these two existing plans.

(6) Analysis of Issues

Review of the legislation and studies discussed above, other documents, and numerous interviews and discussions reveals several key issues that are critical to the further development of an effective national system to protect against earthquake risk. Many of these issues are deeply rooted in underlying social, economic, and political conditions in Nepal, the combined effect of which is that disaster management has not been a priority concern.

Generally speaking, there have been inadequate legal bases, historical precedents, and political priority for;

a) Integrating seismic risk management into ongoing governmental programs,
b) Maintaining active and effective mechanisms for inter-governmental and inter-institutional coordination, and
c) Establishing authority and accountability for a full range of disaster management functions.

There are four major categories of problems that have been observed that must be addressed in order to enhance disaster management capabilities in Nepal. They are in regard to:

a) Legal basis,
b) Institutional framework,
c) Inter-institutional cooperation, and
d) Policies and national plans.

a) Legal Basis

Summary:

- The system is based on an antiquated law that was enacted before democratisation and the Local Self-Governance Act.

- There is no formal assignment of roles and responsibilities to ministries, other than to MOHA, or to local governments.
- The current law and system focuses entirely on short-term relief to victims and have inadequate provisions for public education and information, coordination of response activities, mitigation in pre- or post-earthquake environments, and management of recovery and reconstruction.
- It is not clear who is in charge of overall disaster response (command and control) or who should oversee and coordinate disaster mitigation activities and programs.

Discussion:

The Natural Disaster (Calamity) Relief Act, 1982 focuses on post-disaster activities of response and relief to victims. It has significant deficiencies even in regard to relief. The Act authorises His Majesty's Government (HMG) to "give orders to anyone concerned to undertake relief work" but does not specify which Government officials or institutions are empowered to exercise such authority to give orders. There is no clear chain of command for directing disaster response. The Act fails to assign specific authorities and responsibilities to specific institutions. Roles related to mitigation, disaster preparedness, response, recovery, and reconstruction have not been allocated to governmental entities, including local entities, and non-governmental entities.

The Central Disaster Relief Committee (CDRC) is comprised almost exclusively of central government representatives, and it includes no local government members. Its primary role is to carry out relief and rehabilitation efforts when a disaster occurs. Beyond the CDRC, the law makes no one responsible on an ongoing basis for preparedness actions or specific response and relief functions, let alone for mitigation actions. The Act provides that the Regional, District, and Local Disaster Relief Committees are only constituted by the central government “according to need,” therefore they generally operate only after a disaster occurs, and they have no incentive for ongoing and proactive planning and coordination activities. Moreover, the Act does not specify who comprises and chairs these Regional, District, and Local Disaster Relief Committees. Therefore, it is unclear whether anyone is specifically responsible for their actions or inaction, even though critical response activities are assigned to these committees. For instance, Local Committees are assigned responsibility for preparing loss and needs assessments, organising volunteers, arranging for evacuation of victims and transport of the

injured, conducting preventive public awareness, and distributing relief to victims—in all, a vast array of critically important functions.

The following Figure 3.1.7 depicts how the structure of the government has changed since the original passage of the Natural Disaster (Calamity) Relief Act was passed twenty years ago. This significantly changes the environment for the assignment and execution of disaster management functions in Nepal, exposing the need for amendment of the Act and revision of the institutional mechanisms for carrying out disaster management functions in Nepal.

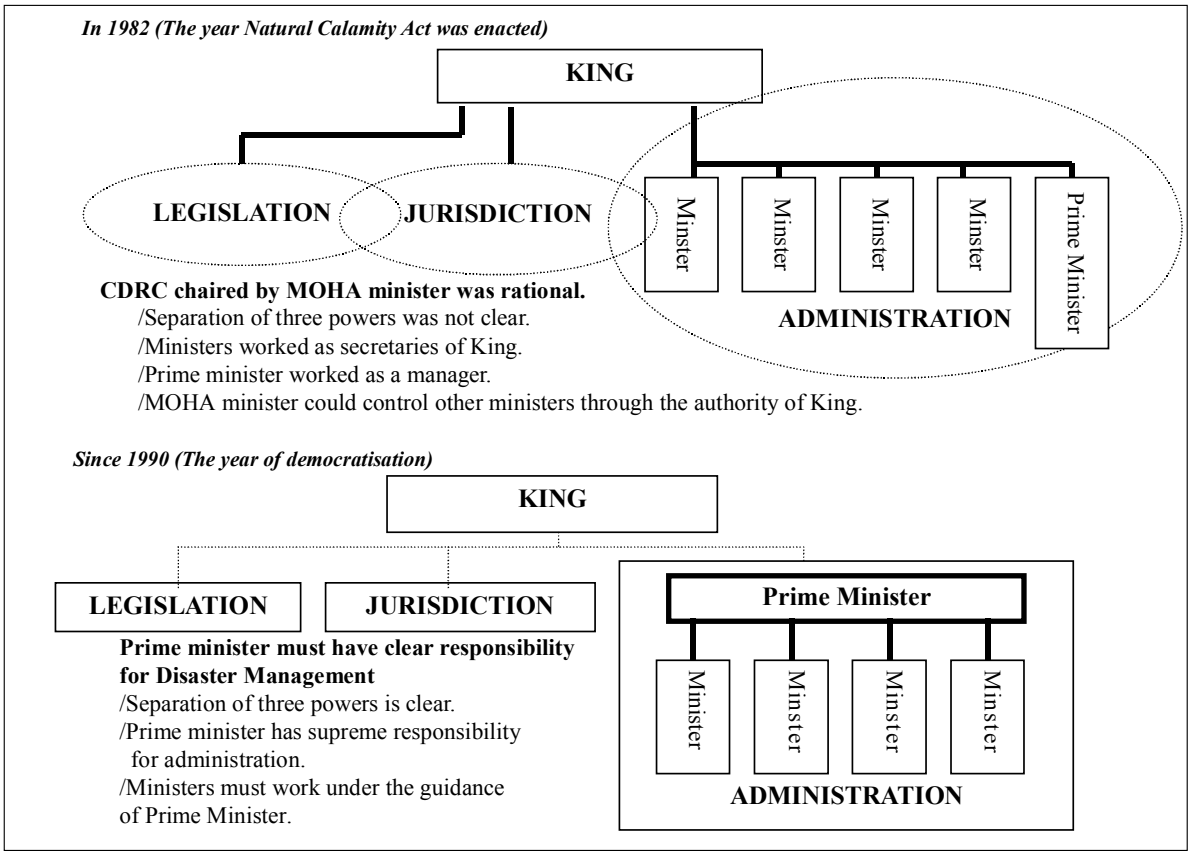


Figure 3.1.7 Environment of the Natural Calamity Act

b) Institutional Framework

Summary:

- The system relies almost completely on central government institutions and officials.
- There is no involvement of ward, VDC, and municipal-level governments.
- There is a recognised central focal point for relief, but the same is not clear in regard to mitigation and other aspects of disaster risk management.

Discussion:

Nepal has a history of entrenched centralism, and the current disaster system is driven by the central government. Decentralisation is now both policy and law, with the enactment of the Local Self-Governance Act in 1999, but the decentralisation process is occurring very slowly, and local entities lack resources and capabilities.

The assignments of functions and responsibilities among ministries and other organisations including local entities must be agreed upon and accepted by all the involved entities. They must be formalised explicitly through disaster legislation, implementing regulations, or a national disaster/emergency management plan that carries the force of law. And there must be an overview mechanism to ensure or enforce implementation of the functions by the assigned entities.

His Majesty's Government's Rules on allocation of functions (1996) assigns to the Ministry of Home Affairs (MOHA) responsibility for "natural disaster relief" and for "all other functions of HMG which have not been specifically prescribed to any other Ministry or Department." While the various other Ministries are not allocated *disaster-specific* responsibilities in the Rules, their normal functions designated in the Rules can guide the proposed assignment of duties related to managing earthquake risk and carrying out emergency preparedness, mitigation, response and recovery functions.

MOHA acts as the secretariat for the Central Disaster Relief Committee (CDRC), which coordinates relief to communities affected by disaster. Chief District Officers (CDOs), who are part of MOHA, act as the "field commanders" in their districts in case of disaster; they conduct situation assessments, communicate with MOHA, and convene District Disaster Relief Committees. Nevertheless, the personnel resources of MOHA's Department of Narcotics Control and Disaster Management and the CDO's Offices are inadequate to manage all aspects of risk management such as land use and construction control.

Post-disaster responsibility for rehabilitation and reconstruction has been shouldered by the Ministry of Housing and Physical Planning, MHPP, after the 1988 earthquake and by the National Planning Commission, NPC, following the 1993 flood and landslide disaster. These roles and assignments should be formalised before a major disaster strikes again, so that the responsible entities can prepare and plan how to carry out their role effectively.

c) Inter-Institutional Coordination

Summary:

- There is inadequate linkage between disaster management and physical and economic development programs.
- There is no mechanism for coordination of disaster mitigation activities and implementation of mitigation in development plans and programs.
- There is no adequate mechanism for coordination of immediate response actions among central government agencies, which in the past has led to duplication of work and delays in rescue and relief works.
- There is no adequate mechanism for immediate communication of disaster information among central government agencies, with local officials, or with the public.

Discussion:

Currently in Nepal a sustainable mechanism does not exist for effective inter-governmental and inter-institutional coordination of the entire range of disaster management functions—mitigation, preparedness, response, relief, and recovery. Inter-institutional coordination must be built through ongoing participation in an active standing interagency committee or council that meets regularly and pursues an action oriented agenda. The committee or council can be assigned either to oversee all phases and aspects of disaster management, including mitigation and post-disaster reconstruction programs, or to focus primarily or exclusively on coordinating emergency preparedness and response activities.

Successful inter-institutional models reflect the following attributes:

- Indisputable legal basis and mandate.
- Top-level support from the government's chief executive (Prime Minister, President, or Mayor) and the chief executives of the institutions.
- Proactive leadership.
- Strong core group and secretariat.
- Incentives for action.

Nepal's National Action Plan (1996) called for a study on constituting the National Disaster Management Council and for finalising the organisational structure for disaster management committees at the central, regional, district and village levels.

d) Policies and National Plans

Summary:

- There is no adequate policy in regard to disaster management and mitigation.
- Seismic design and construction standards are not nationally accepted, and adequate construction supervision and control mechanisms do not exist.
- There is no effective mechanism for oversight and implementation of existing mitigation plans.
- There are very few institutional or inter-institutional emergency plans and no national emergency plan.

Discussion:

The lack of a disaster mitigation policy has often been recognised. The National Action Plan (1996) called for the adoption of national disaster management policy. MOHA's Dr. M.B.P. Chhetri has recently stated that "in view of the complexities and diversities of the disaster management in Nepal, a concrete, effective, practicable and proactive policy is needed" (2001).

The need for policy and enforcement regarding integrating seismic resistance into the process of new construction has also been long recognised and discussed. For instance, the Kathmandu Valley Earthquake Risk Management Action Plan (1999) proposed that the Building Council be directed to draft rules and procedures for implementing and enforcing a building code and require municipal governments to implement and enforce the code.

The need for a national emergency plan has also been cited frequently. For instance, the Kathmandu Valley Earthquake Risk Management Action Plan (1999) recommended that all responsible organisations including government and non-government agencies, public and private utilities, hospitals and schools prepare plans and assess the equipment and training needs to execute the plans. Planning to guide emergency response operations is vitally important, especially the developing of the assignment of functions and responsibilities to specific organisations. It was noted in the lessons learned during the 1988 earthquake that it is necessary to prepare a central level preparedness plan and to implement standing operating procedures. Also, it was recommended that responsible institutions at the VDC level should be developed for proper distribution of relief materials. In the 1993 floods and landslides, the response and relief activities were in many ways improved, however it was still realised that preparedness and coordination need to be strengthened, as well as improvements in damage assessment and managing logistics. Since the 1993 floods, the international community has worked with the

government to prepare draft manuals for logistics, health and food. The need persists, however, for the government to develop its own procedures and manuals for coordinating with the international efforts.

Both of these action plans cited above represented the views of government officials and other persons interested in disaster management in Nepal when they were prepared; nevertheless, implementation of the actions they prescribed has lagged.

3.1.3 Proposed Institutional System

(1) Incentives for inter-institutional collaboration

In Nepal inter-ministerial and inter-agency cooperation should be improved. There is a strong tendency for many institutions to be independent of others. As previously noted, there are several reasons for the existing inadequacy of inter-institutional cooperation.

- Lack of adequate legal framework; unclear responsibility.
- Lack of incentives for individual institutions; adequate budgeting is the largest incentive.
- Lack of audit and a system for administrative oversight; no penalty for non-cooperation.

The inadequacy of the current legal framework has resulted in unclear responsibility. This situation causes major obstacles, not only for the Nepal administration but also for international cooperation.

The largest lack of interest is from the lack of funding. While the disaster management plan should justify the budgeting of funds for disaster management projects, it is necessary that all individual institutions participate in preparing the plan. Otherwise they may lose either power or authority to take action, because no funds would be available. The reality is that few ministries have been motivated to cooperate in making the National Level Plan because budgeting and international aid have not been controlled by it. This is a vicious cycle that must be prevented. Only a participatory approach in National level planning can guarantee cooperation in implementation of risk reduction, crisis management and restoration.

A third issue to overcome is the lack of a proper audit and overseeing system for governmental administration. An authorised Audit or Inspection Agency should inspect all administration work regularly from an efficiency point of view. In many countries, when a lack of coordination among relevant official organisations is disclosed, the audit agency directly advises or warns these organisations, and/or it reports to parliament and also discloses this information to the public. This must be a great advantage to the relevant organisations in a democratic society, whose mechanism works very efficiently in advanced countries.

a) Potential solutions

It is clear that the following steps must be taken to improve the capacity for disaster management in Nepal:

- Establish a strong legal basis for a comprehensive risk management system, involving each level of government and the community. Ascribe responsibility for leadership at all levels of the government, and charge agencies at each level with responsibilities for preparedness and mitigation work, in accordance with their assigned functions.
- Create sustainable mechanisms for inter-governmental and inter-institutional coordination for disaster mitigation, preparedness, response, relief, and recovery activities.
- Ensure that the Tenth Five Year Plan includes plans and funding for concrete mitigation measures.

Two possible approaches for addressing the legal deficiencies of the current Act are to:

- Create consensus for new institutional arrangements, policies and plans that overcome the law's deficiencies, and/or
- Propose new legislation (or amendments to the current Act) and generate institutional and political support for passage of the new/revised Act.

