Title of Research: Comparative Study on District Disaster Management Contingency Plan of Bhutan and Local Disaster Risk Reduction Plan of Japan

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Acronyms

DDM	Department of Disaster Management
DDMC	Dzongkhag Disaster Management Committee
DDMC	Dzongkhag Disaster Management Committee
DDMO	Dzongkhag Disaster Management Officer
DM	Disaster Management
DM Act, 2013	Disaster Management Act of Bhutan, 2013
DMIS	Disaster Management Information System
DT	Dzongkhag Tshogdue
DRR	Disaster Risk Reduction
DZONGDAG	Governor
GNHC	Gross National Happiness Commission
GT	GewogTshogdey
HVCA	Hazard, Vulnerability and Capacity Assessment
ICS	Incident Command System
IMT	Incident Management Team
LGKRAs	Local Government Key Result Areas
LGRR	Local Government Rules and Regulation
NASART	National Search and Rescue Team
NDMA	National Disaster Management Authority
NKRAs	National Key Result Areas
RBP	Royal Bhutan Police
SDMP	School Disaster Management Plan

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CHAPTER 1: INTRODUCTION

1.1 Title of Research Plan

Comparative Study on District Disaster Management and Contingency Plan of Bhutan and Local Disaster Risk Reduction Plan of Japan.

1.2 Background and Significance

Bhutan's Visions to have**:** "Safe, Resilient and Happy Bhutan" and a Mission: To deliver effective coordination and facilitating services with competence in disaster management and to enable government and other stakeholders attain disaster resilience and GNH. Our country being in the Eastern Himalayan region in a rugged terrain landscapes frequently affected by natural disasters such as Earthquake, windstorm, structural and forest fires, landslides, flash floods/floods, hailstorm, thunder/lightning, and GLOF. These natural phenomena are really affected the developmental activities and socio-economic of the country. There is no separate Act or plan developed for Disaster Management for carrying out the Disaster Risk Reduction activities in the National, Dzongkhag, Municipal and Gewogs. However, disaster risk reduction activities were included in the 12th Five Year plan under NKRA-6 and LGKRA-9 which is on carbon neutral, climate and disaster resilient development enhanced. The Department of Disaster Management under the Ministry of Home and Cultural has initiated for the development of the District and Thromde Disaster Management Contingency Plan involving various relevant stakeholders. Therefore, to mitigate, manage and respond the disaster risks in the country, to have a proper coordinated Disaster Management Plan for National, Districts, Thromdes and Gewogs is important in this 21st Century to be safe and happy.

1.3 Specific Aims

The main aims and objectives are to study and learn on the Disaster Risk Reduction Planning System of Japan and to understand the better experiences on the response and preparedness level in National, Prefecture and Local/Municipal level as well as to learn on how the disaster plans were implemented before, during and after the disasters happen. Further, to integrate the activities from Japan to my District plan in times of review and to know on lessons learned from the disasters for future development and community preparedness.

1.4 Proposed Research Activities:

To study DRM plan at all levels, Community involvement for DRR activities, capacity building of the responsible participants, how to improve the District Disaster management plan and develop the community disaster management plan as well as private sector and to learn on stockpiles systems.

1.5 Required Information and Potential Resources

- ✓ Overview of the Disaster Management in Japan
- ✓ Disaster Management Plan of Japan (Central, Prefecture and Local Government level)
- ✓ Community Participation and response in Disaster Management
- ✓ Preparedness, drills and exercises conducted in the Community
- ✓ Communication Plan at Local Government

1.6 Expected Results

Japan is considered one of the greatest countries in the world in terms of preparedness and responding to disaster and as well as for recovery and reconstruction following build back better strategy focusing future disaster risk reductions. Whatever, we have learned from Japan on any disasters and Disaster Management

Plans can be applied in developing similar disaster management plans in the country especially developing community plan in my District involving the community residents through awareness on DRR which will be great outcome of this course.

CHAPTER 2: DISASTER MANAEGMENT SYSTEM IN BHUTAN

2.1 General Overview of the Country

Bhutan is situated in the Eastern Himalayas covering an area of 38, 394 sq. km. It is most recovered by forests and rugged photography with altitudes ranging from 150 meters in the south to 7500 meters in the North above the sea level. A prominent geophysical feature of Bhutan is its glaciers covering about 10% of the total surface area bringing a significant amount of freshwater resources to its rivers. Deep and narrow valleys with concentrated populations are carved into the mountain ranges by Bhutan's rivers that are continuously nurtured by both glacial melts and the monsoons. Forests are the most dominant land cover, making up 72 % as mandated in our Constitution. Bhutan's climate is as varied as its altitudes and has a larger influence from the Indian monsoons. Temperatures vary according to elevation with cool temperate climate in the central regions, hot and humid towards the South, severe winters, and cool summers in the northernmost regions. There are 20 Dzongkhags,15 Dungkhags, 205 Gewogs, 4 Dzongkhag Thromdes ,10Yenlagthromdes and 1044 Chiwogs with a population of 779666.00(PHCB-2017)

2.2 Hazard and its affect in Bhutan

Bhutan is prone and vulnerable to many natural disasters like earthquakes, windstorms, floods/flash floods, landslides, GLOF, forest and structural fires etc. Every year due to such disasters many public structures and critical structures like roads, bridges, school facilities, irrigation channel and drinking water sources, urban and rural homes and agriculture crops were damaged causing loss of lives and properties as well. The past data shows that earthquake magnitude 6.1with epicentre in Mongar in 2009 and magnitude of 6.9 with epicentre in the Sikkim in 2011 claimed 12 and 1 lives, respectively. Many rural homes and public infrastructures were damaged which incurred estimated loss of 2501(million). Likewise, the Cyclone Ailain 2009 has affected the whole of Bhutan taking 12 lives and causing losses of more than Nu. 700 million worth. On October 7, 1994, due to breached of the LuggyeTsho(lake) caused a disastrous flood wave along its path downstream claiming 22 human lives and causing damage to infrastructures and properties. Again, on June 24, 2012, the four-hundred-year-old Wangduephodrang Dzong was razed down to the ground by a fire causing huge damage and loss to Bhutan in terms of its rich cultural heritage. Fire incidences on human settlements and forests are common during the dry seasons. Bhutan losses and average of 10,000 acres of forest cover to forest fire annually. Likewise, human wildlife conflict such as elephants, monkeys and wild boar is a common issue all over the country which affects the livelihood of the rural as they destroy the hardly cultivated crops within a night and also threatens the life of the human beings. Floods /flash floods also destroy the cultivated crops during the monsoon seasons due to flow of rainwater from the uphill's and stagnations in the plain areas. Moreover, windstorm is a major threat affecting the rural village's home due to poor construction practices, timely maintenance and lack of preparedness for the windstorm season like fixing of the temporary roofs and fasten the end of the roofs of the four corners of the house, also causes major damages to the public infrastructures too.

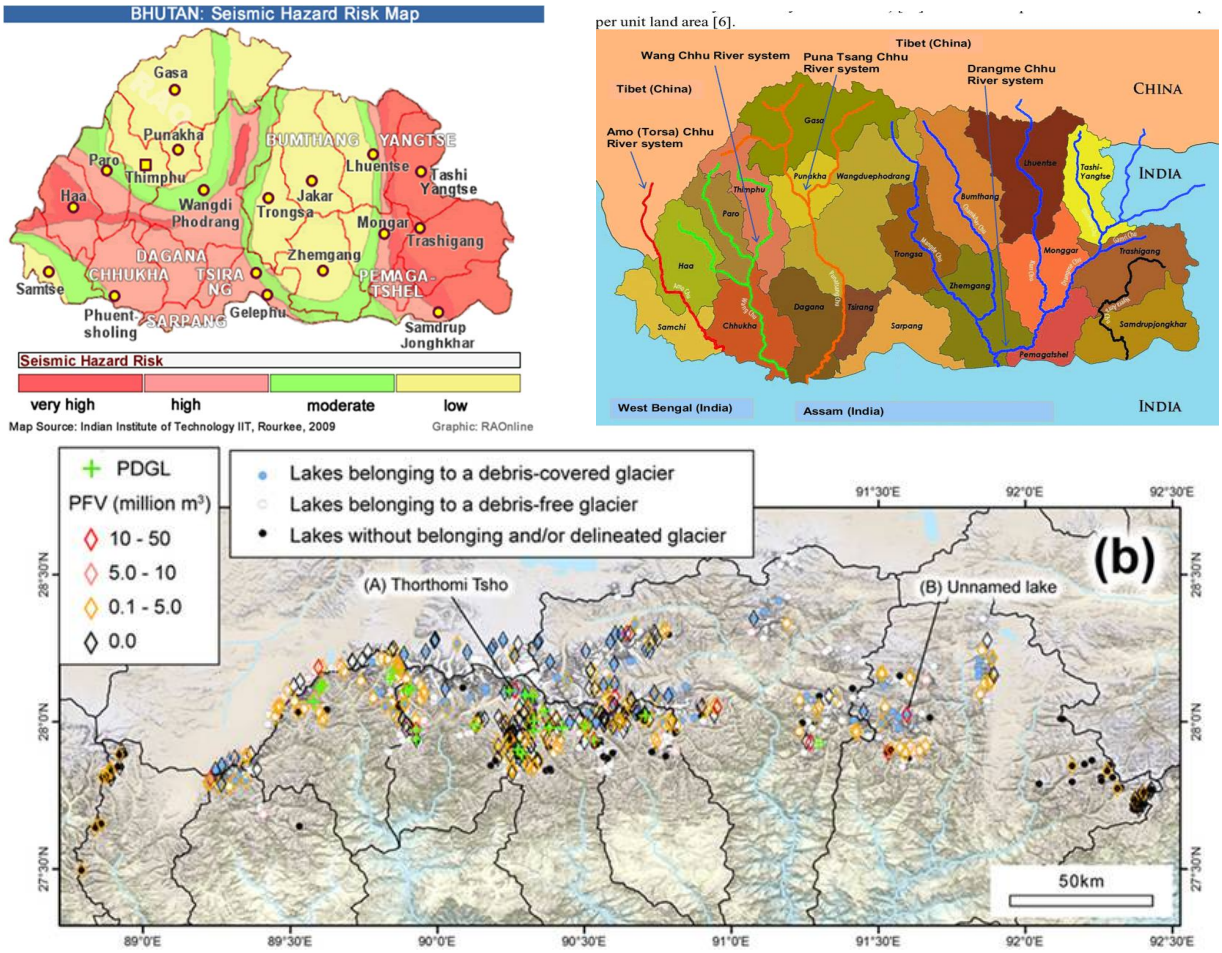

Figure 1. Seismic Hazards map in Bhutan

2.3 Regal System and Regulatory Framework

The Department of Disaster Management the then the division functioning under the Ministry of Home and Cultural Affairs formulated the guidelines for National Disaster Risk Management framework in 2006 which was later covered by the enactment of Disaster Management Act in 2013.Earlier there was no guidelines developed as Bhutan experiences minimal disasters annually and followed compensation systems by the insurance company for those affected ones. The Disaster Management Act, 2013 is the main document for governing the disaster related issues in Bhutan supported by the DM rules and Regulations, 2014. The main purpose of the DM Act is to establish and strengthen institutional capacity for disaster management, mainstreaming disaster risk reduction, an integrated and coordinated disaster management focusing local community. The Earthquake which occurred in 2009 at Mongar and 2011 in Sikkim, which destroyed many government and private structures as well as human lives drives for the need of DM Act.

The Article 8 of the Constitution of Bhutan states that it is fundamental responsibilities of all the people to provide help, to the greatest possible extent, to victims of accidents and in times of natural calamities. Disaster being unpredictable, the Mother of All Laws mentioned clearly on the importance of disaster risk reductions.

Major Disaster Events		Legal System and Framework in Bhutan	
1994	Glacial Lake Outburst Flood (GLOF)		
		2006	National Disaster Risk Management Framework (NDRMF)
2009	Narang Earthquake, Eastern Bhutan (M6.1)	2007	In the process of Drafting DM Act started
		2009	Given the importance of DM Act
2011	Sikkim Earthquake (M6.9)		
		2013	DM Act 2013 Enacted
		2014	Disaster Management Strategic Policy Framework (DMSPF). DM Rules and Regulation

Figure 2. Evolution of Disaster Laws and Framework in Bhutan

2.4 Disaster Risk Management Plans& Institutional Framework in Bhutan

The Department of Disaster Management in Bhutan which is the only institution for coordinating the disaster related responsibilities was formed only during 2008 under the Ministry of Home and Cultural Affairs and initiated drafting of DM Act, 2013 which was later enacted by the parliament in 2013. In the following year DDM also developed DM rules and Regulations in accordance with the Act to implement for disaster risk reductions. This is one of the Legal bases established for managing disaster of the country. As covered in the Act, the National Disaster Management Authority is the highest decision-making body in terms of disaster in the country and DDM functions as the Secretariat to the NDMA. The Disaster Management Institutions are formed as below.

