NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK

Reducing Disaster Risks for a Safe and Happy Bhutan

Department of Local Governance
Ministry of Home & Cultural Affairs
Royal Government of Bhutan

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List of Acronyms

ACRONYMS, ABBREVIATIONS & BHUTANESE TERMS

CITES	Convention on International Trade on Endangered Species
CWC	Centre for Water Commission
DDMC	Dzongkhag Disaster Management Committee
DFID	Department for International Development
DGM	Department of Geology and Mines
DMP	Disaster Management Plan
DYT	Dzongkhag Yargye Tshogdue
ECoP	Environmental Code of Practice
EFRC	Environmental Friendly Road Construction
ESF	Emergency Support Function
EWS	Early Warning System
GDMC	Gewog Disaster Management Committee
GHG	Greenhouse gas
GIS	Geographical Information System
GLOF	Glacial Lake Outburst Flood
GNH	Gross National Happiness
GPS	Global Positioning System
GYT	Gewog Yargye Tshogchung
DRM	Disaster Risk Management
HKH	Hindu Kush Himalayan
ICIMOD	International Center for Integrated Mountain Development
INSARAG	International Search & Rescue Advisory Group
JGE	Joint Group of Experts
LDCs	Least Developed Countries
NAPA	National Adaptation Program of Action
NCDM	National Committee for Disaster Management
NEC	National Environment Commission
NEIC	National Earthquake Information Centre
NEOC	National Emergency Operations Centre
NESB	National Environment Strategy of Bhutan
NSB	National Statistical Bureau
RAP	Rural Access Project
RUB	Royal University of Bhutan
SAARC	South Asian Association for Regional Cooperation
SITREP	Situation Report
SQCA	Standards and Quality Control Authority
TDMC	Thromde Disaster Management Committee
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UTEP	University of Texas at El Paso
WCDR	World Conference on Disaster Reduction
WFP	World Food Programme
WMO	World Metrological Organization

BHUTANESE TERMS

Dzong	Fortress or Monastery
Dzongchung	Small Dzong
Dzongkhag	District
Dzongkhag Yargye Tshogdue	District Development Committee
Gewog	Administrative Block consisting of a number of villages under a Dungkhag or a District
Gewog Yargye Tshogchung	Block Development Committee
Dungkhag	Sub-division
Thromde	City or township

Chapter 1

Introduction

A disaster is a natural or man-made event that negatively affects life, property, livelihood or industry often resulting in permanent changes to human societies, ecosystems and environment (www.answers.com). In the international context disasters mean a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources (www.adrc.or.jp). In the context of Bhutan any man-made or natural calamity that adversely affects life, livelihood, and property of even a single person or a family will be considered as a disaster.

Under the visionary leadership of His Majesty the King, the Royal Government of Bhutan (RGOB) has set the goal of achieving Gross National Happiness through all-round socio-economic development as a priority national objective. In view of the geo-physical location of the country in one of the most seismically active regions of the world and the peculiar geo-climatic conditions affecting the landmass and its people, the RGOB recognizes the national priority of safeguarding the painstakingly built developmental gains, the socio-economic infrastructure, the fragile eco-system and the lives, livelihoods, property and community assets of the people from the vagaries of the destructive forces of nature. The Government has recognized the importance to develop a comprehensive disaster risk reduction strategy for minimizing the impact of both natural and man-made catastrophes.

Acknowledging the umbilical cord between development and disasters, the RGOB is in the process of mainstreaming disaster risk reduction concerns in all development activities and in all walks of socio-economic life. It emanates from the conviction that development cannot be sustainable unless disaster risk management is inbuilt into it and informs all aspects of planning and development process. For this, the Royal Government is adopting a multi-disciplinary and multi-sectoral strategy to ensure that every sector can contribute towards promoting disaster-resilience in accordance with its own mandate, capacity, expertise and strength. Hence, the Framework seeks to ensure that all developmental activities align themselves in a way to reduce the risk of disasters.

Adoption of a disaster risk management framework assumes importance due to emerging trends pointing towards climate change and global warming at an alarming rate. The potential threat from some of the existing hazards viz. Glacial Lake Outburst Floods (GLOFs), flash floods, landslides, forest fires etc. is likely to exacerbate. At the same time, the rapid pace of urbanization as witnessed during the past two decades is causing larger concentration of people and resultant economic activity in hazard-prone areas further compounding the risk.

The devastating disasters in the South Asian and South-East Asian region and in other parts of the world in the recent past with their calamitous impacts on the human population and the national economies have underlined the significance of integrating disaster risk reduction concerns in all walks of Bhutan's national and socio-economic life. The Royal Government of Bhutan has been keenly following the emerging initiatives and strategies at the international level and actively participated in the deliberations and processes of the World Conference on Disaster Reduction (WCDR) held in Kobe, Japan in January, 2005 and has been consciously working towards

devising an appropriate national disaster risk management framework to secure and safeguard the lives and livelihoods of the people and its national development assets. It is striving to establish synergies of action and convergence of approaches between various administrative structures and Ministries/agencies. Closely observing and drawing upon the international perspectives and the best practices, the Royal Government has formulated the National Disaster Risk Management Framework to specifically address the vulnerability and risk profile of the country vis-à-vis natural disasters within the peculiar context of the needs and aspirations of the people of Bhutan and to achieve the national development objectives outlined in 'Bhutan 2020: A Vision for Peace, Prosperity and Happiness".

In the light of the approach outlined above, the Royal Government of Bhutan is making systematic efforts to move towards adopting a strategy of holistic disaster management involving and encompassing every administrative wing as well as the common people to inculcate a mindset of disaster prevention, mitigation and preparedness in the pre-disaster phase while at the same time developing speedy and effective disaster response capabilities at all levels of administration and among the common people. The key objectives of the Framework are as under:-

- To promote a disaster risk management approach instead of an *ad hoc* reactive approach to dealing with disasters;

- To recognize the respective roles of different organizations in disaster risk management and provide all possible support to their work within the national framework for disaster risk management; and

- To establish linkages between disaster risk management and the other ongoing activities in different development sectors.

The steps envisaged to be taken by the Government emanate from the vision enumerated in 'Bhutan 2020: A Vision for Peace, Prosperity and Happiness' and translated into the National Disaster Risk Management Framework dovetailed towards achievement of the objectives enshrined therein and covering all aspects of disaster management. The expected inputs, areas of intervention and Ministries/agencies to be involved at the National, Dzongkhag, Dungkhag, Thromde and Gewog levels have been identified and listed in the Framework. A concerted effort would be made to make the processes introduced under the Framework sustainable and community and/or local government driven. It is hoped that this Framework would provide a common strategy under-pinning all actions and activities of various participating Ministries, agencies and stakeholders and would serve as a roadmap for initiating well-coordinated, organized and synchronous disaster risk management activities to move towards a disaster-resilient nation through optimum utilization of the existing resources and institutions.

The Framework broadly seeks to put the vision into effect through the following initiatives:

a) Institutional, legislative and policy frameworks
b) Hazard, vulnerability and risk assessment
c) Early warning systems
d) Disaster preparedness plans
e) Disaster management system
f) Mitigation and integration of disaster risk reduction in development sectors

g) Public awareness and education
h) Capacity building
i) Communication and transportation

The Framework has been drawn up through a wide-ranging consultative process across different sectors and institutions involving identification of their strengths, resources and capacities. It also comes at a time when the process of formulation of the forthcoming 10th Five-Year Plan (2007-2012) is also likely to commence shortly and it is hoped that the agenda of disaster risk management highlighted in the Framework would find due reflection in the formulation of development proposals for the coming years. The Framework embodies a vision and is hence thematic in character and outline driven by an understanding of the emerging challenges ahead and would need to be converted into sectoral work plans, strategies, policies and instruments to achieve its desired outcome for the overall well-being of our people and sustainability of the development process in Bhutan.

Chapter 2

Situation Analysis: Disaster Management Scenario in Bhutan

2.1 Disaster Risks in Bhutan

2.1.1 Hazards

A hazard can be defined as a phenomenon that may adversely affect human life, property, activity or the environment to the extent of causing a disaster. Bhutan is prone to multiple natural hazards that pose varying degrees of risk to the lives and livelihoods of its 634,972 inhabitants. The country lies in one of the most seismically active zones of the world, GLOFs pose a serious hazard risk in the country, and flash floods and landslides pose an annual threat to human lives, properties and livelihoods - especially in the southern and eastern parts of the country. Forest fires, mainly in the dry winter months cause significant disruption of activity and present a serious threat to the environment and livelihoods of local inhabitants. According to some estimations climate change processes will increase these hazard risks through significant impacts on Bhutan's mountainous ecosystem in the near future. In the past, communities in Bhutan have also been affected by minor outbreak of pest, epidemic diseases and drought. Presently, the influenza pandemic poses a heightened risk.

Hazards in Bhutan

Landslides

Landslide events are closely linked with flooding events, and are also recurrent phenomena in Bhutan. Slopes in the country are highly susceptible to landslides especially in the rainy season. Most occur in the eastern and southern foothill belt where the terrain is steep and rocks underlying the soil cover are highly fractured, allowing easy seepage of water. Contributing factors are the undercutting of slopes by high-energy rivers and streams during a period of heavy rainfall. Landslides can also be caused by the tremors of an earthquake, as witnessed in the aftermath of the 1980, 1988, and 2003 earthquakes. In particular, the urban areas experience secondary affects of landslides due to the importance of road infrastructure for the dispatch of vital goods. Farmers on steep slopes and foothills of the south and the eastern region of the country in particular are regularly affected by the hazard.

Landslide a common problem in Bhutan (Pema Dorji)

Landslides block a part of the highway between Bumthang and Mongar

Landslides in Rotpashong, Lhuentse

Jumja landslide in Chukha

Fires on forest and human settlements

Given the rugged and steep topography with thick ground fuels and erratic wind conditions, Bhutan is prone to frequent forest fires. In the last decade, there have been severe forest fire outbreaks in many parts of the country. The risk of fire outbreaks is generally exacerbated in the dry winter months (November to April). While for most forest fires, the causes have been traced to human behavior (burning of agricultural debris, carelessness and short circuit transmissions), the impact on the natural environment and on local inhabitants' sources of livelihood is significant. A total of 803 forest fires damaging an area of 309,181.9 acres were recorded by the Social Forestry Services Division, Ministry of Agriculture (MoA), over the period 1992 to 2004. Based on the records, Thimphu Dzongkhag in the western region has the highest number of incidents (115) followed by Mongar (105), Trashigang (90), and Samdrup Jongkhar (85) in the eastern region. These incidents have had a devastating impact on the environment and the livelihoods of communities. They also pose a persistent threat to houses, infrastructure, human life, livestock and wild life. Incidents of fires on houses and other settlements are also increasing both in the rural areas as well as in the towns.

In 2002, 25 houses in Yangthang village in Haa were completely razed down by fire. Although there were no human casualties it caused heavy loss to property. In December 2005, 5 houses were burnt down in Zhapong village, in Trashiyangtse and in November 2005, 7 shops were burnt down in Chamkhar town in Bumthang causing heavy loss to property.

The forest fire that broke out from Dangme-Gamrichu confluence in Bartsam Gewog in Trashigang Dzongkhag on 27 March, 2006 spread across the villages of Galing, Bartsam and Bidung and damaged thousands of acres of forests, destroyed five houses in Bidung Gewog. The fire also killed 2 people and injured another. The villagers, civil servants, foresters and armed forces fought the fire for 5 long days till it was brought under control. Reports of similar isolated incidents continue to flow in from various districts in the country. Heavy use of wood in traditional buildings, dzongs, monasteries and other structures of historical significance make them highly vulnerable to accidents caused by fire.

Forest fire above Trashigang Town (Kuensel)

Epidemic, pests and diseases

Communities in Bhutan have been affected by outbreak of pest and epidemic diseases in the past. Malaria has largely affected the southern belt, with a recent dengue outbreak in September 2004 in municipal areas in this region. However, the recent influenza pandemic in the region has been a cause of concern for Bhutan. Bhutan's contact with the outside world has increased with the convenience of both air and surface travel to the countries of the region. Bhutan's porous border with India and frequent exchange of poultry products heighten the risk of infections in the eventuality that India is affected by the pandemic. In response, the National Influenza Pandemic Plan for Avian Flu has been prepared by the Department of Livestock, Ministry of Agriculture, to facilitate clinical surveillance and testing of animals/ birds with symptoms. The plan has been submitted to the DLG, Ministry of Home and Cultural Affairs for incorporation in the national DRM strategy plan to facilitate national and international coordination in this respect.

Bhutan is also the roosting ground for a large number of black necked cranes and other wild birds that migrate to Bhutan from across its borders. They can be potential carriers of Avian flu into the country.

Earthquakes

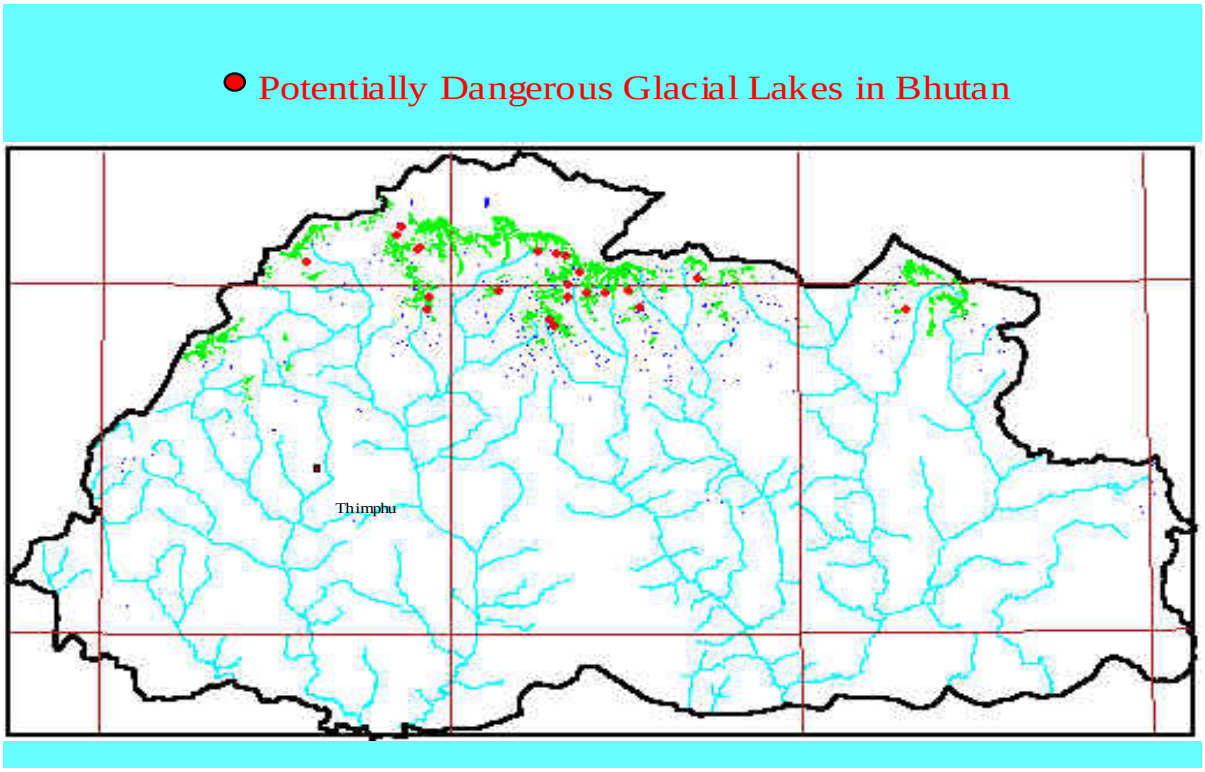
Geo-physically, Bhutan is located in one of the most seismically active zones in the world. Although a detailed and comprehensive seismic zonation of Bhutan is unavailable, its proximity to the north-eastern parts of India, which is in the 'most active' seismic Zone V (according to Bureau of Indian Standards), indicates that the majority of Bhutan is either in Zone IV or V. Despite the high risk of earthquakes occurring in the region, there is little by way of 'official' historical records

tracking earthquakes and consolidating the relevant data. Records suggest that while four great earthquakes of magnitude exceeding 8 on the Richter scale occurred during 1897, 1905, 1934 and 1950, another 10 earthquakes exceeding magnitude 7.5 have occurred in the Himalayan belt during the past 100 years. In recent years, Thimphu, Paro and Phuentsholing have witnessed the effects of three significant earthquakes. The earthquake of 1980 (6.1 on Richter scale), with its epicenter in Sikkim (India), have caused several cracks in buildings in Thimphu, Phuentsholing, Gelephu, Samdrup Jongkhar and Trashigang. There were also reports of some damages caused to houses in the villages. Also, in its aftermath, the Phuentsholing – Thimphu national highway was blocked by landslides caused by the tremor. The earthquakes of 1988 (6.6 on Richter scale) and 2003 (5.5 on Richter scale) with epicenters in the Indo-Nepal border and Bhutan respectively, also caused similar damages to human settlements, institutional buildings (including schools, hospitals, Dzongs etc) and highways.

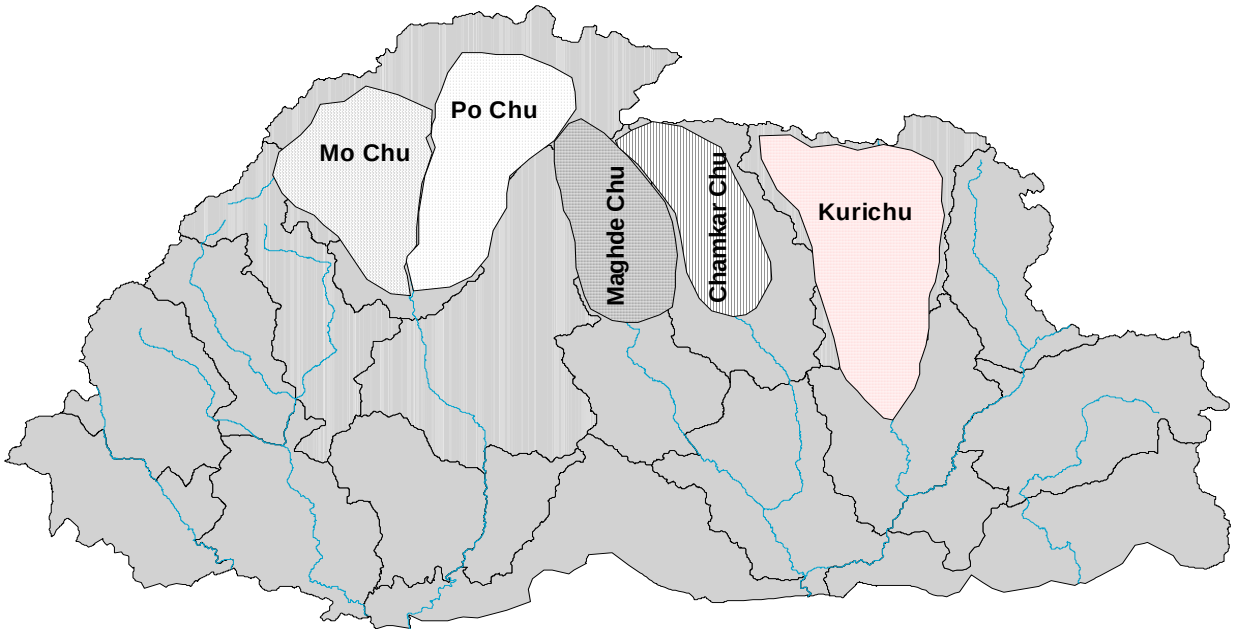
The most recent earthquakes that struck eastern Bhutan in the early hours (2:04 am and 2:07 am) of 24th February, 2006 are a reminder for Bhutan's vulnerability to such disaster. The earthquakes, each measuring 5.8 and 5.5 on the Richter scale were third in a row to hit Bhutan in less than two weeks. The first tremor was located about 33 kilometers beneath the eastern surface, near Dewothang in Samdrup Jongkhar. The second tremor was located between Samdrup Jongkhar and the border of Assam, India. Although the tremors which lasted for five to six seconds were of moderate intensity, damages were caused to the Dzongs and Lhakhangs in the eastern Dzongkhags of Trashigang, Lhuentse, Pemagatshel and Samdrup Jongkhar. The walls and timber structures of Trashigang and Lhuentse Dzongs were affected requiring major repairs.