These approaches can be pursued either as alternatives or in tandem; that is, by creating the new system (institutional arrangements, policies and plans) with the participation and support of the stakeholders, a firm base of support for a new legislative mandate can emerge.

b) A Model for a coordinating mechanism

A sustainable mechanism is needed for inter-governmental and inter-institutional coordination for disaster mitigation, preparedness, response, relief, and recovery activities. On paper it would appear that the Kathmandu Valley Town Development Council may present a viable model for such coordination. The Council is intended to act as advisor and regulator to the local governments and sectoral agencies which will implement the regional development plan; it is envisioned that the Council "shall constantly coordinate with local governments and line agencies to facilitate implementation of the plan."

c) A Model for planning

The "Development Plan 2020 of the Kathmandu Valley" appears to provide a viable model for an overall plan and system for risk management in Nepal. The plan establishes what appears to be a viable mechanism for regional coordination. It establishes local governments as one of the main implementing agencies, stressing their newly strengthened role, and it creates a "plan acknowledgement process" structured to secure participation by local governments and line agencies. The plan also envisions enforcement mechanisms, it provides for improved information flow, and it lays out a basic policy framework to guide future development in the Valley.

d) Use of aid funds

Resource constraints form a major obstacle to enhancing the disaster mitigation programs in Nepal. But while it has traditionally been difficult to allocate funding for disaster prevention and reduction projects, disasters do occur, causing expenditure of vast sums of unbudgeted funds for relief and rehabilitation purposes. The Nepal Country Study (by N. Russell et.) cited above noted that "A sizable portion of the national budget has been allocated to disaster relief and programs related to reconstruction and rehabilitation," and that "Disaster relief and reconstruction compete with development projects for funding." Moreover, while Nepal is fortunate to have a large number of donor agencies active in the country, it has often lacked an ongoing dialogue between the government and the agencies regarding appropriate uses of international aid funds for both prevention and relief purposes.

While all governmental entities should appropriate resources in their budgets for high priority disaster mitigation programs, the central government should also take steps to ensure that funds destined to provide aid following disasters are

appropriately allocated, spent, and accounted for. The development and implementation of regulations are recommended to specify the appropriate use of funds for disaster mitigation purposes and the types of aid to be provided to victims, such as individuals and families, local entities, and businesses, etc. which have suffered losses. Also, provision should be made for monitoring and auditing disaster expenditures.

(2) New Institutional Arrangements

Every institution belonging to the government or civil society to be assigned functions in relation to preparation, response, recovery and rehabilitation from disasters should form a part of an inter-institutional disaster management system or organisation for Nepal. This organisation or system would be under the authority and power of His Majesty the King, as provided by the Constitution of Nepal, 1990, and directed by the Prime Minister. This organisation or system, in organisational terms, should consist of several levels or subsystems that would function in a coordinated and interactive style. Each would be responsible for its own level of the plan, as described in a later section of this chapter, and for organising and preparing to carry out its disaster functions and responsibilities.

The proposed management organisations for the Kathmandu Valley Earthquake Disaster are:

- The National Disaster Management Council.
-
- The Kathmandu Valley Disaster Management Council.
- Municipality and Ward Disaster Management Committees.
- The Emergency Control Board at each level (see Figure 3.1.8).

a) Proposal for new inter-institutional councils and boards

The National Disaster Management Council (NDMC) would be responsible for formulating national disaster management policies and ensuring and overseeing their implementation through the development and exercising of disaster management plans and programs throughout Nepal. The Council would ensure the integration of disaster management priorities and objectives into ongoing physical and economic development plans and policies of the government, and would promote their integration into the activities and programs of non-governmental organisations and international agencies active in Nepal. The Council would oversee the preparation of, and approve, the National Disaster Management Plan.

The Council should ultimately be presided over by the Prime Minister, and it would be comprised of the chief executives of key institutions, including ministries, municipalities, and non-governmental organisations. A core group of the NDMC members would constitute the Emergency Control Board(ECB).

Similar to the National Disaster Management Council, the Kathmandu Valley Disaster Management Council (KVDMC) would be responsible for disaster management policies, plans, and programs for the Kathmandu Valley. Perhaps the Kathmandu Valley Town Development Council may present a viable model for this new Council in certain respects. Both are intended to include and oversee the local governments and sectoral agencies responsible for implementation, and both would be responsible for providing constant inter-governmental and inter-agency coordination and communication. The duties of the Council could include:

- Develop and promote policies and programs to reduce earthquake disaster risk in the Kathmandu Valley,
- Advise the National Disaster Management Council of needed policies and programs to protect the Valley, its inhabitants and economy, from disasters,
- Develop guidance to local authorities and entities for coordination of disaster preparedness, response and relief activities in the Valley,
- Establish priorities for risk reduction programs and projects in the Valley, and
- Promote and coordinate public education and information programs to be carried out by local governments and other entities in the Valley.

Disaster Management Committees should be established at the municipality and ward level to establish disaster mitigation policies and plans and overseeing their implementation (See section 3 below).

Emergency Control Boards (ECBs) would also be established at each level of government. The national level Emergency Control Board would oversee and coordinate the governmental response to a disaster situation. The Board would be convened by the Prime Minister to share disaster information in support of decision-making in regard to directing and coordinating response, rescue, and relief operations. The Board would supervise and control the actions of the government and coordinate them with district and local authorities as well as non-governmental organisations and international agencies. Local governments including municipalities would also establish their ECB to coordinate response to a disaster.

b) Ultimate responsibility for leadership

Through the process of fast urbanisation, a disaster could sometimes be a matter of national security like a war. In many countries, the Prime Minister has been given

the responsibility to chair the national council for disaster management. Even in this case, the Prime Minister's real involvement in the council is usually limited to giving principle instruction and final decisions, particularly in time of disaster. If rules to manage the council regulate clearly, the secretariat manages the council and may command ministers on behalf of the Prime Minister. Nevertheless, this system is workable only in an administrative culture where the secretariat manages the council and members follow its instructions. In Nepal, however, centralism dominates so much in the administrative sector, that there is a tendency to rely on the chairman himself instead of the secretariat. In this circumstance, the necessity of changing the scheme of chairmanship of a national council for disaster management to the Prime Minister may require careful consideration.

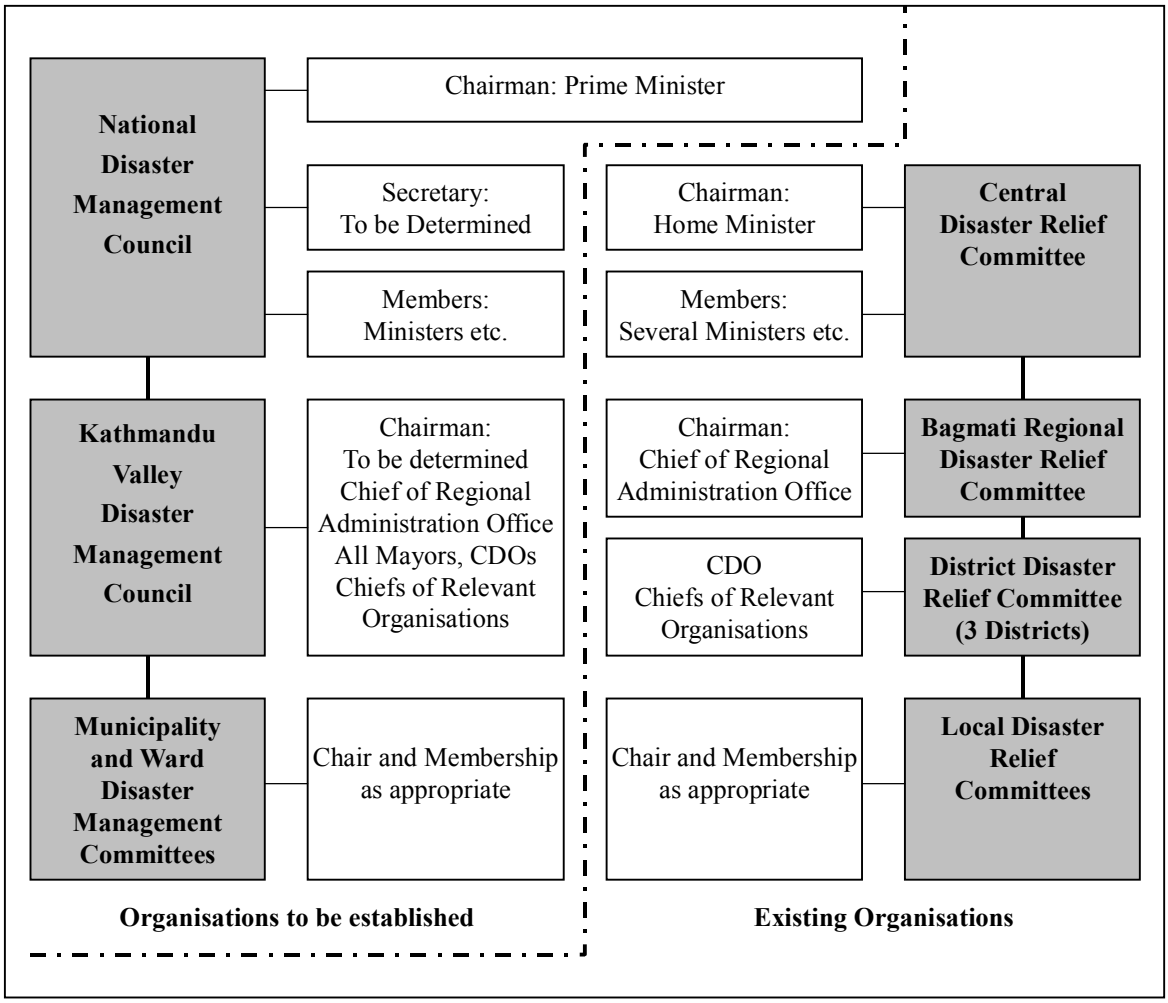


Figure 3.1.8 Disaster Management Organisations in the Kathmandu Valley

(3) Municipality Level Arrangements

Though the national government and ministries should move in order to accelerate

the disaster mitigation activities in the Kathmandu Valley, they need more time even though they have great power. Even when they can move, they will target the establishment of national concepts and arrangements for international co-ordination. In contrast, activities at municipality, ward and community levels can be especially effective because they work through direct contact with citizens, who will affect and be affected by earthquake disasters directly. Municipalities and Wards currently have insufficient institutions, facilities and systematic activities against earthquake disasters, although they have awareness of issues for coping with earthquakes.

Based on the current situation, the following set of project proposals, including disaster management institutions, facilities and activities at the local level are provided.

a) Disaster management institutions

If the Mid Nepal Earthquake, the severest among the scenario earthquakes in this JICA Study, were to generate 18,000 deaths, 146,000 injuries and over 500,000 homeless in the entire Valley, almost half of them would be in the Kathmandu Municipality. In 1995, Kobe City was helpless against the 6,500 deaths, 100,000 injuries and 250,000 refugees, though it had a population of one million and 10,000 City government employees. This means that the 2,000 municipal employees for a city of 500,000 population in Kathmandu Municipality is extremely inadequate to respond to the situation in the Mid Nepal Earthquake or other large scale earthquake. Further, the current institutions in Kathmandu Municipality act separately against disasters as shown in Figure 3.1.9. The newly proposed institutions should unify and lead these activities with assistance from outside experts as shown in Figure 3.1.10.

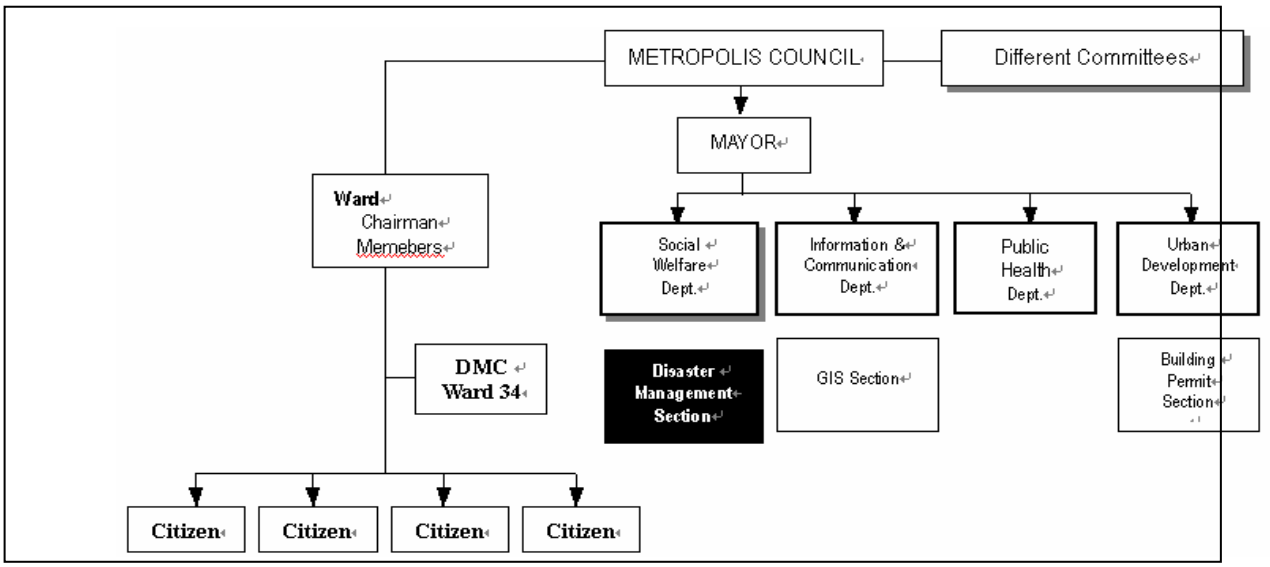


Figure 3.1.9 Current Disaster Management Structure in KMC

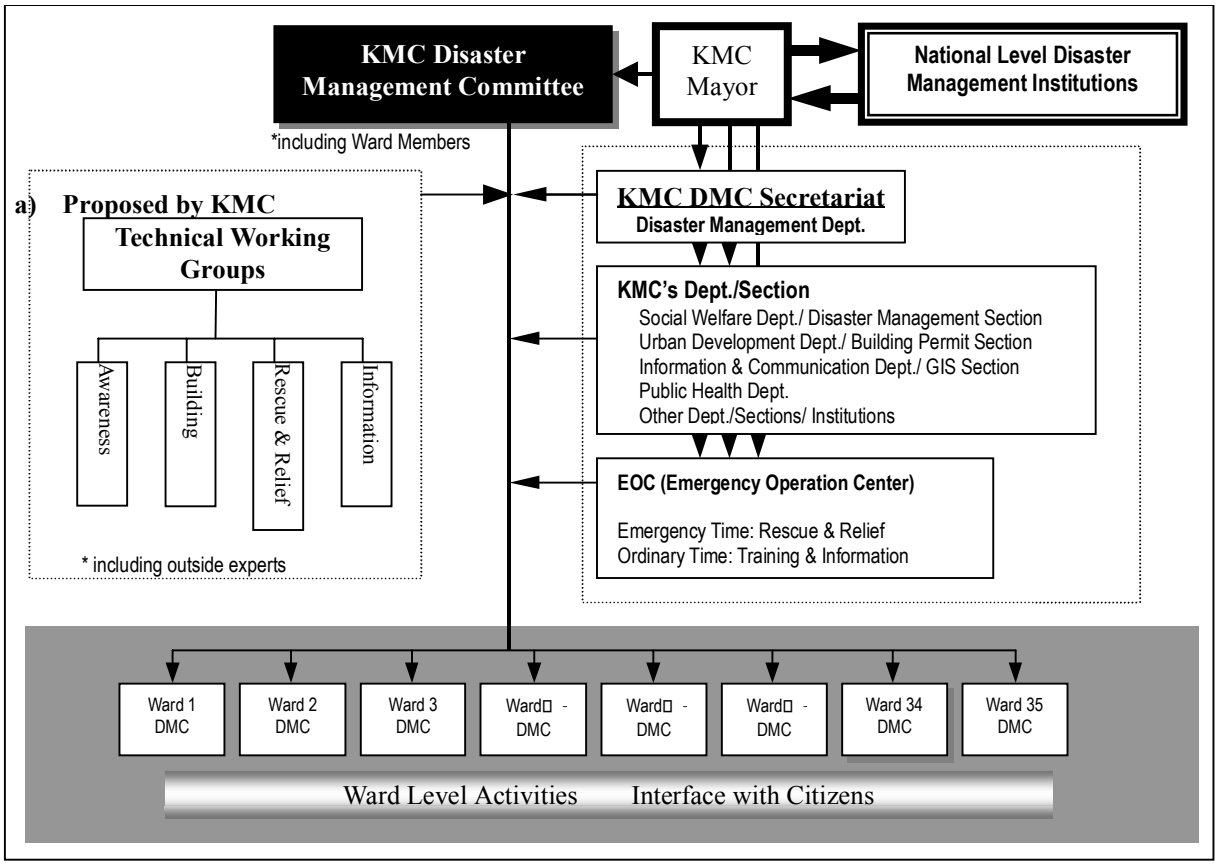


Figure 3.1.10 Desirable Disaster Management Structure in KMC

- Disaster Management Committee

In order to manage and lead the disaster management activities, a Municipal Disaster Management Committee should be established. Though current committees of the Municipality for budget and audit are not active, this committee