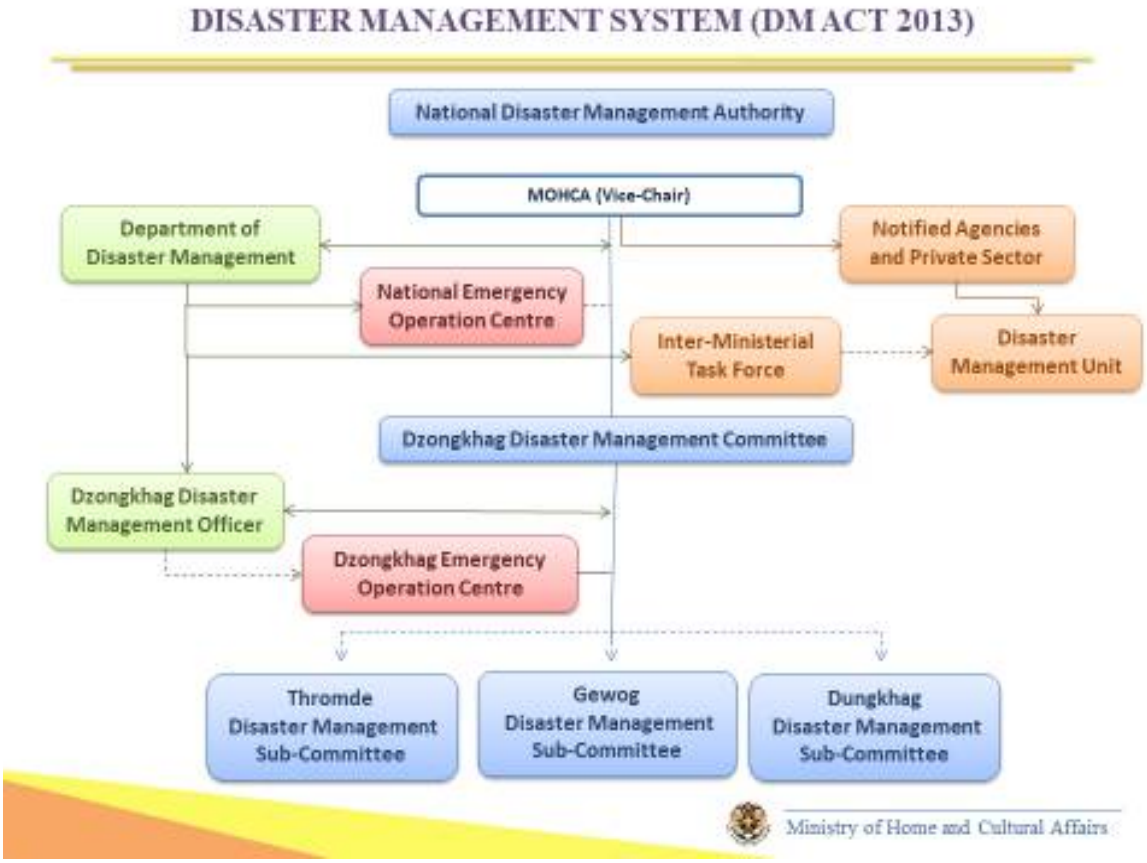

Figure 3. Organogram of Disaster Management

2.5 National Level for DRR

As mentioned above, in Bhutan, National Disaster Management Authority (NDMA) is a highest decision-making body on disaster management. The NDMA is responsible for approving - national DM strategies, policies; the national DM and Contingency Plan; vulnerability and hazard zonation maps; structural and non-structural measures, national standards, guidelines, and procedures. The NDMA is also responsible for allocation of DM related funds; directing agencies to mainstream disaster risk reduction into their development plans, policies, programs, and projects; and ensuring the establishment of an Inter-Ministerial Task Force.

In addition, the NDMA has the power to direct any agency including private sector on disaster management; establish/commission research, develop and provide training in the field of disaster management; direct the Department of Disaster Management, Dzongkhag Disaster Management Committees and agencies including the private sector as may be necessary for the effective implementation of the Act; or perform such other function as may be prescribed under the Act or any law.

Bhutan's five years plan is prepared by the Gross National Happiness Commission in consultation with relevant Ministries, Autonomous Agencies, Thromdes, Dzongkhags and Local government. Currently the plans prepared by the DDM and approved by the NDMA submits to the GNHC for inclusion in the overall

plans of the country. Bhutan has included SDGs targets like Carbon Neutral, Climate & Disaster Resilient Development enhanced under National Key Result Areas(NKRA-6) of the total 17 NKRAs and LGKRAs-9 out of 10 LGKRAs of the Dzongkhag & Gewogs in the Twelfth Five years plan. Which will be implemented by the respective Ministry, Dzongkhags, Thromdes and local governments.

The Department of Disaster Management (DDM) serves as the Secretariat and executive arm of the NDMA as per clause 59 of the DM Act 2013. The DDM is nodal National Coordinating Agency for disaster management in the country and also responsible for laying down strategies, policies for disaster management; ensuring that agencies mainstream DRR; preparing the National Plan in coordination with relevant Agencies; formulating standards, guidelines and procedures for disaster management; developing and implementing public education, awareness and capacity building programme; developing standard training module and curriculum on disaster management; developing and maintaining Disaster Management Information System; and ensuring implementation of Disaster Management and Contingency Plans.

Likewise, the constitution of the Inter-Ministerial Task Force (IMTF) is mandated by Clause 49 of the DM Act 2013. The IMTF comprises of technical experts from relevant agencies and will consist of such number of members as prescribed by the NDMA. The Head of the DDM is the ex-officio chairperson of the IMTF. The IMTF is responsible for review of – hazard zonation and vulnerability maps; structural and non-structural measures; risk reduction activities; national standards, guidelines and operating procedures. The IMTF will also provide technical assistance in the preparation of the National DM and contingency plan and advice the setup of critical disaster management facilities. The Ministry of Education, Ministry of Health and Ministry of Agriculture has developed their own DM and contingency plan and other agencies also in line for developing the plans.

2.6 National Budget Plan for Response & Relief, Disaster Management Activities & Recovery & Reconstruction

As per the DM Act, 2013, there are three different financial arrangement mechanisms;Response and Relief Expenditure, Budget for National Disaster Management Activities and Recovery and Re-construction. In 2017, the Department of Disaster management and Department of National Budget formulated an operational guideline for disaster financing in the country as follows:

- ✓ Response and Relief Activities: As Response and Relief activities need to be carried out right after the disasters, the budget shall be used from the concerned Districts or Agencies and need to submit to the DDM within 10 days for Disaster Type I &II and 21 for the Disaster Type III.

- ✓ Immediate Restoration of essential public infrastructure and service center: for restoring the critical public infrastructure like schools, hospitals, rural water supply, roads and Bridges concerned agencies should submit the detail estimates of the affected by any disaster within 45 days to DNB for the Budget. The said budget will be provided from the General Reserve Fund for the Disaster.

- ✓ Recovery and Reconstruction Activities: Since it's required through assessment for the reconstruction after 45 days all the disaster activities of the public infrastructure should be processed though annual plan budget.

The above three financial plan is developed for the public infrastructures damaged and utilize during the disaster response and not covered private structures. However, disaster affected to the private houses in Bhutan will be paid by the Insurance Company as per their category and damage assessment report. The Agriculture

Ministry is in the process of developing the compensation criteria for damaged of the crops by natural disasters and wild animals in collaboration with the Insurance Companies.

2.7 Contingency Plan –National level

The Department of Disaster Management has developed uniform National Disaster Response system in the country-(National, District, Thromdes, and Local Governments) following the concept of Incident Command System practiced in many other countries which was directed to implement since 2017 by the Chairperson of the NDMA. The ICS system focused on multi-agency coordination's and organization of onsite response in managing the different level of responses required. It is normally structured to facilitate activities in five major functional areas: Command, Operations, Planning, logistics, finance and administration. In addition, the organization can contract orexpand based on the needs of the incident/ disasters. In case of Bhutan, during the disaster type III which affects the whole National, The National Emergency Operations Center (NEOC) should be operationalized by forming the "National Disaster Response Coordination Committee" (NDRCC) to support the onsite IMTs at the dzongkhag levels and other levels. Volunteers like De-Suups, Bhutan Red-Cross, RBA and other NGOs needs for supporting the disasters will be deployed from the National level.

Actually, ICS is a temporary onsite management hierarchy with standardized procedures for managing incidents/disasters of any size without being hindered by jurisdictional boundaries. It is designed to enable effective and efficient incident/disaster response by integrating a combination of facilities, equipment, personnel, procedures, and communications within a common organizational structure. It is used to organize response operations for a broad spectrum of emergencies, from small to complex incidents/ disasters, both natural and manmade, as well as planned events. It is suitable for the civil administration for all types of incident/disaster response and can be used by all levels of government - National, Dzongkhag, Thromde, Dungkhag, and Gewogs, as well as private-sector and non-governmental organizations. There are five levels of ICS concept instituted in Bhutan:

1. National Level
2. District Level
3. Municipal Level
4. Sub-District Level
5. Block Level

The Department of Disaster Management with the financial support from the World Bank Developed Disaster Management Information System (DMIS) for keeping record of disaster data and for efficient response. It comprises of five modules 1. Pre-crisis data 2. Disaster Assessment 3. Report Generation 4. Risk mapping and 5. DRR Activities/Project. This is also part of the DRR response mechanism developed for the immediate response and support during the disaster. This was developed in 2018 and now the Districts Disaster Management officers all over the 20 District updating the data to the system.

Likewise, to tackle the problem of the Communication in the National level is the responsibilities of the Ministry of Information and Communication. They required to set up necessary communication facilities all over the country so that the people will not be affected to communicate during the times of disaster, communication include –Connectivity of Mobile phone& telephone lines, TV and Radio etc. Currently VSAT has been set up in all 20 Dzongkhags and Dungkhags. The similar set up also going on for the Gewogs. The Department of Disaster Management in collaboration with the Arm Forces of the country setting up the VHF-base to cover all the Digital-VHF handsets procured in the country to overcome the communication problem during disasters.

Hazard Maps for earthquake has been carried out by DGM (Department of Geology and Mines) and they have set up earthquake intensity meter in all Dzongkhags and setting up going on in the gewogs. They also responsible for carrying out scientific studies on GLOF and landslides. The Department of Engineering services under the MOWHS is responsible for developing the Hazard maps for floods and mandated for planning on the disaster risk prevention and mitigation works in the country including the DRR activities which they did in few locations in the country. Floods/Flash Floods and landslides are common, mostly in southern and eastern parts of the country during the summer seasons. Likewise, DHS carryout out plans to construction, safety and disasters as well as prepare human settlement policies and strategies. Weather warnings and advisories were carried out by the NCHM. (National Center for Hydrology and Meteorology) in center after collecting the data from the different stations around country. They also provide river level status and forecast of the weather condition for 3 days ahead and share information to relevant agencies and broadcast in the National TV, BBS.

Bhutan has formed National Level Search and Rescue (NASART) team for quick responding and rescue the victims involving diverse participants but however it could not function well due to the members having dual assignments and works. Therefore, now the government has plan to set up in tie with the RBP having separate training Centre. This could be one of the plans of DRR governance.

CHAPTER-3: DZONGKHAG DISASTER MANAGEMENT PLANS (Local Government)

3.1 Objectives

The Department of Disaster Management has initiated to develop District Disaster Management Plan and Thromde Disaster Management Plan after coming out with the pilot Disaster Management Plan in Paro Dzongkhag in 2015, which was found to be very important and necessary to have such plan in all Districts in order to identify hazard and risks in the Dzongkhag and respond to any kind of disaster. So far, 8 Districts out of 20 Districts has been developed District Disaster Management and Contingency plan and other remaining 12 Districts completed final draft and ready for the approval from District Disaster Management Committee (DDMC). Likewise, Four Major Thromdes Thimphu, Phuentsholing, Gelephu and Samdrupjongkhag also developed their Thromde Disaster Management and Contingency plan. The Disaster Management and Contingency Plan for the Dzongkhag is prepared, as mandated by Disaster Management Act 2013. All District plans should be endorsed by the Dzongkhag Disaster Management Committee (DDMC) and serve as a document for reference by all relevant stakeholders – different Dzongkhag Sectors and Gewog Administrations - for implementation of prioritized disaster risk reduction and preparedness activities through mainstreaming.