Glacial Lake Outburst Floods (GLOF)

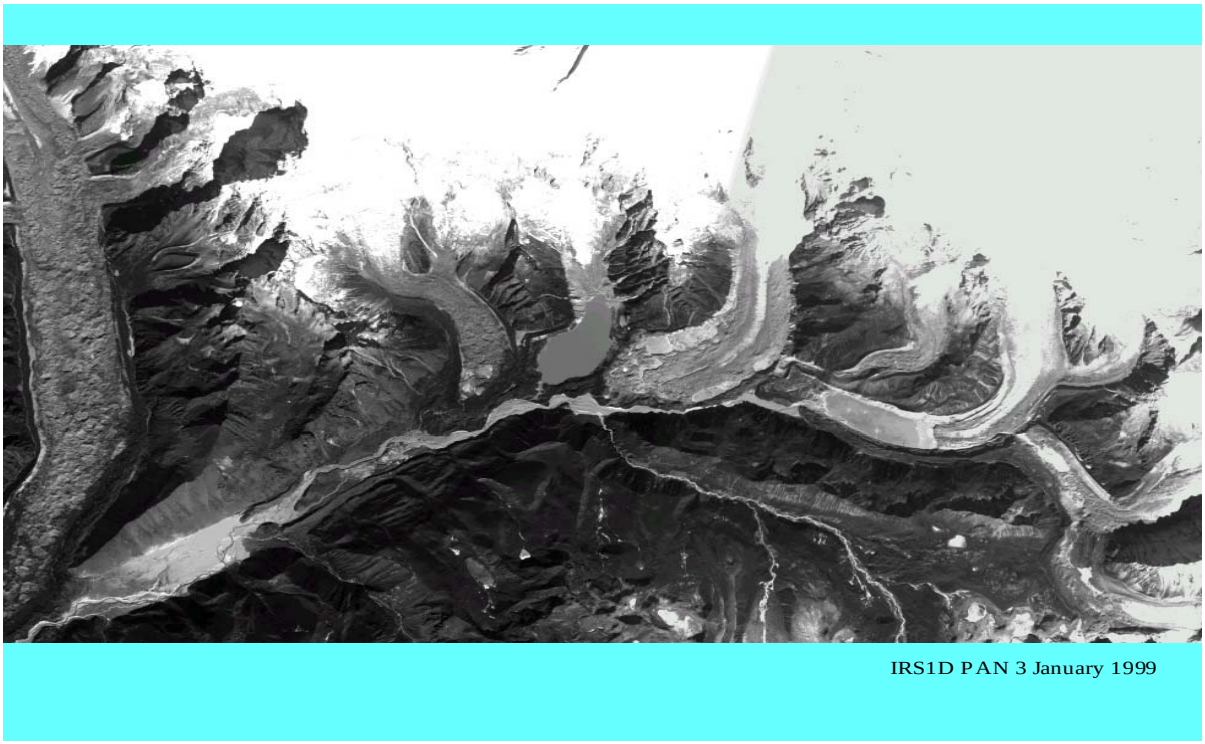
GLOFs are among the most serious natural hazard potentials in the country. Due to the effects of global warming, glaciers in the Himalayas are shrinking rapidly, thus possibly accelerating glacial retreat in this region. According to a recent study conducted by the Department of Geology and Mines (DGM) in collaboration with ICIMOD, there are 2,674 glacial lakes in Bhutan, of which 562 are associated with glaciers. The study has identified 24 glacial lakes as 'potentially dangerous lakes' that could pose a GLOF threat in the near future. GLOF has taken place in Bhutan in the past in 1957, 1960 and most recently in 1994. All of these have taken place in the Pho Chu sub-basin. There is virtually no written record of the 1957 and 1960 GLOFs. The 1994 GLOF, which was caused by partial burst of Lugge Tsho in eastern Lunana, damaged more than 1,700 acres of agricultural and pasture lands and a dozen houses, washed away five water mills and 16 yaks, and destroyed 6 tonnes of food grains. Apart from recurrence of GLOFs in the past Pho Chu sub-basin is a very critical area for GLOF impact mitigation in the future because it hosts one-third of the 24 potentially dangerous lakes in the country. Future threats are likely to encompass regions that fall within the Chamkar Chu basin, the Mangde Chu basin, Kuri Chu basin, Mo Chu basin, and Pho Chu basin. Overall, GLOFs regularly threaten the lives and livelihoods of people living in the valleys and low lying river plains. Also susceptible to damage are industrial infrastructures such as hydropower projects and low lying bridges along the rivers.



Map indicating potentially dangerous lakes (DGM)

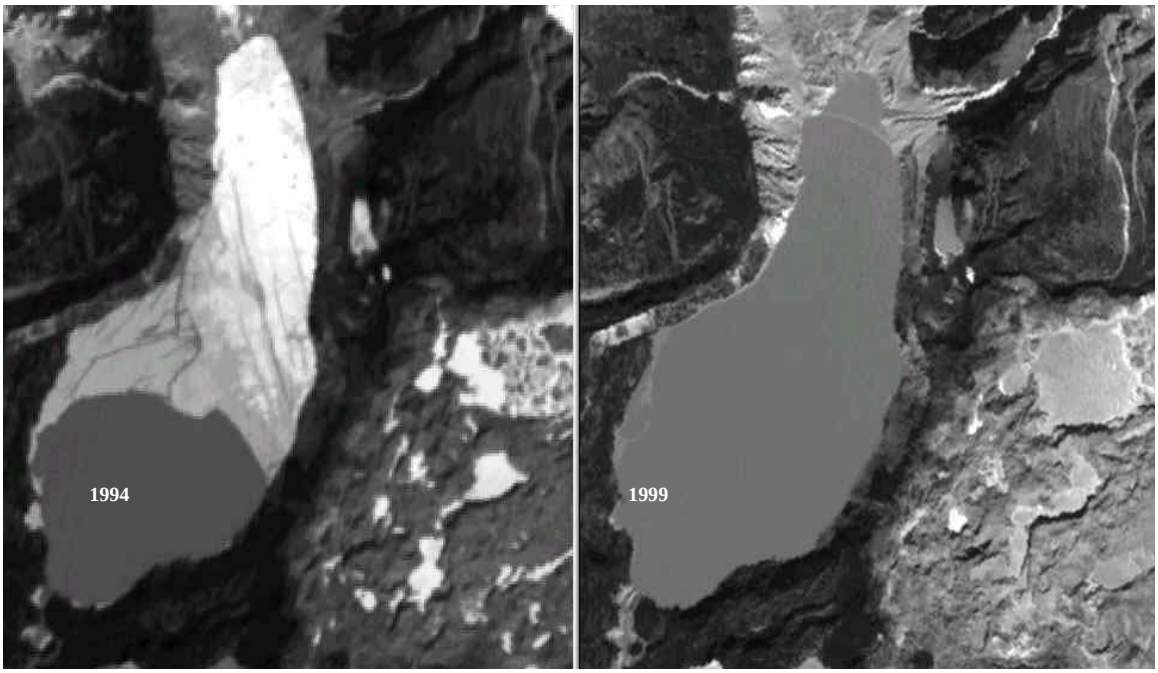


Map of Bhutan with indication of the Five Major GLOF areas (UNDP-Thimphu)



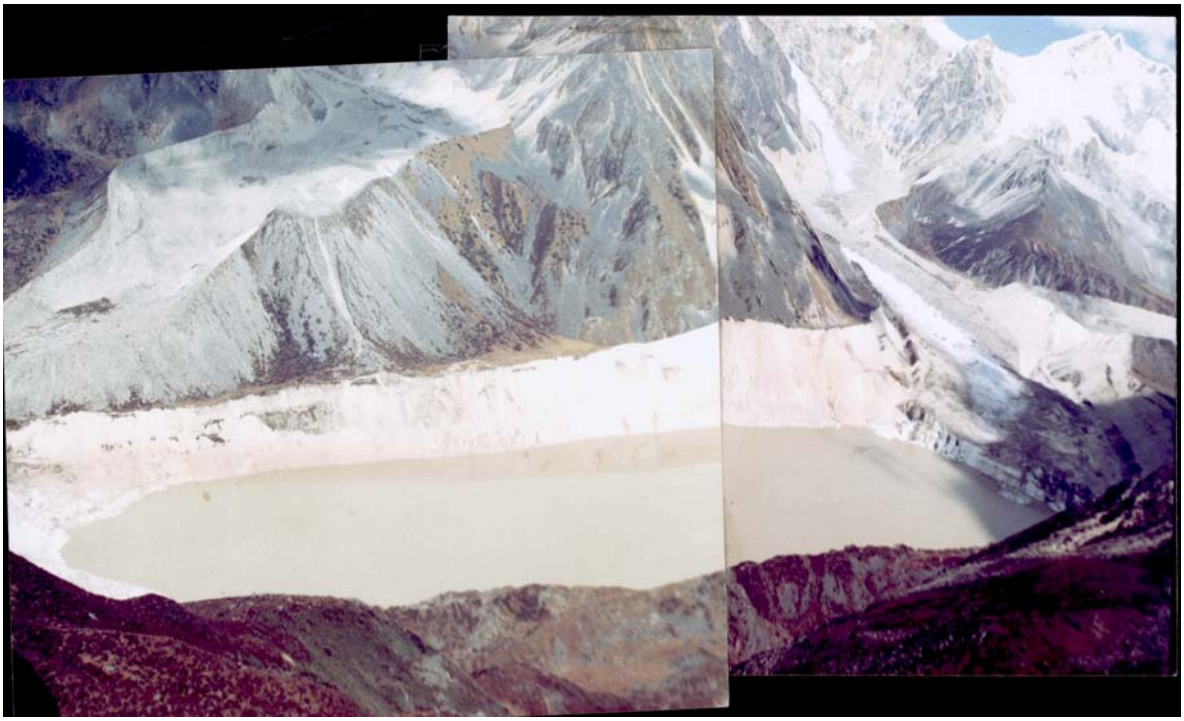
Glacial Lakes (DGM)

Raphsteng Lake and glacier tongue of Thorthormi glacier - Bhutan

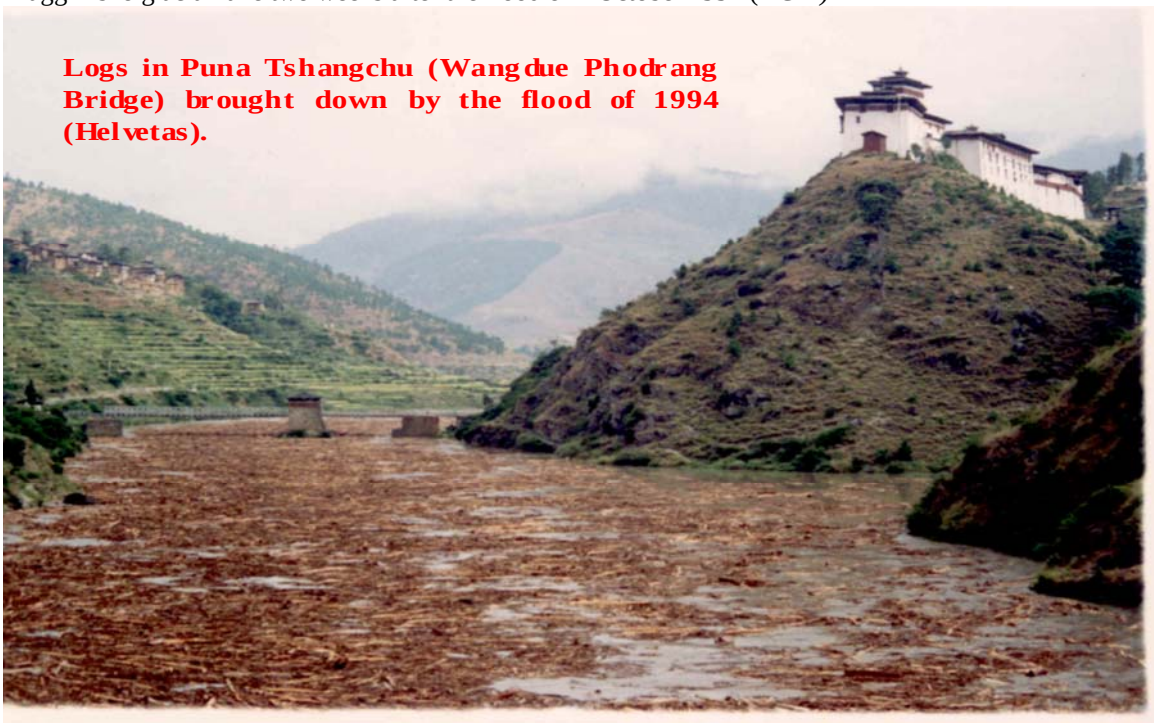


1994 December 25 **1999 January 3**

Developments in Glacial Lakes (DGM)

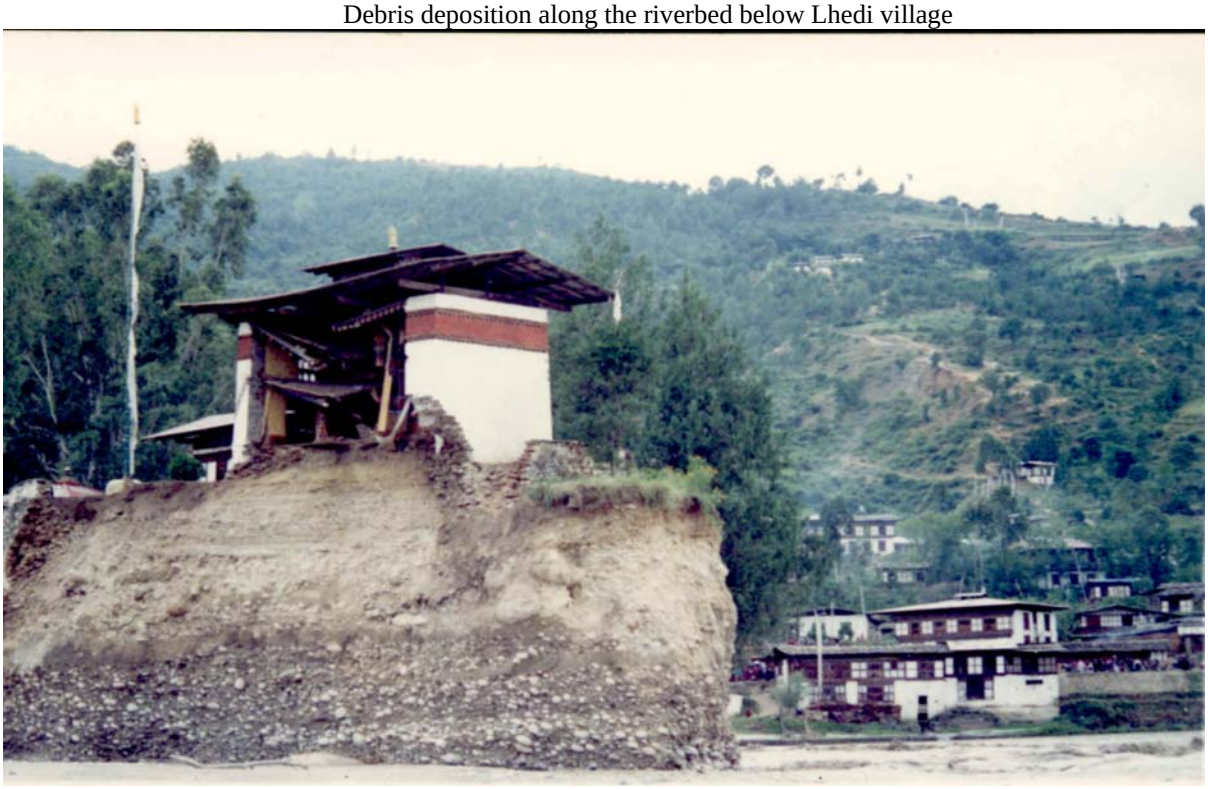


Luggi Tsho glacial lake two weeks after the flood of 7 October 1994 (DGM)



Wangduephodrang Bridge

Debris deposition along the riverbed below Lhedi village



Impact of 1994 flood on one of the oldest temples in front of Punakha Dzong

(Flash) Floods

Landslides and (flash) floods are recurrent phenomena in Bhutan causing extensive damages during the monsoon season (June to September). They have been observed to follow a cyclic pattern of 2 to 4 years with the eastern region being particularly vulnerable. The eastern and southern foothill regions of Bhutan, which have intensively dissected terrains with deeply eroded,

steep and closely spaced gullies, gorges and river valleys, often experience floods caused by heavy rainfall. Most flood events are flash floods, which are local floods of great volume and short duration.

The most recent record of flash floods can be traced to the heavy rains (2000 mm) in the areas of Phuntsholing and Pasakha, along with some southern towns when more than 200 people lost their properties. In 2004, flashfloods affected six eastern Dzongkhags, of which Trashigang, Trashiyangtse and Samdrup Jongkhar were the most affected areas with damages to property and livestock. The 2004 monsoon floods that occurred in the six eastern Dzongkhags killed 9 people, washed away 29 houses and 26 houses had collapsed, 107 houses were partially damaged. A total area of 664 acres of wet and dry farm lands were destroyed. Hundreds of tonnes of maize, paddy and potatoes were lost and about 2000 orange trees were washed away affecting about 1437 households. Taking into consideration the small population size and limited arable land, the loss was enormous.

Lungtenzampa town in Trashigang after the 2004 monsoon flood (Kuensel)

Destruction of a part of road transportation system by flash flood in Lungtenzampa, Trashigang (DoR)

Flashflood in Tshangkha, Trongsa (DoR)

Flashflood damages to motorable roads in eastern Bhutan (DoR)

Natural dam formations and dam bursts

Due to Bhutan's steep terrain, narrow river gorges, unstable physical structures, and increasing incidences of landslides during monsoon have led to the incidences of artificial dam and lake formation on the rivers. In September 2003, there was a dam formation due to rock slide on the Tsatichhu, a tributary of Kurichu. An estimated volume of 33 million m^3 was formed within 0.3 Km^2 of the size of dam body. In May 2004 the dam began to fail leading to dam burst on 10^{th} July 2004 causing downstream environmental impacts. The Kurichu Hydropower Corporation authorities, however, were able to open the reservoir gates in time to avoid major destruction to the dam and other casualties. Such hazards will continue to prevail in Bhutan's rivers placing many of the hydropower plants, farmlands, human settlements, social infrastructures and numerous properties of cultural, social and historical significance that are located along the country's large rivers valleys.

Tsatichu landslide dam above Kurichu due to landslide on one of its tributaries

The Kurichu Hydropower reservoir located downstream of the Tsatichu artificial lake

Windstorms/snowstorms/hail storms/droughts

Due to global climate changes recent climatic variations around the world have been highly unpredictable. This has also resulted in extreme natural events such as dry weather, excessive rains and other devastating natural calamities such as typhoons, floods and droughts etc that have affected many people around the world. Similarly Bhutan is also witnessing extreme variations in its climate and weather patterns. The winter of 2005-2006 had experienced unusually dry winter with no rain and snow. The majority of Bhutanese communities must rely on timely rainfall as

priorities of land and water have to be adjusted on it. Regular precipitation and timely farming practice determines the livelihood of our communities. Although Bhutan has not experienced large scale destructions due to windstorms, snow and hailstorms and droughts, education and awareness among the communities that are likely to be affected must be brought about. The complexity of the factors that determine the vulnerability and the capacity to cope with such natural hazards necessitates policies, scientific interventions and good decision making by the authorities concerned. Strategies that address immediate, medium and long terms must be in place to address these issues.

2.1.2 Underlying Vulnerabilities

Bhutan is exposed to a range of natural hazards but it is the underlying vulnerabilities that intervene in the translation of this physical exposure to hazards into disaster risks. A complex interplay of social, economic and cultural factors determines these vulnerabilities and is increasing the impacts of hazard events over the years.