should be activated by the Mayor and actively participated in by the representatives of the Wards. However, since these committee members are not experts in disaster management, the committee should be strengthened through the participation of outside experts. These outside members could include representatives from the ministries relating to disaster management, such as MOHA, MOLD and DMG, active members from NGOs, international donors such as JICA, the Ministry of Finance or Foreign Affairs, and technical experts on disaster management.

- Disaster Management Department

The current Disaster Management Section under the Social Welfare Department should become a Department with increased employees. It should be the secretariat of the Municipal Disaster Management Committee and should co-ordinate the activities of departments for disaster management and others, mainly those involved in raising awareness and rescue/relief actions.

- Technical Working Groups

These Working Groups should assist in the activities of the Committee, suggesting and researching technical matters. This corresponds to execution of the Municipality proposal regarding the four forums at its last meeting this September. These Working Groups should include outside experts such as representative citizens, NGOs, engineers, professors, the private sector and international donors as well, through the coordination of the Municipality.

- Disaster Management Committee at Ward level

Already Ward 20 and Ward 34 have their own Disaster Management Committees. This type of Committee should be established for each Ward in order to motivate and lead disaster management activities of citizens and also cooperate with the Municipal Committee.

- Input from outside

Since experience and knowledge regarding disaster mitigation are insufficient in the Kathmandu Valley, personnel with advanced experience, knowledge and technologies, should be actively introduced and shared mainly through the assistance of international donors.

b) Facilities

Even establishing institutions is not sufficient to ensure adequate responsive action at the time of disaster. Kathmandu Municipality has the Kathmandu Valley Mapping Project (KVMP) that has been active and has developed the plan for establishing an Information Centre. Applying this plan in combination with the Information Department, it is proposed to form the Disaster Information Centre.

This Information Centre will act as an Emergency Operations Centre at the time of emergency events. It will gather disaster related information and assess the disaster situation in the Valley, disseminate appropriate directions for actions, and communicate with national organisations.

It is important to consider its functions during normal times; otherwise it would not be economical and effective. The Municipality already has a plan to combine its demographic data with detailed digital maps at a scale of 1:2,000, which will be effective for its administrative work, as well as for responding to earthquakes. Further, the Centre can be used for disaster education. School curricula should include children's visits and the study of disasters, lessons and countermeasures. The Centre should be open to the public, holding seminars, lecture meetings and exhibitions for disseminating knowledge to the public.

Although the KVMP building seems to have certain resistance against earthquakes, since the municipality sections are located in dispersed buildings, there is an idea of unified buildings for the currently separated sections and also for the Centre. The Centre should have communication equipment with the information facilities of KVMP.

c) Activities

Current disaster management activities in the Valley have some degree of effectiveness, but they are not necessarily systematic and sustainable, thus reducing their actual effectiveness. The Municipality should coordinate and facilitate but not control those activities, including those by NGOs or international donors.

In the primary phase, activities for raising awareness should be implemented, such as to understand earthquake disasters and adopt drills and training in school curricula. Then step by step, advanced measures can be taken. Appropriate activities should be adopted for each level, such as Municipality, Wards, Communities, citizens, NGOs, and CBOs.

The above mentioned proposal is summarised in attached Figure 3.1.11.

3.2 Plans for Earthquake Disaster Management

Earthquake disaster management should be conducted under an integrating concept and set of principles that provide unity and continuity of the plans of governmental and societal entities. These principles include recognition of the need for leadership, risk reduction, dissemination of public information, and rapid response and recovery actions at all levels of government and society. Thus, the earthquake disaster management plans at each level of government all fit together as elements of a single overall system, operating in a coordinated fashion.

The individual disaster management plans prepared at each level of government and each institution, shall be the fruit of the participatory planning of all stakeholders. The process of cooperative planning, is the prerequisite for later cooperation in the implementation stage.

Disaster management planning provides a means of institutionalising risk management in governmental and non-governmental organisations, which is a critically important part of managing hazards and risk. 'Institutionalising' risk management can be described as integrating it into the society's laws, practices, and customs. Institutionalising risk management depends on building the capability and confidence of institutions and organisations to plan and implement their own management actions that make the most sense to them. Local institutions--NGOs, government, and the private sector--must be empowered, through access to scientific and technical information and to workable solutions, to tackle the disaster risk issues they face.

Plans are built on the hazard and vulnerability assessments and loss estimation studies conducted for the Kathmandu Valley. Basic concepts include;

- Assess capabilities,
- Use a team approach,
- Keep the plan simple,
- Identify resources needed to carry out each function,
- Inventory sources and resources,
- Assign responsibilities,
- Build systems and capability for response,
- Establish survivable communications systems,
- Develop systems for alerting, warning and procedures for evacuation,
- Develop search and rescue capability,

- Coordinate planning with other levels of government, NGOs and the private sector,
- Establish systems for mutual aid, and
- Train and exercise for coordinated responses.

The planning process should follow certain steps, including: gett the support and the involvement of the chief executive, establish a team representing all branches of the organisation to draft the plan, set goals and objectives, assign tasks and responsibilities, achieve consensus of the responsible parties, train staff, and execute the plan.

An important component of each plan should be a matrix of functions and responsibilities that will list the lead and supporting organisations designated to perform each function.

3.2.1 Plans at Each Level

The system would be composed of 5 related but separate plan elements, differentiated by administrative and societal unit, as follows:

- National plan.
- National Government plans.
- Municipalities' plans.
- District plans.
- National companies' plans.
- Private plans.

Each of these plans should incorporate relevant means of coordination and communication with the other elements.

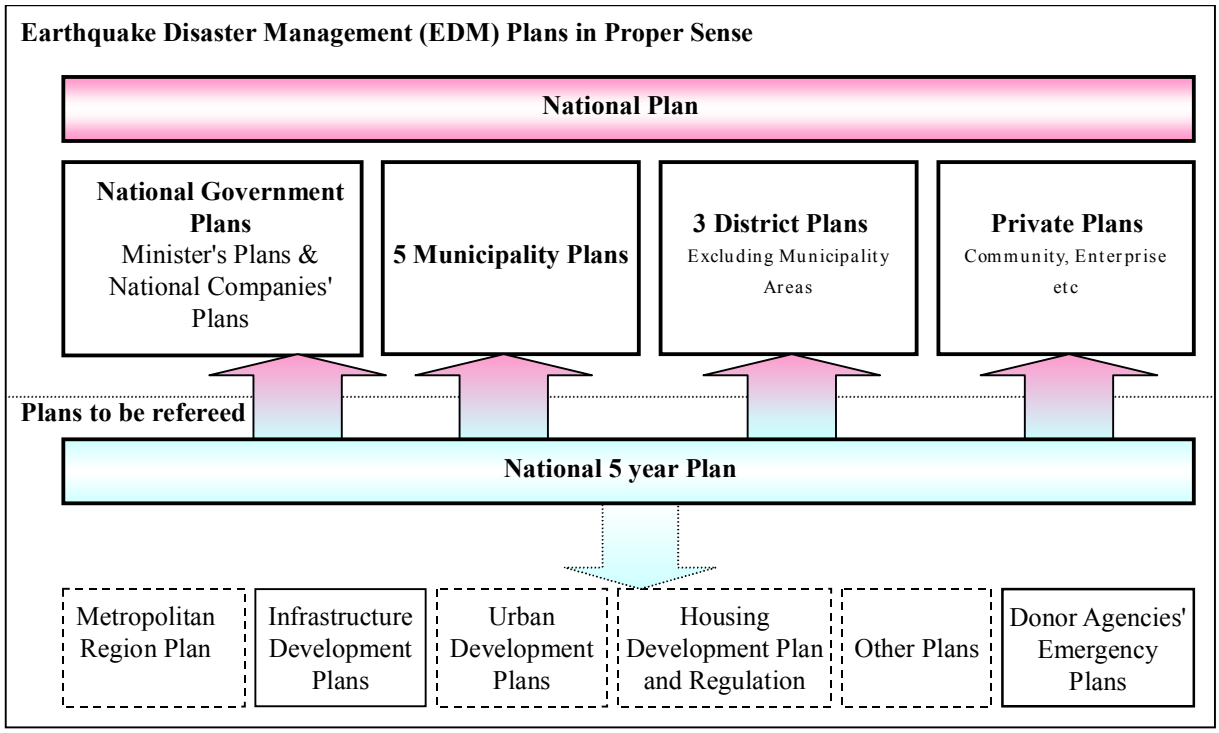


Figure 3.2.1 Structure of Disaster Management Plans and Other National Plans to be Referred

(1) National Plan

The National Plan deals with basic policy for risk management and establishes the national framework of cooperation among central government, army and national police, local bodies, national companies, private enterprises, non-governmental organisations, communities and international agencies active in Nepal etc. The Plan also assures a method of accessing national assets such as government funds.

(2) National Government Plans

The National Plans are for Ministries, Royal Nepal Army and National Police, which formulate solid plans of disaster mitigation and initial response for individual governmental institutions. Individual Ministries' plan also provides guidelines for disaster management for the national companies they oversee.

(3) Municipality Plans

Municipality Plans are for Kathmandu Metropolitan Municipality, Lalitpur Sub-Metropolitan Municipality, Baktapur Municipality, Madiapur Municipality and Kirutipur Municipality.

There are two basic options to describe the relation of municipalities' plans to the national plan:

- Subordinate.
- Parallel.

Some national plans treat municipalities, districts and the private sector, as subordinate and provide many pages of planning instructions to these subordinate levels. In contrast, municipalities' and others' plans could be parallel to the national plan, dividing tasks and responsibilities horizontally with them.

In Nepal, the latter case, i.e. independent municipalities' plans with a parallel but not hierarchical structure to the national plan, would be preferable. The reasons for this are as follows:

- The target area, Kathmandu Valley is special, in terms of urbanisation, and the general guidelines of the national plan for managing earthquake disaster risk are not entirely applicable.
- The central government does not have enough resources to lead and oversee all aspects and elements of disaster management planning.

The municipalities' plans should integrate ward-level plans defining the tasks and responsibilities to be carried out at the ward level.

(4) District Plans

District Plans are for the Kathmandu, Lalitpur, and Baktapur Districts excluding the municipality areas.

The Kathmandu Valley belongs to the Region/Central Administrative Unit, though the Unit's administrative office is located in Hetauda, a half-day drive outside of the Valley. Moreover, their task has been no more than maintenance of security. Therefore, the Region/Central is not feasible to conduct management of an earthquake disaster that impacts on the Valley.

Five Municipalities and 97 VDCs are administrative components in the Kathmandu Valley. Each Municipality is expected to be the key administrative body under the newly enacted Local Self-Governance Act and has to a play pivotal role in earthquake disaster management, not only because the urban area is prone to disaster, but also because it is closest to the people. VDCs are also closest to the people and have to play a big role at disaster time, but their planning resources have been very limited. Since the study team considers that the planning by individual VDC would not be effective without outside guidance and oversight, the district

administration offices should cover these VDCs in the district plans, and also provide planning guidelines to the VDCs. Based on these guidelines, the individual VDCs will understand their disaster management responsibilities and can easily prepare their own basic VDC plans and integrate them into the district plans.

(5) National Companies' Plans

National Companies' Plans are for lifeline companies such as Nepal Electric Agency, Nepal Telecommunication Company, Nepal Water Supply Company and the national bank, the Nepal Rastra Bank. These companies have to make plans for earthquake disaster management in order to maintain their normal functions as much as possible, even in earthquake disaster times. In addition, since dysfunction of their operations and facilities would be inevitable in earthquake disaster time, they need plans for fast recovery and restoration of services.

These companies shall be provided planning guidelines in the line ministers' plans and elements of the National Plan. They should develop detailed plans for seismic strengthening, maintaining operational status, and post-earthquake rehabilitation.

(6) Private Plans

Private Plans are for individual companies, associations, institutions such as schools and hospitals, and non-governmental organisations (NGOs). Private companies and these other organisations will conduct a large portion of the relief and reconstruction works. For example, emergency transportation of food, water, fuel and utensils, etc. will be provided by private companies, and emergency removal of blockages on roads and emergency bridge restoration will be performed by private construction companies. Private companies should be requested to prepare plans for fast response. Community-based organisations, associations, other groups and NGOs will be very powerful stakeholders at disaster time. It is preferable for each of them to develop individual disaster management plans through participatory processes.

3.2.2 Earthquake Disaster Management Plan and other Referred Plans

(1) National Five-Year Plans

The supreme development plan in Nepal is the National Five-Year Plan by the National Planning Commission (NPC). It is sometimes said that plans are worth little, because most often, projects have been conducted independent of the plans. In

fact, ministries seem to show scant concern for the planning. The reasons for ignoring or disregarding the plans are said to be many. Examples are as follows:

- No consultation with the representatives of foreign aid organisations, which provide much of the resources to be used.
- NPC's alleged tendency for disregarding the people, local institutions, and even the ministries once they have made their initial recommendations (D. B. BISTA, Fatalism and Development).

Whatever the reason may be, the plan must be respected in order to implement systematic and cooperative management for earthquake disasters.