The objectives of the Dzongkhag Disaster Management and Contingency Plan are:

- ✓ To ensure mainstreaming and facilitation for implementation of disaster risk reduction and preparedness activities in Dzongkhag;
- ✓ To ensure required capacities are developed for risk reduction, mitigation, preparedness and response;
- ✓ To increase awareness on disaster risks, risk reduction and preparedness measures in the Dzongkhag;
- ✓ To establish coordination mechanism and standard operating procedures for emergency response and relief operations.
- ✓ To ensure safety of community, reduce loss to property; protect critical infrastructure, and environment and continuity of essential services.

3.2 Dzongkhag Disaster Management Committees

Dzongkhag Disaster Management and Contingency Plans to be rolled out, at the local level, as per the DM Act 2013 mandates every Dzongkhag Administration to constitute a Dzongkhag Disaster Management Committee (DDMC) under the Chairmanship of the Dzongdag (Governor). Most of the Dzongkhags has formed the DDMC as per the instruction of NDMA and DDM. The lowest level of the DRR organization committees are Thromde committees, Dungkhag committees and Gewog committees. The main function of the DDMC as per the DM Act 2013 are: preparing and implementing the *Dzongkhag* Disaster Management and Contingency Plan; monitoring and evaluating measures for prevention, mitigation, preparedness, response and capacity building taken up by sectors in the *Dzongkhag*; ensuring establishment and functioning of Critical Disaster Management Facility; ensuring mainstreaming of disaster risk reduction into the local development plan and programs; ensuring compliance of approved hazard zonation and vulnerability maps; ensuring the enforcement of structural and non-structural measures; ensuring communication of hazard/disaster events to the DDM and NDMA; ensure assessments and monitoring reports; ensure promotion of education, awareness, capacity building at dzongkhag and community level; conduct regular mock drills; report on the progress of implementation of the Disaster Management and Contingency Plan; direct *Dungkhag*, *Thromde* and *Gewog*

Disaster Management subcommittees, if any; and perform such other functions as prescribed under the Act by the NDMA.

3.3 DRR Plans in Dzongkhag

The main document of the DRR plan is the 12th Five Year Plan of the respective Dzongkhags. The DRR activities has been included in the LGKRA-9 of the Dzongkhags and Gewogs plan under -Carbon neutral, climate and disaster resilient development enhanced. Every year under this plan target Dzongkhags propose budget for the DRR activities in all the Dzongkhags,T hromdes and Gewogs after approval from the GewogTshogde, Thromde Tshogde and Dzongkhag Tshogdu. Upon final discussion and approval from the Parliament, Dzongkhags and Gewogs carried out the prioritised DRR plans within the financial year like awareness program, mitigation works such as construction of river embankments, irrigation channels and maintenance etc. The sector concerned propose DRR budgets according to the plans like Agriculture, livestock, engineer, environment, disasters, and gewogs. Dzongkhags are not allowed to propose for the reserve fund for the disasters, its reserved in the Central Budget.

The Construction of public infrastructures and private houses under the districts were monitored by the Dzongkhag Engineering cell and local governments respectively, as they approve the drawings and designs after verifications.

3.4 Dzongkhag, Thromdeand Gewog level Response Plan

Like in the central level, Incident management Teams at Dzongkhag and Dungkhag and Gewogs has been established with the direction from the DDM, all Incident Team Members has been assigned their responsibilities in all the Dzongkhags, Thromdes, Dungkhags and Gewogs. The formation of the response team was coordinated by DDM after consultation with the various stakeholders like, LG leaders, Governor, sector heads and regional heads. Due to the human resources shortages many ICS positions were clubbed that one person involving in two tasks assigned systems.

Dzongkhag Disaster contingency Plans has been developed and assigned with responsibilities but found in implementing the plan facing various problems like budget constraints, human resource shortages and coordination among the different agencies in practically as well as lack of technical capacity. So to curb such issues the government should look into providing full time DDMO as per the ACT to look after the disasters and should provide separate disaster budget for the Dzongkhags and Gewogsto manage any disasters instead of keeping at the center level like in Japan.

CHAPTER 4: CASE STUDY OF DAGANA DISTRICT DISASTER MANAGEMENT

4.1 Dagana Dzongkhag profile

Dagana Dzongkhag is geographically located at the South-Central part of the country. The elevation ranges from 200 to 4720 meters above sea level covering an area of 1722.57Sq. Km. The Dzongkhag shares its border with Thimphu and Chukha Dzongkhag to the west, Wangduephodrang to the north, Tsirang Dzongkhag to the East and India to the South.The Dzongkhag has a mixed ethnicity comprising of Ngalops, Sharchops, Khengpas and Lhotshampas. The Dzongkhag consists of one Dungkhagand 14 Gewogs. 230 KM away from the Capital of Bhutan, Thimphu.

The Dzongkhag Administration, similar to the administrative setup in other Dzongkhags, isheaded by the Dzongdag with various sectors representing line Ministries working under the Dzongkhag's administrative jurisdiction. The Dzongdag and the Dzongkhag Administration work in close collaboration with the elected local bodies – the Dzongkhag Tshogdu and the GewogTshogde. The other institutions in the Dzongkhag are the Dzongkhag's Judicial system headed by the Drangpon and DagaRabdey by the Lam Neten.

The Dzongkhag has two major climatic conditions. Summer is usually hot and wet while winter months are dry and cold. Heavy rain falls are expected in the month of June-August which leads to abundant water flow causing minor floods in the plain area. Cold winter starts from October till February. The temperature ranges from 20-37 degree Celsius. The main source of income of the Dzongkhag is Agriculture and livestock farming. The Dzongkhag has a fertile land and a suitable climate for agricultural production, making it one of the major producers of mandarin and cardamom in the country. All the gewogs are connected by farm road and telecommunication networks, and electricity except for few far flung areas.

The total population of Dagana Dzongkhag is around 24,247(PHCB, 2017) with 7346 households. With a crude birth rate of 13.7%, a death rate of 8.0% and a natural population growth rate of 1.8%, the population is projected to 43,915 in 2030.

Figure 4. Dagana Dzongkhag Map

Table 1. Key Demographics

	Gewog	Area (Sq. Km.)	No. of Households	Population		Health Facilities			Schools				
				Male	Female	Hospital	BHU	ORC	HSS/CS	MSS	LSS	PS	ECR/ECCD
1	Dorona	107.69	231	398	336		1	1				1	
2	Drukjeygang	54	565	1180	1296		1	3	1			1	3
3	Gesarling	36.81	219	853	724			2	1				1
4	Goshi	22.14	384	1183	1248	1		1				1	2
5	Kana	193.11	510	1241	1229		2	2			1	2	2
6	Karmaling	4046	267	695	535			3				1	1
7	Khibesa	95.92	298	580	617		1	3				2	3
8	Lajab	210	202	371	389		1	3				1	
9	Lhamoidzingkha	103	540	1365	1319		1	1		1			2
10	Nichula	138.97	152	235	192			1					2
11	Tshangkha	9060.9	405	849	838		1	3			1	1	2
12	Tashiding	39.53	355	841	838			3			2		1
13	Tsendagang	95.84	456	1200	1147			2		1		1	3
14	Tseza	210	175	1313	1235		1	2	1		1	1	2

BHU – Basic Health Unit; ORC – Out Reach Clinic; HSS – Higher Secondary School; MSS – Middle Secondary School; LSS – Lower Secondary School; PS – Primary School; ECR – Extended Classrooms

4.2 Dagana Dzongkhag DisasterManagement Plan

Dagana Dzongkhag formed the Dzongkhag level Dzongkhag Disaster Management Committee (DDMC)as mandated by the DM Act of Bhutan, 2013 as follows:

a) Dzongdag, Chairperson (ex-officio)
b) Dzongrab, Co-opted Member
c) Dzongkhag Welfare Officer, member
d) Chairperson of Dzongkhag Tshogdu (DT), member
e) Gups of all Gewogs, member
f) ThromdeThuemi, member
g) Superintendent of Police/Officer-in-Charge, RBP, Dagana, member
h) Drungchen, DagaRabdey, member
i) Dzongkhag Disaster Management Officer, Member Secretary

The DDMC is mandated to meet at least twice a year and to frame rules and regulations concerning the conduct of its meeting. The DDMC members endorsed the Dagana Dzongkhag Disaster Management and Contingency Plan on 15/08/2018 after through discussion for implementing the mandates of the DDMC and carry out DRR activities by including in the Annual District plan and proposing the Budget for implementation. Awareness program on disaster and mitigation works were discussed and conducts drills in collaboration with the other agencies.
The DDMC also constituted a subcommittee at the Dungkhag, Thromde or Gewog level to assist the DDMC in the performance of its functions under the DM Act of Bhutan 2013.

4.3 Disasisk Profile of DaganaDzongkhag

Dagana Dzongkhag has experienced several disasters over the last 20 years, the most devastating being the September 18, 2011 Sikkim earthquake of M 6.7, which caused widespread damages to rural homes and government infrastructure. The other major and recurrent hazard has been windstorms causing extensive damages to roofs of houses and government infrastructure. The Hazard Vulnerability and Capacity Assessment (HVCA) process carried out for the Gewogs also identified other hazards such as – forest fire, structural fire, flood, landslides, thunderstorms and pests and diseases. TheHVCA assessment of Dagana Dzongkhag, as per consultations with the community is as follows:

Table 2. Hazard Assessment

S/N	Hazard	Secondary Hazard	When it could occur	Probability of Occurrence	History of Past Disaster	Impact
1.	Wind Storm	Structural Fire	Winter month (December-March)	Medium	April 2011 April 2014 May 2015	321 HHs affected
2.	Landslides	Flash Flood	June-September month	High	2016,2017	Dzongkhag Road, Farmroad, irrigation channel,pvt land affected.
3	Structural Fire	Forest fire	During Winter Season	Medium	2017	1 house affected.
4.	Forest Fire	Structural fire	Winter season	Medium	2016	300 acres affected.
5	Lightning and Thunder	Structural fire/forest fire	Summer season	medium	2018	Electric lines short circuited and window glasses broken.
6	Earthquake	Landslide, Structure Fire	Anytime	High	2009, 2011	More than 136 HHs affected.
7	Flood	Landslides	June to August	medium	1995	Damaged crops and cultivatable land.

Table 3. **Vulnerability Assessment**

S/N	Hazard	Element at risk	Why they are at risk	How will they be affected
1	Wind Storm	Structure and crops	1. Temporary Roofing 2.Lack of proper anchorage 3.Lack of Lung-go(wind to pass through)	1. Roofing will be blown off. 2. Structures collapsed. 3.Live lost/injury
2	Landslides	1. Houses (Tsendagang) 2. Two households (Tsendagang Village)	1. Sinking Area 2. Landslide prone area	Properties and lives will be lost. Orange orchard
3	Structural Fire	People and property (Lhamoizingkha, Dagapela,Sunkosh and Dagana Town)	1. Poor wiring, old and clustered structures 2. use of butter lamp, heaters and firewood 3. Carelessness while using fire.	1. Property 2. Live
4	Forest Fire	Houses and Environment	1. Carelessness while burning debris 2. Dry season	1. Properties and lives will be lost.
5	Lightning and Thunder	People and property	Working in paddy field and poor electric wiring.	Property and affect human live.
6	Earthquake	1. Traditional houses 2. Dzong and Lhakhangs	1. Traditional houses are not constructed as per Standards and codes	1.Collapse/ cracked 2. Live lost/ injury
7	Flood	Lhamoizingkha and Sunkosh satellite town	Settlement near Sunkosh River.	Damaged property and Human live will be affected.