A crowded weekend market day in Kuru town in Punakha. Located on the banks of Puna Tsangchu Khuru is vulnerable to GLOF flooding.

Some of the underlying vulnerabilities in Bhutan

Unsafe construction practices: Lack of incorporation of adequate disaster risk reduction elements in construction renders the physical infrastructure in both the public as well as the private domain susceptible to hazards. In addition, there is insufficient technical expertise among engineers,

architects, masons and other building artisans of disaster-resistant construction practices. The fact that there has not been a major disaster in the country in recent memory has bred certain complacency among the people at large.

***Rapid urbanization**:* In recent decades, there has been a spurt of urbanization in Bhutan and more often than not, this growth has been unplanned and haphazard. For example, the population of the capital city Thimphu has increased five times in the past twenty years and an urban earthquake is likely to have a far more devastating impact today than a few years ago. The increasing population and other demographic changes especially in the two largest urban centres such as Thimphu, Phuentsholing and other emerging townships of Paro, Wangdue, Punakha, Gelephu, Gedu, Chimalakha, Samdrup Jongkhar, Tala, Mongar, Gyalpoizhing and Trashigang have redefined the hazard and risk profile in the country.

Thimphu, the capital is one of the fast growing urban towns in Bhutan

***Pressure on land and settlements**:* A vast majority of the people is dependent on agriculture and forestry products for livelihood which in turn requires more and more areas to be brought under cultivation and denuding of hill slopes rendering them vulnerable to landslides, mudslides and flash floods during the rainy season. The problem is further compounded by the geo-physical structure of the area. So far, the process of sitting of habitations has not been taking into account their vulnerability to hazards. For example, the development of townships does not consider whether the area is prone to landslides or flash flooding at the inception stage thereby necessitating larger amounts of resources at a subsequent stage to reduce the risk to inhabited areas.

***Socio-economic factors**:* The socio-economic conditions are perforce compelling the common people to adopt livelihood patterns which tend to cast an adverse impact and vest the country with a high vulnerability profile. People settle in hazard-prone areas such as steep slopes or flood-prone river beds in search of sources of sustenance and are exposed to a high degree of risk.

Lack of awareness: At the general level, there is an inadequate incorporation of disaster risk reduction concerns in the planning and development process especially in the private sector and at the community level. The overall lack of awareness that something can be done to reduce the risk further compounds the scenario.

Environmental degradation: The pressure exerted by increasing population on the environment is leading to its rapid degradation and denuding of hills threatening the human settlements downstream as well as the national infrastructural assets viz. dams, hydro-electric plants, road and communication network etc. which are the lifeline of the national economy. Environmental degradation is leading to a high rate of siltation in the dams and reservoirs, necessitating timely interventions before the situation becomes precarious.

Insufficient enforcement of building by-laws: There is an insufficient and slack enforcement of building by-laws and codes in the urban areas due to a lack of expertise and trained human resources to enforce the same. The compliance among the common people is also low due to a lack of awareness and general apathy to disaster risk management issues.

Lack of preparedness planning: There is a general lack of disaster preparedness and response planning not only at the administrative level but also at the community level with the result that the capacity to mitigate the impact of disasters and to generally respond to them in a speedy and effective manner is also non-existent.

2.2 Existing Institutional and Legislative Arrangements for Disaster Risk Management

2.2.1 Institutional Arrangements /212111

We believe that Bhutan has not suffered from any major disasters due to the blessings of the protective deities of the country. A few disasters which were caused due to fire, flooding and landslides have been attended to personally by His Majesty the King. His Majesty the King has been personally involved in the welfare and rehabilitation of affected communities and even down to individuals where ever there has been accidents and natural disasters like house fire, destruction of homes and farmlands by flash floods and landslides, loss of crops to pests or bad harvests due to failure of crops, or vehicular accidents involving public transports. Although such informal arrangements have worked well for small scale disasters it is important that the institutional response mechanisms are established to oversee larger disasters.

In the past Bhutan has been able to respond to disasters quite effectively through optimum harnessing of the resources in spite of no integrated disaster risk management mechanism. Although, over the years, the response mechanism has been found to be quite robust and effective to meet the exigencies of the situation, yet the constraints remain in terms of adequate institutional arrangements with capacity for meeting the challenges of natural disasters.

The establishment of the Ministry of Home and Cultural Affairs (MoHCA) as the nodal agency by the Royal Government of Bhutan is an important step in the overall framework for disaster management in Bhutan primarily because the country's administrative units like the Dzongkhags, Dungkhags and the Gewog administrations fall under the administrative functioning of the

Ministry. Furthermore the Ministry facilitates the pursuance and implementation of national policies and interests by local governments in the overall interest of promoting good governance in the country. Therefore the Ministry is well set to ensure that the programmes are planned well and implemented with a greater degree of efficiency and effectiveness. The Ministry has a well established line of communication and coordination with Dzongkhags and other administrative units in times of emergency. In view of this the Royal Government of Bhutan has designated the Ministry of Home and Cultural Affairs as the nodal agency for disaster management in the country.

As the coordinating agency, the Ministry will assume responsibilities that have larger policy implications and also coordinate emergency responses. However, the MoHCA will refrain from interfering in the ongoing risk reduction and preventive activities that are being initiated by the various government, public and private sectors especially where technical and professional expertise are involved. Disaster management is a multi-sectoral and multi-disciplinary responsibility that ensures that every sector can contribute towards promoting disaster resilience within its own mandate, capacity, expertise and strength.

While MoHCA will be the focal agency at the national level, the Dzongkhags, Dungkhags, Gewogs and the Thromdes (Municipalities) at their respective levels will be given the responsibility to implement disaster risk management activities. The DLG, MoHCA has also been entrusted to directly coordinate disaster management programmes and activities at the Dzongkhags and in other administrative units.

- A detailed profile of sectoral initiatives in disaster management/ response activities anchored by these (and other) institutions in Bhutan is listed in Annex 1 [‘Institutional Profiles’].

2.2.2 Legislative arrangements

Although no laws, statutes or any other legal framework dealing specifically with disaster management exist, Article 8(6) of the Draft Constitution of the Kingdom of Bhutan provides that it is the responsibility of every Bhutanese to provide help to victims of accidents and in times of natural calamities. The Environmental Acts and Policies, the Mines and Minerals Management Act, the Bhutan Water Policy, the Land Act and the Bhutan Building Rules indirectly support disaster management. The Royal Bhutan Police Act has provisions for the RBP to provide help in times of disasters. Similarly the other branches of the Armed Forces must take part as and when they are called upon to do so. The Gewog Yargay Tshogchung (GYT) and Dzongkhag Yargay Tshogdu (DYT) Chathrims also state that the GYT has the administrative powers and functions to organize relief measures during natural disasters/ emergencies and the DYT to mobilize voluntary actions in times of natural catastrophes and emergencies.

As far as the legislative mechanism is concerned, while there is no legislation/Act that specifically addresses disaster risk management, elements supportive of and addressing disaster risk management concerns albeit in an elementary form can be found in some Acts/ Rules and Regulations existing in various sectors. Past legislations from the environmental and building sectors in particular, need to be reviewed and analyzed in view of the key components of the emerging National DRM Framework so that avoidable overlaps/conflicts with existing policies and rules and regulations may be obviated. The objective will be to integrate these existing regulations

with the National DRM Framework, thus establishing disaster risk management as a cross-cutting, multi-sectoral development priority. Some of the legal enactments are mentioned below:

- Environment Assessment Act, (2002), along with a series of other instruments pertaining to the environment, guide development project components through the process of acquiring an environmental clearance. The process is aimed at mitigating and preventing the undesirable impacts of developmental activities on the country's environment.

- Bhutan Water Policy (2003), underlines the need to "develop a national adaptation strategy for climate change, including a national flood management and mitigation strategy" (section 35) and stresses the importance of an integrated approach in water resources management in general and in monitoring, early warning and mitigation measures in relation to GLOFs in particular.

- Bhutan Building Rules (2002) deal with the process of grant of building permits and Building Code of Bhutan (2003) lays down a set of minimum standards for the construction of public works buildings and housing settlements.

With regard to risk transfer mechanisms, at present, the Royal Insurance Corporation of Bhutan (RICB) provides risk insurance facility to every household [permanent and semi-permanent houses at differential premium] in the rural areas mandatorily and fire insurance is extended to the urban households in cases where the houses are constructed with assistance from the financial institutions. However, it would be appropriate to develop national risk transfer mechanisms covering large-scale natural disasters as well as the small individual/personal disasters too in keeping with the Royal Government's endeavors to secure Gross National Happiness for its citizens and to cover the risk posed to the community at large.

In view of the proposed National Disaster Risk Management Framework, these sector-specific Acts, guidelines, rules and regulations and other developmental schemes need to be reviewed from the perspective of mainstreaming disaster risk management concerns therein. An Inter-Ministerial Committee or an Inter-Agency Task Force may need to be constituted to analyze the existing legal instruments and recommend appropriate measures to streamline the same in the light of the NDRM Framework.

It would thus be apparent that elements of a national disaster risk management system do exist within the administrative machinery. However, the need for a properly coordinated approach and well-delineated action plan covering all sectors under a uniform national framework, with various agencies implementing their mandates with their sector-specific work plans, has been felt and the Government realizes the need to promote a more pro-active approach to managing disaster risks rather than a reactive approach concentrating only on managing their aftermath.

2.3 Recent Developments

In order to give an impetus to initiation of disaster risk management activities in the country and to draw a National Disaster Risk Management Framework in a consultative and interactive process, the Department of Local Governance had recently organized two consultations with active participation of all concerned sectors and stakeholders. The first consultation was held in Phuentsholing on 22-23 November, 2005 and the other in Thimphu on 23rd February, 2006. The

inputs and the presentations made by the participating sectors helped identify the needs and assess the gaps in disaster risk management. The consultation process led to the formulation of the first draft of the Framework which was shared with the participating Ministries/agencies for their review and comments and has now been drawn up for adoption.

In between, a study tour to India was organized for Bhutanese officials and other stakeholders in the month of January, 2006 during which they were familiarized with the systems, institutions and mechanisms developed for disaster risk management in that country.

It may also be noted that recently the South Asian Association for Regional Cooperation (SAARC) has included disaster management as one of the thematic areas for cooperation and exchange among the countries of the region and a SAARC Centre for Excellence in Disaster Management is also proposed to be set up in Delhi. As a member of the SAARC the role of the Royal Government of Bhutan is expected to increase in the area of disaster management especially that relates to trans-boundary disaster issues. A joint group of experts on flood management has been formed between the Royal Government of Bhutan and the Government of India to discuss and assess the probable causes and effects of the recurring floods and erosion in the southern foothills of Bhutan adjoining the plains of India and recommend to both Governments, appropriate and mutually acceptable remedial measures.

The first meeting of the Joint Group of Experts (JGE) was held in Thimphu/Phuntsholing from 1-5 November, 2004.The meeting decided on a set of flood mitigatory studies to be done by both Bhutanese and Indian experts. The fund for conducting the meeting has been projected in the budget for the fiscal year 2005-2006. The fund for actual works would be known only after the preparatory works are completed.

In addition, some of the Ministries/ sectoral agencies are implementing or have completed implementation of certain projects with institutions/organizations in the region viz. Asian Disaster Preparedness Centre (ADPC), International Centre for Integrated Mountain Development (ICIMOD), International Search & Rescue Advisory Group (INSARAG), Centre for Water Commission (CWC) etc. and the sufficient experience and learning has already been garnered from these interactions.

The Royal Government of Bhutan has also initiated the process of consultation with the international humanitarian organizations such as the United Nations Development Programme (UNDP), World Food Programme (WFP), Food and Agriculture Organization (FAO), World Health Organization (WHO) and United Nations Children's Fund (UNICEF) with a view to learn from the international experience, perspective and best practices evolved in different countries and in countries facing disaster risk management challenges similar to Bhutan and has sought to contextualize them in conformity with the needs, challenges, opportunities and aspirations of the our people.

2.4 Key Challenges and Opportunities for Disaster Risk Management in Bhutan

Institutionalization and mainstreaming of disaster risk management agenda in the national and socio-economic life of any country is beset with its own challenges and obstacles while at the same

time affording unique opportunities. Some of the key challenges and opportunities can be enumerated as follows:-

2.4.1 Challenges

Lack of Resources: The government systems with regard to disaster risk management are still at an evolution stage and as such there is a lesser degree of understanding of issues connected therewith leading to inadequate allocation of resources for initiating holistic disaster risk management activities in the country. The government would be required to mobilize resources from across the national sectors or forge partnerships with international organizations for disaster risk management. In this context, it necessitates building on existing resources, strengths and initiatives. Therefore, it is important that efforts to build disaster risk management capacities in the country take a pragmatic, low-cost approach and build on the work of other sectors to the maximum extent possible.

Low to moderate technical capacity: Effective disaster risk management requires synthesis of technical as well as organizational capacities across a range of sectors. While Bhutan has a fairly elaborate organizational structure connecting national, intermediate (Dzongkhags) and Dungkhags and the local levels (Gewogs and Thromdes) that have proved to be very effective in responding to disaster events, technical capacities in areas such as meteorology, climatology, geophysics, seismology, geotechnical engineering and earthquake engineering is fairly limited. The administrative system is fairly strong but it has low technical capacity. There is also a need to develop capacities at the Dzongkhag and below levels for basic disaster risk management work.

Competing development priorities: A developing country like Bhutan has its own sectoral developmental priorities and intra-sector development plans accord priority to building and expanding sector-specific services and infrastructure without mainstreaming disaster risk reduction elements. The health, education, infrastructure etc. are some of the sectors where greater priority is given to creating assets viz. hospitals, schools etc. without paying adequate attention to their ability to withstand natural hazards. Hence, it is a critical challenge to intertwine disaster risk management concerns while determining developmental priorities.

Multi-sectoral coordination: It has also been experienced that different wings of the Government and agencies have undertaken independent disaster management initiatives pertaining to their sector. However, these have not been properly coordinated leading to duplication/overlap of efforts. A properly coordinated mechanism would have led to confluence of competence, expertise and resources to achieve optimum results. In order to pave the way for a well-coordinated and well-devised national strategy for holistic risk reduction, the Department of Local Governance, MoHCA has been designated as the co-coordinating agency for Disaster Management. Under this coordination arrangement it is hoped that the disjointed and disparate efforts that exist today among the various sectors will be reduced.

2.4.2 Opportunities

His Majesty the King has already laid a firm foundation of a strong civil and public administrative system that offers opportunities for many new development initiatives. Today government, public

and private sectors have adequate technical, managerial know how and capacity to meet challenges in disaster management. Since the sectoral initiatives are still isolated from each other concerted effort should now be made towards an integrated multi-stake holder approach.

***Plethora of existing initiatives**:* A number of initiatives and activities are underway with various Ministries/agencies which though specific to their respective sectors have the potential to address disaster risk management issues. These existing programmes can be built upon and disaster risk management concerns interwoven into them. For example, some hazard zonation work has been done by the Department of Geology and Mines which can be further expanded and applied for risk mitigation. Similarly, other initiatives under National Adaptation Plan of Action (NAPA), GLOF mitigation, early warning systems etc. can also contribute towards this end. The need is to synthesize and consolidate these currently disparate and disjointed activities under one mechanism to strengthen the disaster management capabilities in the country.

***Sound civil administration system**:* The civil administration system in the country is very strong and extensive and some core personnel in each sector have undergone training within and outside the country and their expertise can be harnessed for developing wholesome capacities in the countries. Similarly, the administrative structures at Dzongkhag, Dungkhag, Gewog and Municipality levels are also quite well delineated and linkages can easily be established through proper coordination to mainstream risk management concerns.

Multi-stakeholder approach: The social, economic and cultural strands in the country indicate a strong mindset of inter-dependence and cohesive social system. The traditional way of life coupled with strong religious moorings validate a multi-stakeholder approach. The Constitution of the country also seeks to inculcate a spirit of mutual assistance in times of need and natural disaster. Moreover, there are a number of national and international organizations which are implementing projects in partnership with Government agencies and have developed mutual confidence and mechanisms to jointly address the concerns and share experiences. These processes can be built upon to implement successful and wide-ranging partnerships across a whole range of actors at the national and local level including technical experts, institutions of learning and excellence, corporate sector, academia, community leaders, media and other significant players in the national and socio-economic life of the country.

The Royal Government of Bhutan is striving to convert the challenges into an opportunity to usher in a disaster-resilient and safer nation through the implementation of the National Disaster Risk Management Framework.

2.5 Proposed Institutional Framework

2.5.1 At the national level

In order to secure synergies of action and confluence of strategies and resources for implementation of disaster risk management agenda in the country, it is essential that a well-defined structure/mechanism is put in place at all administrative levels. An underlying principle of an effective administrative structure is that different administrative rungs reflect the national vision and objectives to achieve commonality of approaches, harmonization of efforts and effective harnessing of national capabilities and resources.

With His Majesty the King at the apex level, the **Cabinet** with the Prime Minister as the Chairperson shall be the highest decision-making body. It shall take a holistic view of the disaster management scenario in the country and shall lay down appropriate institutional, legislative and policy mechanisms addressing an entire gamut of issues relating to disaster prevention, mitigation, preparedness and response. The Cabinet shall set-up the requisite funding mechanism for disaster risk management. It shall decide the corpus for the National Disaster Mitigation and Preparedness Budget to finance hazard-specific risk mitigation projects/schemes and to strengthen the response capabilities at all administrative levels, including the community, and for providing succor to the affected people through appropriate relief, recovery, rehabilitation and reconstruction efforts in the aftermath of any disaster. The Cabinet shall report to His Majesty the King for directions.

The National Committee for Disaster Management (NCDM) shall be the highest executive body chaired by a Cabinet Minister on a rotational basis for a period of one year. The Secretaries of the Ministries including representatives of Dratshang Lhentshog and the Armed Forces shall be the members of the Committee. The Home Minister shall be the vice Chairperson. The Department of Local Governance (DLG) shall function as the Secretariat to the Committee. The Committee shall supervise/assess various disaster risk reduction initiatives/ projects and oversee the effectiveness of response mechanism. It shall approve different sectoral risk management and response strengthening proposals/schemes and give directions to line Ministries/agencies for mobilizing resources, manpower and expertise and take such suitable steps as may be deemed necessary. It shall provide regular inputs to the Cabinet as required by it or during a situation of a national emergency. It shall cause for requisite steps to be taken at national, Dzongkhag, Dungkhag, Gewog and/or Thromde level to meet the exigencies of a situation as may be deemed necessary by it in the event of a disaster and shall meet regularly to review the relief operations and extend all possible assistance to the affected areas.

The Department of Local Governance, Ministry of Home and Cultural Affairs shall be nodal Ministry for coordinating the national disaster risk mitigation, response, relief and rescue endeavors. It shall formulate schemes/programmes for incorporating disaster risk reduction measures in the development process as also in the public domain. Through the **National Emergency Operations Centre (NEOC)**, it shall maintain continuous disaster surveillance, tracking and ensure real-time warning dissemination to the Dzongkhags, Dungkhags, Gewogs and Thromdes likely to be impacted by an impending disaster and shall keep the NCDM and the Cabinet informed regularly about the gravity of the situation. It shall also be mandated to requisition resources, manpower and assistance from other Ministries/agencies in an emergency situation, shall give directions to the local administrations and shall closely monitor the entire process of disaster response including recovery and reconstruction.

2.5.2 At the Dzongkhag level

At the Dzongkhag level, a **Dzongkhag Disaster Management Committee (DDMC)** shall be constituted under the Chairmanship of the Dzongda. The Dzongkhag DMC shall implement cross-sectoral risk reduction initiatives at the Dzongkhag level and develop capacities to respond to disasters in their respective areas. It shall also maintain and manage a **Dzongkhag Disaster Management Fund** to raise resource for the activities aimed at risk reduction and set-up a **Dzongkhag Emergency Operations Centre (DEOC)**. It shall maintain continuous contact with

the National EOC and disseminate information to the Dungkhags, Gewogs and Thromdes in case of an emergency. A SITREP (Situation Report) shall be regularly sent to DLG/NEOC during a crisis situation. The Dzongkhag DMC shall assess the requirements, mobilize/summon resources and manpower to respond to a disaster and extend all assistance to the Dungkhags, Gewogs and Thromdes within its jurisdiction.