The current 9th Five-Year Plan started in 1997 and will end on 7/15/2002, with little attention to the disaster problem. Since the current 9th Five-Year Plan was made, a number of major earthquakes, such as those in El Salvador, Taiwan, and Turkey have occurred in the world, awakening people to the danger of earthquakes. In addition, the Gujarat Earthquake occurred in India in January last year, revealing the danger of disasters in the Himalayan Region.

The NPC has begun to prepare the next Tenth Plan targeting 16 July 2002 – 15 July 2007. They submitted conceptual papers for further discussions, and detailed planning will proceed until June of 2002.

According to an authoritative source, the NPC will place more emphasis on measures to cope with earthquake disasters, devoting a specific section of the Plan to this subject. In these circumstances, concerned ministries have to prepare supporting documents with the matrix of prioritisation etc. for detailed planning of projects for management of earthquake disaster. This report may meet the requirements for the supporting documents.

(2) Specific Plans to be Referred

A management plan for earthquake disaster shall be prepared based on the existing specific plans that have already been prepared for improving everyday life and social development. The reason for this is that minimum standards for either quality of life or function of urban facilities in normal times form the basis for determining the actions to be taken for disaster management. Consistent functioning in normal times must be assured. The earthquake disaster management plan aims to minimise the functional deterioration of systems and facilities even in disaster times. However, in any country the task of improving everyday life and assuring consistent functioning of urban systems and facilities is ongoing.

Therefore, the usual earthquake disaster management plan would refer to the National Five-Year Plan, the Kathmandu Metropolitan Region Plan, various Infrastructure Development Plans, Urban Development Plans and Housing Development Plan and Regulation, etc. However, in this instance, they cannot be referred to, because most of them are either inadequate or not authorised. Our plan has limitations for these reasons. Meanwhile, the study team will provide suggestions to develop and authorise such development plans from the viewpoint of earthquake disaster management.

3.3 Community Resilience and Self-reliance

3.3.1 Characteristics of Social Structure

(1) Social Cohesion and Mutuality

a) Newar community is a dominant group in the Valley

The study area (Kathmandu, Bhaktapur and Lalitpur) is predominantly a Newar community though other communities too have coexisted. According to a 1991 census, Newari population is about 42% in the valley, and its breakdown is 40% in Kathmandu District, 64% in Bhaktapur, and 50% in Lalitpur. Newar is a culturally dominant community. The Newari have notable features in terms of social cohesion and settlement patterns. These features are the key factors in thinking about disaster mitigation activities. Old city core areas, which are regarded to be vulnerable to earthquake disasters, are Newar settlements. In the following sections, characteristics of the Newar will be described.

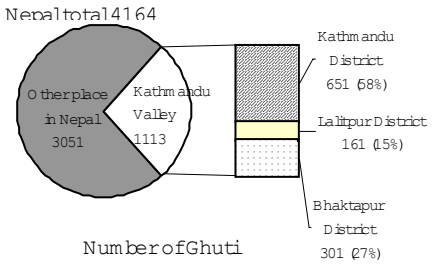
b) The system and present status of Guthi

The Newar society is notable for its numerous *Guthi* institutions, which grant membership to the individual household groups. Each Newar, in one way or another, is associated with his *Guthi* in his society. It is generally ascribed by his family tradition. Each *Guthi* has its own rules and regulations which must be strictly observed by its members. Although *Guthi* was overwhelmingly present in the Kathmandu Valley, it is found everywhere in Nepal, especially around religious shrines and traditional settlements. The *Guthi* Corporation was created and is running until the present time.

The *Guthi* is created by offering private property, cash or kind, including landed property for the sake of sustaining worship in temples, maintenance of public rest houses for pilgrims and several other socio-religious functions. Such landed and other immovable property is so vast that the *Guthi* corporation runs branches in 11 districts and the Land Revenue District office of HMG looks after this in 60 districts

(*Guthi* Corporation Inventory, 1999) (see Figure 3.3.1).

The Inventory lists the following statistics:



Guthi owned landed property:

Tarai 66,037 Bigha (458km^2)
Hills 516,332 Ropani (263km^2)

Guthi Managed :

Temples	712
Rest Houses	647
Ponds	159

Source: Guthi Corporation Inventory

Figure 3.3.1 *Guthi* Inventory

The *Guthi*s appear to be religious in nature but they perform innumerable social functions. In fact, they are very strong cohesive factors uniting several segments of society. The temples and rest houses run by the *Guthi*s are venues for socio-religious functions including marriages, initiation ceremonies and other kinds of social feasting in times of peace. In times of calamities these venues provide excellent rescue and relief sites. Thus, the *Guthi*s are useful both during peace and disaster.

But, according to the *Guthi* corporation inventory, 1999, a majority of the rest houses and many temple premises are dilapidated and need a large amount of maintenance. The corporation has leased out a large number of physical facilities - houses, shops, fishing ponds, etc. - but the leasees, both government and private, owe a large amount of revenue to the corporation. So, it faces repeated financial crises.

(2) Settlement Pattern and Society

a) Characteristics of the Newar settlements

Centuries of habitation in the Valley have illustrated that man is an important factor in the creation of the existing physical setting. Innumerable small fields, water canals and flights of terraces take utmost advantage of the natural configuration of the land and reshaped the surface of the Valley far up the slopes of its surrounding hills. Most of the prominent settlements representing the Newar community of the Valley date back to the beginning of the Malla period (thirteenth to eighteenth centuries) and have remained in the compact forms that were established then. Closely spaced houses with narrow streets and small courtyards located mostly on up land plains between or along rivers are uniformly built of bricks, clay tiles and

timber.

In spite of variations in size, geographic location and economic activities of their inhabitants, the Newar settlements were not radically different from one another irrespective of whether they were called towns or villages. Still, they were far from merely smaller or larger additions of single housing units designed to provide shelters – they formed institutional and social units for performing the various functions involved in the life of the people.

As an outgrowth of as well as a motivating factor for this compact settlement pattern, the social cohesion and organization of its inhabitants shows marked differences from the situation found in traditional dispersed agricultural settlements, in and out of the Valley. These settlements also represents a strong economic framework for maintaining compact groups large enough to broaden associations beyond tight extended-family circles and include a majority of functionally evolved castes.

The streets are mostly brick or stone paved and the houses, of rather uniform height, traditionally three and one-half stories, built on either side have at least the brick walls of the compounds adjoining. Those enclosing a courtyard are sometimes secular growths of earlier monastic units and are termed *'Bahals'*- this is particularly true in the three cities (Kathmandu, Patan and Bhaktapur) of the Valley. In most courtyards there are small freestanding shrines. Of functional and visual importance are the open ponds, sunken waterspouts and wells existing in each settlement. These wells and waterspouts are found either in partially or totally enclosed courtyards or frequently as twin ponds at either end of the main road. These factors coupled with a lack of unutilised housing spaces within the compact settlements create a generally homogeneous character throughout.

The Newari people, who are the original inhabitants of the Kathmandu Valley and responsible for much of the high culture of Nepal, developed a unique culture which is highly urban in character. Living in a society with strong social links based on the *Guthi* system, they traditionally preferred to live in compact settlements, the streets lined with continuous rows of brick and timber houses. Thus even villages have the character of small towns and the houses themselves, which can date to the 17th century or even earlier, are frequently richly decorated with artistic woodcarvings and moulded terracotta. As such, they are closely related in style to the architecture of more important monuments, such as palaces and temples.

b) Urbanisation process of the Valley

Urbanisation in the Kathmandu Valley commenced in the mid 1950s and peaked between 1971 and 1991. The period coincided with rapid industrial and institutional growth. The concentration of all social, political, physical, financial, institutional, transportation and communication networks facilities in the Valley towns and severe deficiency of such facilities in other parts of the country is responsible for the rapid urbanisation of the Valley. Urban expansion in the Kathmandu Valley, excluding the city core areas of Kathmandu, Lalitpur and Bhaktapur, is horizontal rather than vertical. In the early days, major growth occurred along the city arterial roads leading to Maharajgunj, Jawalakhel, Gaushala and others. The construction of the Arniko highway and the "ring road" in Kathmandu and Lalitpur municipality areas provided opportunity for urban expansion and it is now extends beyond the municipal boundaries and onto agricultural areas.

Construction of the Ring Road in the mid 1970's induced development in surrounding areas specially Balaju, Maharajgunj, Bansbari, Chabahil, Koteswore, Satdobato, Balkhu, Kalanki, while the areas along the radial roads and the flood plains of Bagmati, Bishnumati and Dhobikhola were developed after 1981. An area between Kathmandu and Lalitpur municipality and Bhaktapur has been developed recently. Some old settlements such as Thimi, Kirtipur, Chapagaon, Lubhu, Boudha, and Budhanilkantha have experienced rapid urbanisation. It has been visualised that in 2020 AD, the present day five municipalities and their adjoining areas will form one urban mass by KVTDC.

(3) Key Factors for Disaster Mitigation Planning

Following are highlights of the finding of the Social Structure Survey, in which personal interviews were conducted according to unified questionnaire sheets.

a) Emergency foods & water

About 40% of the households of Kathmandu Valley keep stocks of water for the first 3 days. A majority of households keep approximately a one-month stock of food, which may be of use to survive in the emergency situation.

b) Education on disaster mitigation

Households valued education and educational expenditures are the second largest after food. 93% of residents thinks that Education on Earthquake Disaster Mitigation should be in the school curricula, whereas, 57% have not received any information on earthquake disaster mitigation. Thus, education on earthquake

disaster mitigation and public awareness raising activities would be significant and effective.

c) Fundamentals of mutual cooperation

Households were mostly religious and had the attitude of helping each other. There still existed mutual cooperation among the Nepalese as they preferred neighbouring houses as places for emergency shelter.

d) Caste sensitivity

The community is not highly stratified on caste grounds, as 85% were prepared to share shelter and food together in case of disaster. However, 15% of the households have a caste barrier. Consequently, certain considerations of the society need to be taken to those who are unwilling to do so, and participatory planning in detail for each local area, deciding evacuation places, emergency water resources and so on, would be appropriate and effective.

e) Earthquake perception

30% of Valley residents think that an earthquake is an act of God. Most households were found to be sensitive to earthquake disaster. Women and householders of 40-50 years of age tended to be more risk-perception sensitive. The level of risk perception was relatively high in the traditional area and the city core clusters. Similarly risk perception was also related to willingness to insure the house. Nearly 80% of the residents want to strengthen their houses. Households felt they were not well prepared for mitigation measures; however, they were prepared to volunteer for rescue operation when needed and expressed a need for relevant training. Therefore, self help and autonomous community level earthquake mitigation activities could function well under appropriate support and guidance.

f) Possibility of community level mitigation

Social organisations such as *Guthi*, clubs, trusts and associations are very useful community based organisations, which may be well mobilised during disaster time. In the city core area, nearly 84% of the households are affiliated with such organisations. For new settlers and younger households, various clubs, association and similar other informal organisations would be a potential focal point for locally based activities. It is important to activate these organisation and put them into a framework of community level disaster mitigation activities. Rescue and Relief is the major interest of disaster mitigation activities of the respondents. Close and synergic linkage between these organisations and public authorities such as wards or municipalities is the essential step for increasing resilience.

(4) Disaster Prevention Capacity

a) Religious tolerance

Historically, different communities have coexisted with mutual help and cooperation in Nepal. There has been a cultural and religious tolerance. In particular, Hindus and Buddhists have been visiting the temples and the monasteries and worshipping each other's Gods and Goddesses. There has been a tradition of self-help organisations such as the *Guthi* among the Newars.

b) Social organisations in old Newar settlements and new development areas

In the city core, the Newars are still intact. Their existing social organisations work as a binding force for mutual cooperation. But in the newly developed areas, people have come from different localities and gradually have to work together to arrange facilities of common interest such as roads, electricity, drinking water and sewerage.

Moreover, the lanes are narrow, and there are no established institutions in action (such as the *Guthi*) or any earlier acquaintances among the newly settled residents. In such situations some kind of organisation which could produce an environment to work together for a common goal becomes very important.

c) Possibilities of promoting CBOs in new development areas

One such organisation would be the Ward Office within a Municipality and a Village Development Committee (VDC). But these political/ administrative organisations have their own constraints and limitations. A Ward also could be a large area to cover during disaster. So the possibility of involving local organisations such as clubs, associations, or any non-governmental organisations at the grassroots level was considered.

Group meetings were arranged and opinions of residents were sought (Focus Group Meeting in Ward No. 34 of KMC and Ward No. 17 of Bhaktapur Municipality). It was very revealing to note that the participants were very enthusiastic in helping each other by getting organised in relevant groups. In both places (Wards), there were a couple of community-based local organisations, which could be very well prepared and used in case of disaster. They suggested that besides the various clubs, schools also could be used in case of emergency. And the linkage between Ward / Municipality and such local organisations should be promoted.

d) Willingness of disaster mitigation actions

At the meeting in Baneswore, Ward 34 of Kathmandu Municipality, participants expressed their willingness to retrofit their homes. There was also a suggestion that

a complete inventory of the condition of infrastructure (including the buildings) together with resources, such as open spaces, school compounds etc. should be made. The municipality also should develop and strictly monitor a scientific building code in order to avoid/reduce future risk.

e) Existing disaster management committee and its expansion

Ward No. 34 of KMC has a Disaster Management Committee, which is doing a preliminary survey of all houses and families as well as rehabilitation facilities. The participants were very appreciative of this activity. Even Bhaktapur even group promised to create one such committee at the ward level, which would strictly work for social works such as disaster management.

It was also suggested that all functional clubs such as sports clubs, school associations, temple trusts etc. should be made more functional and any non-functional clubs should also be revitalised. Everybody realised that 'sensitisation' and proper training for rescue were very important activities to be pursued in the future.

f) Future actions and public responsibilities

In Bhaktapur, the younger participants expressed their inability to face the dangers of new types of RC buildings. They had heard from their grandparents that wooden beam houses used to have hooks which would tie the walls and roof in such a way that the traditional technology was less prone to earthquakes, but they expressed their helplessness with the 'modern' buildings and were unaware of techniques for protecting against disaster if it happened in the future. This also necessitates a good training program for mitigation. Baneswore participants also suggested the updating of mapping of houses which would help one to plan the mitigation measures in the future. In Bhaktapur the ward chair strongly expressed his desire to get involved in such activities in the future. A list of 13 local organisations engaged in socio-religious work was provided which could be useful in such disaster management. During a Pilot Project, the Mayor of Lalitpur also emphasised the importance of community based disaster mitigation activities and the effective linkage between public and citizens.

(5) Lessons from the Pilot Project

A pilot project was conducted not only creating awareness among wards/community level but also getting feed back on an education plan for citizens. Three pilot areas were set, and they differentiate each other in characteristics of development age, city structure, community ties and earthquake vulnerabilities.

Activities were attempted to be carried out by both municipality / ward initiative and community initiative.