Table 4. Capacity Assessment

S/N	Hazard	Physical capacity	Economic capacity	Social/Institutional capacity	Environment capacity
1	Wind Storm	Most of houses have wind tie.	House Insurance, life insurance		
2	Landslides		Land Exchange		
3	Structural fires	Fire extinguishers and fire hydrant in Dzong area and offices, schools and lhakhangs. Excavators/ JCB	Insurance (house and life)	DDMC (IMT) Fire Fighting Unit Community SAR team Desuups Schools (students)	
4	Forest Fire	Fire line		Forest personnel Desuups and community	
5	Flood	JCB (1) Plantation/ land management Water source and catchment area protection		RBP and RBA in Lhamoizingkha Desuups IMT members	
6	Earthquake	Open spaces in Dzongkhag and all gewogs.	House Insurance, Life insurance.	Hospital and BHUs Schools Cooperatives	

Overall, in all the Gewogs there are certain capacities and some level of awareness on prevailing hazards and some knowledge on the measures to take to reduce risk before and during disasters.According to the above risks assessments following are summary of capacity needs in Dzongkhag:

Risk Reduction and Mitigation

There is need to build capacities in the Dzongkhag engineering cell and Dzongkhag DM Officer to lead both structural and non-structural mitigation activities in the communities, schools, health facilities, etc. Rural homes, school structures, health facilities and cultural structures have been particularly vulnerable in past earthquake events. Therefore, vulnerability assessment of old andimportant/ public structures is important to determine strengthening needs or replacement decisions. In terms of earthquake, and also other hazards, there is need to strengthen the construction quality monitoring system to ensure constructions adhere to standards and building codes.

Landslide is also a priority hazard for Dagana and there is need to build capacities in the Dzongkhag to raise awareness in the community on ways of land management and carrying out mitigation in structures such as roads, schools, lhakhangs, etc. that suffer from recurrent landslide damage.

Community groups such as community forest groups and system of having Re-suups, Me-suups, Chu-suups, etc. need to be encouraged. Also there is still need to raise awareness within the Dzongkhag and in the communities on key messages for risk reduction and preparedness.

Dzongkhag and gewog is carrying out the mitigation works for disaster risk reduction but lack of fund to mitigate all is a major problem.

Preparedness

For preparedness there is need to ensure early warning capacities for heavy rainfall, thunderstorms, avalanches, hailstorms, and other such extreme weather conditions and have systems in place to provide the early warning/ advisory to the affected communities in time. Capacities also need to be built in terms of raising community awareness on risks and family preparedness. Similarly preparedness capacities need to be developed in important public institutions such as schools and health facilities. Community awareness conducted but could not cover all institutions due to budget constraints.

Response

In terms of response, capacities for - Search and Rescue, First Aid, conducting various assessments (rapid, damage, safety etc.) need to be built at various level. There is also need to support and organize volunteers for response and coordinate with existing volunteer organizations such as Desuups. For effective response, Standard Operating Procedures(SOPs) need to be developed for each Gewog. Simulations and drills should be carried out to test and practice the procedure. At the Dzongkhag level, EOC should beestablished along with related Standard Operating Procedures (SOPs).

Incident Management team formed in the Dzongkhag for response as measures and EOC has been identified in the Dzongkhag and Gewogs but need to relook and place equipments required. The following action plans has been developed for enhancing disaster risk reductions in the local governments covering the activities like meeting of DDMC,awareness and Education,preparedness and response as well as construction in the districts. In order to implement all the plans are very difficult owing to budget constraint and lack of technical capacity and human resource constraints as well poor participation of qualified contractors.

Table 5. Disaster Management Action Plan (2018 – 2022) Dagana Dzongkhag

Priority Area	Key Activities	Target	Lead Agency/Person	Supporting agencies	Timeline	Budget estimate (Nu. in M)
DDMC Meetings as per the DM Act of Bhutan 2013	Conduct DDMC meetings bi-annual as per the DM Act of Bhutan 2013 (to review the DM and Contingency plan, assess implementation of the activities and dissemination of plan)	DDMC	DDMO	DDMC	To be clubbed with DT Meetings and also conducted in Gewog Centres	0.100
1. Awareness and Education	1.1 Raise awareness on top priority hazards – Landslide, earthquake, windstorm and fire	All 14 Gewogs, Dratshang, Monasteries Schools Business Community	DDMC	Gewog Administration DDM RBP	2018-2020	0.200
	1.2 Distribute posters with key messages on risk reduction and disaster preparedness prepared by the DDM	Both to urban and rural public	DDMO	DDMC DDM Gewog Adm. Relevant sectors	2018-2021	0.060
	1.3 Encourage contractors to incorporate risk reduction features in the farm road, irrigation and other infrastructural development projects	Both rural and urban communities	DE, Gups, DDMO	DDM Gewog Adm. DDMC	2019– 2020	0.100
	1.4 Dzongkhag observes International disaster day and Annual school preparedness drill day	Schools, communities, Rabdey, Business community	DDMO	DDMC, DDM, Gewog Adm. MoE Dratshang	Annually	0.25
	1.5 Raise awareness on family preparedness	All Gewogs Communities	DDMO/GAOs	DDM, Gewog Adm.	2019-2020	0.200

	1.6 Conduct awareness programs on insurance benefits and encourage families to insure their property against various hazards	All Gewogs Communities	DDMO/ GAOs	Insurance companies, DDM, Gewog Adm.	2019 – 2020	(club with other awareness activities)
2. Enhance risk reduction and Mitigation	2.1 Conduct training on good construction practices	Engineers, carpenters, Masons and house owners	DDMO/ DE	DDM, DES, MoWHS	2020 -2021	0.100
	2.2 Carry out vulnerability assessment of old/ existing government buildings – schools, health facilities, cultural buildings, office buildings	Engineers	DDMO/DE	DDM, DES, MoWHS, MoE, Gewog Adm. Dratshang	2020-2021	2.00
	2.3 Implement structural mitigation measures or replacement as per vulnerability assessment recommendations on a prioritized basis	Mitigation for priority structures	DE/ DDMO	DDM, DES, MoWHS, MoE, Gewog Adm. Dratshang	2022 onwards	Based on assessment
	2.4Institute construction quality control and monitoring mechanism for materials and adherence to standards and designs	Engineering Division	DE/ DDMO	DES, MoWHS, DDM Other relevant sectors	2019	0.200
	2.5Implement mitigation measures on a prioritized basis in the Gewogs as per HVCA: - Fire safety training in Nichula and Dorona gewog - Landslide mitigation in	Gewogs, Respective Sectors.	Gewogs/ Sector heads/ DDMO	DDM, GNHC, MoF, concern ed sectors	2019– 2020	Based on identified priority mitigation activity

	Lajab&Tashiding. - Encourage anchorage of roofs and other mitigation for Windstorm inDorona, Goshi and Tsendagang Gewog					
	2.6 Training of Engineers, Sector heads and GAOs on Rapid Damage Assessment skills	Engineers, Sector heads and GAOs	DE/DDMO	DES, MoWHS, DDM, DDMC	2018-2019	0.150
	2.7 Refresher course for the Dzongkhag SAR Team	Dzongkhag SAR team, RBP	DDMO	DDM, RBP	2019-2022	0.300
	2.8 Hands on training on use of fire-fighting equipment	DDMC/Lhakhang care takers/Business Community and Communities	DDMO	RBP DDM Dratshang Relevant sectors	2019-2020	0.300
	2.9 Form and train gewog SAR teams	Gewogs	Dzongkhag and Gewog Administration	DDM	2020-2022	1.650
	2.10 Procure additional VHF sets	Dzongkhags/ Gewogs	DDMO	Dzongkhag/ Gewog Administration	2018-2020	0.300
	2.12 Ensure fire preparedness measures is put in place in the BOD in the Dagapela town	BOD	DDMO	DDMC RBP	2018-2019	

3. Enhance preparedness, response, and recovery levels	3.1 Establish Dzongkhag Emergency Operation Center	Dzongkhag	DDMO	DDMC, DDM NDMA, Relevant sectors	2018-2022	0.200 (for furnishing only)
	3.2 Raise awareness and sensitize on Dagana Dzongkhag DM and Contingency plan other response measures	Dzongkhag, Gewog, Dratshang, RBP, RBA, Judiciary, Regional Offices, Desuups, Communities	DDMO	DDM	2018-2019	0.300
	3.3 Stockpile materials required for emergency response and immediate recovery at strategic locations	Dzongkhag	DDMC	DDM,MoF, relevant sectors	2018-2020	0.500
	3.4 Establish and institute pre-arrangements for emergency procurement and requirements	Dzongkhag	Procurement Officer DDMO/ Finance Officer	DDMC, DDM, MoF	2018-2019	0.200
	3.5 Coordinate with Dagachhu Hydro Project to establish Flood early warning for low lying gewogs	Dzongkhag	DDMC	DDM, DHMS, Dagachhu Project, RBP, Gewog Adm.	2019	1.500
	3.6 Identify Evacuation sites for various hazards (keeping in mind the needs of people with disabilities, women, children and elderly)	Community and Offices	DDMC, Gewog Administrations	DDM, relevant sectors	2018	

	3.7 sensitize, conduct mock drill/ simulation on Dzongkhag DM and Contingency plan	Dzongkhag, Drungkhag Administration, Gewog Administration Dratshang, RBP, RBA, Judiciary, Regional Offices, De-Suung, Business and Communities	DDMC	DDM	2018-2022	0.500
	3.8 Procure additional SAR equipment	Gewog Administration	Dzongkhag / Gewog Administration	DDM	2019	3.000
	3.9 Establish community based early warning system for floods and landslide including monitoring and reporting system	Dzongkhag	DDMC/ Dzongkhag and Gewog Adm	DDM, DHMS, DGM, RBP,	2018	0.500
	3.10 Identify Dzongkhag Disaster Assessment Team for various hazards	Dzongkhag and gewogs	DDMO	DDM	2018	

4.4 Contingency Plan

Information Flow Mechanism

The Contingency Plan for responding to the disaster is very important to save the human life and properties by managing well like human and financial resources, coordination and communication procedures and being aware of the technical and logistical response. In case of disaster type I,II& III follows the above SOP developed for decision making and response. If the disaster situation is not under the coping capacity of Dzongkhag and Thromde(type I & II) they report to the NDMA where NEOC activated and takes decision for the assistance and beyond the control of the NDMA has provision for seeking the international assistance through coordinated by the RGOB.