2.5.3 At the Dungkhag, Gewog and Thromde levels

Similarly, City/Thromde Disaster Management Committee (TDMC) and Gewog Disaster Management Committee (GDMC) shall be constituted to discharge a similar set of responsibility for their respective areas. The two municipal areas of Thimphu and Phuentsholing shall have independent disaster management plans in operation. However disaster management linkage modalities for the Gewogs lying within the peripheries of designated Thromdes may need to be taken into consideration

2.6 Proposed Response Mechanisms

The institutional arrangements proposed above shall also continue to discharge their responsibilities in both the pre-disaster phase [by conceptualizing, formulating, approving and supervising implementation of national and sectoral disaster risk management measures] as also in the post-disaster situation [to address speedily the relief, rehabilitation, reconstruction and recovery needs of the affected populace and the region].

In the eventuality of a disaster of national proportions or a situation where the localized disaster is of such magnitude that it is beyond the coping capacity of one or more Dzongkhags, the Cabinet shall cause such steps to be taken to effectively respond to the situation and shall continuously monitor the response endeavor. The National Committee on Disaster Management (NCDM) shall cause to mobilize the requisite assistance to the affected areas and give directions/advisories to the central ministries/agencies as also to the Dzongkhags, Dungkhags, Gewogs and Thromdes to summon their resources and take necessary steps to meet the exigency. Where appropriate the services of the Armed Forces should be called in.

The **National Emergency Operations Centre (NEOC)** shall be the hub for maintaining a constant vigil on the emerging disaster situation and coordination of response endeavors. It shall maintain regular contact with Dzongkhag Emergency Operation Centres (DEOCs) and assess their requirements and provide regular situation reports to the NCDM and the Cabinet.

At the Dzongkhag level, the Dzongkhag EOC and the Dzongkhag Disaster Management Committees shall have the responsibility of supervising the disaster response and shall report on a regular basis to the National EOC or DLG about the requirements and needs in the affected areas and extend such assistance as shall be required by the Dungkhags, Gewogs and the Thromdes.

At the National, Dzongkhag, Geog and Thromde levels inter-sectoral co-operation and co-ordination shall be sought to ensure effective management in times of disasters. The Royal Government of Bhutan is confident that the institutional arrangements being set-up at different administrative levels shall go a long way in streamlining and coordinating the initiatives and efforts being made by various constituents of the administration and shall lead to a synchronous,

harmonious and efficacious functioning of disaster risk management mechanism and shall substantially contribute towards strengthening the disaster response capacities across the country in a systematic and steady manner over the coming years. These institutional mechanisms shall help achieve a vision of creating a disaster-resilient nation.

2.7 Financial Arrangements

It is essential for the success of the national and sectoral initiatives for disaster risk management and response capability strengthening that appropriate funding mechanisms to support and sustain the activities are also created. The envisaged funding mechanism shall also provide financial support to disaster risk management activities at the Dzongkhag, Dungkhag, Gewog and Thromde levels.

a) Disaster Mitigation, Prevention and Preparedness Budget

It is proposed that the Royal Government of Bhutan shall constitute a national budget designated as the Disaster Mitigation and Preparedness budget. It shall be coordinated by the Ministry of Home and Cultural Affairs and the programmes/ activities/ sectoral initiatives addressing disaster management concerns approved by the National Committee for Disaster Management shall receive appropriate disbursement from the budget. The budget shall finance hazard-specific risk mitigation projects/schemes/programmes formulated at the national level. It shall also extend suitable financial assistance for such programmes/schemes undertaken at the Dzongkhag, Dungkhag, Gewog and Thromde levels. Every Ministry/agency of the Government shall review its developmental guidelines and activities and formulate components for addressing disaster risk reduction elements therein and make suitable allocations from their regular annual budget.

b) His Majesty's Relief Fund

Over the years His Majesty the King has been personally attending to the welfare of the affected individuals and families in the times of disasters. His Majesty's relief grants to the affected families are given in the form of ration, building materials and in some cases cash to enable them to reconstruct their homes. At present, except for His Majesty's personal intervention there is no regular fund to provide timely and adequate relief and rehabilitation to individuals and families affected.

In view of increasing incidences of disasters that occur in the country and in particular those that affect poor and vulnerable rural communities whose response capabilities are minimal, a regular fund need to be established. The Royal Government of Bhutan has therefore instituted "**His Majesty's Relief Fund"**. The Fund shall be administered by the Department of Local Governance, Ministry of Home and Cultural Affairs. The corpus of the Fund shall be determined by the Ministry of Home and Cultural Affairs. The resources under the Fund shall be utilized to complement and strengthen disaster response systems and capabilities at various administrative levels and for mounting a speedy, timely and efficacious disaster response and to address relief, rehabilitation, recovery and reconstruction needs of the affected areas and people. Utilization of this fund must be approved by His Majesty the King. This fund shall be mobilized through voluntary contribution made by the private sectors, civil societies, NGOs, supplemented by annual budget of the government.

c) Major Disaster Fund (Emergency)

The Royal Government will also institute a Major Disaster Fund to finance response and relief operations in the country in the event of a major disaster in the country and its immediate aftermath. The corpus of the fund will be decided by the Cabinet and coordinated by the Ministry of Home & Cultural Affairs in association with Ministry of Finance. Approval for the release shall be sought from His Majesty the King. The fund will be used for immediate relief; restoration of essential infrastructure; and restoration of public assets in the social sector.

The MoHCA shall seek funds from international agencies through the Cabinet. Private and public sectors will also be involved if need for such support arises in times of major disasters.

In case of a major disaster, the affected Dzongkhag will submit a detailed report of the disaster to the Ministry of Home & Cultural Affairs along with estimates of damages. The MoHCA will then form a central investigating team with the Director General, DLG as the team leader. The central team shall go to the affected place, assess the damages and recommend to the Cabinet for release of fund.

Chapter 3

Disaster Risk Management Framework (DRM) for Bhutan

3.1 Disaster Risk Management Framework

The Royal Government of Bhutan recognizes the need for promoting a risk management approach to dealing with disasters rather than only a reactive approach that deals with the aftermath of disasters in an ad hoc manner. In this context, Disaster Risk Management has been defined as the "systematic process of using administrative decisions, organizational and operational skills and capacities to implement policies, strategies and coping capacities of communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards" [International Strategy for Disaster Reduction (ISDR) Secretariat, 2004].

While primary responsibility of formulating a DRM framework lies with the government, its effective implementation will require active participation of all stakeholders including communities, volunteers, religious organizations, local governments, academia and scientific and technical institutions.

3.1.1 Key objectives

As mentioned in Chapter 1, the key objectives of this framework are:

- To promote a disaster risk management approach instead of an *ad hoc* reactive approach to dealing with disasters;
- To recognize the respective roles of different organizations in disaster risk management and provide all possible support to their work within the national framework for disaster risk management; and
- To establish linkages between disaster risk management and the other ongoing activities in different development sectors.

3.1.2 Scope of the DRM Framework

This Framework includes all the elements of a risk management framework including: establishing the context; risk identification; risk analysis; risk evaluation; risk communication; risk reduction (through both anticipatory and compensatory means) and continuous monitoring and evaluation. The Framework covers these elements of disaster risk management through the following distinct but inter-related components:

- Institutional, legislative and policy frameworks

- Hazard, vulnerability and risk assessments
- Disaster management system
- Early warning systems
- Disaster preparedness plans
- Mitigation & integration of disaster risk reduction in development sectors
- Public awareness and education
- Capacity building
- Communication and transportation

The Framework outlines all the key outcomes that need to be achieved under each of the components and indicative activities that need to be carried out to achieve these outcomes over the short, medium and long term. However, as the implementation of this Framework commences, detailed programmes will have to be developed covering all the components. In this respect, this framework presents the 'breadth' of actions that need to be undertaken over the next ten years but does not cover the 'depth' of analysis and programming that needs to be undertaken to carry out these activities. This will be done by the respective lead institutions for each of the components when the implementation begins.

3.1.3 The consultative process

These components have been developed through a consultative process and have drawn upon key 'good practices' in disaster risk management from around Asia. The process began with a national consultative workshop organized in the run up to the World Conference on Disaster Reduction (held in Kobe, January 2005), which produced a report on status of disaster risk management in the country. Subsequently, a 'National Consultative Workshop on Instituting an Integrated Disaster Risk Management Strategy' was held in November 2005 in Phuentsholing, which provided a forum to review the overall disaster management context in Bhutan and assess the existing gaps and potential opportunities for integrating local and national response and risk reduction strategies. As a follow on to the November 2005 workshop a draft Framework was developed and shared with all stakeholders. Another consultative meeting held in February 2006 provided feedback on the draft Framework.

Simultaneously, various other processes have contributed to this Framework such as the study tour of Bhutanese officials to selected institutions in India in January 2006.

The National Consultative Workshop in Phuentsholing in Nov. 2005

2nd Consultative Workshop in Thimphu in Feb. 2006

The Components of the Framework:

3.2 Institutional, legislative and policy frameworks

The objective of this component is to design and implement an appropriate institutional and legislative framework for disaster risk management in Bhutan. This will help define the mandates and inter-relationships of respective organizations across sectors as well as across different administrative levels. Appropriate financial arrangements to meet the various disaster risk management needs (disaster risk reduction, disaster response and local level risk reduction) of the country will be designed under this component. Under this component, the government will also begin to articulate its policies on different aspects of disaster risk management (such as recovery, rehabilitation). Adequate investments will have to be made in capacity building at different levels to ensure the effectiveness of this component. There are potential synergies with other development activities such as the ongoing efforts to build capacities of the local governments and decentralization.

Component 1: Institutional, Legislative and Policy Frameworks

To establish an appropriate institutional and legislative framework defining the mandates and inter-relationships of various organizations across sectors and administrative levels.

Expected Outputs	Activities/Areas of Intervention	Timeline 1-2 yrs (S) 3-5 yrs (M) 6-10 yrs (L)	Lead/Responsible Agencies/sectors with supporting institutions
1.1 Institutional Framework			
Coordination mechanisms established at the national level	Establish following key mechanisms: Cabinet with Prime Minister as chair. National Committee on Disaster Management (the highest executive body Chaired by the Minister, MoHCA to oversee disaster risk management activities) DLG within the MoHCA to coordinate and facilitate disaster mitigation and preparedness as well as disaster response activities across different sectors/Ministries and at Dzongkhag, Dungkhag, Gewog and Thromde levels	 (S) (S) (S)	DLG, MoHCA
Coordination mechanisms established at the Dzongkhag, Gewog and/or Thromde levels	Establish Disaster Management Committees at Dzongkhag, Dungkhag, Gewog and Thromde levels responsible for implementing disaster risk management initiatives at different levels	(S)	DLG, MoHCA
1.2 Legislative and Policy Framework			
National Disaster Risk Management Act	Constitute a Working Group of legal practitioners, policy makers (with technical support from disaster risk management experts) to draft the bill. Submit the draft to the Cabinet for consideration and approval of the same in the national assembly.	(S) (S)	DLG, MoHCA and organizations concerned (Legislative agencies)
Enunciation of a National Disaster Management Policy	Constitute a working group to start articulation of Government's policy on different aspects of disaster management viz. guidelines for relief, recovery, rehabilitation, enforcement of codes etc.	(S)	DLG, MoHCA, in consultation with other relevant Ministries/sectors including Planning Commission for prioritizing the activities.
1.3 Capacity Building of National Focal Institution			
Capacities of the national focal institutions (MoHCA, DLG) strengthened	Conduct needs assessment and formulate a targeted capacity building programmes Develop skills, provide equipment and systems in the relevant departments Training of human resources	(L)	MoHCA in consultation with sectors concerned.

1.4 Financial Arrangements			
His Majesty's Relief Fund established	Develop guidelines for the utilization of His Majesty's Relief Fund to strengthen response capabilities at national, Dzongkhag and other administrative levels.	(S)	DLG, MoHCA, Ministry of Finance, Private and Public sectors
National Disaster Mitigation and Preparedness Budget	Develop guidelines for financing local level disaster mitigation and preparedness projects/ schemes Propose corpus at the national, Dzongkhag and other administrative levels for the approval of the Cabinet.	(S)	DLG, MoHCA and Ministry of Finance and Dzongkhags.
Major disasters (Emergency Fund)	Work out financial modalities	(S)	DLG, MoHCA, Ministry of Finance, Private and Public Sectors
Risk Transfer Mechanisms	Constitute a working group involving the Royal Insurance Corporation of Bhutan (RICB) Review and analyze the existing risk transfer and insurance mechanisms Although property insurance exists, compensation of valuable properties lost due to disaster must be made mandatory through a insurance scheme	(S)	DLG, MoHCA, Ministry of Finance, Royal Insurance Corporation of Bhutan & concerned sectors.

3.3 Hazard, Vulnerability and Risk Assessment

The objective of this component is to improve access to synthesized information on disaster risks for policy and decision makers across different sectors and administrative levels. In the absence of such information, policy and decision makers have to make disaster risk management decisions (such as where to invest in risk control measures, where to locate emergency response assets, where to locate critical facilities), in an ad-hoc or at best intuitive manner, which may not make the most optimal use of scarce resources. This component will synthesize existing information on hazards, vulnerabilities and risks that is available with different organizations in such a form that it can be utilized for decision making for disaster risk management. At the same it will identify critical gaps in existing information and work towards filling those gaps in a prioritized manner. Under this component a geo-referenced disaster database will be set up that will capture disaster impacts at the *Gewog* level in order to track existing and emerging patterns of disaster risk.

Component 2: Hazard, Vulnerability and Risk Assessment To identify the probability of occurrence of various hazards in a specified future time period, as well as the intensity and area of impacts.			
Outputs	Activities	Time Line 1-2 yrs (S) 3-5 yrs (M) 6-10 yrs (L)	Lead/Responsible Agencies/sectors with supporting institutions
2.1 Hazard Atlas			
First version of a multi-hazard atlas of Bhutan produced	Compile existing hazard maps from different sources for each district of the country Using the best available technical information and expert judgment determine hazard risk for each hazard for each district (if possible smaller administrative levels) Produce the first version of an easily understandable and usable hazard atlas in print as well as digital format Compile maps related to settlements, population density, land use etc. and to the extent possible prepare overlays with the hazard maps	(M)	DLG (MoHCA), DGM, (MTI), and Dept. of Survey (MoA)
2.2 Hazard zonation for all major hydro-meteorological and geological hazards			
Hazard maps for all hazards (landslides, floods, GLOFS, earthquakes, forest fires) developed further in a prioritized manner	Identify gaps in existing hazard maps for different hazards in terms of coverage as well as quality (appropriate scale for use in decision making, presentation etc.) Prioritize areas for hazard based on exposure in terms of human settlements, critical infrastructure and other assets Prepare a multi-year plan for hazard mapping based on the above Constitute suitable implementation teams and begin hazard mapping	(M)	DLG (MoHCA), DGM (MTI), and NEC
2.3 Disaster databases			
A geo-referenced national database of all disaster events captured at *Gewog* level and their impacts established	Define key disaster types to be captured in the national disaster database Identify and evaluate key disaster data sources for building a historical dataset Train relevant staff at the MoHCA in a methodology to develop disaster datasets Build historical dataset from archival sources, and institutionalize a system for prospective data collection and analysis	(M)	DLG (MoHCA)

2.4 Multi-hazard maps for human settlements			
Multi-hazard maps developed as an input to the development of new townships and expansion of the existing ones	Review plans for new settlements as well as expansion of new settlements Constitute a multi-sectoral working group to develop multi-hazard maps for these new settlements Develop multi-hazard maps at an appropriate scale for the use of urban planners and developers.	(M)	DLG (MoHCA) MoWHS DoE (MTI)
2.5 Seismic Zonation Maps			
Seismic hazard maps developed for Bhutan Set up permanent seismic monitoring network for the country	Develop initial seismic hazard maps based on existing scientific information from national and international sources and empirical evidence Drawing upon the experience of pilot seismic networks established earlier, establish a permanent seismic (telemetred) network Establish a seismic monitoring cell in DGM and train staff to regularly analyze the data received from the seismic network and progressively enhance the understanding of seismic hazard in the country	(M)	DGM (MTI)

3.4 Disaster Management System

The National Disaster Risk Management Framework envisages the development of a holistic approach designed to manage disasters in more proactive basis involving various sectors, it is felt that a strong disaster management system should be put in place so that the sectors will be fully accountable in the long run. Plans, programmes and procedures relating to disasters must be institutionalized. This will ensure timely and coordinated actions at all spheres of administrative levels and at the communities during a major disaster. The MoHCA as a coordinating agency shall see that the disaster preparedness and response system is built into all government, public, private, corporate sectors and civil societies by incorporating plans, adequate financial arrangements and a set of practical measures in their development plans.

3.5 Early Warning Systems (EWS)

The objective of this component is to work towards development of a coherent, end-to-end EWS that has both broad spatial coverage (covering all vulnerable areas) and a broad multi-hazard focus to reduce risk from all natural hazard events. The promotion of community-based and people-centered approaches to disaster risk management will be part and parcel of this process. Various agencies in Bhutan are organized according to specialized tasks for different hazards, with relatively little information sharing or partnerships with other agencies. It is these gaps that this component seeks to address by bringing together all concerned agencies. It will begin to establish a

policy dialogue so that appropriate standards for end-to-end early warning systems are developed, implemented and institutionalized at the national level. This will have linkage with Communication and Transportation components that will address issues related to the lack of communication lines/ networks and especially their unavailability during times of emergency. The local and national level support activities will also be designed to integrate with regional and international early warning system development efforts.

A local approach to EWS also needs the direct participation of those who are likely to be exposed to such hazards. Involvement of local communities in all stages of EWS will reinforce public understanding of the whole range of risks they face thus strengthening the desired preparedness actions and warning response.

Component 3: Early Warning Systems To generate advance warnings and thus improve capacity of decision-makers to take required action prior to the occurrence of a disaster			
Outputs	Activities	Time line 1-2 yrs (S) 3-5 yrs (M) 6-10 yrs (L)	Lead/Responsible Agencies/sectors with supporting institutions
3.1 Design and implementation of end-to-end GLOF/ Flood Early Warning Systems in some of the vulnerable flood basins			
End-to-end early warning systems for GLOF/ Floods established in the most vulnerable river basins	Identify the river basins most vulnerable to flash floods and GLOF Taking stock of existing capacities, design an end-to-end early warning system for these river basins including monitoring, warning formulation, warning dissemination and local response mechanisms to warning systems In a prioritized manner, strengthen different components of early warning systems in these river basins	(M)	DLG (MoHCA), DGM, DoE (MTI) and other related sectors.
3.2 GLOF monitoring			
GLOF Monitoring systems Web enabled databases and capacity for voice and data traffic established	Identify the most vulnerable glacial lakes. Install systems for monitoring the water levels in these lakes and the risk of their outburst Link the GLOF Monitoring system with the overall early warning systems for flash floods and GLOFs in respective river basins	(M)	DLG (MoHCA), DGM (MTI), DoE (MTI) and other related sectors.
3.3 Landslides monitoring			
Landslide monitoring systems established in the most vulnerable locations	Identify sites that are most vulnerable to landslides and have significant potential for causing damage downstream (e.g. impact on human settlements, infrastructure, formation of artificial dams) Install systems for monitoring the water levels in these lakes and the risk of their outburst Link the GLOF Monitoring system with the overall early warning systems for flash floods and GLOFs in respective river basins	(M)	DLG (MoHCA), DoA (MoA), DGM, DoE (MTI) and other related sectors.