A series of activities was conducted as listed in attached Figure 3.3.2. Several points were recognised to be strengthened during the pilot activities. They are: public awareness raising, capacity building of local governments, empowerment of communities, training leaders, strengthening the community and local government relationship, and networking of different stakeholders.

3.3.2 Target Groups and Tasks

(1) Target Groups

Citizens and communities can become more self-reliant and resistant to earthquake impacts through sustainable outreach and education programs which provide them the knowledge and skills to prepare for and respond to a disaster. For effective disaster education activities, the common target groups are citizens and civil servants, taking into account that the key structural elements of disaster mitigation like schools and other buildings have been well taken care of. In contrast to this common practice, it has been observed in Kathmandu that the school buildings are not properly built and maintained to withstand a relatively major earthquake. Thus, children are regarded as one of the most vulnerable populations in the Kathmandu Valley. Moreover, most of the casualties in a Kathmandu Valley earthquake will be attributed to the unsafe buildings popularly known as non-engineered construction, which are built by local masons, often without any proper engineering interventions. Thus, increasing the capacity of the local masons is an important element to reduce vulnerability. Consequently, four target groups are recognised: civil servants, citizens, school children, and masons.

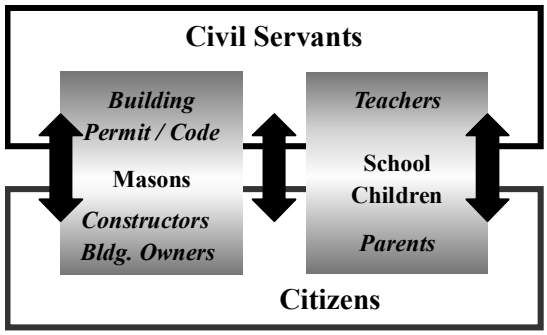


Figure 3.3.3 Mason and School Children as binding actors between Civil Servants and Citizens

(2) Target Tasks

Valuable lessons have been learned during the Social Structure Survey and Community Activities in the study's Pilot Project. Six tasks have been set in summarising these lessons. These are:

a) Risk Assessment,
b) Public Awareness Raising,
c) Human Resources Development,
d) Capacity Building for Organisations,
e) Networking, and
f) Establishing Infrastructure for Effective Disaster Management.

A task-target matrix has been prepared and the primary responsibilities are mentioned in attached Tables 3.3.1 and 3.3.2.

3.3.3 Civil Servants

(1) Capacity Building for Emergency Response

It is observed in recent disasters that the local government plays an important role in responding during a disaster. Thus, capacity building among local government entities is essential for effective emergency response during a disaster. An emergency response manual, which determines the roles and responsibilities of different agencies, is needed. To effectively use this manual, training programs, workshops and seminars will be required.

(2) Strengthening Coordination Capacity with Relevant Organisations

Proper coordination with different organisations is necessary to effectively use the available resources. The capacity, expertise and resources of different organisations can be utilised at the maximum level if there is prior communication among all these organisations. This will minimise the duplication of efforts and will be able to serve the people who need it the most. For strengthening such capacity, Role Play Exercises would be effective along with regular on the job training.

(3) Public Awareness Raising Activities

Civil servants have an important role in the dissemination of useful information to the general public. A master plan and an annual plan of dissemination should be made indicating the target groups. To effectively disseminate information, it is important to involve community workers, who are able to establish close linkages

with the community. Mass media can also play an important role in dissemination of information.

(4) Establishing Information and Communication Centre

Due to the lack of infrastructure, effective disaster management is found to be a problem in many cases. Centralised databases, a minimum amount of equipment, and networking are essential features of the infrastructure. An Information and Communication Centre is proposed to be built at the municipality level. This centre will have multi-purpose functions. It will serve as the Emergency Operation Centre (coordination centre) for local government during the emergency, and on the other hand, during normal times it will act as the information dissemination and training centre for the public servants and also for local citizens effectively.

3.3.4 Citizens

(1) Citizens as the First Respondents

When an earthquake occurs, public agencies try to minimise the damages, but the impacts of an earthquake disaster range over various fields, from road blockages, collapse of buildings, to suspension of the water supply and electricity. It is always the case that immediately after a disaster, we cannot expect normal public services. Thus it is necessary for local citizens to prepare for disasters in order to increase resilience in the community. If citizens unite and cooperate with each other, they can protect more lives and properties, since it is the citizens who know their neighbourhood very well and can respond effectively in the disaster situation. It is important for the local residents to know the conditions of their surroundings, and understand what the real hazards would be in disaster situations.

(2) Organisation as a Key Driving Force

Small wards or Village Development Committees (VDCs) are made up of a few thousands of residents, while bigger ones are more than 50 thousand residents. It would be more effective if there are Disaster Management Committees in smaller units in wards or VDCs. In some wards or VDCs, there are smaller units called toles, and in such units, Community Based Organisations (CBOs) often undertake social and cultural activities. Such organisations could be autonomous earthquake disaster management units for community level disaster management activities.

In traditional settlements, especially Newari settlements, such kinds of social

organisations usually exist. *Guthi* is the representative system of socio-religious association which have different annual functions, feasts, festivals, and occasions where participation is obligatory to all members. Some *Guthi*s have membership fees and annual fees to manage their activities. In most cases, they own buildings for gatherings and religious rituals, and they have kitchens and utensils for feasts and special occasions. These facilities can easily be transformed to a temporary shelter or community kitchen in a time of earthquake disaster, if the building remains standing, and their human networks and managerial practices could be a basic source for mobilisation of disaster management activities.

(3) Reinforcing Linkages between the Community and Public Authorities

Close linkage between the community and public authorities such as ward and VDC offices and the Municipality will minimise the risks and damages. Ward and VDC offices are the most in-front public bodies to the citizens. They would take initiatives to define roles and responsibilities of the CBOs and support them to prepare emergency guidelines. In normal times, public authorities would support locally based mitigation activities and suggest how community based organisations can play an active role. In emergency situations, CBOs would be an information source; they would collect information and convey objective information to the public authorities. Public authorities also convey necessary information through CBOs. An Information and Communication Centre, which was mentioned earlier in 3.3.2 (4), could be utilized effectively in this regard.

In such areas where social cohesion is tight and CBOs are active, there are two possible choices; one is to add new functions of disaster mitigation and management to the existing organisations, and the second is to create a completely new organisation. Each community can search for their own way among themselves. The point is for them to decide what is best to maintain continuous disaster mitigation activities which can penetrate into the everyday life of the general public.

In newly developed areas, social cohesion is comparatively less, but there are various CBOs. In these cases, the existing CBOs should be utilised as the seed to enhance community cohesion in a participatory approach. It is recommended to have autonomous disaster management units in the communities.

Self-help and work-sharing are two issues for effective community involvement in disaster management. While empowering CBOs for specific tasks, it is best to distribute responsibilities among different parts of the community for its effective response. It is advisable to clearly demarcate the responsibilities during normal

times and emergency times, so that the organisations work well during the emergency period. This has to be decided by the community at the local level. Table 3.3.3 identifies four sample recommended responsibilities of the Disaster Management Committee at the local level, which may vary depending on the nature of the community.

Table 3.3.3 Sample Role of Disaster Management Committee

	Evacuation Rescue First Aid	**Information**	**Buildings Public Facilities Shelters**	**Food & Water Supply**
Normal time	-Acquiring rescue, first aid skills etc. -Earthquake drill training	-Disseminating earthquake knowledge -Awareness raising	-Surveying resources and hazards	-Promoting Emergency kit bag
Emergency time	-Rescuing the injured -Instructing evacuation routes	-Collecting / circulating information among citizens & public authorities	-Cooperating to repair damaged houses	-Distributing food & water

(4) Socialisation and Public Dissemination

Socialisation and public dissemination of the results of damage estimations and disaster management plans to citizens are the first concrete step toward disaster mitigation.

Based on the experiences obtained from the community involvement activities during the Pilot Project, the following Model Plan for Earthquake Disaster Mitigation Activities is formulated and proposed for undertaking future actions by the initiative of the municipalities. Series of activities are recommended to be conducted at the ward level and diffused throughout the Valley with participation of different stakeholders, activities could be chosen effectively according to the realities of the selected areas and constraints of budget and time framework of the municipalities.

The image of the model plan is shown in attached Figure 3.3.4. The overall flow of the activities is made up of three steps; Learn, Think & Plan, and Action. Participants are recommended to include ward chairman, ward members, municipal civil servants, local leaders, representatives of CBOs, school teachers, health and medical service provider, and police.

In the “Learn” process, knowledge of the science and technology, such as earthquake mechanisms, damage estimation, and building vulnerability would be disseminated by the initiative of municipalities. At the same time indigenous knowledge such as personal earthquake experience of 1934 or/and 1988, past

earthquake damages in the area, roles and functions of the local communities, and CBO activities would be introduced by the local residents. The fusion of the scientific, technological and indigenous knowledge shared among the participants would make it easier to start thinking about earthquakes as their own problems according to their own surroundings and situations. During this step, audiovisual materials are recommended to be used to sensitise the participants.

In the second "Think & Plan" process, hazards and resources would be visualised and necessary countermeasures would be planned. "Community Watching", a walking tour of a community to identify hazards and resources along the designated route in a small groups with experts such as a structural engineer, an urban planner and so on, is an useful tool to learn the earthquake risks of neighbourhoods. During the tour, participants would check evacuation routes, open space, water resources, public facilities, building vulnerabilities, and hazardous objects on a map and take photos. Based on this experience, DIG (Disaster Imagination Game) would be conducted. DIG is a map manoeuvre exercise on a bigger scale map, (at least 1/10,000 map are recommended to be used) to mark hazards, resources, roads, bridges, public facilities, and plan countermeasures using the map, assuming various situations. Several DIG sessions are necessary to come to an agreement among different stakeholders. Action plans and To be done lists would be prepared to ensure an earthquake safer environment. Meanwhile, a mechanism for bringing disaster management resources budget to wards is also important. During the process, it is ideal to form a self help organisation among the participants for managing earthquake disaster mitigation activities. Otherwise, a certain existing CBO would take initiatives for such activities. In both cases, sustainability should be considered. Later, resource / hazard maps would be produced to alert earthquake risks and raise awareness among citizens.

The third "Action" process is to acquire direct experience and training. Getting a first hand experience is vivid and appealing. During the pilot project, most people were concerned about two points; one is whether their houses are earthquake-resistant or not, and the other is that how to react to earthquakes. These two points are basic question of how to survive in an earthquake. Model building experiments are the demonstration comparing vulnerability between an earthquake strengthened building and an ordinary one. Citizens would be sensitised to see the real situation of the two different models. Once a year on earthquake safety day in the middle of January, this model experiment would be demonstrated.

The earthquake drill would be practical experience on how to react during the real situation. The drill is to train for a safe evacuation process and procedures in earthquakes and impart first aid and rescue knowledge. The earthquake drill would

be done with the collaboration of the police, Nepal Red Cross Society, local schools, hospitals, and so on.

3.3.5 School Children

(1) Children as the Most Vulnerable Group

Since the school buildings of the Kathmandu Valley are found to be unsafe to withstand a moderately strong earthquake, school children are regarded as one of the most vulnerable groups. It is needless to say that children are the future citizens and the most valuable part of the community. School children have far-reaching impacts on the community as great potential for the next generations, and through the children, we can reach their parents and a larger section of the community. In this regard, it is important to put emphasis on disaster mitigation education for school children.

(2) Emergency Response Manual for Safety of the Children

While focusing on school children it is equally important to emphasise the training and understanding of the teachers, and make them well-prepared for an earthquake disaster. Thus, it is essential to have an emergency response manual, which will define teachers' response and leadership, direction during the emergency situation, information dissemination, and linkages between the relevant organisations.

(3) Earthquake Mitigation Activities in School Curricula

Besides the need for effective action during the emergency, it is also important to understand the nature of the disaster to avoid unnecessary panic. Thus, school curricula should be developed which will state the nature and cause of disasters and what to do before, during and after a disaster. The curricula will depend on the respective education level and will vary from elementary to high schools. A model school at different levels will be selected to develop, test, and modify the curricula, and its acceptance by the children will be ensured.

In the Kathmandu Valley, government schools are obliged to operate on two shifts or sometimes three shifts. Consequently, schools cannot provide enough hours for regular subjects, education for personality development is scarce, and disaster education is rare. Besides, students are keen on academic achievement, especially for a national level unified exam called School Leaving Certificate at the 10^{th} grade.

However, certain private schools in the Valley have realised the necessity of earthquake preparedness and published a guidebook on how to react to earthquakes. We need to formulate realistic model disaster education practices to cope with this situation involving relevant organisations, possibly with the Ministry of Education, municipalities, and so on.

(4) Earthquake Drills

To obtain first-hand experience of an earthquake disaster, it is recommended to have earthquake drills for school children, to simulate the earthquake event. These drills are regarded as one of the best training and education media to understand different elements like evacuation, first aid, etc. The importance of open space and safer buildings will be emphasised using the mitigation maps as a training tool. The Earthquake Safety Day on January 15th can be used as a possible date for drills in the schools.

3.3.6 Masons

(1) Introducing Certification for Skilled Masons

Most houses in the Kathmandu Valley are made up of non-engineered buildings, built by local masons. Thus it is important to focus on the masons and to increase the capacity of the masons for earthquake-safer construction. To make the efforts sustainable, it is useful to provide incentives to the masons and to provide certification after the training, which can ensure higher wages for those who are certified.

(2) Mason Training Centre

To enhance the capacity of the local masons, a Mason Training Centre is proposed to be built at the local level. This centre will be a joint initiative of the local government and non-governmental or community-based organisations. The major purpose of the centre is to train local masons. However, this centre will also act as an awareness raising centre to emphasise the need for safer construction practices with basic experimental equipment to test building materials. Thus, this centre will contribute towards the sustainable efforts for effective disaster mitigation. At the same time, a social economic system to ensure higher wages for masons will be introduced along with upgrading technical skills.

CHAPTER 4 MAINTAIN GOVERNANCE

This study has identified the characteristics of the earthquake hazard that the Kathmandu Valley's urban areas face, what activities, institutions and structures are at risk from those hazards, and why, and how to identify, select, and implement actions and programs to reduce earthquake risk over time. But earthquakes and other disasters happen, posing immediate threats to lives and property. The immediate action in response to an earthquake requires preparation in the form of planning, training, interagency coordination, and other tasks in order to minimise losses and suffering.

Disasters occur whether we have adequately prepared or not. Some are slow to develop, while others, including earthquakes, occur without warning. When disasters strike, individuals and organisations react; their reactions are guided by whether they know what to do, their degree of preparedness to take appropriate action, and other factors, including their confidence in the safety of loved ones.

In a major earthquake disaster, it is quite possible that some key officials of the government may be injured, incapacitated, or killed, that some government offices and equipment would be destroyed, and that public or private documents essential to the continuity of governmental and business operations, would be ruined or lost.