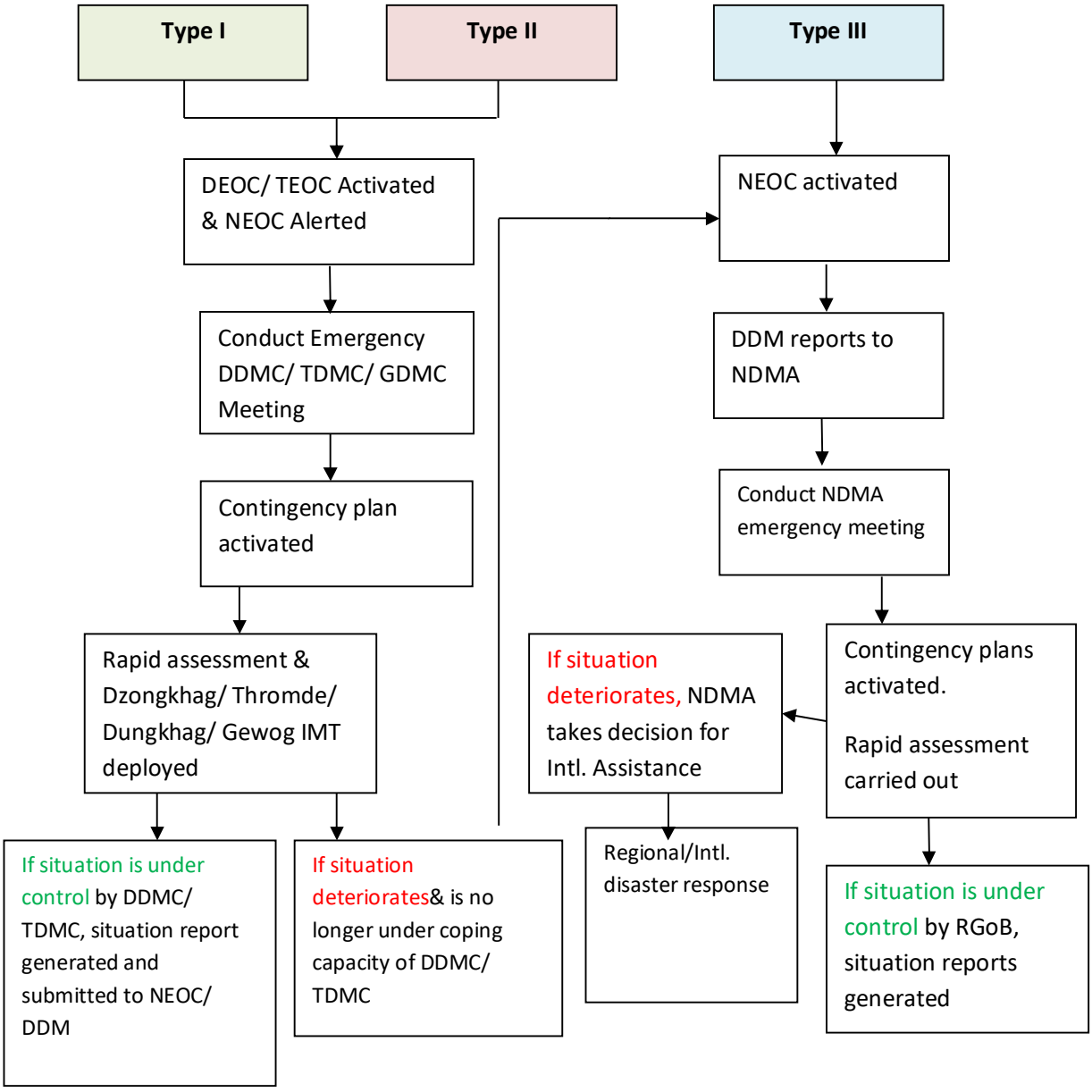

Figure 5. Information Flow Chart

In case of the isolated local incident, which does not have a widespread effect on people and property and can be managed within the normal operations of the agencies concerned, and such incident shall not require emergency procurement and funding. For isolated local incidents, such as fire affecting single house or windstorm blowing off roof of one structure in a locality, and cases which do not qualify under Disaster Types I - III of the Disaster Management Act of Bhutan 2013. The concerned victims reports to the Gewog Administration and the Gewog Administration submits the report to the Dzongkhag and the Insurance company for assessment and claim. The Dzongkhag Administration liaise with the Insurance company for

earlier payment to the victims. The Dzongkhag and Gewog provides immediate relief and response to the victims.

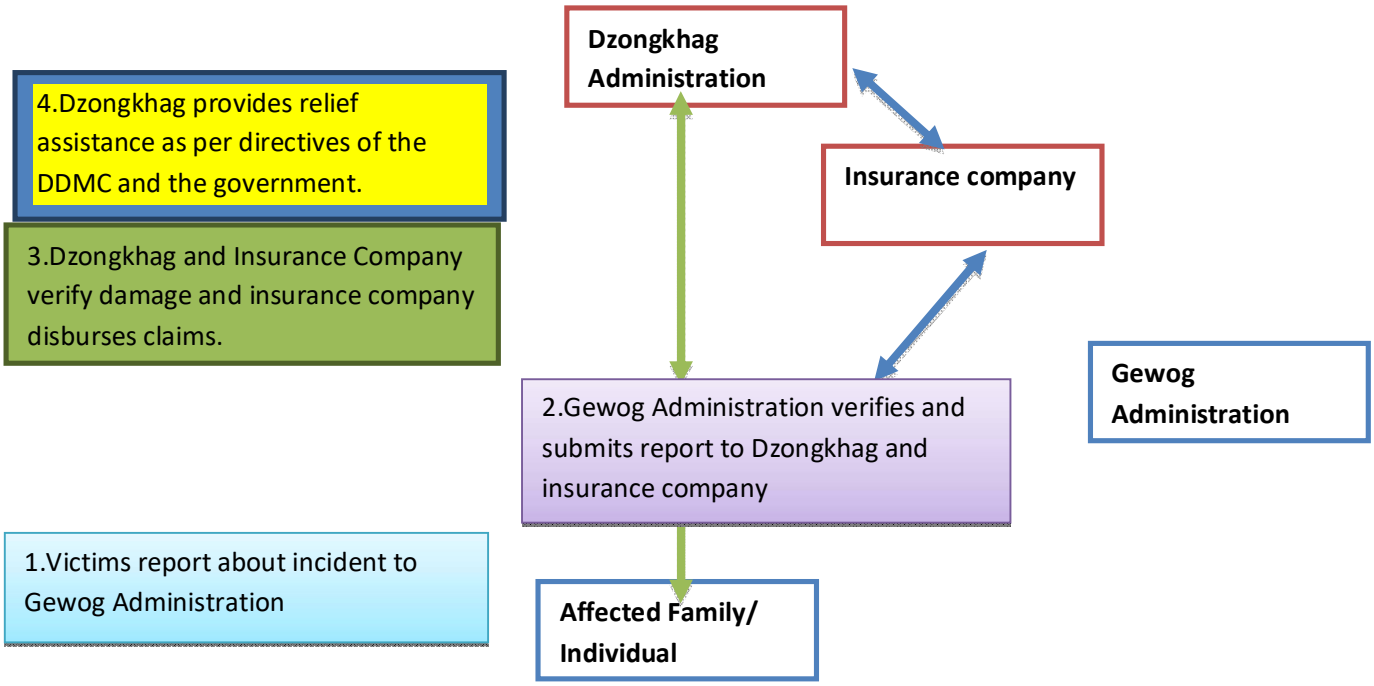

Figure 6. Standard procedure for isolated local incidents

Data Collection Method

As soon as the gewog receives the information of any incident within the locality, the concerned Gewog Administration reports to the Dzongkhag with brief incident information and the same information shared by the Dzongkhag to relevant authorities through various means of social media groups created for the fast information like emails,telegrams,phones etc. DDMO of the Dzongkhag submits Initial disaster reports using recently developed DMIS within 24 hours and PDNA within 72 hours. The DMIS system has been developed recently in order to have the proper record of data related disaster for future reference and research purposes. This data collection system is for all types of disaster in Bhutan.IDA can be submitted through mobile apps even when offline.

Incident Management Team at Gewog level

In all the 14 Gewogs, the Gewog Incident Response Management Team has been establish with Gup as the Incident Commander, monitored by Dzongdag and Dungpa as detailed below. Due to the lack of sufficient officers at the Gewog level, the Logistics and Finance functions will be undertaken by the same officer especially in Type I disasters. In case the disaster becomes Type II but still limited to geography of the affected Gewog then the IMT from the Dungkhag / Dzongkhag will assume command with the support of the IMT at the Gewog for managing the smooth functioning of the response in the gewogs.

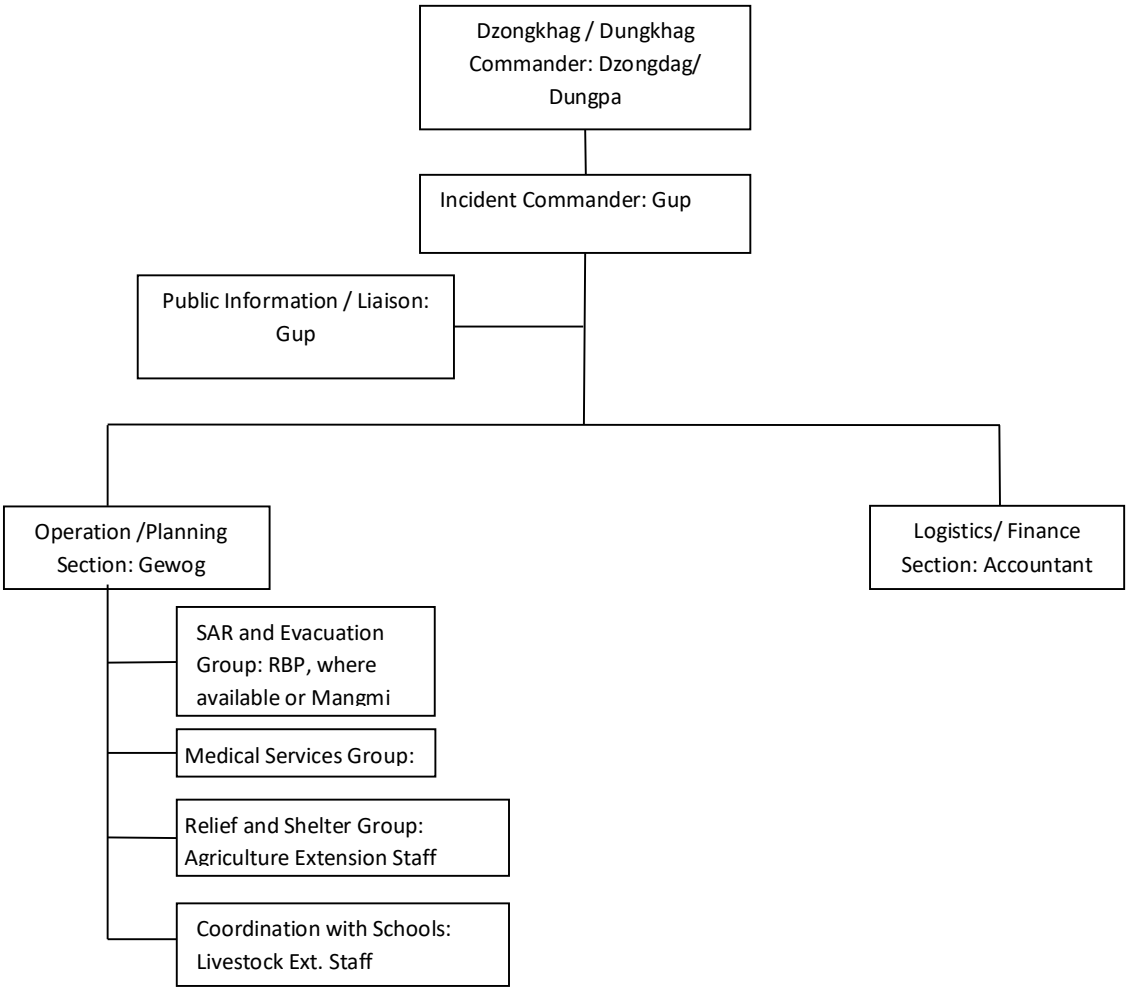

Figure 7. Incident Management Team at Gewog level

Incident Management Team at Dungkhag level

The Dungkhag Incident Response Management Team is led by Dungpa and monitored by Dzongdag. Due to a shortage of human resources and smaller scale of response, Operations and Planning section combined in to a single section and Finance and Logistics alsocombined in to a single section. However, when the scale of response escalates to Type II then the Dzongkhag takes the charge like in the Gewogs.