3.4 Training of local administrative officials			
Officials at Dzongkhag and other levels of administration trained on issues related to Early Warning systems	Develop training modules on issues related to Early warning dissemination and response Deliver these training programmes to the local administration officials	(M)	DLG (MoHCA), DGM, DoE (MTI) and other related sectors.
3.5 Strengthening Meteorological services			
Meteorological services strengthened	Review the earlier assessments of the meteorological services and draw up a plan for better coordination between the meteorological capacities at the Ministry of Agriculture and Dept. of Energy as well as overall enhancement of their capacities in a prioritized manner	(M)	DLG (MoHCA), MoA, DoE (MTI) and related sectors.
3.6 Improving hydrological observation network			
Hydrological observation network strengthen	Identify the most flood vulnerable river basins in the country and assess the current hydrological observation network in these river basins Strengthen this hydrological network in a prioritized manner over a period of 4 years	(M)	DLG (MoHCA), DoE (MTI) and related sectors.
3.7 Information flows and coordination mechanisms			
Information network and coordination mechanism strengthened	Streamline information flows and coordination mechanism to ensure effective vertical and horizontal linkages across all stakeholders involved in EWS.	(M)	DLG, MoHCA, DoE, DGM (MTI) and related sectors.

3.6 Disaster Preparedness Plans

The objective of disaster preparedness planning is to minimize the adverse effects of a hazard through adequate preparedness and response planning to ensure timely and coordinated action at administrative and community levels to meet the exigencies arising out of a natural catastrophe. Preparedness involves development and regular testing of warning systems (linked to multi-hazard EW Systems) and plans for evacuation or other measures to be taken during a disaster alert period. It also involves education and training of officials, intervention teams and communities. Establishment of policies, standards, organizational arrangements and operational plans to be applied following a disaster are also crucial.

Disaster preparedness planning at all administrative levels is essential to ensure proper assigning of roles and responsibilities and conduct of mock-drills to test the efficacy of the plan. It also requires systematically building capacities for immediate response and recovery across all levels. The plans clearly define the roles of concerned agencies in order to avoid mismanagement, overlaps and gaps and emphasize coordination of all sectoral agencies, sensitizing the media and ensuring development of relevant information mechanisms.

Component 4: Disaster Preparedness Plans

To prepare multi-hazard disaster preparedness and response plans at national, Dzongkhag, Dungkhag, Gewog and Thromde levels to ensure requisite levels of preparedness and functioning of sectoral response plans

Expected Outputs	Activities/Areas of Intervention	Timeline 1-2 yrs (S) 3-5 yrs (M) 6-10 yrs (L)	Lead/Responsible Agencies/sectors with supporting institutions
4.1: National Disaster Preparedness and Response Plan			
Development of disaster preparedness and response plans at the national, Dzongkhag, Dungkhag, Gewog and Thromde levels	To conduct hazard, vulnerability and risk assessment in various administrative units. To develop multi-hazard preparedness and response plans in a prioritized manner at national, district and local levels to deal with large-scale disasters in hazard-prone areas. To draw up multi-disciplinary plans in conjunction/ consultation with Ministries/ sectors/agencies entrusted with disaster risk management mandates. To establish linkages with plans at other administrative levels. Training a cadre of officers at various levels for undertaking plan preparedness. To test sectoral preparedness at regular intervals. To assign roles and responsibilities to different sectors and individuals and check preparedness levels. Sharing of plan with all relevant actors.	(S)	DLG (MoHCA) and all other concerned Ministries/sectors and district and local level administrations
National Emergency Operations Center (NEOC)	To design and set up a National Emergency Operations Center to meet the multi-hazard operational requirements. To constitute a multi-sectoral experts team to assess requirements of infrastructure, equipments and trained man-power. To develop Emergency Support Function (ESF) Plans to ensure timely and effective intervention by all sectoral agencies. The NEOC to build on existing capacities Training and capacity building of the staff in emergency response and protocols. To have adequate communication systems with stand-by facility and redundancy.	(M)	DLG (MoHCA) and other sectoral Ministries/agencies entrusted with disaster response as per disaster preparedness plan
Inventory of disaster response resources	To develop a geo-referenced web-enabled inventory of resources, equipments and trained man-power available at national, Dzongkhag, Dungkhag, Gewog and Thromde levels for facilitating easier access and mobilization during an emergency. To constitute a team of IT skilled professionals for developing the portal Procurement of appropriate hardware and software support. To provide training in developing and operationalizing the portal to the IT professionals.	(S)	DLG (MoHCA) and all line Ministries/ sectors/ agencies at national, Dzongkhag, Dungkhag, Gewog and Thromde levels

Community based Disaster Preparedness Planning (CBDP)	To enhance community capacity in multi-hazard risk management and preparedness in vulnerable administrative units in a prioritized manner. To focus on building the skills and aptitude of the community including vulnerable groups Capacity building and training in developing disaster preparedness plans at the community level. To provide support to the people to develop the plans. To tap expertise from relevant organizations to facilitate the process. To rehearse preparedness planning at community levels at regular intervals to ensure sustainability of the process and to ensure updating of the plan.	(M)	DLG (MoHCA), Administrations of Dzongkhags, Dungkhags, Gewogs and Thromdes, all line Ministries/ sectors/ agencies especially the ones with Emergency Support Function (ESF) plans to be part of the planning process

3.7 Mitigation and Integration of Disaster Risk Management in Development Sectors

The objective of this component is to reduce loss of life and property in the event of potential hazard occurrences. The primary aim is to reduce the risk of death and injury to the population. Secondary aims include reducing damage and economic losses to public sector infrastructure and reducing private sector losses in as far as they are likely to affect the community as a whole. The objectives are likely to include encouraging people to protect themselves as far as possible.

Any mitigation strategy is likely to include a range of measures. A set of actions that includes engineering measures, spatial planning, and a degree of economic management and community participation will be needed to bring about effective mitigation. A mitigation programme that concentrates solely on any one of these five aspects will be unbalanced and is unlikely to achieve its aims.

Disaster Mitigation investment has to be seen in terms of the price of protecting existing and future infrastructure. The spending of a few percent extra on a new facility to build it a little stronger and protect it against a future threat is usually seen as prudent. The level of investment that is justified to protect society, its economic activities and its built environment is a matter of political decision making, and the economics of risk. Decision making on appropriate levels of investment in disaster mitigation depends on how likely the hazard is to occur, and what would be the impact of the hazard if it does occur. The costs and benefits of alternative investment strategies need to be carefully evaluated. The use of a systematic framework of risk assessment to establish which hazards are most likely to occur and the probable effects will help define the priorities of mitigation programmes.

Component 5: Mitigation and integration of DRR in development plans			
Outputs	**Activities**	**Time line** **1-2 yrs (S)** **3-5 yrs (M)** **6-10 yrs (L)**	**Lead/Responsible Agencies/sectors with supporting institutions**
5.1 Integrating Disaster Impact Assessment into all development projects			
Mechanisms (such as mandatory risk assessments) developed to incorporate disaster risk concerns (mitigation measures) in all development projects	Review existing environmental impact assessment guidelines and explore the possibility of either integrating disaster risk assessment components to it or developing new set of disaster risk assessment guidelines for all new development projects Appropriate budgetary allocation for ministries/departments involved in mitigation/prevention Evolve a robust risk transfer system to mitigate losses and damages	(M)	DLG (MoHCA), NEC, Planning Commission, MoF and SQCA (MoWHS)
5.2 Earthquake risk mitigation			
Building codes/guidelines developed for earthquake resistant construction	Review and adapt building codes of other countries to the Bhutan context Review byelaws to examine possible gaps, and review ordinances which are not being implemented	(M)	DLG (MoHCA), SQCA (MoWHS)
5.3 Hazard-specific (landslide, flood, GLOF, fire etc.) mitigation measures developed and implemented in vulnerable locations			
Some of the most vulnerable sites identified and hazard specific mitigation measures implemented	Identify the most vulnerable locations (with regards to GLOF, floods and landslides) that require structural mitigation measures on an urgent basis Develop detailed mitigation plans for the above Implement the mitigation measures in a prioritized manner	(L)	DLG (MoHCA), MoWHS
5.4 Local level mitigation action plans developed and implemented			
Mitigation assessments and programmes in risk prone areas	Identify some of the most vulnerable communities. Locate high and moderate disaster risk sites around these communities. Undertake detail assessments to determine the most suitable and economically viable mitigation measures. Implement recommendations at the local level.	(L)	DLG (MoHCA) Dzongkhags, Dungkhags, Gewogs and MoWHS

3.8 Public Awareness and Education

Building awareness among the people about the hazards, vulnerabilities and disaster risks and the steps that can be taken for mitigating the same is a sine qua non for building their knowledge, aptitude and skills for effective disaster risk management. Incorporation of disaster risk management issues in the school, college and technical curricula will facilitate creation of a generation alive and sensitive to risk reduction and amounts to a wise investment for mitigating and managing future risks. Cross-sectoral partnerships and concerted efforts at disseminating the agenda of disaster management to the younger generation through school curricula and through conduct of preparedness drills at regular intervals will go a long way in inculcating a culture of disaster safety and risk management among people at large.

Component 6: Public Awareness and Education **To establish partnerships with media and community organizations for dissemination of disaster risk management agenda and incorporation of the same in education curricula to promote a people-centric approach to mitigating disaster risks**			
Expected Outputs	**Activities/Areas of Intervention**	**Timeline** **1-2 yrs (S)** **3-5 yrs (M)** **6-10 yrs (L)**	**Lead/Responsible Agencies/sectors with supporting institutions**
6.1: Generating Public Awareness			
Initiating a national public awareness generation programme for disaster mitigation and preparedness	Formulating a national awareness generation strategy Developing public awareness generation programmes for hazard-specific campaigns Establishing partnerships across the spectrum of print and electronic media and socio-cultural and religious organizations for harnessing their reach for dissemination of disaster management agenda. Constituting a working group of professionals and experts to devise the campaign. Launch of an informative website containing information on different hazards and possible mitigation, preparedness and response measures.	(M)	DLG (MoHCA), National media- Kuensel /BBS and private newspapers/media and concerned institutions/sectors
6.2: Incorporation of disaster management in school and college curricula			
Introduction of modules on disaster management in school and college curricula	Constitution of a Working Group to assess the school curricula and develop appropriate disaster risk education materials in school curricula Introduction of practical trainings and conduct of mock-drills in educational institutions Development of interesting hazard-specific reading materials for children by an expert group Training of teachers Constitution of working group to assess disaster risk, education materials in tertiary institutions especially in engineering institutions.	(L)	DLG (MoHCA), Curriculum Department (MoE), RUB and other relevant agencies

3.9 Capacity Development

Effective implementation of disaster risk management necessitates development of an appropriate human resource with technical, managerial and communication skills. Training and capacity building is a continuous process necessitating familiarization with latest thought-processes and developments in the field of disaster risk management. On the one hand, the training programmes would seek to build a better understanding of disaster management scenario in the country and on the other it shall also be ensured that sector-specific training modules are available to develop requisite technical skills in concerned Ministries/sectors.

The Department of Local Governance shall strive to formulate a comprehensive, prioritized multi-year training and capacity building policy for up-grading and developing the knowledge and skills of disaster management practitioners at various administrative levels on the basis of capacities and needs assessment. Requisite partnerships and linkages with institutions of excellence and training academies in the region as well as with international organizations would be forged to facilitate training of disaster management professionals.

Component 7: Capacity Development

To create a cadre of trained and skilled professionals and disaster management practitioners with requisite knowledge and capacity to initiate and implement disaster risk management programmes

Expected Outputs	Activities/Areas of Intervention	Timeline 1-2 yrs (S) 3-5 yrs (M) 6-10 yrs (L)	Lead/Responsible Agencies/sectors with supporting institutions
7.1: Human Resource Development			
Capacities and needs assessment carried out at the national, Dzongkhag, Dungkhag, Gewog and Thromde levels	To conduct a systematic training needs assessment/ analysis for identifying the critical areas, the gaps and prioritization of training needs. Assess capabilities of administrative and technical officers for addressing disaster risk management issues. To develop a national human resource plan. To develop a prioritized multi-year capacity building programme for supporting the functionality and effectiveness of the institutional and legal system.	(M)	DLG (MoHCA) in due consultation with relevant sectors /R.C.S.C for developing sector-specific training programmes
Training of officers, cadres and agencies entrusted with disaster mitigation, preparedness and response related activities	Draw up suitable training capsules to meet sector-specific training needs. Training of Trainers (ToTs). Incorporating capsules on disaster management in entry-level and refresher training programmes for government officers in all administrative units viz. police, fire, health, education, works and human settlements etc. Training of Dzongkhag, Dungkhag, Gewog and Thromde level administrative officers. Up gradation of equipments, machinery, tools and infrastructure for continuous skill development.	(M)	DLG (MoHCA) in consultation with sectoral agencies like RCSC for developing suitable training programmes and capsules
Forging partnerships with national, regional and international institutions for capacity building support	Developing linkages and signing MOUs with institutions of excellence, learning [distance] and training. Linking up with information sharing networks in the region. Exposure visits to facilitate learning from the experiences and capacities of other countries and institutions. Twinning arrangements with technical institutions/agencies.	(L)	DLG (MoHCA), MFA in consultation with other sectoral agencies/Ministries

3.10 Communication and Transportation

Communication is the first casualty in the aftermath of a disaster. It has been experienced that the traditional telecom connectivity of the affected areas becomes largely dysfunctional and flow of timely and correct information from the affected regions is severely hampered. The absence of first-hand information constricts the disaster managers' ability to assess the magnitude of the situation and leads to an avoidable delay in launching a suitable disaster response. This underscores the need to design and develop multi-modal communication networks with adequate back-up facility.

The transportation networks are also at times severely disrupted with roads getting washed away or getting buried under a landslide or debris. This assumes greater importance in the context of Bhutan with its hilly and rugged terrain affording only limited access to many regions and the criticality of mounting a speedier and timely response puts a lot of strain on the available modes of transportation. It is not only critical to build disaster-resistant road networks in the country but also to formulate a long-term plan to build alternate routes to various Dzongkhags, Dungkhags, Gewogs and Thromdes so as to ensure adequate connectivity at all times.

Since the villages in Bhutan are well connected by mule tracks a location wise (Gewog) inventory of mules and horses should be maintained in all Dzongkhags.

Mules and horses are Bhutan's most efficient means of transportation in the remote areas.

A remote village in Dagana.

Component 8: Communication and Transportation **To develop capacities for communication with sufficient redundancy to meet the connectivity needs during a disaster and to build an adequate transportation network for speedier disaster response**			
Expected Outputs	**Activities/Areas of Intervention**	**Timeline** **1-2 yrs (S)** **3-5 yrs (M)** **6-10 yrs (L)**	**Lead/Responsible Agencies/sectors with supporting institutions**
8.1: Disaster Communication Network			
Design and implementation of a disaster communications network	To review current capacities and draw up a communication plan, obtain requisite sanctions and put the communication network in place in a phased manner. To develop plans for inter-linking of various administrative units with the National Emergency Operations Center with a disaster fail-safe communication network. To establish telecom, wireless broadband and satellite based communication networks with sufficient redundancy in a phased manner within all administrative units. To develop standard operating procedures (SOPs)	(L)	DLG (MoHCA), DoR (MoWHS), MoIC, other relevant sectoral agencies viz. Bhutan Telecom Ltd. DoI, Armed Forces, MFA.

Developing protocols for emergency communications	Protocols for dissemination of warning to administrative units and communities. To establish linkages with networks in neighboring countries and institutions for communication and dissemination support. To develop systems for mass communications.		
8.2: Emergency Transport Connectivity			
Establish better transport connectivity and transportation arrangements	To develop emergency transport systems by taking into account in-country assets. To plan creating alternate routes to multi-hazard and hazard-prone areas in a prioritized manner. To establish protocols for logistics support from neighboring countries. To establish protocols with international agencies [eg. UN Joint Logistics Center] for utilizing their logistical assets and capacities. To develop aerial modes of transportation and landing capacities. To develop appropriate mechanisms and protocols for securing international assistance in mobilizing resources and materials during a crisis situation.	(L)	DLG (MoHCA), MoIC, DoR (MoWHS), MFA and other relevant agencies/ oganizations, Civil Aviation and Armed Forces.
Traditional Modes of communication and transportation	To maintain database of existing mechanisms of communication and transportation in hilly and inaccessible areas in a region-specific manner. Mapping of mule tracks and inventory of mules and horses in gewogs.	(M)	DLG (MoHCA) DoR (MoWHS), Dzongkhag, Dungkhag, Gewog Administrations and other concerned agencies/sectors.

Integrating Cultural Heritage into Disaster Planning

Bhutan has experienced many natural disasters in the past. Several structures of historical and cultural significance have been lost to fires, earthquakes, flash floods etc. One of most sacred temples, the Taktshang established in the 8th century A.D by Guru Rimpoche was completely destroyed by fire on 19 April, 1998. One of the oldest Dzongs in the country the Punakha Dzong has a long history and recurring instances of earthquakes and fires. The fire accidents of 1780, 1789, 1802, 1831, 1849, 1897 and 1986 destroyed many historical documents and artifacts of great historic and religious significance. Similarly Jakar Dzong in Bumthang and Drukgyel Dzong in Paro were destroyed by earthquake and fire of 1897 and 1951 respectively. By their location along the downstream river valleys many important structures such as the Dzongs, temples, and monasteries are at great risk. The 1994 Glacial Lake Outburst Flow (GLOF) of the Lugge Tsho in Lunana region washed away some properties in Punakha and Wangdue. The historic Dzongchung was partially washed away and the Punakha Dzong itself was put at high risk.

Many of the past disasters that have struck Bhutan have been of less destructive nature in terms of human casualty and loss of properties. The people attribute this to their unwavering faith in the country's powerful protective deities and their blessings which safeguard people and properties against such misfortunes.

All Dzongs, monasteries and other buildings housing arts, artifacts and other materials of cultural importance must have a comprehensive disaster prevention, preparedness and response plan. Concerned authorities and staff must be trained in mitigation, protection and recovery of the artifacts. A list of artifacts available and prioritization of artifacts to be recovered along with location in case of a disaster must also be maintained.

In times of disasters, it is the usual practice that emergency management commonly prioritize and focus on humanitarian and other strategic concerns and cultural issues receive very little attention. Fundamentally some degree of awareness and education must be imparted to generate support for such effort. Bureaucrats and administrators should be adequately educated to initiate protection and conservation of cultural properties from disasters.

The Department of Culture, Ministry of Home & Cultural Affairs is responsible for safeguarding and conservation of Bhutan's rich cultural heritage. An inventory of cultural properties should be followed by activating mitigation and protection measures against disasters. It is essential to assure inclusion of cultural heritage sites, structures, and monuments as well as museums, libraries, archives and their contents into strategies that address mitigation, relief and preparedness at the national and local levels. Non-structural mitigation measures is an important step in safeguarding many important artifacts located in the Dzongs, museums and other store houses. For instance, a fire protection plan in all vulnerable structures should be mandatory. Fire detection and response must be fast to be effective, such as less than 5 minutes for fire service response. Water sprinkler systems as safe and reliable fire protection in Dzongs, monasteries, archives, libraries must be installed. An important task ahead for the department will be to create a national strategy for integrating cultural heritage into disaster planning, mitigation and relief, at local and national levels in the context of regional and international cooperation.

Chapter 4
Implementation Arrangements

It is considered essential to create a mechanism for supervising, monitoring and evaluating the efficacy and proper implementation of various disaster risk management programmes/schemes by various sectors. A project proposal formulated by the Department of Local Governance or any other sectoral initiative shall be examined by an Inter-Ministerial Task Force [a sub-group of the National Committee for Disaster Management], constituted for a specific task/purpose, comprising of the officials of the Ministries of Home and Cultural Affairs and Finance. The Hon'ble Lyonpo, Ministry of Home & Cultural Affairs shall Chair the deliberations of the Inter-Ministerial Task Force and Hon'ble Lyonpo, Ministry of Finance shall be the Co-Chair.