The government, at all levels, is responsible for providing continuity of effective leadership and authority, direction of the emergency operations, and management of recovery operations. For this reason, it is essential that governmental entities continue functioning during and following the occurrence of a disaster. This requires that they take precautions and preparedness actions including developing plans and manuals to guide response, establishing systems for communications, and coordination, including an Emergency Control Board and Emergency Operations Centre, and advising employees of their responsibilities in case of disaster.

The primary aims of emergency planning are to save lives, protect property, and avoid disruption of governmental, social and economic activities. Key elements of emergency plans and manuals include the assignment of responsibilities and authority, and the establishment of systems for command and control, communications, coordination, and collection and dissemination of information. Emergency response and recovery planning provides for enhanced decision-making and implementation of the decisions before disaster strikes, in the immediate emergency period when decision-making is a matter of life-and-death,

and after the event, when the welfare of victims, society, and the economy are at risk.

4.1 Lessons from the Gorkha Earthquake

The Gorkha earthquake, which occurred on 16 July 2001, revealed a weak initial response in Nepal. The time of the occurrence was at about 9:57 pm, just ten minutes before the end of broadcasting service time. No broadcasting station reported the earthquake that night, with the exception of Radio Sagarmata, which extended its broadcasting time until 10:30 pm, creating the first special program in the history of Nepal as a consequence of an earthquake, though it is believed that few listened to it.

Table 4.1.1 Characteristics of Gorkha Earthquake (By USGS)

Lat, Lon, Depth	27.973N, 85.213E, 33km
Time	2001/07/16/ 21:57:46 (Local Time)
Magnitude	5.1Mb
Houses collapsed, Injured	At least 20, At least 3 (By Kathmandu Post)

The Department of Mines and Geology (DMG) calculated the epicentre and magnitude of the earthquake within 30 minutes, using the data automatically transmitted through their own lines from various seismograph observation centres. As soon as a staff member sensed the shaking in his home, he rushed to the office for the task; however, he did not report the findings to anyone, though he informed some people who called him up.

The Control Room in MOHA, always on standby for emergency action, awaiting receipt of any information from 75 CDOs, did not make any notifications to the disaster management staff or take any action. Therefore, at the Department of Narcotics Control and Disaster Management there was no knowledge of the epicentre and magnitude, and it was thought that the initial response should be taken by the CDO, and not by the department. Consequently, no action was taken officially by the department until the next morning, ten hours later. Nevertheless, the department and MOHA should become comfortable playing a leadership role in managing inter-institutional response to all but the smallest disasters, because each CDO has limited resources and controls a limited geographic area.

In order to manage a major earthquake disaster in the Kathmandu Valley, MOHA and the department will need to gain repeated experience in managing smaller disasters and simulated large disaster events. They need to become accustomed to handling such major earthquake disasters in advance as the anticipated Kathmandu Valley event will cause much more extensive disruption and damage than disasters in rural areas.

4.2 Acquisition of Earthquake Information

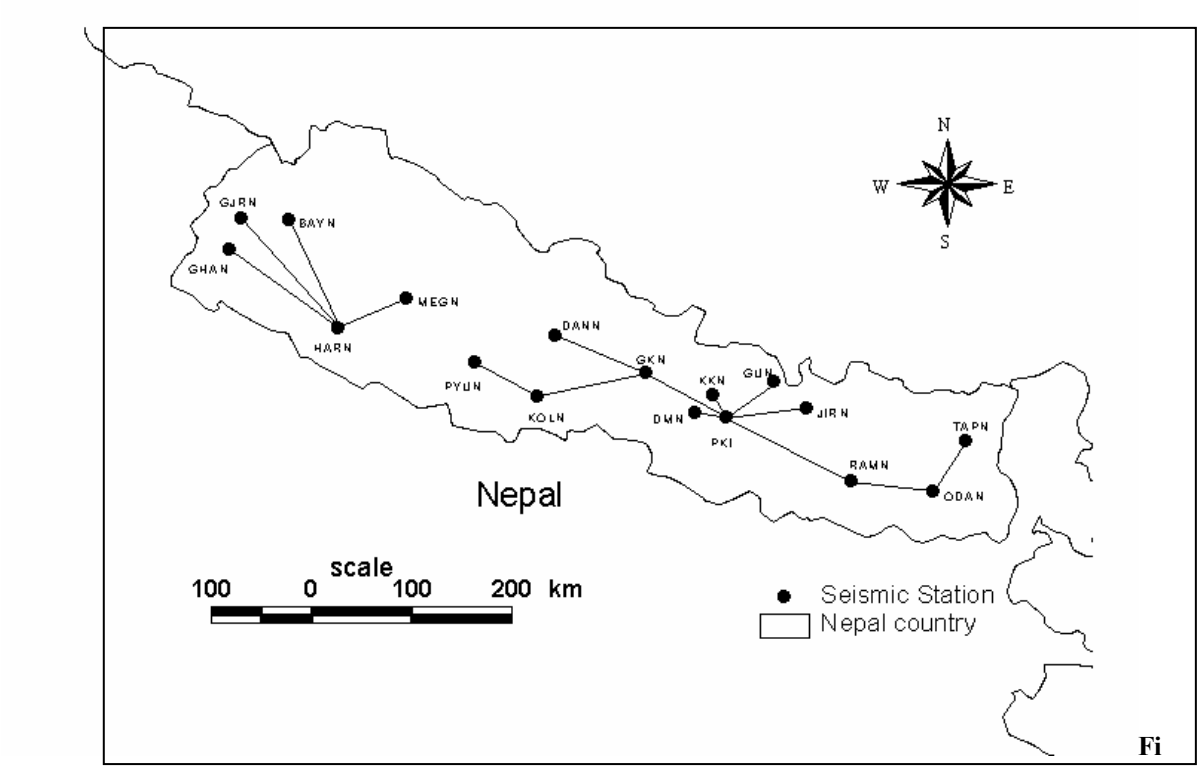
One of the important lessons learned from the Gorkha Earthquake was that Nepal currently has no rapid means to communicate any earthquake information, when an earthquake hits the nation. The Control Room in MOHA would be able to receive some initial subjective reports regarding the earthquake from the 75 CDOs. However, MOHA's communication system is not resistant to strong ground motion nor is it capable of dealing with congestion caused by many communications.

Rapid acquisition of earthquake information motivates institutions to take initial response action in a timely manner, before the reports of the disaster's impacts start to come in.

4.2.1 Acquisition of Epicentre, Magnitude and Seismic Intensity

DMG is operating the one and only seismological network in Nepal. The network was started in 1985 with five stations around Kathmandu and expanded in 1994 to 17 stations covering the entire country as shown in Figure 4.2.1. The seismic records of the central and eastern 12 stations are continuously transmitted to the National Seismological Centre (NSC) in Kathmandu (in DMG), and another five stations transmit to the Regional Seismological Centre in Birendranagar. The seismic wave records, which are collected by the Regional Seismological Centre, are transported to NSC in digital tape cartridges.

When the earthquakes occur, the origin time, epicentre location and magnitude in local magnitude (M_L) are decided by processing the seismic records by the operator manually. It is estimated that all earthquakes greater than M_L= 2.0 in Nepal can be detected by this network.



gure 4.2.1 Seismological Network of Nepal

The purpose of this network is to detect the location and size of the earthquake precisely. The rock sites are selected for the station to avoid noise. The sensor that is used for this type of observation is called seismometer, which is designed to detect very weak ground motion.

The strong ground motion seismometer is another type of sensor to record seismic waves. The strong ground motion seismometer can record up to 2 g acceleration normally. This type of sensor is used to record surface ground motion or vibration of buildings during large earthquakes. DMG has two strong motion seismometers in DMG and Kakani. The records are picked up manually by visiting the station.

4.2.2 Rapid Radio/TV Broadcasting (or Report by Electronic Media)

An earthquake disaster begins immediately when the earthquake strikes. Between the earthquake and the effects it induces, there is only a short time lag in the case of a tsunami or earthquake-induced debris flow from a glacier lake outburst, etc. Therefore, rapid radio/TV broadcasting of the occurrence of the quake, as a natural phenomenon rather than as a disaster, has sometimes received little attention. The tragic effects of a large earthquake can easily take days to be realised and understood, because the extent and range of the disaster is very difficult to define. Therefore, there is typically confusion among policy-makers and emergency

responders in the absence of accurate information about the severity and scope of the disaster. Fast broadcasting by radio and TV of the earthquake event, even if it contains little or no information about the disaster, can assist in securing appropriate responses by the public as the disaster unfolds.

The electronic media provide the best tool for rapid dissemination of earthquake information to the public. An excellent example of this is presented by the system in Japan. It has become customary in Japan that as soon as citizens and officials sense earthquakes, they automatically switch on their TV or radio to find out the location of the epicentre, the magnitude, and the shaking intensity level in various districts. This behaviour is almost routine for many Japanese and has contributed to a high level of sensitivity to earthquake disasters and to training on how to respond when the disaster strikes their area. Official broadcasting stations are obliged to stop regular programming immediately to report the earthquake and its effects if the scale is bigger than a certain limit. TV broadcasts run telop (written messages across the television screen) on the earthquake and its effects, if it is smaller than the limit. Announcers in broadcasting stations are trained to announce notices, like "remain calm", "do not get upset", and "extinguish fires," etc., reading from manuals always set on their desks, as soon as they sense earthquakes.

The Japan Meteorological Agency, the responsible organisation for seismological observation in Japan, not only analyses transmitted earthquake data but also collects reports of shaking intensity from various districts, immediately after earthquakes, and reports the results automatically to concerned authorities and media companies on direct lines within minutes. This system provides the foundation for prompt response by the media to any earthquake.

4.2.3 Rapid Notification of Key Institutions

In the Gorkha Earthquake, DMG succeeded in identifying the quake's epicentre and magnitude within 30 minutes. A similar response is expected in the case of the anticipated Mid Nepal Earthquake because DMG's observation system is supported and backed up by its own efficient wireless communication systems and generator. However, DMG did not report the results soon enough to key institutions like the Prime Minister's Office, MOHA, RNA, Police and media etc., and key institutions did not request the data with the exception of Radio Sagarmata.

It is strongly recommended that DMG develop an automated reporting system to key institutions, preferably by dedicated lines.

4.2.4 Proposal on Rapid Acquisition/Report of Earthquake Information

The followings are recommended points for improvement in the acquisition and reporting of earthquake information.

a) All the necessary equipment in NSC should be fixed on the desk or shelf so it will not fall due to shaking.
b) DMG can decide the epicentre and magnitude soon after earthquake if the earthquake occurs during business hours. There is no responsible person in NSC at night-time and holidays, because the organisation is regarded as a pure academic research institute. NSC should be designated as one of disaster prevention organisations and a system for 24-hour operation is necessary.
c) The five separate seismic stations of west Nepal should be merged with the central network for an integrated national seismic network.
d) The communication network with MOHA, the Royal Palace, Radio/TV stations and other related organisations, which can be used in case of disaster, should be equipped.
e) Several strong ground motion seismometers are recommended to be set at several points in the Kathmandu Valley. The recordings of these sensors can be used to ascertain ground characteristics and to decide seismic code provisions for structures.

4.3 Communication of Damage Information

4.3.1 Assessment of Damage Information

Timely assessment of damages is essential for rescue and relief work. Without a good idea of the extent and severity of the damages, it is not possible to prioritise and send rescue workers and equipment, thus causing confusion and ineffective response. The size of the area to be covered in the assessment, differs from central government to local bodies. The former needs to reflect a regional/district scale and the latter a local scale.

In any country, the initial response from the government depends primarily on information from the media. The government has lines of communication from the police, army and ministries; nevertheless, their reports are generally not only either slow or old but also do not reach the person in the right position who needs the information. The media is expected to provide information services to the society in Nepal; however, the contribution would be within some limitations, because the capability has not developed very well. This subject of the media will be taken up in the next section.

Most of the detailed information from the official sector would be provided by the Royal Army, police, fire service, and civil servants who are close to the community. However, the current situation regarding Army and police communication systems is not open enough to allow detailed evaluation, so that further discussion deals only with regard to the administrative sector. Civil servants very often perceive their reporting tasks as ancillary to other critical disaster response duties, such as rescue and relief. Systematic institutional methods for the collection of information have not been developed in the administrative sector. Even in normal times, the bottom up transmission of information is little, due to the prevailing environment of extreme centralisation. First of all, the lines of communication should be established as soon as possible, and the business style in normal times should be improved from the current top down approach to the combination of top down and bottom up.

An even more difficult task is to acquire early damage assessment information for areas at the regional/district level. Recognising the difficulty of damage assessment, HMG developed certain strategies during the response to the floods of 1993 (Disaster Relief Implementation Manual: Logistics Support, 1996, UNDP), which are also applicable to the current case:

- The fielding of personnel from the international community to act as monitors and neutral observers of relief operations in the field.
- Inviting international personnel to join the Government team staffing the Disaster Relief Unit (note: no longer in existence) in the Ministry of Home.
- Sending a special team to the field from the central government to verify damage statistics and take necessary actions to improve the disaster response efforts.

Newly taken aerial photographs or High Resolution Satellite Images would be another realistic and powerful tool in Nepal, because they do not depend on institutional systems. They provide accurate maps not only for the initial response, e.g. to determine which areas are affected the worst and where roads are blocked due to landslide, but also for planning for reconstruction. Aerial photographs are preferable due to higher resolution, though Nepal has no aeroplanes for this purpose, so this is something that international donor institutions should implement promptly and provide to the appropriate Nepalese institutions.

4.3.2 The Role of the Media

The media would be an indispensable tool for initial response. The media provides the fastest information to the public, even though they are poorly equipped. Among the media, the electronic media is expected to play the larger role in an earthquake disaster because of their potential for providing fast and vivid reports, although newspapers have the advantage of providing more analytical, objective and influential comments. Technical issues must be addressed in order to facilitate advances in the electronic media. Also, government officials must take into account that for the media to fulfil their potential, they require good cooperation from the official sectors.

(1) The role of radio

Among the electronic media, it is said that the radio stations are the most influential in Nepal.

Table 4.3.1 Radio Broadcasting Stations in the Kathmandu Valley

As of August 20, 2001

	Station Name	Operator	Modulation	Frequency	Studio Location
1	RADIO NEPAL	Government	AM	576 kHz	SINGHA DURBAR
	do.	do.	AM	648 kHz	do.
	do.	do.	AM	684 kHz	do.
	do.	do.	AM	792 kHz	do.
	do.	do.	AM	810 kHz	do.
	do.	do.	AM	1143 kHz	do.
	do. (VHF)	do.	AM	41.0 MHz	do.
	do. (VHF)	do.	AM	60.0 MHz	do.
2	RADIO SAGARMATHA	Commercial	FM	102.4 MHz	KUPANDOLE
3	KANTIPUR	Commercial	FM	96.1 MHz	PULCHOK
4	ONE HUNDRED	Commercial	FM	100.0 MHz	SINGHA DURBAR (Leased from Radio Nepal)
5	METRO FM	Municipality	FM	106.7 MHz	ASAN (MUNICIPALITY)
6	HITS FM	Commercial	FM	91.2 MHz	BANESWOR
7	97.9 KATH FM	Commercial	FM	97.9 MHz	NEW ROAD
8	HIMALAYA (HBC)	Semi-Commercial	FM	94.0 MHz	BAUDHA

The news source of Radio Nepal is to be supplied by the Official RSS news agency. Other radio stations do not have a specific newspaper publishing company. They have their own correspondents all over the country, but sometimes get stories from a newspaper publishing company.