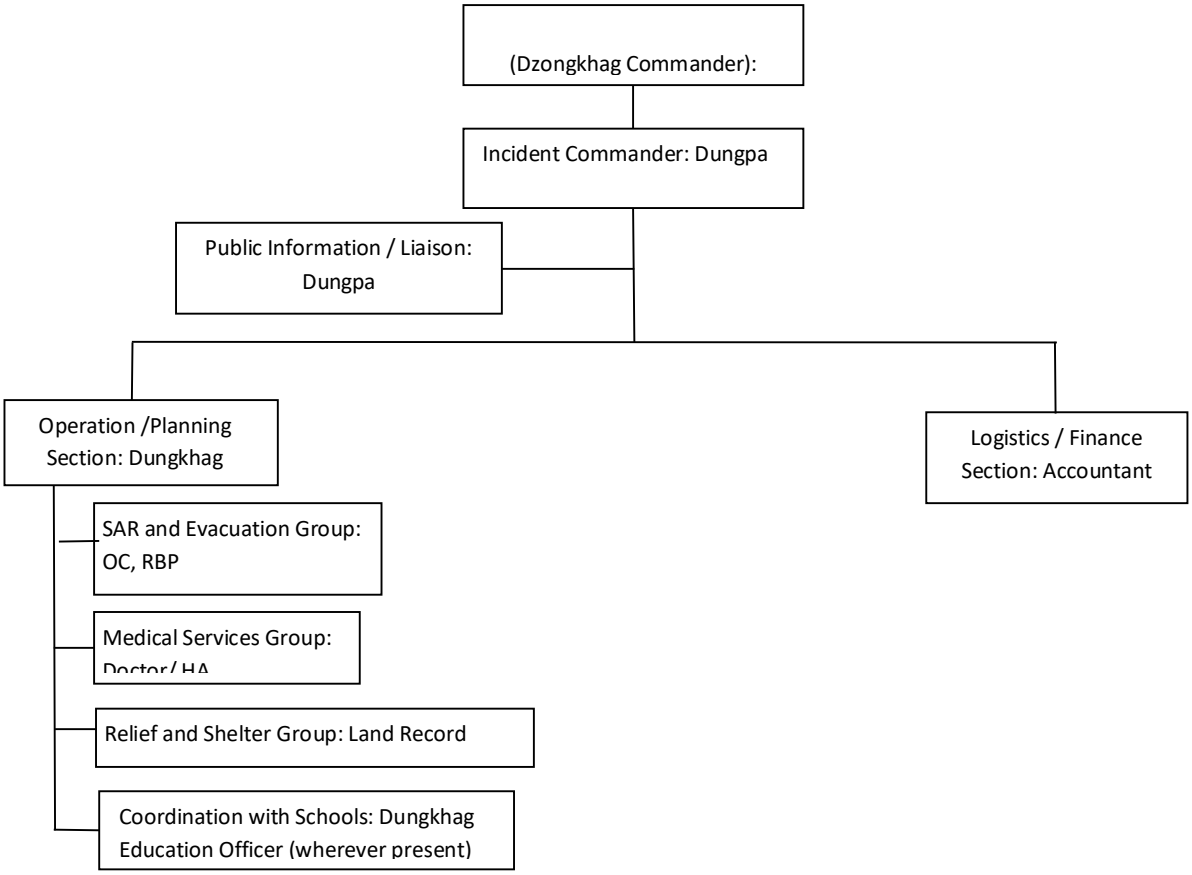

Figure 8. Incident Management Team at Dzongkhag Level

Incident Management Team at Dzongkhag Level

The Dzongkhag Incident Response Management Team has been formed with the Dzongdagas Incident Commander in any disaster and Dzongrab as the alternate. The IC shares the information related to disaster and manage overall situations and liaise with office of the Gyalpoi Zimpon, Army, and Desuups for effective response for supporting incase if the situation escalates and require more volunteers. Various positions in the team is occupied by the officer's present at the Dzongkhag level and together they will respond to a disaster in a well-coordinated manner using the resources that are available within the Dzongkhag.

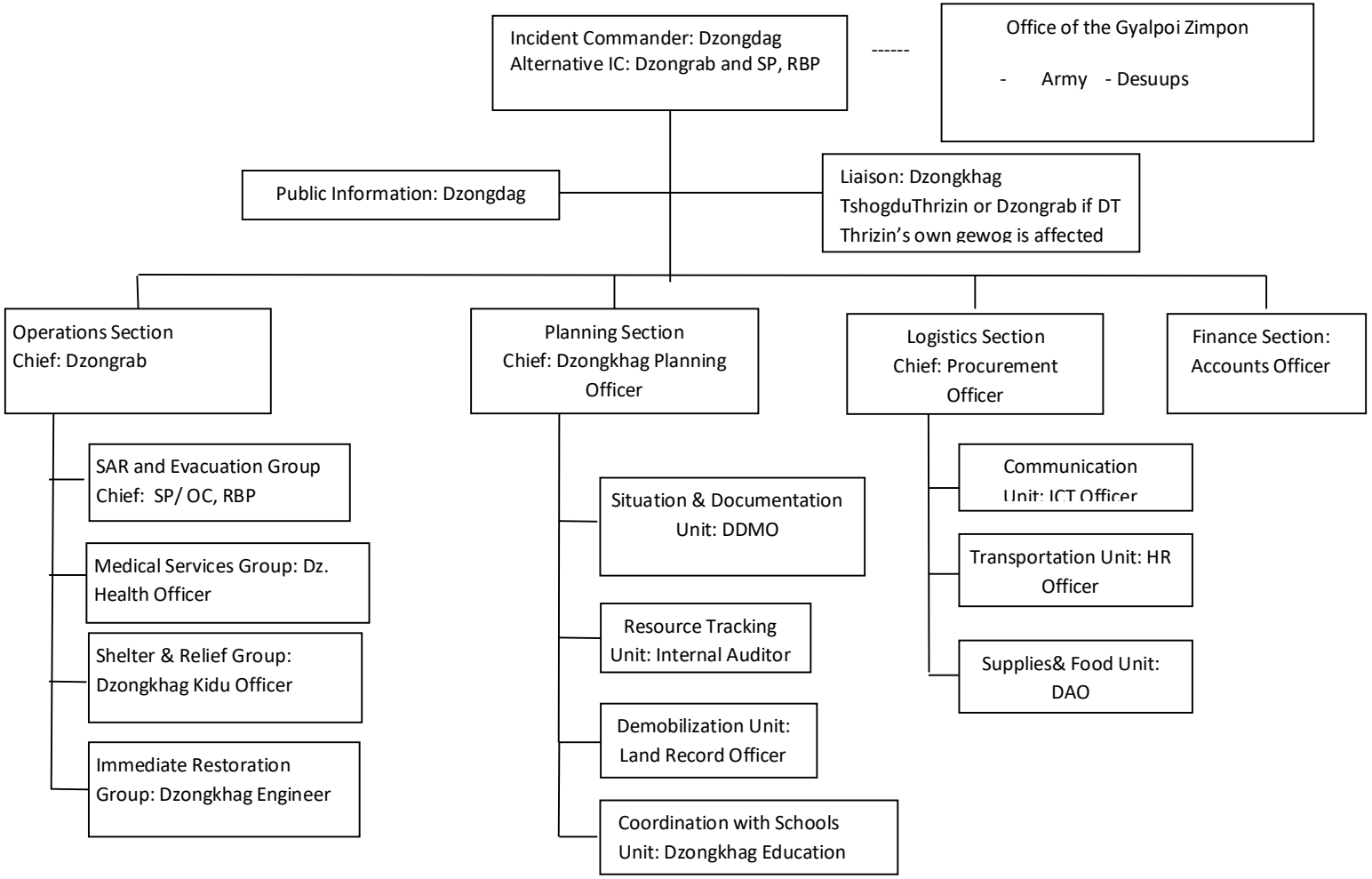

Figure 9. Mode of Communication during disaster/ threatening disaster situation

Communication is challenging part during disaster in the locality because all lines disrupts and cannot function affecting for the quick response. So the First line of communication is VHF handsets (RBP & Dzongkhag), alternative modes of communications are Mobile phones, Social media (WhatsApp, WeChat and Telegram groups for Dzongkhag, Dungkhag and Gewogs. BBS and radio for giving information to communities. Sat phone: not activated (to be used for emergencies when other modes of communication fail) only one for the Incident Commander. Gewogs are procuring VHF handsets for emergency purposes.

The DEOC is established as per Section 105 of the Disaster Management Act of Bhutan 2013 to receive disaster alerts and warnings from responsible agencies and other sources and communicate the same to all relevant agencies, forward reports to relevant agencies, Monitor response and relief operations, Facilitate coordination ,Requisition resources during disaster, Other functions as may be necessary. DEOC is set up in Dzongkhag Tshogdu hall but lack of human resource and equipment. DDMO is looking after the DEOC. DDMC to meet in the DEOC to make critical decisions during emergencies.

CHAPTER 5: DISASTER MANAGEMENT SYSTEM IN JAPAN

5.1 Brief background

Japan is situated in the Circum -Pacific Mobile Belt where seismic and volcanic occurs frequently with surface area of 138000 square kilometers and covered by more than 6800 islands of various sizes. Mt. Fuji of Japan is one of the famous mountains of the world with 3776 M above sea level andalsohas ten major Rivers and lakes. The total population of Japan in 2018 is 126.44M ranking 11th largest population in the world and 54.33 M private households as per the population census 2015(excluding-institutional households) and birth rates are declining and more aging populations increased in Japan as compared to 1950s,which shows changes in the population pyramid. Japan comprises of 47 prefectures as of now.

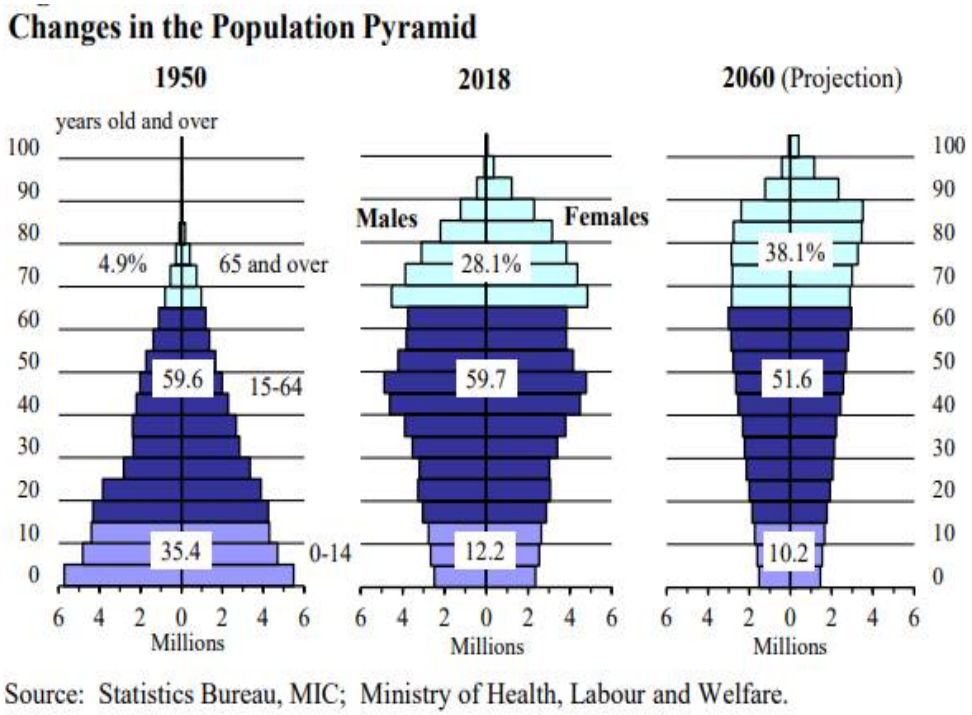

Figure 10. Population Pyramid in Japan

The country is subject to frequent natural disasters like earthquakes, Tsunami, floods, landslides and heavy snowfall due to the geographical, topographical and metrological conditions. There are four plates which collide around Japan Island and causes frequent earthquake in the areai.e. Philippine Sea plate, Eurasian plate, Pacific plate and North American plates. Every year in Japan due to the natural disasters people's lives and property has been damaged. The past data from 2004-2013 shows that ratio of earthquakes and volcano in Japan alone was 18.5% and 7.1 % respectively then with those in the world. With the development of Disaster Management Systems for mitigation of vulnerabilities in the area, capacity enhancement to respond, improved technology methods for weather forecasting and upgrading the disaster information communication systems, disaster damaged has been declined. However, the great Hanshin-Awaji earthquake,1995 and the Great East Japan earthquake and tsunami ,2011 has affected greatly to the human lives and the public and private infrastructures. There is also a very high probability of the occurrence of large-scaleearthquakesin the near

future including impending possibilities ofNankai Trough Earthquake and Tokyo Inland Earthquake. As such, natural disasters remain analarming threat to the safety and securityof the country.

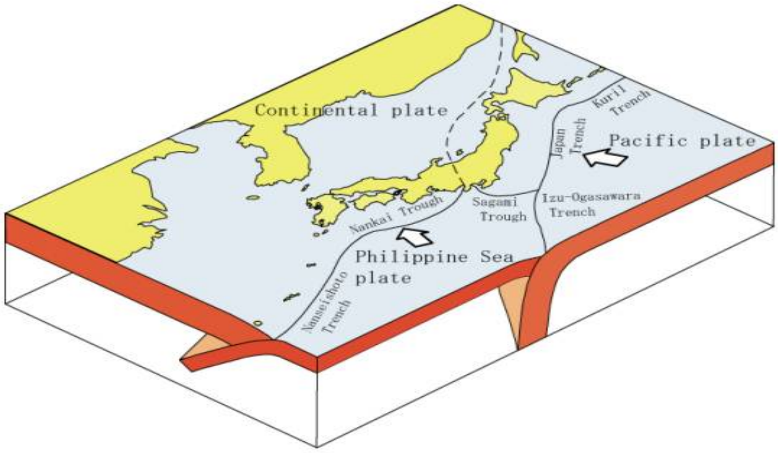

Figure 11. echanism of Earthquake around Japan

5.2 Disasters in Japan

Japan has many vulnerable risks due to its geographical location and climate change. Every year Japan experiences minor as well as major disasters like Earthquake, Tsunami, Volcano, Flash floods, floods and storms damaging properties and human lives. The past data shows that Earthquake and Tsunami damaged many structures and affected human lives. Recent earthquake recorded in Japan was in September,2018 with 6.7 M at Hokkaido, Eastern Iburi affecting 42 human casualty and damaging many properties. As per the data published by the Statistic Research Department, on December 16,2019 on the cost of damage caused by the natural disaster in Japan since from 2008 -2017 was amounted to around 599 billion Japanese Yen. The highest amount was incurred during the Great East Japan Earthquake.