The Inter-Ministerial Task Force shall be assisted by an independent Technical Advisory Committee [consisting of experts from different fields' viz. earthquake engineering, management, finance, information management, technical experts etc.]. The Technical Advisory Committee shall examine the proposals relating to risk reduction activities submitted for funding from the National Disaster Mitigation and Preparedness Fund and report its recommendations directly to the Inter-Ministerial Task Force/Steering Committee for approval/suitable modification/rejection of the proposal. This will ensue objectivity in assessment and evaluation of all initiatives and activities.

The Disaster Management Division (DMD) within the Department of Local Governance (DLG), MoHCA, shall provide guidance and direction on a regular basis for efficacious execution/implementation of different initiatives. The division shall identify critical areas, needs and gaps requiring specific attention and guide the programme implementation on a continuous basis to ensure that the same meet their desired objectives.

Annex 1: Institutional Profiles

1. DEPARTMENT OF GEOLOGY AND MINES (DGM)

The main roles of the Department of Geology and Mines under the Ministry of Trade and Industry include geological mapping, exploring mineral resources, providing engineering geological services, ensuring environment friendly exploitation of economic mineral resources, and carrying out scientific studies and monitoring of natural hazards like Glacial Lake Outburst Flood (GLOF), earthquakes and landslides which are prevalent in the Himalayan environment. The Department also acts as crucial link between Bhutan and the geological organizations of other countries for exchange of information and technology.

The risk of GLOF has been a major threat in Bhutan. The glaciers in Bhutan are important water resources for hydro power generation, drinking, irrigation and other domestic uses but they are also a potential source of geo-hazards such as rock fall, landslides and flashflood if preventive and mitigation measures are not in place. According to the recent study carried out by the DGM in collaboration with International Center for Integrated Mountain Development (ICIMOD), Nepal, there are 667 Glaciers and 2674 glacial lakes in Bhutan alone out of which 24 glacial lakes are potentially dangerous. The study was done to monitor the GLOF events and hazards using GIS and satellite imagery and also to establish early warning system to reduce GLOF hazards on lives and properties.

There is no documented evidence of past GLOF incidents in Bhutan except for the GLOF incident on 7th October 1994 from the partial burst of Luggi Tsho in eastern Lunana. This flood caused extensive damage to properties along Punakha-Wangdi valley. The *Dzongchung* or small Dzong was partly destroyed.

The study by the DGM along with the Institute of Geology, University of Vienna, Austria warned of possible hazard potential of combination of Raphstreng and Thorthormi Tsho which could result in more then two times the volume of 1994 Luggi Tsho outburst. If this is true then the consequences can be very devastating.

Some elderly people still remember the flooding from GLOF in 1957, which affected Punakha-Wangdi valley destroying part of the Punakha Dzong that was caused by the outburst of Tarina Tsho in Western Lunana.

The Himalayan region has been categorized as one of the seismically active zones in the world. During the past 100 years the region has witnessed four great earthquakes with M>8 that devastated the region bringing huge losses and misery to millions of people. The Bhutan region on the other hand never experienced any major events.

Disaster Management Initiatives undertaken by DGM

Due to the enormous threat posed by the glaciers and glacial lakes in Bhutan, the DGM with organizations in other countries have so far carried out numerous studies to monitor the developments in the glacial lakes. They have also provided some mitigation measures to minimize the impacts of possible GLOF.

In 1967, identification of potentially dangerous glacial lakes in Lunana region was carried out. The Geological Survey of India carried out Aerial reconnaissance survey of the Lunana region. The Joint DGM and GSI conducted the Lunana expedition in 1986. The expedition to Lunana by Indo-Bhutanese team to identify the causes and effects of 1994 GLOF was conducted in 1995. The multi-disciplinary team from National Environment Commission, DGM, Department of Roads and Bhutan Survey conducted an expedition to Roduphu glacial lake. The mitigation measures for Raphstreng Tsho were carried out in collaboration with the Government of India from 1996-1998. The Joint Japan-Bhutan project for Hazard Risk Assessment for GLOF was done in 1998. The Risk Assessment of Upe Tsho and Tsokar Tsho at the source of Chamkhar chhu in Bumthang was conducted by the DGM in 1999. Finally in 1999-2001 a Joint Bhutan-Austria Project for the risk assessment of glaciers and glacial lakes was completed.

The Austrian Government also assisted Bhutan in monitoring and GLOF hazard analysis of Lunana for down stream effects of Phochu.

Apart from the many expeditions made to GLOF sources the DGM also monitor the developments in glaciers and glacial lakes through the use of satellite images, time series data and hardcopy maps. The DGM has also done a comprehensive Hazard Assessment of the Lunana glacial lakes and prepared a Hazard Zonation Plan for these lakes in order to reduce the possible impacts on lives and properties in the event of a GLOF.

With regard to earthquake threat in Bhutan, the DGM is working closely with the University of Texas at El Paso and University of Colorado to understand the earthquake and tectonic characteristic of Bhutan Himalayas. The collaborative Project between DGM and UTEP resulted in training of one Bhutanese student in the field of earthquake and exploration geophysics and another one in research on neo-tectonics of Bhutan region. The collaborative work between DGM and UTEP installed 5 temporary seismic network stations for one-year period in January 2001 to understand the Seismicity of the country for the very first time. The preliminary results showed that over a six month period the network recorded over 1600 tremors of which 642 were regional/local events.

The Department has been carrying out geological risk assessment along the national highway. They are preparing a landslide hazard map for the stretches already covered in their field work. On the Phuntsholing-Thimphu Highway such studies were also carried with the Norwegian Geotechnical Institute. Inclinometer and piezometer had been installed at Kharbandi slide to monitor the movement of the slide in collaboration with the Norwegian Government Fund.

The collaborative work between the DGM and the University of Colorado at Boulder involved in understanding the tectonic and earthquake hazards using the GPS technology capable of measuring deformation rate up to +/- 3mm. This deformation rate is the key to the size and damages of earthquake in Bhutan. Numerous GPS points were measured during Oct-Nov 2003 along Thimphu-Phuentsholing highway, Punakha-Laya, and Bumthang-Zhemgang highway. Besides, two permanent GPS stations were installed at Royal Bhutan Institute of Technology in Phuentsholing and Thimphu to determine the convergence rate.

The Department is also carrying out a project through SDS fund on the slope stability and environment assessment in collaboration with ITC, Netherlands. In this project three batches of foresters and engineers were trained in the field of engineering geology especially addressing the problems of slope stability and environment.

It has also been actively associated with the foundation studies for various infrastructural development and also risk assessment. It has also been providing geotechnical advice and laboratory services to both the private and public sectors.

The Department of Geology and Mines plans for the future are:

- Proposals have been put up to set up a seismic network for the entire country.
- Seismic hazard zonation map for the country will be prepared and the collection of information on seismic activity in the country is under process.
- Prepare land slide hazard zonation map for the country.
- Based on regular monitoring of glacial lakes, suggest mitigatory measures and early warning systems for the flood prone areas.
- Continue to provide geotechnical services for infrastructure development and slope stability among other subsurface stability related problems.
- Efforts shall be made to collaborate with ICIMOD, Katmandu and other institutions that are involved in monitoring seismic activities and behavior in the Himalayas.

2. NATIONAL ENVIRONMENT COMMISSION (NEC)

The National Environment Commission in Bhutan is one important agency which looks after the overall legislation and legal framework on environment sectors in Bhutan to ensure that the socio-economic development is consistent with the 'middle path' of sustainable development. They have published the Environment Assessment Act in 2000 and many other publications such as Environment Code of Practices and sectoral guidelines on environment which cover a broad spectrum of developmental activities like roads and highways, hydropower plants and transmission lines and other infrastructure constructions. Besides, the NEC also conducts research, monitoring and awareness on environment. It is also a focal point on various International conventions to which Bhutan is signatory.

Realizing the damage that can be caused by unplanned and uncontrolled development the Royal Government of Bhutan has taken the "middle path" of sustainable development, in order to raise the living standards of the present population without compromising the country's cultural integrity, historical heritage or the quality of life for future generations. Due to the strong exemplary environment practices in the nation, environment degradation is not a major contributing factor to disasters in the country although at some point of time the pressure of economic development may prove too great to maintain the fragile ecological balance. In early 1974 the National Assembly passed a strong resolution mandating the country to maintain at least 60 percent of its total area under forest cover for all times to come.

At the international level Bhutan is signatory to many regional and international conventions on environment such as the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Convention on Biological Diversity (UNCBD), Convention on International Trade on Endangered Species (CITES), World heritage Convention and Basal Convention.

With regard to climate change, Bhutan stands out as one of the very few countries in the world with greenhouse gas sequestration capacity which can be credited to its vast forest cover, limited industrialization and use of clean energy sources. But global warming and climate change due to increased GHG production from human activities around the world makes Bhutan vulnerable as climate change may disrupt the delicate balance of the mountain ecosystem. The NEC is the focal agency for the United Nations Convention on Climate Change. The adverse effects of climate change will lead to variability in weather patterns, and threats of glacial lake outburst floods.

Disaster Management Initiatives undertaken by NEC

The NEC has come up with many sectoral guidelines on environment assessment, air and water quality standards and other Environment Codes of Practice which take care of major environment degradation at the project implementation level. However the impacts of climate change will be felt in Bhutan due to increased Green House Gases (GHG) generation around the world. The financial and technological constraints in Bhutan are a major obstacle to prepare itself against the consequences of climate change.

Although global warming and climate change will affect all the countries, the least developed countries will be affected the most due to lack of financial and technical resources to adapt to climate change. As a means to help the LDCs adapt to climate change the Conference of Parties to the UNFCCC started to help the LDCs prepare its National Adaptation Program of Action (NAPA) in its Seventh session in 2001.

The NEC is currently working on NAPA Project which is funded by the Global Environment Facility through UNDP. The Project started in June 2004 and is expected to be completed by June 2006. During 2005, the project carried out an assessment of the possible impact of climate change on various sectors: health, agriculture, forest and biodiversity, water and energy, infrastructure and disasters. Subsequently, a Plan of Action for Adaptation to Climate Change, prioritizing immediate and urgent needs was developed by a multi-sectoral team, coordinated by the NEC. The Action Plan includes the following nine projects of highest priority:

- Disaster management strategy
- Artificial lowering of Thorthomi Glacial Lake (GLOF)
- Weather forecasting system to serve farmers and agriculture
- Landslide management and flood prevention (Pilot scheme in critical areas)
- Flood protection of downstream industrial and agricultural areas

- Rainwater harvesting
- GLOF hazard zoning (pilot scheme-Chamkhar Chu basin)
- Installation of Early Warning System on Pho Chu basin
- Promoting community-based forest fire management and prevention

3. DEPARTMENT OF ENERGY (DoE)

The Department of Energy within the Ministry of Trade & Industry is responsible for the power sector policy, planning & regulation. In addition, the Department is also responsible for generation, distribution, transmission, investigation and implementation of various projects. The hydropower sector is the engine of socio-economic growth in Bhutan. As of now, Bhutan exports about 75% of its electricity to India. Bhutan is endowed with a large hydropower potential of over 30,000 MW.

There are three major hydroelectric Projects in Bhutan:

1. **Tala Hydroelectric Project**
   This project is scheduled for completion in the year 2005/2006 with an installed capacity of 1020 MW and an annual generation of 4865 Million Units. The project is financed by the Government of India with a financing mix of bilateral assistance and soft loan. This project is the largest high-head (860m) power plant being constructed in the region.

2. **Kurichu Hydroelectric Project**
   This project was completed by 2002 with an installed capacity of 60 MW and an annual generation of 400 Million Units. It has started supplying power to six Dzongkhags in eastern Bhutan and two Dzongkhags in south-central Bhutan. Surplus power is being exported to India through the 132 kV Gelephu-Salakati line. The project is financed by a combination of bilateral assistance and soft loan from the Government of India.

3. **Basochu Hydropower Project**
   This project has an installed capacity of 22.2 MW with an annual generation of 105 Million Units. This project has helped to augment the generation supply in western Bhutan as well as improve the reliability of power supply in the region. The Austrian Government under a financing mix of bilateral assistance and soft loan finances the project.

In these power projects, the government is spending huge resources and the Department of Energy is well aware of the threat posed by GLOF and floods. In order to cope with disasters such as GLOF and floods, the Department of Energy has taken some important measures on flood and GLOF monitoring and early warning system.

Disaster Management Initiatives undertaken by DoE

The Hydromet Services Division under the Department of Energy is responsible for Planning and Design of Hydro-met Network for collection of Hydromet data required for hydropower planning, flood and weather forecasting as well as for energy generation scheduling. They collect the Hydromet data and disseminate to the end users such as the hydropower plants and other agencies. They are also actively involved in flood warning and flood prevention measures.

Presently the Hydromet Services Division has 10 Hydrological stations and 33 rainfall stations spread across the country. They also have one station in Thangza to monitor the glacial lakes.

The Hydromet Services Division of the DoE in collaboration with International Center for Integrated Mountain development (ICIMOD) and World Metrological Organization (WMO) held a meeting in Thimphu to establish a flood information network in the HKH (Hindu Kush Himalayan) region. It was felt that a regional information network among countries like India, Nepal, Bhutan, Pakistan and China would help them to be in a better position to manage floods.

The various flood related activities coordinated/ carried out by the Department of Energy are:

Flood Warning

The Department of Energy through the Flood Warning Section (FWS) aims to prevent disaster by issuing timely warning for floods. This activity proved very beneficial by preventing major damage to the Kurichhu Project when

Tsatichhu landslide dam burst on 10th July, 2004. The project authorities were able to open the gates to release flood waters after receiving news of the lake burst over wireless from Ladrong, located opposite the lake.

The Flood Warning Section (FWS) is presently with the Hydro-met Services Division of the Department of Energy. The FWS till its transfer to the Department of Power in 2002 functioned as Hydro-met Unit under the Department of Telecom. The unit was transferred when the Department of Telecom was coporatised in January 2000 and renamed as Flood Warning Section. The activities of the FWS are funded by the Government of India. Its primary function is to transmit river level data of the main rivers flowing to India for flood forecasting purposes. The stations on various rivers are equipped with wireless sets and the river information transmitted to stations of Central Water Commission in Cooch Bihar, Jalpaiguri, Nalbari and Barpeta.

The flood warning activity is reviewed every six months through the Joint Expert Team (JET) meetings. Representatives from the Government of India and the Royal Government meet alternatively in Bhutan and India to review the flood warning network, approve budgets and address other issues of mutual concern. The delegation from India is led by the Chief Engineer, Brahmaputra and Barak Basin of Central Water Commission while the Bhutanese delegation is led by the Director General, Department of Energy. The funds for flood warning activity including Lunana are projected yearly to the Royal Government.

GLOF Monitoring of Lunana Lakes

After the 1994 GLOF in October, the Royal Government had directed Bhutan Telecom to establish an early warning system at Lunana. The FWS of the DoE continues with this function.

The Flood Warning Section has two personnel posted in Thanza to monitor water levels of Bey Tsho, Rapstreng Tsho, Thorthormi Tsho and Lugge Tsho. The water level of the main stream formed by the four smaller streams flowing from the lakes is also monitored daily. The operation of Thanza station is funded by the Royal Government. In case of a lake outburst, a set procedure is in place to warn people living downstream. The charter of duties defines the responsibilities of the various organizations and individuals.

Monitoring of glacial lakes in Bhutan is being undertaken by the Department of Geology and Mines (DGM). The FWS considers placement of staff for early warning purposes only when the DoE is informed either by the DGM or the Royal Government that there is a need to do so.

Tsatichhu Lake Mitigation and Warning Activity

The lake was formed on 10th September, 2003 after a massive landslide impounded the water of Tsatichhu stream. This lake was formed at the border of Lhuentse and Mongar Dzongkhags. To reduce the danger posed downstream by a possible outburst, it was commanded to be breached. To look into the possibility of breaching, a multidisciplinary team visited the site on 5-7 December, 2003. Given the volume of the dam body, the impoundment and the risk assessed at that time, the team recommended that instead of breaching the dam, the lake be monitored during the monsoon of 2004.

The multidisciplinary team submitted a nine (9) point recommendations to mitigate and monitor the lake. The nine point recommendations included geo-technical investigation works, lowering the lake level, construction of a cableway, setting up of a flood warning station at Ladrong and establishment of hydro-meteorological stations. The DoE was made responsible for coordinating the activities. As the works needed to be carried out urgently, fund was sought from the Royal Government for setting up the flood warning station, construction of a cable way, setting up hydro-meteorological stations and carrying out geo-technical investigation works. The work of lowering the lake level was entrusted to the Kurichhu Hydropower Corporation.

Due to heavy rain in May, 2004, a part of the dam body gave away, the approximate volume which slided was around 8 million cubic meters. With this occurrence, personnel posted at the sites were more vigilant. A second wireless station was set up in Autsho to increase reliability in warning. The lake volume at that time was estimated at 12 million cubic meters.

The dam finally burst on 10th July, 2004.The discharge as estimated at Kurizampa was about 6000 cubic meters per second. Only minimal damage was done to Kurichhu Hydropower Corporation due to timely receipt of flood warning.

To assess if the dam still posed a risk, a team from the Department of Geology and Mines and the Department of Energy visited the site on 29th December 2004- 1st January 2005. The visit has confirmed that though the risk is reduced, there may be potential of further floods. The Kurichhu Hydropower Corporation is working on reducing the levels of both Tsatichhu and Wabragchhu to minimize the risk. These works will be completed by April 2005.

Bhutan- India Joint Group of Experts (JGE) on Flood Management

A joint group of experts on flood management has been formed between the Royal Government of Bhutan and the Government of India to discuss and assess the probable cause and effects of the recurring floods and erosion in the southern foothills of Bhutan adjoining the plains of India and recommend to both Governments, appropriate and mutually acceptable remedial measures.

The first meeting of the JGE was held in Thimphu/Phuntsholing from 1-5 November, 2004.The meeting decided on a set of flood mitigatory studies to be done by both Bhutanese and Indian experts. The fund for conducting the meeting has been projected in the budget for the fiscal year 2005-2006. The fund for actual works would be known only after the preparatory works are completed.

While it is not the responsibility of the DoE to undertake flood management, the Director General, DoE was asked to lead the team from the Royal Government for JGE. Every year floods are reported in different parts of Bhutan. The year 2004 saw major floods in Trashigang and Trashiyangtse. The Department of Energy strongly recommends that the Royal Government assign a body to take care of flood management so that preventive action is taken to mitigate the risk of floods, that an agency of the Royal Government should be identified for overall management of water resources.

4. MINISTRY OF AGRICULTURE (MoA)

The Ministry of Agriculture plays an important role in increasing food production, raising rural income and improving the livelihood of the nation's large rural population while preserving the pristine natural environment and conserving the rich natural resources of land, water, forests, flora and fauna for future generations. The Ministry also provides crops, livestock and forestry services to the people.

The Water and Agriculture sectors are the most sensitive to climate change impacts due to increase in volume of floods and surface runoff. The occurrence of forest fire is also a frequent phenomenon in Bhutan where hundreds of hectares of forested lands are destroyed and many wild animals killed. Agriculture, on which 85 % of the population depends, is likely to suffer major losses due to high temperature, severe draught and changes in climatic patterns. At other times it is the outbreak of pests and diseases. Given the small land holdings of most farmers in Bhutan and their total dependence on agricultural products, any damage to their crops will make life difficult for them. The high biodiversity concentration in Bhutan is also threatened by the synergistic effects of climate change and habitat fragmentation due to rapid urbanization.

Just in the 2004 Monsoon 350 metric tonnes of maize, 126 metric tonnes of paddy and 21 metric tonnes of potatoes were lost in the 6 eastern Dzongkhags of Bhutan due to floods, flashflood and landslides although emergency situation such as out break of diseases or severe food shortages did not occur in any of the affected areas. The vulnerable people in Duksum, Tashiyangtse were evacuated to a safer site and the Royal Government provided food and other essentials. Agriculture related disasters are usually confined to local levels and nation wide disasters have not yet occurred in Bhutan.

Disaster Management Initiatives undertaken by MoA

Crops

When there is an outbreak of pests and diseases in the agricultural fields, the Department of Agriculture provides technical expertise and provides measures to control the outbreak. If the situation becomes worse and if there is severe food shortages then the Department also provides direct food aid to the affected group of people for a limited duration as a temporary measure. The Dzongkhags also provide small amounts of free inputs such as seeds and fertilizers to the affected farmers. To protect the livelihood of farmers the idea of crop insurance has been raised in the past but it has not materialized till date. This is an important concern which should be taken seriously.