The Government monopolised all media before the multiparty revolution, and still there exists no private TV broadcasting stations. Hence, the lack of competition in the TV sector leads to little innovation in programming, which in turn results in

little success in building popularity among the public. In addition, many subscribers receive service through cable rather than antenna, which may be more fragile in disaster time. Meanwhile, the radio stations are developing steadily to contribute to disaster management through the principle of competition. Radio Sagarmata has regular earthquake disaster awareness programs under the sponsorship of the Nepal Society for Earthquake Technology (NSET-Nepal). The radio stations also have improved their initial response after earthquakes. The Ghorka Earthquake occurred at about 9:50 pm on 16 June, 2001, shaking Kathmandu, and radio service had almost ended because the scheduled service time ends at 10:00 pm. But as soon as the staff at Radio Sagarmata felt the earthquake, they created a special program for the earthquake by extending the service time untill 10:30. It is said to be the first urgent special program at a time of disaster in the history of Nepali media. It was not only a great contribution to raise public awareness but also a good drill of initial response for greater disaster from earthquakes.

(2) Issue to be Resolved

The private media are still facing a chronic lack of resources like qualified staff, reinforced offices, alternate communication systems, and mobile systems, etc. At the time of a great disaster in Kathmandu, it would be required that their service be not degraded, but also that their resources be mobilised in a better way than at normal times. Hence, preparedness of the media is strongly recommended in order to enhance initial response in an earthquake disaster in the Kathmandu Valley.

In addition, local journalists have little experience in dealing with a tragic disaster, so they are not prepared enough to meet the rigorous demands of the situation that would be caused by a major earthquake. Therefore, it is also recommended that seminars be conducted on the role of the media in disasters and how to react and provide useful and accurate coverage of the disaster situation. In recent years, such seminars have been conducted by a local professional organisation, the National Society for Earthquake Technology (NSET-Nepal), and have been very well received by the Valley's media representatives, and these should be continued and held periodically. It should also be considered to offer the opportunity for journalists or media companies to receive international training or consultancy services as an ODA.

The National Broadcasting Act, 1993 formulates the priority programs that agencies must present; however, it does not mention anything about disaster reporting. Prompt revision of the Act to outline the responsibilities and tasks of the

various media in regard to disaster reporting is recommended.

4.3.3 Emergency Public Information

Public awareness about disasters can be easily enhanced through vivid news reports on earthquake disasters, their impact, and how to avoid loss and injury due to disaster events. Live reports of how people are coping with disaster can educate better than textbooks if they are thoughtfully prepared. Besides acting as a beacon for initial response, the media plays at least five roles for earthquake disaster management as mentioned below:

- Biggest tool for awareness.
- Obstacle against irresponsible rumours.
- Interface between rescue teams and victims.
- Conveyor of encouragement to depressed people.
- Watchdog for proper management by the public sector.

All public information and education programs should be based on the analysis of risk (hazard and vulnerability), in order to identify the types of emergency situations that could arise. Involved institutions - government, the media, and non-governmental organisations - should consider the following:

- Create an active program that combines emergency information with educational material.
- Maintain strong contact with the media, so that local newspapers, radio and television cooperate in the dissemination and publication of detailed and specific instructions to the public about the nature of the disaster and action to be taken.
- Following the earthquake, it is likely that electric power will not be functioning and some media would have suffered damage, so that the usual news media may not be able to disseminate information.
- Voluntary groups of amateur radio operators should be incorporated into the program for dissemination of alerts and instructions to the public.

Before the earthquake occurs, public awareness campaigns about the potential threats and appropriate responses should be conducted. The success of the campaigns and other programs will depend largely on the degree of cooperation between the government and the commercial news media. When a disaster occurs, the Emergency Control Board is responsible for coordinating the release and

dissemination of situation-specific information. It is essential that the government speak with a single voice, and for that reason a Coordinator of Public Information should be designated to be responsible for information dissemination to the media and the public during the disaster.

The first priority is to give to the public who are at risk, information and instructions that are timely, coherent and useful. The control of false rumours and problems with "black market" traffic and price speculation for emergency supplies need to be taken into account. Positive and verified information about the operations with respect to the emergency should be offered.

In the event of an emergency, public information should correspond to protocols or procedures that have been designed to generate an effective response by the population. Care should be taken in the design of messages to the public, and a monitoring system should evaluate how the public receives and reacts to the messages. Systems for alerting the public to imminent danger should also be devised.

4.4 Emergency Communications

4.4.1 Communication System of Army and Police

The army and police hold the only nation-wide emergency communication networks in the country. The existence and continued functionality of these networks are essential. To maintain the networks, every effort should be made that these systems operate satisfactorily at any time to cope with a state of emergency; in other words, they should operate without failures and bring their ability into full play during relief and restoration activities.

A heavy responsibility toward the people must not be neglected in order to get their trust. The role of the army and police contains many different things in order to protect the nations' life and property, as well as social life, for which the stabilised emergency communication system is indispensable.

Hence, preparedness of the hardware systems is mandatory. There is a point to be considered whether the present network can fully cope with every situation in an earthquake disaster. Since the army and police so far have not experienced a large-scale earthquake and the response to it, earthquake countermeasures and precise preparations are required. It is necessary to know the defects of the present network such as radio wave propagation distance range, existence of frequency interference and system reliability.

To strengthen the functionality of the communication network, first it is requisite to

make close inspections periodically of the existing facility/equipment for complete operation. Secondly, it is required to have a sufficient number of communication equipment, and finally, since the presently operating systems are conventional type, it is recommended that the police communication system be replaced with a modern digital system such as multi-channel access (MCA) as mentioned later, which is widely applied in Japan for many purposes. The system is furnished with the field proven performance that has played an active part in the Hanshin-Awaji Earthquake Disaster in Japan. The present police communication systems are co-used or reserved as a backup facility. In addition, the provisional use of a satellite mobile telephone is also to be considered for stable emergency communications.

4.4.2 Emergency Communication between Administrative Organisations

When a serious earthquake occurs, what is the suitable means of communication with responsible persons in the administrative organisations? The army and police have their own communication network with versatile equipment, but these are in principle used for various relief activities on the spot. For gathering emergency information and fast contact with each administrative organisation right after the earthquake, several communication means are contemplated, including utilising subscriber telephone, public mobile cellular phone, leased lines, facsimile and Internet etc. However, it is more effective for the Government to establish exclusive hot lines as an integrated communication network between each organisation using a digital mobile multi-channel-access system. This network would connect with DMG, MOHA, the Prime Minister, Royal Palace, Police Department and relief parties, National Radio and Television, CDOs, Central Disaster Relief Committee, Airport and UNDP as shown in attached Figure 4.4.1. The mobile telephone network operates as two-way communications like an ordinary telephone and can even be connected to the public subscriber telephone network (PSTN). In addition, it is possible to communicate with MOHA and above organisations simultaneously. In this way, it is unnecessary for MOHA to speak the same information and/or instructions by repetition to each organisation, and that can save time. The portable handset is small in size and light in weight, so that the person in charge always carries it without missing an important emergency call.

The ideal situation would be to establish all at once an integrated communication system for disaster management, all in one project; however, it is not realistic. This goal should be pursued so that such systems would be realised to some practical extent, in the course of development of individual projects to construct or improve individual communications systems. In order to achieve the anticipated goal,

however, it is desirable that a master plan be designed for an integrated communication system, so that the development of individual components of the system is compatible with other components. As part of this overall master plan, certain protocols should be prepared, e.g. planning of appropriate emergency frequencies.

4.4.3 Amateur Radio Network

In the event that the major communications network is interrupted or disabled, the amateur radio operation is helpful for reporting the disaster status. It will perform a very important role during disasters as is known in many cases of its activity in the past. Since the amateur radio stations are scattered all over the country and world-wide, they are widely expected to act as helpful reporters and collaborators as well as volunteers. They are able to give further detailed information of disaster status on the spot. They will make fast reports with careful consideration of victims and first-hand information of damages from the standing point of an inhabitant. Since the number of the amateur radio stations is extremely small, or almost nothing in the country, it is suggested that concerned governmental entities should promote the widespread use of the amateur radio stations which cooperate and contribute in an emergency. By forming the Nepal Amateur Radio League (NARL), the activity by the amateur radio operators will fulfil its function of assistance and contribution to the official relief work.

4.5 Direction, Control and Coordination of Response Operations

Research performed by academicians and practitioners alike on the lessons learned from disasters around the world indicate three recurring themes. Breakdowns in direction and control, coordination, and communications are almost inevitable.

4.5.1 Direction and Control

In a crisis, in order for response operations to be undertaken with speed and efficiency, lines of authority and responsibility for making decisions and taking actions must be clearly defined and well understood. That is, everyone must recognise who is in charge, who sets priorities, how decisions are made, and how they are communicated to field personnel and other implementing entities.

(1) Powers of His Majesty the King

If a grave crisis confronts Nepal, His Majesty may, by proclamation, declare or order a State of Emergency in respect to all or any specified part of the Kingdom. By virtue of such declaration, His Majesty may issue such orders as are necessary to meet the exigencies of the situation, and orders so issued are operative with the same force and effect as law, so long as the State of Emergency is in operation. These powers are conferred by the Constitution of Nepal (1990).

Accordingly, it is clear that His Majesty retains the power to direct and control all operations in response to a disaster during a declared State of Emergency. This could include making instructions to governmental and civil entities, requiring that they support and provide services, equipment and supplies for the purpose of safeguarding lives and property and assisting in rescue and relief.

(2) Activation and Mobilisation

When a disaster appears imminent or has been detected, the Prime Minister or other responsible official so authorised should activate the governmental resources necessary to respond to the situation. Also, facing an imminent disaster, the responsible officials in each governmental entity should activate the personnel necessary for responding to the situation. Each governmental organisation should be required to develop procedures for activation and mobilisation of its personnel.

4.5.2 Coordination

When several or many organisations respond to a disaster, decision-making must be coordinated and centralised. Due to the multiplicity of players to disaster response, the organisational model for multi-agency response should emphasise coordination rather than a strictly militaristic command and control model. The key is clear delineation and assignment of functions and responsibilities and effective inter-agency coordination. In order to effectively manage response, an efficient system and means for coordination and dissemination of critical information about the incident and respondents' activities is also necessary.

It is envisioned that the proposed Central Government Emergency Control Board(ECB) should play the primary role in overseeing and coordinating all central governmental activities in response to a disaster situation. The Board would be convened by the Prime Minister to share disaster information in support of

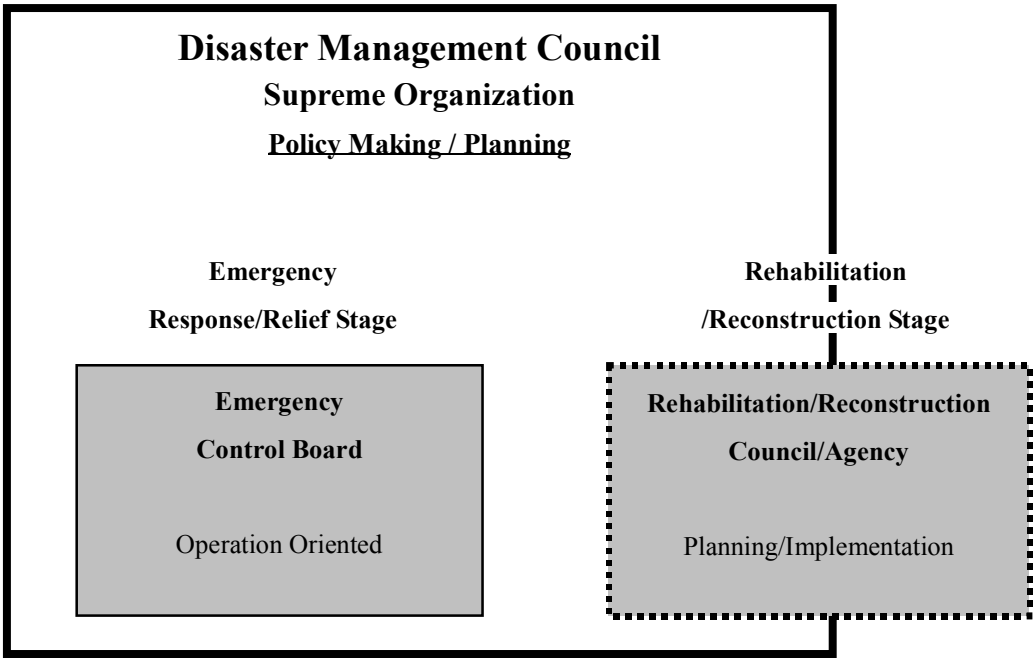
decision-making, in regard to directing and coordinating response, rescue, and relief operations. The Board would supervise and control the actions of the government and coordinate them with district and local authorities as well as non-governmental organisations and international agencies.

In addition, every concerned organisation, either official or private, should establish its own Emergency Control Board (ECB), to be activated immediately after any medium to large scale earthquake occurs, to manage its own response and to coordinate with other responding agencies. Every ECB should have clear assignments of responsibilities among the organisations and clear lines of communication and command as a basic foundation.

To carry out these functions, each Board would be supported by an Emergency Operations Centre (EOC) as an operative facility.

4.5.3 Emergency Operations Centres (EOCs)

The central government EOC serves as the natural focal point for the overall national emergency response as well as for the central government's response. Municipalities and wards should also designate an Emergency Control Board and maintain a facility that the Board can use as an EOC.



- Each stage needs different focal points, because each stage needs different players.

- Above-mentioned system must be prepared in different levels of institutions such as central/local governments and communities etc.

Figure 4.5.1 Special Organisation in Disaster management Council during and after EARTHQUAKE

(1) The Central Government EOC

This is the most important EOC, as it is the focal point for centralising all information about the disaster and response activities, for evaluating and prioritising needs for assistance and equipment, and to provide the basis for effective decision-making and dissemination of information. It serves as the natural focal point for the overall national emergency response as well as for the central government's response. However, the current EOC of the central government lacks the necessary foundation of well-trained and experienced participating staff at all key institutions, adequate communications systems, reliable backup power, etc. due largely to the big bureaucratic systems surrounding by up to 21 concerned ministries. Again, we have to emphasise the establishment of a clear institutional and inter-institutional system in the government. Also, involved ministries and government companies need to establish their own emergency procedures and Emergency Operation Centre (EOC).

The central government EOC should have, as hardware, the following attributes:

- Earthquake resistant building.