Table 6. Major Earthquake Damage in Japan (since the Meiji Period)

Disaster	Date/Year	Number of Fatalities and Missing persons
Nobi Earthquake (M8.0)	October 28,1891	7,273
Meiji Sanriku Earthquake and Tsunami (M8.25)	June 15,1896	22,000
Great Kanto Earth Quake (M7.9)	September 1,1923	105,000
Kita Tango Earthquake(M 7.3)	March 7,1927	2,925
Showa Sanriku Earthquake Tsunami(M 8.1)	March 3,1933	3,064
Tottori Earthquake(M 7.2)	September 10,1943	1,083
Tonankai Earthquake (M7.9)	December 7,1944	1,251
Mikawa Earthquake (M6.8)	January 13,1945	2,306
Nankai Earthquake (M 8.0)	December 21,1946	1,443
Fukui Earthquake (M 7.1)	June 28.1948	3,769
Tokachi Oki Earthquake(M8.2)	March 4,1952	33
Chile Earthquake and Tsunami (Mw 9.5)	May 23,1960	142
Niigata Earthquake (M7.5)	June 16,1964	26
Tokachi Oki Earthquake(M 7.9)	May 16,1968	52
IzaHantooki Earthquake (M 6.9)	May 9,1974	30
Izu-Ishima-Kinkai Earthquake (M 7.0)	January 14, 1978	25
Miyagi-Ken-Oki Earthquake (M7.4)	June 12,1978	28
Nihon-Kai-Chubu Earthquake (M7.7)	May 6,1983	104
Nagano-Ken-Seibu Earthquake (M 6.8)	September14,1984	29
Hokkaido-Nansei-Oki Earthquake (M 7.8)	July12,1993	230
Great Hanshin -Awaji Earthquake (M7.3)	January 17,1995	6,438
Mid Niigata Prefecture Earthquake (M 6.8)	October 23,2004	68
Iwate-Miyagi NairikuEarthquake (M7.2)	June 14,2008	23
Great East Japan Earthquake (Mw 9.0)	March 11,2011	22,252
Kumamoto Earthquake (M6.5 &7.3)	April 14&16,2016	273
Hokkaido Eastern Iburi Earthquake (M 6.7)	September 6,2018	42

Source: 2019, White Paper Disaster Management in Japan, Cabinet Office

5.3 Disaster Management Laws and Systems

Japan government has managed to develop many disastersrelatedactssince from 1945 after affected by the Typhoon IDA(Makurazaki) and Nankai Earthquake in 1946. The most important part of the disaster is to respond and provide aids to the affected people and build back better. So the Disaster Relief Act has been developed and passed for managing the disasters in 1947. Accordingly, Laws were implemented by the National, Prefecture and Local governments. On January 17,1995 the Great Hanshin -Awaji Earthquake in Kobe City destroyed many critical infrastructures like roads, Bridges, Railways, Hospitals and residents set by fires where 6438 people lost their lives to disaster.Due to the immense affect with such earthquakes, Act on Special Measures for Earthquake Disaster Counter Measures has been approved, and Earthquake retrofitting's measures for Buildings has adopted for the safety of the people. Likewise, the Great East Japan Earth Quake in

2011 triggering Tsunami devastated 22252 human lives and settlements were completely destroyed. So after experiencing such disasters, many provisions of the Laws has been amended as shown in figure below for the preparation of the Nankai Trough Earthquake and Tokyo Inland Earthquake following the Sendai Framework of Build Back Better policy systems.

Table 7. Evolution of Disaster Management Laws and Systems Since 1945

Disaster that triggered law /System Introduction	**Disaster Management Laws**
1945-Typhoon IDA(Makurazaki) 1946- The Nankai Earthquake 1947- Typhoon Kathleen 1948- The Fukai Earthquake	1947 Disaster Relief Act 1949 Flood Control Act
1959- Typhoon Vera	1950 The Building Standard Act
1961- Heavy Snows 1964- The Niigata Earthquake 1967- Torrential Rain Uetsu	1960-Soil Conservation and Flood Control Urgent Measures Act 1961- Basic Act on Disaster Management 1962- National Disaster Management Council Established 1963- Basic Plan for Disaster Risk Reduction 1962-Act on Special Financial Support to deal with Extremely severe Disasters Act on Special Measures for Heavy Snowfall Areas 1966- Act on Earthquake Insurance
1973- Mt. Sakurajima Eruption Mt. Asama Eruption 1976- The Seismological Society of Japan publishes reports on a possible Tokai earthquake 1978- Miyagi Earthquake	1973- Act on Provision of Disaster Condolence grant Act on Development of Evacuation facilities in Areas Surrounding Active Volcanoes(Act on Special Measures for Active Volcanoes -1978) 1978- Act on Special Measures Concerning Countermeasures for Large-Scale-Earthquakes 1980- Act on Special Financial Measures for Urgent Earthquake Counter Measures Improvement Projects in Areas for Intensified Measures. 1981- Partial Amendment of order for Enforcement of the Building Standard Laws
1995- The Great Hanshin-Awaji Earthquake 1999- Torrential rain in Hiroshima,TokaimuraNucleaur Accident	1995- Act on Special Measures for Earthquake Disaster Counter Measures Act on Promotion of the Earthquake Proof Retrofit of Buildings partial amendment of Basic Act on Disaster Management

	1996- Act on Special Measures for the preservation Rights and Interests of the Victims of Specified Disasters 1997- Act on Promotion of Disaster Resilience Improvement in the Densely inhabited Areas 1998- Act on Support for Reconstructing Livelihoods of Disaster Victims 1999- Act on Special Measures Concerning Nuclear Emergency Preparedness
2000- Torrential rain in the Tokai Region **2004- Torrential rain in Niigata,Fukushima** **Niigata Chuetsu Earthquake** **2011- The Great East Japan Earthquake** **2014-Heavy Snow** **Hiroshima Sediment Disaster** **Mt. Ontake Eruption** **2016 – Kumamoto Earthquake** **2018**	2000-Act on the promotion of Sediment Disaster Countermeasures for Sediment disaster Hazard areas 2001- Partial amendment of the Flood control Act 2002- Act on Special Measures for Promotion of Tohnankai and Nankai Earthquake Disaster management 2003- Specified Urban River Inundation Countermeasures Act 2004- Act on Special Measures for Promotion of Disaster management for trench-type earthquakes in the Vicinity of the Japan and Trishima Trenches 2005- Partial amendment of the flood control Act \Partial amendment of the Act on the Promotion of Sediment Disaster Counter Measures in Sediment Disaster Hazard Areas Partial amendment of the Act on the Promotion of the seismic Reinforcement and Retrofitting of the Buildings 2006- Partial amendment of the act on the Regulation of Residential Land Development 2011-Act on the Promotion of Measures for Tsunami Act on Development of Areas resilient to Tsunami Disasters 2012- Partial amendment of Basic Act on Disaster Management Act for establishment of the Nuclear Regulation Authority 2013- Partial amendment of Basic Act on Disaster Management Act on Reconstruction from large scale disasters Partial amend of the act on the promotion of the seismic Reinforcement and retrofitting of the Building Partial amendment of Flood Control Act and River Act Act on special measures for land and building leases in areas affected by large scale Disasters Act on Special measures for the promotion of Nankai Trough Earthquake Disaster Management Act on Special Measures against Tokyo Inland earthquake 2014-partial amendment of Basic Act on Disaster Management Partial amendment of Act on the promotion of sediment Disaster countermeasures for Sediment Disaster Hazard Areas

	2015- Partial amendment of Act on Special Measures for Active Volcano's Partial amendment of Basic Act on Disaster Management 2016- Partial amendment of Basic Act on Disaster Management 2018- Partial amendment of the Disaster Relief Act Partial amendment of Basic Act on Disaster Management

5.4 Disaster Management Plans

In Japan, the Basic Disaster Management Plan is the Master Plan and basis for the entire disaster risk management plan. Disaster Planning is prepared by the Central DM Council which is the apex body for the disaster in accordance with the Disaster Counter Measures Basic Act. Ministries and public entities prepare Disaster Management Operations Plans and implement. Likewise, the Local Prefectures and Municipalities prepare and implement the plans by the respective DM Council all over the Japan. All the preparations/preventions, emergency response and disaster recovery in the Local level are managed by the Local DM Councils in collaboration with residents. The Community develop disaster prevention and response plan which is very effective during the times disaster situations. The Disaster Plans of Japan are exemplary as all the plans are fully implemented and also tested by conducting the drills participating from the Central to the Local Government almost twice a year. Communities are very much aware of the disaster plans as they involve in making the plan and conduct drills and simulation coordinating with other agencies. The Plans are prepared according to the types of disasters like Earthquake, Floods and Tsunamis etc.

Figure 12. Organization of Central Disaster Management Council

5.5 Communications, Early Warning Systems and Hazard maps

Japan has developed all the hazards maps in the country which is very convenient for the construction of mitigation works in the designated areas and this would also help to minimize the risks in the future. Municipalities create awareness using hazard maps showing the vulnerable areas. Hazard maps are basically designed for residents to understand better risks and take actions on it. Town watching is the good experiences for identifying the risks and raise issues to the concern authority to take actions based on the findings of the town watching.

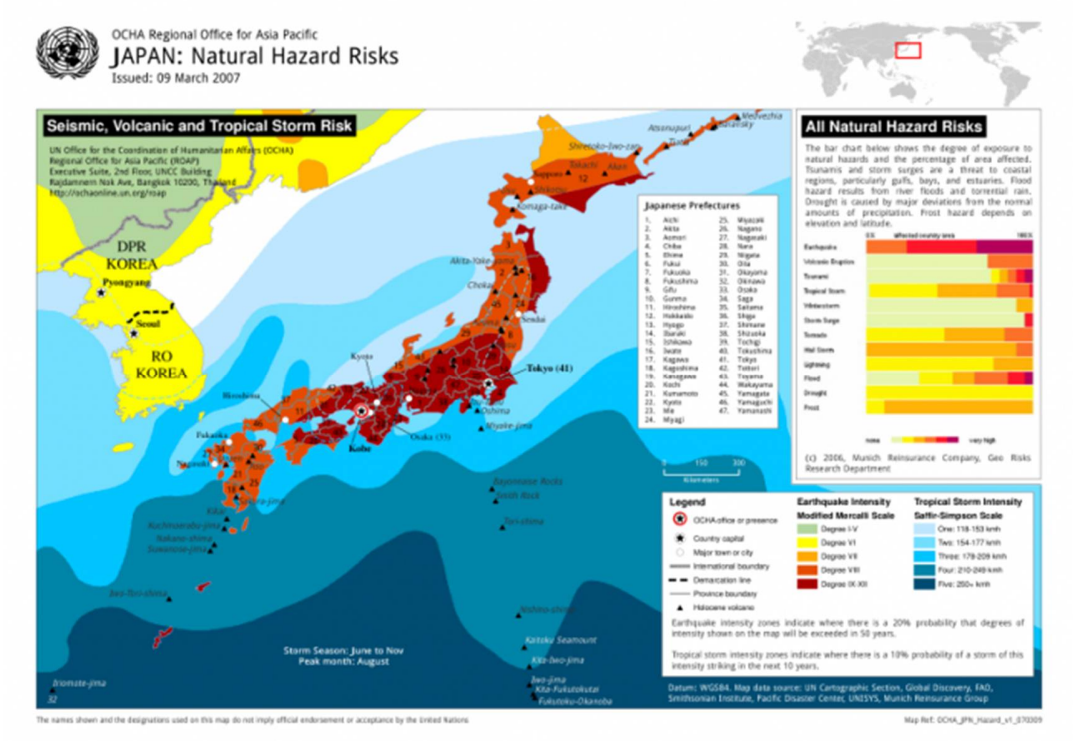

Figure 13. Natural Hazard Risks in Japan

Communications is vital for collecting information and contacting during the disaster. So in this, Japan has been practicing various means of communication like using websites, public cars, news board, publication paper, Radio, TV, Local media FM Radio, social networks Twitter, Facebook and Lineusing during the emergencies. All the communities are aware of it.