Forest fire

During a forest fire, there is no comprehensive management plan to respond to fire disaster. The usual practice is that the community and government servants help to control the situation and try to save lives and properties at the most. The government also investigates the causes of fire and if anyone is convicted of intentionally setting the forest on fire he or she faces severe punishment.

Irrigation channels

Irrigation systems in Bhutan are relatively small. They are not a cause for concern if managed properly by the users. However in combination with other factors such as excessive rainfall irrigation systems tend to cause considerable damage. This is compounded by the fragile geo-physical conditions of the young Himalayan mountain system. The problems are more acute along the southern belt where a combination of fragile terrain and heavy rainfall create optimum conditions for natural disasters. Floods and landslides occur more frequently in the foothills. When an irrigation system is damaged, the farmers try to repair it themselves using their own resources. However, when the damage is beyond their means they seek government support.

The repairs of the damaged irrigation systems are usually carried out in the following year after obtaining supplementary budget. The Department has also adopted the National Irrigation Policy where the farmers are responsible for repairs and maintenance of irrigation channels.

River bank protection

Another important structure in agriculture is river bank protection. This is usually provided in the valley bottoms and the southern foothills to prevent damage to the limited agriculture land, human lives and other properties. It consists of gabion-crate walls stacked on top of each other. These walls afford protection for several years with standing normal flood-level flows. However, during severe flooding they are damaged mainly due to toe failure. This is because the

river scours the base of the lower most crate leading to collapse of the upper layers. This is compounded by the poor quality of wire materials and sub-standard workmanship.

Bank protection failure can lead to loss of life and property. Large tracts of fertile land along the river banks are washed away annually resulting in irreparable damage to the lives of the affected farmers. Occasionally, even human lives are lost when such events occur at night and people are caught unawares. Measures of redressal will be similar to the others described above.

Farm roads and power-tiller tracts

Farm roads and power-tiller tracts are a recent introduction into the Bhutanese countryside. Farm roads are built on contract and handed over to the communities. Power-tiller tracts are constructed by the farming communities themselves with material and technical support from the Dzongkhags.

Roads constructions involve large amounts of earth movement in mostly steep terrain. Fragile environment and less than standard construction quality combine to cause damage along these roads. Although farmers are expected to carry out routine maintenance it does not happen. Minor damages are ignored which lead to larger problems usually resulting in wash-outs. Such reports are routed through the GYT from where the same route can be followed.

Reporting protocol

When some form of disaster strikes any of the above, the farmers concerned will inform the Tshogpa, who is a GYT member for that locality. The Tshogpa in turn will bring it to the attention of the Gup. The GYT will then submit a report to the Dzongkhag who will send an investigating team consisting of relevant sector staff and local representatives. For crop damages the Extension Agent will assess the extent and cause of damage and file in a report to the Dzongkhag. Based on the investigation report the Dzongkhag may arrange for relief measures if possible and report to the Department of Local Governance (DLG) with a copy to Agriculture Ministry. The report will contain estimates for compensation or repair of damaged structures.

The DLG will assess the problem and recommend for compensation as per government norms. The MoF shall arrange to release funds accordingly. However in the event of outbreak of plant diseases and/ or small pests the Department of Agriculture will deploy chemicals and technical expertise to control the problem.

5. STANDARDS & QUALITY CONTROL AUTHORITY (SQCA)

The Standards and Quality Control Authority under the Ministry of Works & Human Settlement was established in 2000 with the primary responsibility to develop standards and ensure quality in the public infrastructure projects. Derived from the broad government instructions, the SQCA has set its long-term vision as "Enabling development of technically superior quality public infrastructure, cost effective in its construction and engage the state of the art technology". The fact that major portion of Bhutan lies in one of the most seismically active zones in the world is imposing a major threat to Bhutan. In order for Bhutan to prevent and minimize the impacts of possible earthquakes, SQCA is executing a project to assess the vulnerability of buildings in the country and to come up with retrofitting recommendations.

Disaster Management Initiatives undertaken by SQCA

Presently SQCA is implementing a project called "Thimphu Valley Earthquake Risk Management Project" funded by the UNDP as a preparatory assistance in the field of earthquake related disaster. The objectives of the project are to:-

- Undertake vulnerability study of Thimphu valley & draft action plan for earthquake disaster management.
- Carry out detailed seismic assessment for selected critical building in Thimphu valley and
- Build technical & human capacity for earthquake resistant construction.

Earthquakes do not kill people but the buildings and other infrastructures do in the event of an earthquake. The basic objective of the project is to assess the vulnerability of buildings in Thimphu Valley and propose recommendations and relevant retrofitting techniques for those buildings that are vulnerable.

The project includes the following major activities:

1. Development of an earthquake scenario for Thimphu valley using RADUIS Methodology which would assist to generate an earthquake risk management plan for Thimphu valley.
2. Vulnerability Assessment of 15 critical Buildings in Thimphu valley to formulate scheme for retrofitting and strengthening of critical buildings. Buildings have been selected based on their social importance, age, shape, size, purpose, alteration made etc.
3. Document Methodology and tools for rapid vulnerability assessment of some most prevalent building types to produce tools for conducting vulnerability assessment for large public buildings.
4. Build technical in-house capacity for earthquake vulnerability assessment and earthquake resistant construction relevant to Bhutan.
5. Produce awareness material on the project and earthquake resistant construction Technology and good practices.
6. Disseminate outputs related to the process and product of the project to strategic stakeholders at different points during the project. Similar projects will be carried out in the all the cities and towns in the country gradually.

The Thimphu Valley Earthquake Risk Management Project under the UNDP assistance is only the first initial step of a long-term objective of ensuring structural soundness of all the building in the country against severe earthquake. Major tasks lie ahead for achieving this objective. According to the SQCA the important activities which are necessary to be carried out are:

(i) Conduct seismic study and develop a seismic zoning map for Bhutan. This has become very crucial as Bhutan presently is taken to be in seismic zone V (the severest zone) based on the regional seismic information. This has considerable impact on design standards and the cost on construction. This activity may overlap with earthquake geotechnical engineering which is under the preview of Department of Geology & Mines and may require coordination.

(ii) Review & revise code for seismic structural standards, based on the seismic zoning map.

(iii) Additional technical and financial support to continue with similar project of Thimphu Valley Earthquake Risk Management in other towns & cities.

(iv) Technical & Human capacity building in the seismic assessment, design of retrofitting techniques.

6. DEPARTMENT OF ROADS (DoR)

The Department of Roads under the Ministry of Works & Human Settlement is responsible for planning, execution and management of all road infrastructures development in Bhutan. So far Bhutan has only 3900 Km of road network. All district headquarters and some geogs are accessible by road. However many other geogs and villages still rely on animal and head-load transport system.

There is an increasing need to expand road network in Bhutan to enhance the socio-economic status of the rural communities as well as upgrade the existing road network to cope with increasing vehicular traffic. The country's fragile terrain, high ridges and deep gorges, scattered settlement and low population density are some of the constraints which hinder the development of road network in Bhutan. Every monsoon, there are many landslides, roadblocks and flashfloods in most parts of the country. Roads and bridges have been washed away and some damaged due to landslides and flashfloods. The Royal Government also spends millions of Ngultrum in the monsoon damage restoration works such as rebuilding protection walls, culverts, and drainage system and in some cases realignment of the entire road.

During the damage assessment of the 2004 Monsoon carried out by the Ministry of Agriculture in the eastern Dzongkhags, it was found that a total of 22 bridges have been washed away or severely damaged. Some farm roads and feeder roads were also badly damaged requiring high repair cost.

Disaster Management Initiatives undertaken by DoR

The Department of Roads has been exploring the possibilities of better road construction and road corridor planning techniques. Apart from the simple survey and construction of some permanent structures to mitigate the smaller landslides, DoR has adopted Environmentally Friendly Road Construction (EFRC) techniques which include detailed geological and environment assessment studies to reduce the negative impacts of road construction on society, economy and the environment.

The Environmentally Friendly Road Construction (EFRC) technique is, in principle, the translation of the environmental policy on road sector activities as governed by the *Environmental Assessment Act-2000* and the *Environmental Code of Practice-April 2000*. In simple terms, EFRC can be defined as the construction of roads in such a manner that the damages caused to the socio-economic development and the environment is minimized to the extent possible.

The EFRC technique was introduced in Bhutan in 1999 with construction of 122 km feeder roads in 4 eastern Dzongkhags of Zhemgang, Lhuentse, Trashigang and Tashiyangtse under the Rural Access Project (RAP). The Project is funded by the World Bank, SNV and the RGoB. As a prelude to the introduction of the EFRC technique, Environmental Code of Practice (ECOP) and Bio-engineering Manual were developed. The engineers from DoR were trained on planning, surveying and designing of roads, and several workshops and seminars were conducted to familiarize the concerned stake holders on the new technique of road construction.

The RAP, on a project level, has the mandate to develop the EFRC method and to build the requisite construction and maintenance capacity within DoR and other relevant agencies such as the Ministry of Agriculture, Forestry Development Corporation Limited and at the Dzongkhag and at the community level.

During a mid-term review (MTR) of the project, some of the major findings of the MTR team were that the EFRC technology was found well developed within the DoR and the project feels that DoR was competent enough to adopt the new technology. This could be replicated at the national level for all agencies involved in different types of road construction. The EFRC technique was also appreciated by all stakeholders including the private sectors and the project has shown encouraging results.

The following were identified as some of the main areas which require attention:

- Higher initial investment costs – Cost-estimates of a few roads which are under construction, have shown that the initial investment cost on road construction by EFRC method is 25 to 30% higher as compared to the conventional method. However, in the long run, the road constructed using EFRC techniques is envisaged to be more economical owing to low routine maintenance and recurrent costs as disturbance to the geology and environment of the road alignment is minimized to the extent possible during the construction stage.

- Considerable time is required to carry out planning, geo-technical, social, environmental studies and survey and design.

- Limited availability of appropriate construction equipment and planning tools such as maps of desired scale, etc.

Apart from introducing the EFRC technique in road construction, a Landslide Risk Assessment Project was also carried out in Mongar-Trashigang road, Sunkosh-Dagana road and Chukha-Damchu road. This was a research project by the Scott Wilson Company and the project was funded by the Department of International Development (DFID), UK. The Project aimed at developing rapid, low-cost methods of landslide hazards and risk mapping based on the geological features, meteorological data and existing landslides of these three locations so that there will be better landslide management and road corridor planning in future. The main tools used in the project were GIS, Aerial photographs, seismic data, satellite images, land use maps and topography maps. The Project covered a total area of 80,000 hectares during which more than 500 landslide zones have been identified in these three pilot areas.

7. DEPARTMENT OF URBAN DEVELOPMENT AND ENGINEERING SERVICES

Rapid developmental activities and urbanization within the last decade has led to an unprecedented boom and mushrooming of urban infrastructures, of which buildings, both commercial and residential, are the most prominent. Thus the need for a local authority to manage, regulate and monitor the otherwise chaotic and precarious approach to construction of such buildings was deemed indispensable. The urban centers usually consist of high population density and if disaster such as fire, earthquakes, floods and landslides occur, the number of casualties can be very high.

The Municipal Corporations thus established in the various cities and towns of the country now play a very instrumental and vital role in disaster prevention and to some extent disaster management. There are two major cities in Bhutan, Thimphu and Phuentsholing. There are also many other satellite towns coming up in many other parts of the country. The approach adopted by these municipalities presently, in disaster management is predominantly proactive in nature rather than reactive. Great care is taken to avoid disasters but very little effort is made to respond to disasters.

Prior to the establishment of these municipalities, buildings were constructed mostly at the whims and fancies of their owners. The engineering and technical aspects of the buildings were given negligible importance. The durability of the building and more importantly the safety of the occupants are seriously jeopardized at the cost of economy and haste in construction.

Disaster Management Initiatives undertaken by DUDES

The municipalities are responsible for ensuing that the buildings meet the requirement for safety and strength so as to avoid catastrophic damage to lives and properties in the event of a disaster.

With the establishment of the municipal corporations, strict rules and systems for enforcing the application of the various relevant building design and construction codes were initiated. Seismic design codes are strictly adhered to while designing structures and special care and attention to details is given to structures having immense community services and utility such as Hospitals, fire stations, schools, radio and communication stations etc. Since Bhutan can be possibly considered to fall under either of the two most highly vulnerable seismic zones IV and V the municipalities adopt the Indian Standard (IS) code provision for Zone V while designing and assessing the buildings for approval.

Depending upon the soil condition and degree of vulnerability to certain kind of events (fire, landslides, flood, storm, earthquake etc...) the Thimphu City Corporation has been categorized into zones which determine the type and height of a building that can be built.

Anybody aspiring to construct a building should submit a complete set of drawings illustrating the type, the details of structural component, sewerage, plumbing and electrical wiring provision for the building, for scrutiny to the concerned section of the municipal corporation. The drawings have to comply with the technical norms and fulfill all the structural requirements to be approved for construction. A separate division known as the Building Inspection Division functions under the municipal corporations. This division performs both regular and surprise sporadic inspection to the construction sites to ensure that the buildings are being constructed as per the approved drawings and norms.

In its attempt to safeguard the community against the possibilities of fire hazards the municipal corporations plan and construct public foot path along the periphery and within the city to act as a fire line in an event of fire outbreak. However fire safety designs and practices are not incorporated in particular at present. The municipal corporation and the fire division of the police in association with few other organizations are in the process of developing fire code and guidelines for Bhutan.

Monsoons at times can be very heavy and since most of the settlements in the country are located along the river running through the valley, there is always the threat of flood and river water intrusion into the valley.

The municipal corporations initiate construction of river training works along the rivers likely to flood during monsoon.

The Phuntsholing City Corporation (PCC) along with various organizations has devised a Disaster Management Plan (DMP) for the city so that if emergency situation arises it would be able to respond quickly and appropriately to minimize the loss of lives and properties. The Disaster Management Plan includes 4 “R’s” principles. They are:

- Reduction of disaster through physical strengthening of structures and facilities
- Readiness in preparing arrangements to cope with disaster
- Response to deal with the consequences of disaster and
- Recovery from disasters to restore the city to its normal functioning.

They have formed a committee of ten members consisting of representatives from key organizations likely to be involved in disaster management. The group have identified hazards likely to be faced by Phuntsholing like flood, storm/ cyclone, landslide, earthquake etc. and given likeliness of occurrence like high or low.

8. DEPARTMENT OF MEDICAL SERVICES (DMS)

The Department of Medical Services under the Ministry of Health instituted the Emergency Medical Services and developed an Emergency Medical Response to deal with outbreak of diseases in times of disasters. Under the broad area of Emergency Medical Services, 244 Emergency Medical Technicians (EMTs) and about 94 hospital based personnel for trauma care from among various categories of health workers were trained to back up the armed forces during the flushing out operation of the foreign militants in December 2003.

During the process various coordinators at different levels and a supreme Joint Task Force at the national level were formed and it still exists for activation at any time if need arises.

In November 2003 the policy on Emergency Medical Response was further refined as policy Directive on Disaster Management and Internal Displacement. Their efforts will be mainly directed towards addressing all types of trauma relating to both natural and manmade disasters such as earthquakes, flashfloods, land slides, road traffic accidents, occupational/ industrial injuries, blast injuries, etc. Hospitals along the highways and Dzongkhags are being scaled up in terms of facilities for trauma care.

Trauma care is an extremely important area that needs to be initiated in a multi-sectoral approach. Women and children who are the most vulnerable to trauma after a disaster also need to be represented.

9. DEPARTMENT OF BUDGET & ACCOUNTS (DBA)

The Department of Budget & Accounts (DBA), Ministry of Finance, is the central agency for financial management of the government. The DBA has linkages with all the budgetary agencies (Ministries, Dzongkhags, Gewogs, Autonomous agencies) in the government.

Mandate & functions in relation to Disaster Risk Management (DRM)

The responsibility and functions of DBA in relation to DRM will be mainly on the aspects of financial management. The functions are as follows.

1. Making budget available for DRM as per the framework developed by the government (Proposals for budget for DRM should be put up by the responsible agencies).
2. Releasing fund to relevant agencies in respect of DRM through Letter of Credit (LC) Account opened for the agencies with the Bank of Bhutan.
3. Making the agencies accountable for fund released through reporting of expenditures and submission of monthly accounts.

Note: The Department of Budget & Accounts has been bifurcated into two departments and will soon function separately as Department of National Budget & the Department of Public Accounts. The above functions will also be divided between the above.

10. BHUTAN TELECOM LTD. (BTLtd)

The Bhutan Telecom Limited (BTL) aims to provide high quality, affordable, reliable and integrated telecommunication services to improve the quality of life of the people and also facilitate internal and external trade & commerce.

- Provide high quality, affordable & reliable telecommunication services to the people.
- Enhance accessibility to telecommunications and its related services in the rural areas at affordable prices.
- Promote ICT (Information & Communications Technology) to reduce digital divide in the country.
- Provide customized services as per customer need.

Areas of involvement in Disaster Risk Management:

The BTL has the responsibilities in relation to disaster management:

1. Provide reliable telecommunication services in the Kingdom.
2. Formulate strategies to provide back up services, through Satellite link, and wireless network should terrestrial link be disrupted by disaster.
3. Assist in establishing help desk hotlines.
4. Provide trainings for handling rescue operation communication equipments.
5. Assist in drawing up plans and equipment specifications for telecom related equipments to set up disaster management telecommunication networks in the country.

11. ROYAL BHUTAN POLICE (RBP)

The primary function of Royal Bhutan Police (RBP) is the prevention and detection of crime and maintaining law and order in the country. It also provides fire and rescue services. During a disaster the following will be the roles and responsibilities of the RBP.

1. Security of the scene and establishing effective cordon within the disaster zone.
2. Evacuation of casualties and rescue operation.
3. Evacuation of people from the affected area if situation demands.
4. Safeguarding properties from pilferage.
5. Control movement of people and traffic at the scene of disaster.
6. Maintaining law and order in the affected zone.
7. Dispatching Fire Services Teams for fire control and rescue.

Areas of involvement in Disaster Risk Management

1. Scene security and maintenance of law and order.
2. Fire control and rescue of trapped persons.
3. Establishment of full- fledged fire stations in the districts.
4. Capacity building for disaster response by establishing fire and rescue training facilities, HRD and manpower, equipments and required infrastructure.

Annexure 2:

Disaster Management Plan- Phuentsholing City Corporation

The Phuntsholing City Corporation (PCC) along with various organizations has devised a Disaster Management Plan (DMP) for the city so that if emergency situation arises it would be able to respond quickly and appropriately to minimize the loss of lives and properties. The Disaster Management Plan includes 4 "R's" principles. They are:

- Reduction of disaster through physical strengthening of structures and facilities
- Readiness in preparing arrangements to cope with disaster
- Response to deal with the consequences of disaster and
- Recovery from disasters to restore the city to its normal functioning.

They have formed a committee of ten members consisting of representatives from key organizations likely to be involved in disaster management. The group have identified hazards likely to be faced by Phuntsholing like flood, storm/ cyclone, landslide, earthquake etc. and given likeliness of occurrence like high or low.