- Spacious rooms, preferably with work space for 50 staff members, which are not currently available at either MOHA or the Prime Minister's Office.
- A media briefing room.
- Backup generator.
- Adequate and earthquake resistant communication system.
- Computers and local area network.
- Maps and resource inventories.
- Stock of drinking water and food, etc.

As for the location of the EOC, it should be in Singha Durbar, preferably in the Prime Minister's Office. As for communications systems, commercial lines, army lines, police lines, mobile communication systems and satellite communication systems should be included. An efficient communication system is also needed to transfer the features of the earthquake, i.e. the place and depth of epicentre, magnitude, and anticipated shaking intensity in each district. It could be argued that the first priority for communications would be to improve the administrative and operational systems, however, it is recognised that communications systems need human components as well as hardware, and it takes a certain period of time to establish the human and institutional foundation for the hardware to be used as intended.

(2) Municipal and Ward EOCs

The EOC for a municipality or other local body should ideally have the same attributes as that of the central government, but realistically it can be expected that smaller space and less equipment and supplies will be available. One of the big problems to be solved is the availability of an EOC building for local bodies. The Kathmandu municipality has "Municipality Office" in Kalimati, though, it is a small Mayor's office and in fact it is located far from the core area of the city, and individual departments such as Social Welfare Department in charge of disaster management which are scattered. Other municipalities' offices would probably not survive a major earthquake due to their extreme vulnerability.

Ward offices are the most fundamental EOCs, as they are closest to the people with on-site information about the disaster. Ward offices would assess which sites are most affected, who needs what kind of assistance/help, and mobilise representatives of individual communities to transfer relief work or material to victims. However, the current ward offices have a major flaw, in that they are ward assemblies rather than administrative offices.

Ward officials have a tendency not to behave as autonomous bodies nor effective administrative branches of the municipality. If some wards are dominated by one political party, they may behave in a political manner and equality in treatment of the citizens may be lost, causing irrevocable damage to society. This issue must be considered carefully.

At this time, most ward offices are very vulnerable to earthquake and do not have any emergency equipment or supplies.

(3) EOC in the UN Compound

The United Nations in Nepal has already established an EOC building in PulChok where all UN organisations are centred. The EOC's primary role is to confirm of the safety and relief of their staff who are located all over Nepal, though, it would be available for rescue and relief of the people after a while.

4.6 Maintain Ability of Governance

It is essential that governmental entities continue functioning during and following the occurrence of a disaster, because all levels of government are responsible for providing continuity of effective leadership and authority, direction of the emergency operations, and management of recovery operations. This requires that they take precautions to protect vital records, develop emergency procedures, and advise employees of their responsibilities and obligations in case of disaster.

4.6.1 Obligations of Officials and Employees of the Government

During a disaster, all officials and employees of the Ministries and other governmental entities should be advised that they are obligated to work and provide the services required by the situation or requested by the Prime Minister or other responsible official. During disaster periods, institutional officials and staff who have decision-making authority should be obligated to make themselves available to determine the measures to be taken in the case of problems that are not routine and unexpected.

4.6.2 Obligations of the Companies that Provide Public Services

During a disaster, all officials and employees of public service companies such as those that supply power and telecommunications services should be obligated to work and provide the services required by the situation or requested by the Prime Minister or other responsible official.

4.6.3 Lines of Succession

It is necessary that every government official who has a role in managing disaster response and recovery, nominate three alternate officials or staff who can, if necessary, carry out his responsibilities. These named persons would have, in such an event, the same responsibilities and authority as those who cannot act. The lines of succession in each governmental or autonomous institution such as the government utilities should be established according to each organisation's internal procedures.

The National Disaster Management Council and the central government ECB should maintain the succession lists, including contact information for the persons who are named.

4.6.4 Preservation of Vital Records

Vital records can be defined as archives that are essential to the rights and interests of individuals, governmental entities, corporations and other entities, including vital statistics, land ownership and taxation files, registries of licenses and permits, articles of incorporation, and historical information. Vital records also include the records that are essential for response and recovery operations, the location of equipment and emergency supplies, personnel lists, etc. They also include the records that are essential to the functioning of the government, such as laws, decrees, court archives, financial records, etc.

Each Ministry and governmental entity should be assigned responsibility for identifying, preserving and protecting its vital records, and creating and maintaining copies thereof in a location separate from the original documents.

4.7 Emergency Plans and Manuals

Inter-institutional management in a tragic disaster shall be implemented not through a command approach, but through a cooperative one. Damage to communication systems and means of transportation stress systems of command and control; often,

subordinate staff in the field must act on their own, as orders cannot be communicated to them by headquarters. Relevant organisations or individuals have to respond to their own judgement in more or less isolated situation. It is like the situations when corps or soldiers are isolated on the battlefield.

In these circumstances individual organisations or persons have to respond based on their own understanding of their roles and responsibilities and based on their perspective or images of how others are coping with the disaster. "How they can take a proper response in the isolated situation" depends on "How they can get an accurate perspective or images on works by others".

The fruits of planning for disaster management in normal time are not only the final product itself but also the planning process, as individual participants obtain accurate perspectives or images in disaster time. It is the best training or exercise procedure. Therefore, planning shall be implemented among all concerned organisations in an open and participatory process.

Research into the response to various world-wide disasters has indicated that planning and preparedness pay off when disasters strike. Planning and preparedness reduce confusion from the unknown, during an emergency and improve decision-making. The best plans are simple, straightforward, clearly understood and accepted by all parties, and fit with normal duties and expectations. The best plans are built on the daily or routine response and take into account existing informal relationships and lines of communication; otherwise, they may be ignored.

In the Kathmandu Valley, significant emergency planning efforts have been undertaken by three sectoral working groups organised jointly by the UNDP with other international institutions and the Government. This work has resulted in the development of an inter-institutional planning process and draft implementation manuals for three critical areas of emergency relief, viz:

- Logistics (including procedures for disaster assessment and relief supply procurement and distribution).
- Health Disaster Relief.
- Food Disaster Relief.

To build on, complement, and integrate with these manuals, the central government and each concerned institution must develop its own emergency plan or manual to define the actions each will take and how they will interact and coordinate with other institutions. In more severe and tragic disasters, the central government has to play the most significant role, due to the overwhelming situation and need for many

personnel and vast resources. Therefore, it is essential that a National Emergency Plan be developed to provide the framework for response and relief at each level of government and society. The Emergency Control Board should prepare the draft plan for the approval of the National Disaster Management Council. Key areas on which to focus these emergency planning efforts include;

- Damage and needs assessment (in coordination with international community),
- Logistics/acquisition and distribution of relief supplies (in coordination with international community),
- Urban search and rescue,
- Mass care and sheltering,
- Interagency coordination and command and control, and
- Communications and emergency public information.
- Disaster Medicine

Recent example on this matter is the effort carried by Disaster Health Working Group. In the end of 2000, the Epidemiology and Disease Control Division, Department of Health Services and the World Health Organization revitalised that working group in order to strengthen the emergency preparedness and disaster management efforts in the health sector. The working group has printed the first draft of the Emergency Preparedness & Disaster Response Plan for the Health Sector in Nepal (MOH, 2001), which provides a framework for further inter-agency and intra-sectoral collaboration"

The design for the National Emergency Plan will reflect these criteria:

a) Be simple and easily understood.
b) Reflect reality in Nepal.
c) State clear policies and operational priorities.
d) Define responsibilities, authorities, and relationships.
e) Provide systems for inter-institutional coordination.
f) Provide timely and accurate information to decision-makers and the public.
g) Involve non-governmental and community-based organisations.
h) Aim to be widely accepted by involved organisations and the community.

The following key elements should be considered for inclusion in the draft National Emergency Plan. Only simple, critical information should be included, as detailed planning for each of the elements requires at least many months of effort.

EMERGENCYPLAN ELEMENTS

Basic Plan
Organization
Direction and control
Coordination of response operations
Roles and responsibilities
Inventory of resources
Preparedness and warning
Emergency public information

Response Operations
Damage and needs assessment
Emergency communications
Evacuation
Search and rescue
Medical and health care
Firefighting
Security

Restoring Basic Services
Debris removal and disposal
Energy and electricity

Telecommunication

Restoring Basic Services (continued)
Water and sewers
Transportation
Telecommunications

Relief and Recovery
Sheltering
Provisions for victims
Safety inspections of structures
Estimation of damages
Temporary housing
Psychological assistance
Managing donations and volunteers

Appendices
Authorities
Checklists of Roles and Responsibilities
Guidelines for Standard Operating Procedures (SOPs)

4.8 Establish Recovery Operations

Disaster experience shows that sound disaster management decisions made immediately after an earthquake can result in rebuilding a stronger, more resilient community and economy.

Immediately following a disaster, there is likely to be an air of tension and uncertainty, both among the public and among public officials. This is largely based on not having clear and complete information regarding the situation and what will happen next. Victims wonder where they will live and how they will rebuild their lives; public officials wonder where the money will come from to rebuild. Emotions run high and vary from anger to a spirit of community self-help. All of this sets the scene either for total crisis in society, or for strengthening governmental and social systems and structures.

Before disaster strikes, issues related to the post-disaster period are typically not

thought of or are ignored. The post-disaster period involves different issues and requires the involvement of different players as compared to immediate response and preparing for immediate response. In the post-disaster environment, frequently there are emergent organisations and coping mechanisms that need to be taken into account, including community-based or grass-roots efforts. It also is necessary to take into consideration the need for an organisation with capability to cope with incoming relief, including international relief. Coordinating priorities and requests for assistance as well as coordinating the receipt and distribution of assets and supplies for recovery and rebuilding, is an enormous and often utterly overwhelming job.

Political will is the first prerequisite for effective management of recovery and rehabilitation processes. Measures to reduce future risks, such as effective regulation and control of land use and building construction, must be implemented. Enforcement mechanisms must be created or enhanced to ensure compliance.

One of the first problems is separating and defining the role of different levels of the government. There are competing interests and a shifting balance of powers among central, district, municipality and other local level authorities. In the Kathmandu Valley a separate urban development authority has also been established apart from municipal or other levels of government, in order to provide an independent and long range view on the development needs of the Valley.

Organisational capacity for implementing and enforcing land use and construction regulations must be developed. Capacity building is needed to enable governmental officials and staff to develop the necessary skills, knowledge, and attitudes to effectively partner with other players in the recovery processes. Education about environmental degradation and mitigation measures as well as hazards, vulnerability, and risk reduction measures needs to be provided not only to government employees but also to the private sector and the public. Greater awareness of hazardous conditions, assessment of the impact of human activities and development on those conditions, and ways to involve all stakeholders and work towards achieving consensus are factors that can help lead to more sustainable land use and safer construction. These efforts should be undertaken in the pre-disaster period so that the skills and capacity are already there when the earthquake occurs.

4.8.1 Set Policies and Priorities

As in the pre-disaster period, after a disaster strikes, the government and affected community should set goals or guidelines to guide development and the reduction

of risk from future disasters. One goal may be to adopt standing criteria for essential public facilities which avoid hazardous areas; another may be to identify alternative locations for housing now at risk, and develop programs to acquire or retrofit high-risk housing. A goal may be to ensure that all new development is adequately provided with life safety services, or to minimise residential uses "in harm's way." Lands prone to repetitive flooding can be evaluated for open space uses such as wetland restoration or recreation. A goal in the area of transportation services might be to establish and maintain access routes during a future flood or earthquake.

One place to start would be to review the existing priorities and projects, included in the Five-Year Development Plan as well as District, Municipality, and Village Development Area plans, and evaluate them in light of their potential contribution to immediate recovery and long-term mitigation of disasters.

4.8.2 Develop Strategies for Relief and Recovery

In order to recover from a disaster, everyone—government, business, community-based organisations, individuals and families—must pull together. Regaining normalcy is much easier and quicker if the partnerships and policies to facilitate recovery are in place before the disaster. In the recovery, a community must deal with both direct and indirect, less tangible effects of disasters, such as psychological recovery and restoring community services, employment, commerce, and industrial production. Recovery involves decision-making at every level, from individual and family to local and central government to international agencies. And often, decisions made hurriedly in the rush to restore normalcy have unintended, negative consequences on the welfare of the victims or the future of the country.

Following are some of the basic issues to be considered in pre-disaster planning for post-event relief to victims and to hasten the overall social and economic recovery of the community. These are recurring problem areas in all major disasters, so the government and stakeholders should think about and address them over time. Detailed planning in every area, however, will require a long-term commitment.

a) Restoring services

- Include procedures, coordinated with utility companies, in response plans
- Prioritise services and areas for restoration of services, taking into account interdependencies among various services and the needs of critical facilities such as hospitals

- Be prepared to start repairs immediately
- Repair and reconstruct lifelines and facilities in such a way to resist further damage and avert further disruptions (rebuild better; build- in mitigation)

b) Assessing damage to public and private facilities

- Be prepared to effectively use volunteer engineers
- Need for training in rapid damage assessment
- Levels of assessment vary according to purpose, e.g. assessing safety vs. damage assessment for insurance recovery or repair cost estimates

c) Plan to inspect and post unsafe buildings

- Be prepared to post buildings and restrict entry
- Train building officials and engineers in inspecting damaged buildings
- Set priorities ahead of time, for structures to be inspected immediately and by the most skilled engineers (E.g. dams, power plants, hospitals, hazardous materials sites, schools and other large occupancies)
- Determine the responsibilities for inspection
- Establish standard forms, procedures, and records (preferably computerised) of inspections

d) Plan for debris removal and disposal

- Early on, debris removal must be coordinated with rescue efforts
- Clear important access routes first, then the other streets
- Identify disposal sites

e) Establish programs for short-term recovery

- Establish authority to make decisions during early recovery
- Accommodate increased demands on local services and financing needs
- Administer processes for repairs and rebuilding
- Assist local businesses to prepare for recovery

f) Plan sites for temporary housing (Address the gap between emergency shelter and permanent housing)

g) Plan for long term recovery

- Standards for repair and reconstruction
- Siting and changes in land use
- Financing, etc.
- Build- in mitigation into the reconstruction, i.e., rebuild better

h) Psychological recovery, especially for children

4.8.3 Work with the Private Sector

Business and commercial activities rely on urban services including the workforce, transportation, and utilities. Small businesses and local artisans are particularly vulnerable to the effects of a disaster, because they do not have adequate savings or access to credit or other resources, to retain their customers until they can recover and resume operations. Following a major earthquake, many businesses will go out of business completely due to such factors as:

- Damage to facilities,
- Destruction of inventory,
- Lack of access to needed materials and supplies,
- Extended loss of electrical power, water or telecommunications services, or
- Injury or death of key employees.

Addressing the needs of these affected businesses is essential to the economic well being of the community. Some typical business concerns and needs, following an earthquake include;

- The need to relocate (temporarily or permanently) to a usable business location or building,
- Identification of government or international assistance to aid effected businesses,
- Consideration of new types of construction to repair and rebuild damaged firms, and
- Designation of new sources of financial assistance to aid the return of existing businesses and to attract new ones.