Japan Meteorology Agency provides all early warnings to the respective government offices and TV & radios whereby the concerned prefecture/Municipality informs the public accordingly. When an earthquake occurs JMA after analyzing the data from the seismometer and seismic intensity meters provides warnings. JMA has developed new alert systems for earthquakes which are found to be very technically useful. Though earthquake can't be predicted, such quick alert just an earthquake starts, providing valuable seconds to people to protect themselves before strong tremors felt. This has been installed in Trains, Bus and other public places,. Also, people receives EWS by radio, TV, and via mobile phone. For floods, JMA in Collaboration with MLIT and Prefecture governments issues Weather warnings and advisories for the public in different types of warnings like heavy Rain, flood/flash floods, storm etc.

5.6 Local Disaster Risk Reduction Plan: Hyogo Prefecture & Kobe City –Case study of Disaster Safe Welfare Communities (BOKOMI)

Hyogo Prefecture with the population of around 5.59 m has been greatly affected by the Great Hanshin-Awaji Earthquake on 17 January,1995. A total of 6434 casualties and injured 43792, $100b lost and nearly 249000 houses destroyed. The reports find out that due to lack of government preparedness, coordination among the disaster organisations were not enough. Moreover, rescue workers could not reach to the affected individuals in times of the need for evacuation of the victims, so in such times of disaster local community and volunteers within the areas found to be very important as they are involved in saving the lives of the people who has been affected by the disasters. It has also mentioned that most of the schools, public buildings and houses were not seismic resistant, it shows that 83% were killed by the collapsed buildings and 13% by the fire outbreak.

Hyogo prefecture government has initiated measures after the Great Hanshin-Awaji Earthquake such as Establishment of Initial Response System - opening of Disaster Management Center,24-hour monitoring and quick response system with stand by lodgings, Phoenix Disaster Management Systems and improvement of Disaster management capabilities by supporting Voluntary activities and school teachers as well as development of Emergency Management bases and improvement of earthquake resistant houses and public buildings. Prefecture also established headquarter control room, operation room, media conference room under the 24-hour monitoring system and sent emergency information's to the citizens by E-mail. As a measure they also developed regional emergency management bases in district offices and disaster management drills has been conducted involving various stakeholders like fire Dept.,SDF,Medical Organisations and volunteers. For the improvement of the community the prefecture supports volunteers providing trainings and necessary equipments. DRR museum has been developed for learnings by the national and International, retrofitting work of the private houses for earthquake resistant introduced which is vital for the safety of all. JMA introduced Earthquake Early Warning System as a part of preparation for Tonankai and Nankai Trough Earthquake.

Kobe City is once severely devastated by the Great Hanshin-Awaji Earthquake on January 17, 1995.The Community experienced the loss of lives and the properties by the earthquake disaster, and through this they gained the knowledge of responding and prevention better than any other countries in the world. Kobe Community volunteered to form Disaster Safe Welfare Community with the members including local residentsAssociations, WomenAssociations,Business members,senior citizens and local fire brigades. This system has been practicing over all the districts and even the internationals learning from them by participating in the events organized. BOKOMI-a volunteer group also supported by the government by giving them few amounts for conducting the programs annually for preparing and working towards disaster preventions and reductions involving the various community. Kobe City provides necessary support for giving the trainings on the usage of the fire equipment's and awareness. BOKOMI has a good coordination with the schools and conduct the program together as schools are identified as the evacuation center for the community during the times of disaster.

I was also fortunate to participate practically in one of the program conducted by the community in the Junior High School as VR from ADRC.The Community conducts the fire drills with the support from the fire brigade, Kobe, learning on how to use the fire extinguishers to control fire, fire bucket relay participation and how to walk out in case of the smoke covered areas. This was very informative and a part of DRR. The most important take away from this event was the participation of kids and the disabled persons practically.

Another good practice developed in Kobe is Iza! Kaeru Caravan! A Fun Disaster Education programs developed for kids to learn through such fun games activity. Many kids participate in the program and learn the techniques that require during the times of disaster. All are participating the program actively to get the cards and gift at the end. I am fortunate to take participate and observe the fun game organized at JICA. This has been shared with the world and many countries are organizing such programs in the schools using the technique learned from Japan. Bhutan has been learning in few schools but not covered in all the schools. So the above program needs to be adopted as DRR in all schools.

Figure 13. Bhutan Learning Kaeru Caravan

Figure 14. Community Disaster Drill in Kobe, Japan

CHAPTER 6: KEY FINDINGS AND GAPS

Based on the above, the key findings from Japan are; Bhutan and Japan shares many similarities in terms of locations like mountains,rivers,snow,agriculture practice and occurrence of types of disasters except the Tsunami and Volcano. The Disaster Planning System in Japan is considering for the long-term impact anddisaster resilient, also focusing on disaster risk reduction at all levels. Learnings from the past disasters and bitter experiences collected and shared from the affected people help to improve the plans from prevention of disasters as well as preparedness to any kind of disasters. With the learning's and experiences help to develop resilient responding systems like newly developed earthquake alerts system in informing the people to prepare from arriving the big tremors after few seconds. Early warning information technologies are set up for all kind of hazards for quick response and evacuation which will help in minimizing the casualty. In every small town, Cities and resident's areas, fireequipmentsare set up for the prevention of fire disasters. All kinds of hazard mappings are done ateach municipality in Japan. Community and volunteer's involvement in preparation and developing the plansof their own areas has the good practices and even the children's learning through fun games of disaster education has been practiced very well as an annual event like – IZA!KaeroCaravan!Schools across the prefectures conduct disaster drills thrice in a year in collaboration with community is one of the best practices. Disaster Management plan in Japanese local government focuses for preparedness for response.DRR such as mitigation is planned at the City development plan.

Hazard Maps and Early Warning systems:

Hazard Maps of earthquake,GLOF and floods/landslides covering major lakes,rivers in the country has been studied,also set up with early warning systems along the downstreams like in PunaTsangchhu in Punakha and Chamkharchhu in Bumthang etc.However,hazard maps identified needs to be clearly advocate to the local leaders for inclusion of DRR activities in the plan and accordingly the local government leaders must provide awareness to the community on such risks like settlement and construction of houses along the hazard areas and also on early warning systems installed for quick information on evacuation to higher places. In Nepal, hazards like earthquake, floods,landslides,GLOF, etc. occur causing devastating disasters affecting the livelihood of the people and many casualtiesyearly. Hazard risk mapping in the few major areas has been carried out with the support from the ADPC and OCHA for DRR in the country. Lack of awareness, no strict follow on policies and guidelines, unplanned development activities, lack of proper land use, encroachment of open areas, deforestation have turned those hazards into disasters.

Education:

For the implementation of the Disaster Risk Reduction in the local government, disaster Education should also introduce in a class room teaching for the teacher trainees so that all the teachers will able to provide DRR information to the students when they are placed to the schools under the local government areas as well as can conduct drills. In the current situation,DRRfocal persons from the schools conduct drills once in a year. So this gaps could be filled up if such system come up with proper study by the Ministry of Education.With this more education on DRR,preparedness and response during disaster situation would enhance in the schools. Miyagi University of Education, in Sendai provides such disaster education to the teachers linking field programs to with classroom studies on basic knowledge on natural hazards,emergency management,first aid and community based DRR and diversity of DRR topics such as health,food,geology geography and psychology.

Capacity Development:

In order to implement the local level plans for the disasters the capacity for the DDMC members,IMT members and local leaders and administrators need to be enhanced.The Department of Disaster Management in collaboration with the districts must provide trainings time to time and local government should also keep their budget for capacity development annually

Awareness and Information:

The districts provide awareness to the Public on disasters but due to limited budgets unable to cover all the blocks.Providing public awareness is more useful than issuing pamphlets because of low illiteracy. Therefore, to address such issues local government can also study of setting up local radio station to provide awareness and information during disaster using local languages in collaboration with BBS and deploy volunteers in the stations.At the current situation,BBS only provides awareness through TV and radio in three dialect-local government must initiate to come up such useful mechanisms in the community. Such practice system are used in Takatori Community Center,Hyogo Prefecture in Japan, where many different foreigners settle and experienced language problems during the time of Great Hanshin-Awaji Earthquakes.

Reinforcement of Buildings:

Local government should frame local plan to ensure the public to construct earthquake resistant houses following the technical advice of the engineers and guidelines provided by the MoWHS for the safety of individual residents as well as plan to conduct seismic capacity evaluation of the houses in local government areas and then reinforcement of the private houses and public buildings should strengthened for future risks as well as provide trainings to the local carpenter and masonry. The report shows that in Hyogo Prefecture during the Great Hanshin –Awaji Earthquake most of the casualty mentioned were due to collapse of buildings and fire. Likewise in Nepal,2015 Earthquake ,it shows that two third of the damages causing large number of human casualty were all due to old non-engineered construction and lack of reinforcement construction practices.

Risk Transfer:

Especially during the monsoon seasons, many crops were destroyed by the flash floods and landslides as well as the wild animals. So the Agriculture Ministry needs to come out with the level of compensations across the country or need to collaborate with the insurance company to insure crops by the farmers in certain period. Moreover, currently people only insure their private houses with government subsidy. Government buildings and religious institutions must also insure by the local government or propose in the annual budget for the insurance.

Community Volunteer:

PBV (International NGOs) believes that,above all else,people are the key to reducing disaster risk,building resilience and minimizing impacts of disasters. Local community volunteer need to be strengthened in all the gewogs to response during the times of disasters in the community.There are many groups formed in the gewogs but not for disasters .So Gewog should plan to institute volunteers in the community to learn DRR and disseminate information by themselves to the individual households. Local people should be encouraged to come up with respond plan using local practice in times of disaster as the districts are away from the villages. such gaps need to be put in practice.

CHAPTER 7. CONCLUSION

All are unquestionable when the natural disasters will occur and end. With the climate change around the globe year by year the risk of disaster occurrence is increasing and thousands of human lives, sentient beings, the public infrastructures and private houses has been damaged beyond unimaginable. So in order to prevent and protect from such natural disasters we need to study according to the type of disasters and making a reliable disaster plan for disaster risk reduction in the country is felt very necessary and we must able to learn from the Japan on it, particularly on the build back better strategy. So need to revisit the district disaster plan to improve the preparedness and response mechanism such as functioning of DDMC,DEOC and on responsibility of IMT positions as well as make community to learn on the importance of response during the disasters. The systems of disaster managements are aligned with the Sendai Framework for DRR.

Moreover, planning ahead with a proper coordination will make difference to protect lives and livelihoods from the disasters. It would also result in faster and more effective responses, so that can help avoid losses to the people and economy of the country. Local leaders who are elected by the people should avoid future vote's mindset in providing fast relief materials and differentiation of people when disaster strikes in the area rather think of providing protection making a local disaster risk reduction plan stronger and resilient one which would bring more impact to the community.Forming a volunteer group in the community can be a good mechanism for response during disaster with basic support from the Districts and Gewogs like providing search and rescue equipments and trainings to the leaders.

RECOMENDATIONS

Japan has developed many reliable plans for the preparedness, prevention and mitigation of any kind and size of the future disasters, which we have learned through conference participation, field visits, practical participation and presentations from various professors and research papers as well as reports published. Bhutan has been preparing and developing many measures for the management of the disasters seeking international help and applying in our context but at minimal level and need to work more on DRR. However, in the implementation of the local district disaster management plans and response mechanism developed needs to be look into the following areas for further preparedness, disaster risk reduction and for build back better system enhanced in our country.

- ✓ Gewog plans need to be focused on disaster risk reduction areas and should give priority for disaster as well as propose certain percentage of budget annually.
- ✓ Development of Gewog disaster plan and enhance of community response plan is necessary.
- ✓ Replicate the activities like Iza! Kaeru Caravan! program in all the schools under the districts and gewogs,ECCD centers.
- ✓ Increase capacity of the DDMC members and IMT members both at Dzongkhags,Dungkhags and Gewogs.
- ✓ Communication system need to be enhanced in local and community level likeusuage ofVHF handsets and also study the earthquake early warning system of Japan for future planning but it's too difficult to develop and cost is too high.
- ✓ Community volunteer should be focused and need to train and support with equipments.
- ✓ Study on retrofitting system of the rural houses and training for local carpenter and masonry should be conducted by the local governments.

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