Given below is the **Disaster Management Plan for Phuntsholing** that the Disaster Management Group has come up with, in brief:

Emergency Services and Lifeline Organizations in Phuntsholing

1. **Urgent Emergency Needs**
    - Fire Fighting
    - Rescue of casualties and people under fallen debris
    - First aid/ immediate injury treatment
    - Ambulance/ Evacuation to hospital
    - Dealing with loss to human life/ Identification of bodies

2. **Less urgent/ long term needs**
    - Evacuation of casualties to other hospitals
    - Water
    - Food supplies
    - Restoration of power
    - Temporary local shelters
    - Setting up camps in safe areas for evacuated people
    - Evacuation of public to camps
    - Welfare
    - Sanitation

- Health- prevention and control of diseases
- Break down of law and order

Proposed Emergency Services in Phuntsholing
RBP- Fire Services
RBP- Search and Rescue
RBA- Emergency Shelter
Ambulance Services
Hospital/ Injuries
FCB- Food Supplies

Proposed Lifeline Organizations in Phuntsholing
Hospital/ Health
BPC
Telecom
PCC- Water supply/ Sewage disposal
DOR
RBP- Public protection
Fuel supplies
FCB- Food supplies

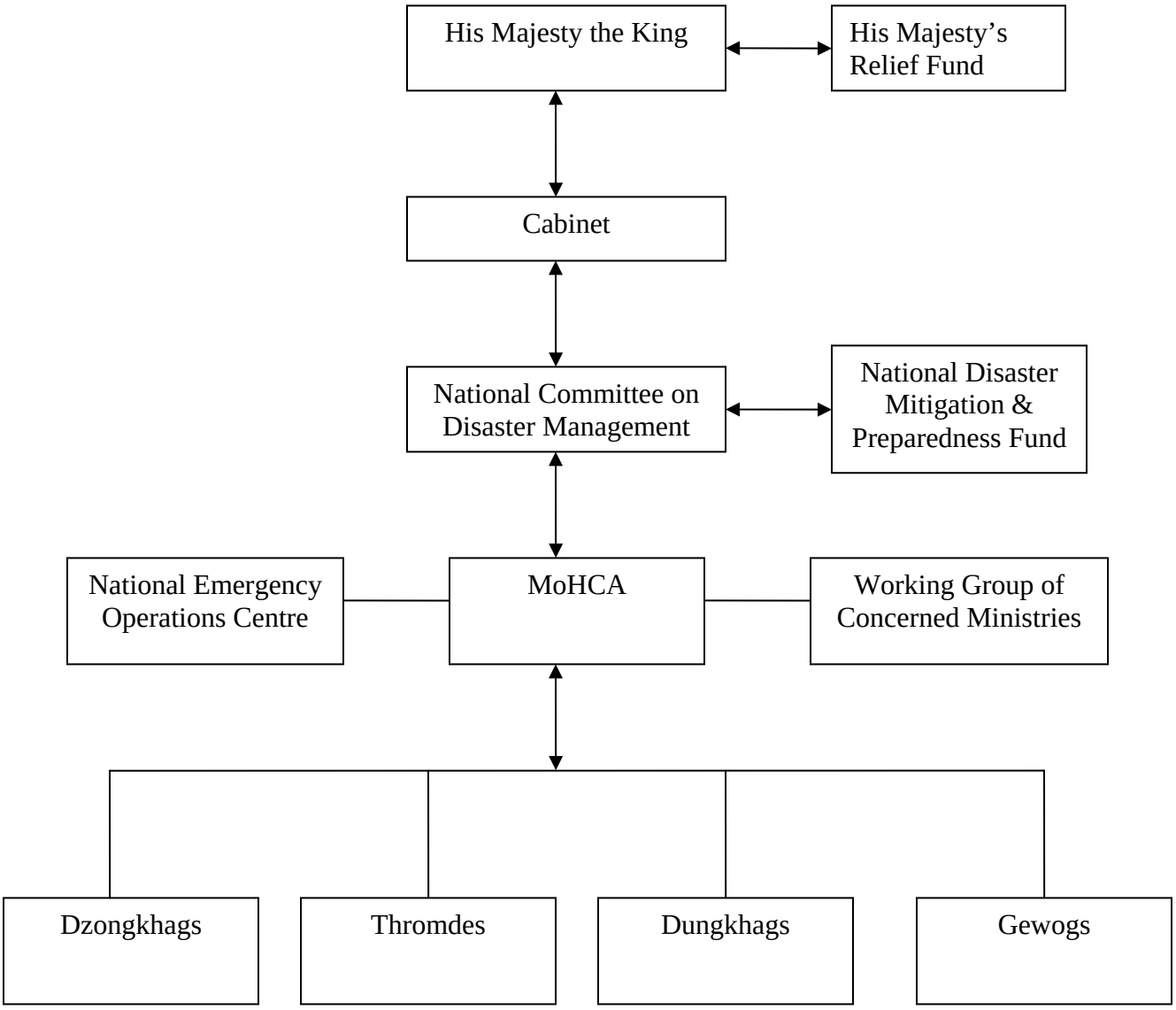
ALLOCATION OF RESOURCES

Organization	**Reports to:**	**Liaises with:**	**Responsible for:**	**Equipments needed**
Emergency Control Centre (ECC)	Central Government	All	Coordination and control of all operations	Walki-Talki radios, safety equipments, transport facilities
RBP	ECC RBP H/Q	RBA	• Search and Rescue • Law and Order • Provide Walkie-Talkie radios to all sections that need them	Walki-Talki radios, safety and general equipments for Search & Rescue teams
RBA	ECC RBA H/Q	RBP	• Erect tents at PSA ground for ECC, field hospital and other facilities (10-12 tents) • Provide trained troops to act as stretcher bearers	Walkie-Talkie radios and Tents

Hospital	ECC	RSTA	• First aid in the field • All medical treatment of casualties	Walki-Talki radios, First aid kits, tents and beds
RSTA	ECC	Hospital RBA	• Ambulance services • Transport to other hospital	Walki-Talki radios and Transport vehicles
DOR	ECC		• Clearance of all vital roads in the city	Walki-Talki radios and
Dratshang-Monk Body	ECC	Hospital	• Identification and disposal of bodies	Walki-Talki radios and tents
BPC	ECC		• Restoration of power to Hospital and other vital services	Walki-Talki radios and tents
Telecom	ECC		• Restoration of telephone services	Walki-Talki radios and tents
City Corporation	ECC		• Restoration of water and sewage disposal facilities	Walki-Talki radios

Annexure 3:

ORGANOGRAM A: INSTITUTIONAL MECHANISM AT THE CENTRE



The Cabinet

- Chairperson: Prime Minister
- Vice-Chairperson: Home Minister
- Ministers from all Ministries as members

National Disaster Mitigation and Preparedness Fund

- Administered by MoHCA, DLG
- Corpus of the fund to be decided by the Cabinet
- Executed by NCDM
- To finance hazard-specific risk mitigation projects/schemes formulated at national level by different sectors/Ministries
- Finance similar projects developed by Dzongkhags, Geogs and Municipalities.

National Committee for Disaster Management

- Chairperson: Ministers will function as the chairperson on a rotational basis.
- Vice-Chairperson: Home Minister
- Secretaries from all Ministries as well as representatives of Dratshang Lhentshog and Armed Forces as Members
- Member Secretary: Director General, DLG

His Majesty's Relief Fund

- Corpus of the fund to be decided by the Cabinet
- Executed by NCDM
- Administered by MoHCA, DLG
- To strengthen response capabilities at various administrative levels eg. Roads, Police, Communication
- To address speedy relief, recovery, rehabilitation & reconstruction

Working Groups of Ministries concerned

- Every Ministry concerned may constitute sector-specific working groups to implement various initiatives/meet sector-related response needs.

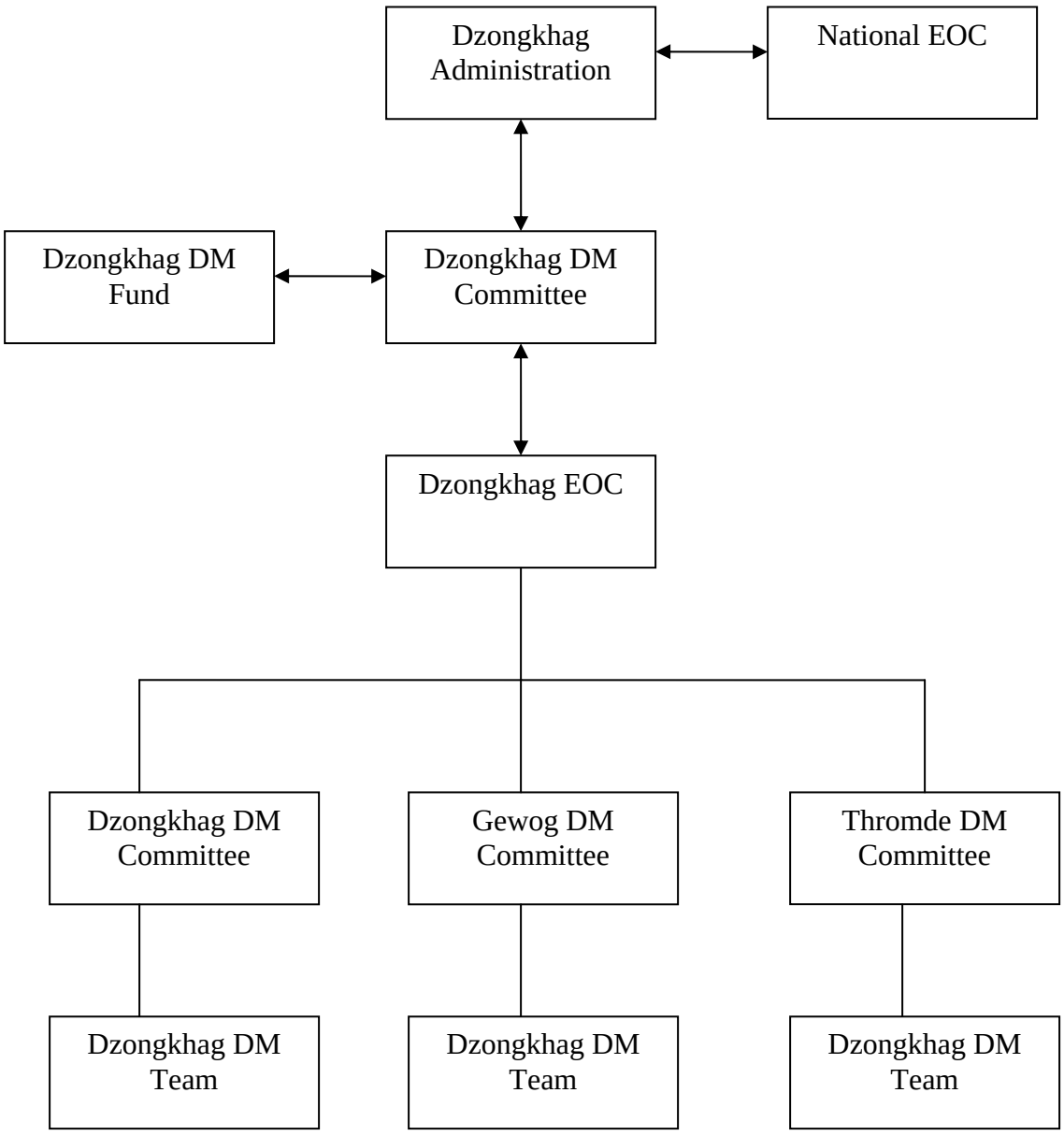
National Emergency Operation Centre

- Provide disaster surveillance and warning systems 24 hrs x 7 x 365 days

Emergency Support Function (ESF)

- Various Line Ministries/Agencies to have sectoral functional core teams' viz. Health, Police, Transport, Communication, Agriculture etc

ORGANOGRAM B: INSTITUTIONAL MECHANISM AT THE DZONGKHAG, DUNGKHAG, THROMDES & GEWOGS



Dzongkhag Disaster Management Committee (DDMC)

- Chairperson: Dzongda
- Members: Representatives of line Ministries/ sectors including NGOs, Religious bodies, Police, Army, Fire etc.

Dzongkhag Disaster Management Fund

- Dzongkhag level disaster management activities including mitigation, preparedness and response
- Funding sectoral schemes

Dzongkhag Emergency Operation Centre (EOC)

- Monitoring and warning dissemination
- It will be operational 24 hrs x 7 days

Gewog Disaster Management Committee

- Chairperson: Gup
- Representatives of relevant sectors, Tshogpas, Mangmis, Chupons as members.

Gewog Disaster Management Teams

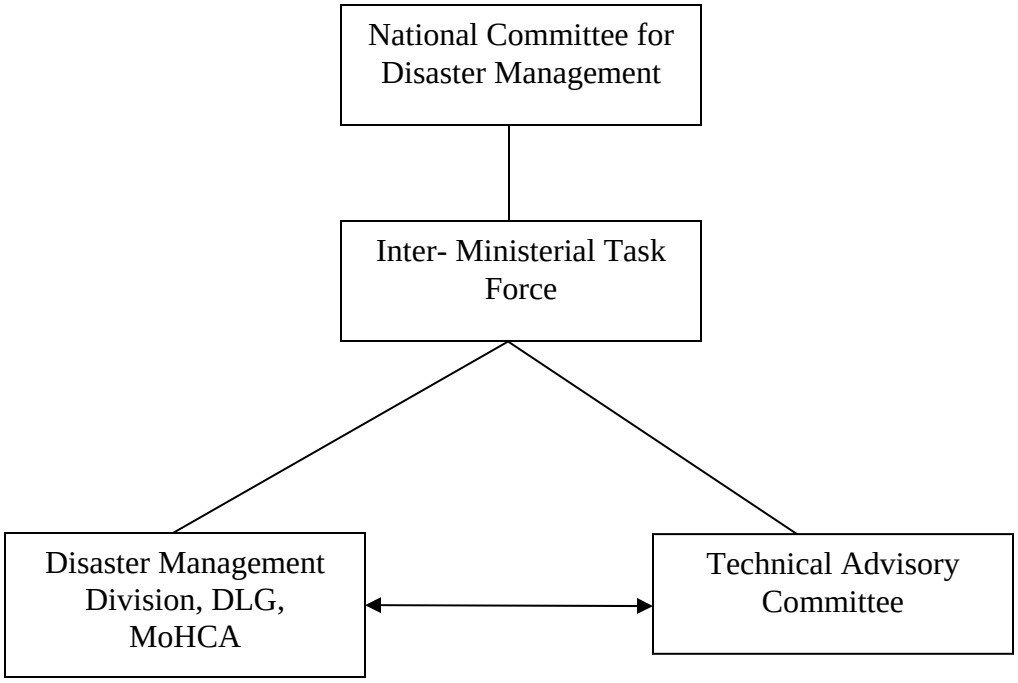
- Core teams of trained people in various facets of disaster response viz. Search & Rescue, First-aid, Shelter Management, Evacuation, and Communication etc.

Dungkhag Disaster Management Committee

- Chairperson: Dungpa
- Vice-Chairperson: GYT Chairman
- Members: All Gups, representatives of relevant sectors, Tshogpas, Mangmis, Chupons etc.

Thromdes to have similar committees and teams.

ORGANOGRAM C: IMPLEMENTATION MECHANISM



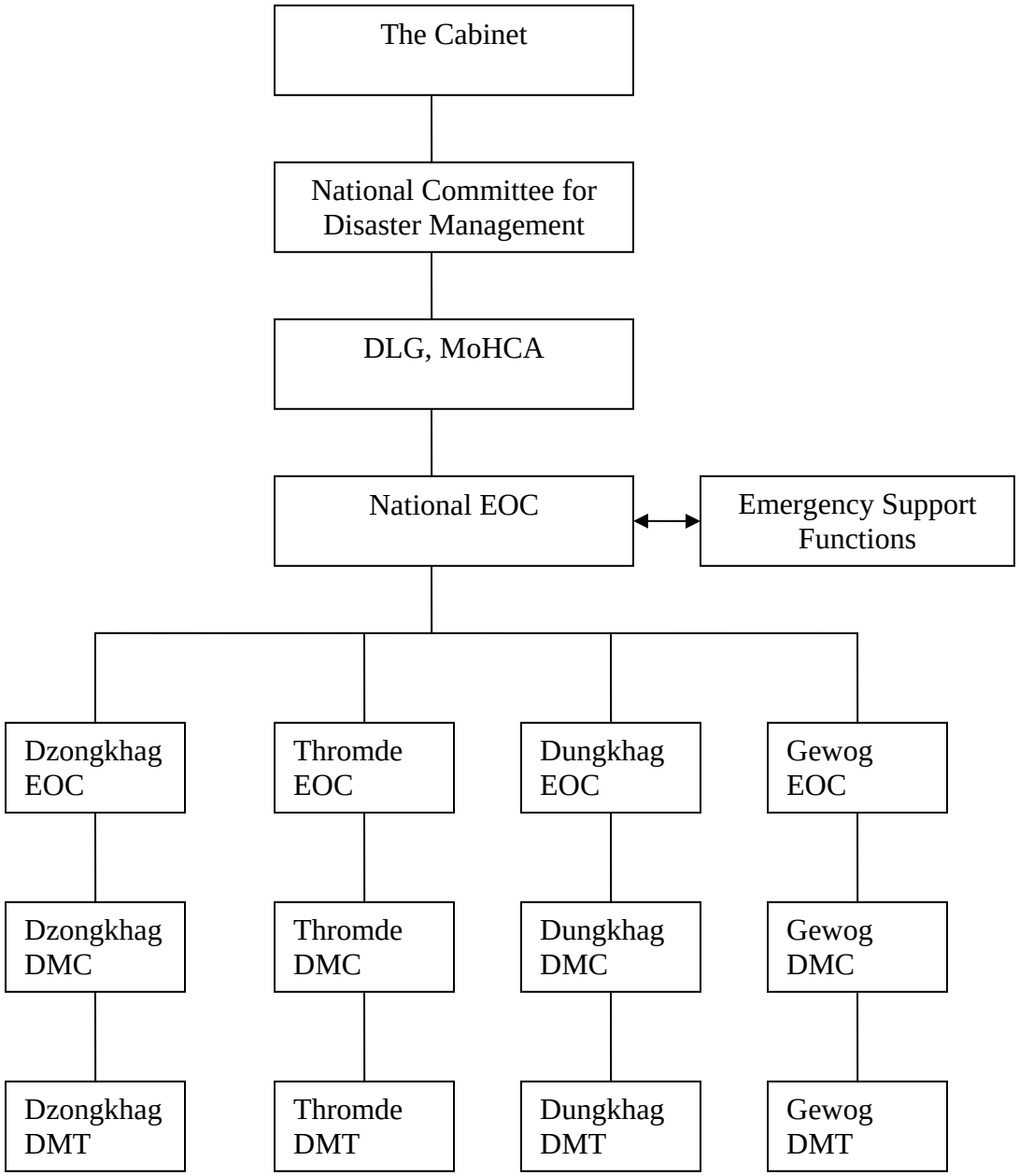
Inter-Ministerial Task force

- Chairperson: Hon'ble Lyonpo, MoHCA
- Co-Chair: Hon'ble Lyonpo, Ministry of Finance
- Members: Officers from other relevant departments.
- DLG to act as the Secretariat for the Steering Committee

Technical Advisory Committee

- To report directly to the Inter-Ministerial Task Force
- Comprise of technical and subject or hazard-specific experts to provide expert advice to the Inter-Ministerial Task Force on different sectoral initiatives formulated and their desirability.

ORGANOGRAM D: RESPONSE MECHANISM



The Cabinet

- To meet immediately in case of a disaster of national magnitude to assess the situation, summon national resources, allocate money from Major Disaster Fund and if required, decide to seek international assistance and decide on appropriate response measures.

National Committee for Disaster Management (NCDM)

- To oversee/supervise the effectiveness of response mechanisms, give directions to line Ministries/agencies, decide on the quantum of relief assistance, mobilization of resources, provide regular inputs to the Cabinet and directions to Dzongkhags, Dungkhags, Thromdes and Geogs etc.

Department of Local Governance, Ministry of Home and Cultural Affairs

- To act as the nodal Ministry or Department for coordinating all disasters.
- To coordinate national response efforts during a major national disaster or a region/ Dzongkhag/Geog specific disaster;
- Give inputs to NCDM and the Cabinet about the situation; requisition required assistance, resources, manpower from other Ministries/ Agencies; give directions to local govt. authorities;
- Overall supervision of the situation up to recovery and reconstruction.

Dzongkhag DM Committee (DDMC)

- To provide SITREP to DLG/ NEOC; assess requirements; summon assistance; mobilize own manpower/ resources; allocate Dzongkhag DM Fund; extend help to Municipalities/ Gewogs; overall management etc.