5.3 Standard Operation Procedure (SOP)

(1) Purpose

A Standard Operation Procedure (SOP) is the manual indicated step by step procedures of emergency response for municipal officials to understand the specific emergency response activity in the case of disaster. It is important for officials to confirm each role and responsibility by using SOP for swift emergency response and recovery in case of disaster. However SOP was not developed on the municipal level in Nepal when this project was started. This activity aimed to develop an SOP for the three target municipalities based on the experience of the Gorkha Earthquake which hit in Nepal 2015. The target natural disaster of this SOP was set up as "Earthquake". Also this SOP was planned to be developed in English and Nepali.

(2) Schedule

The SOP activity was started in December 2016. This activity is separated into three phases as shown in Fig 5.3.1. "Research and Development" was to research existent Guidelines and Manuals in Nepal and Japan. Experience and knowledge from both countries were utilized for developing the first draft SOP. "Workshops and Meetings" aimed to collect opinions and suggestion from MoHA as the counterpart, and the participants in the workshops of each municipality. "Finalize SOP" was to finalize SOP based on the result of the "Workshops and Meetings". Detailed of each activity are reported in next.

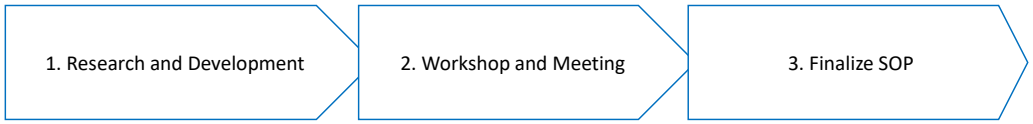


Figure 5.3.1 Flow of SOP activity

(3) Activities

1) Research and Development (December 2016 – March 2017)

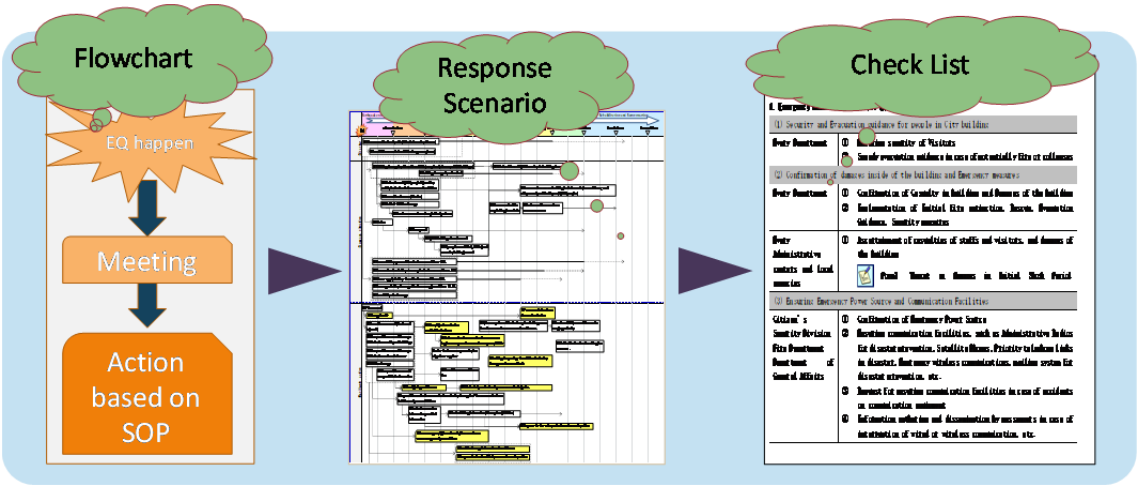
Basic information from existent manuals and guideline in Nepal and Japan was needed for developing the first draft SOP. The Project Team collected these documents from December 2016 to March 2017. A part of main reference guideline and manuals are as shown in Table 5.3.1. It was found that there are some of common feature in these guideline and manuals as follow. Based on result of this activity, project team developed first draft SOP.

- ✓ Flowchart, Responses Scenario and Check List are included as basic component
- ✓ SOP supposed three days activity after disaster
- ✓ Simple explanation for officials to understand easily

Table 5.3.1 List of existent manuals and guideline in Nepal and Japan

Country	Name	Issued	Issued by	Type
Nepal	Standard Operating Procedures - SOPs	2015	Ministry of Home Affairs, Government of Nepal	Report
Nepal	National Disaster Response Framework	2013	Ministry of Home Affairs, Government of Nepal	Guideline
Nepal	Disaster Risk Reduction and Management Act, 2074	2017	Secretariat of Legislature Parliament, Nepal	Act
Nepal	Local Governance Operation Act, 2074	2017	Secretariat of Legislature Parliament, Nepal	Act
Nepal	Annual Municipal Development Plan F.Y. 2074/075, Budhanilkantha Municipality	2017	Budhanilkantha Municipality	Booklet
Nepal	Bhaktapur Monthly, First Municipal Assembly Special 2074	2017	Bhaktapur Municipality	Booklet
Nepal	Report, Organization Development Study Program	2016	Lalitpur Metropolitan City	Report
Japan	Disaster Operation Manual for officials	2013	Konan City, Shiga Prefecture	Guideline
Japan	Disaster Operation Manual for officials	2014	Ogori city, Fukuoka Prefecture	Guideline
Japan	Disaster Operation Manual for officials	2015	Tosashimizu City, Kochi Prefecture	Guideline
Japan	Disaster Operation Manual for officials	2007	Yokosuka City, Kanagawa Prefecture	Guideline
Japan	Disaster Operation Manual for officials	2008	Fuchu City, Tokyo Metropolitan	Guideline
Japan	Operation Manual for officials	2016	Nanjo City, Okinawa Prefecture	Guideline
Japan	Disaster Operation Manual for officials	2015	Sibetsu City, Hokkaido Prefecture	Guideline
Japan	Operation Manual for officials	2015	Tarui Town, Gifu Prefecture	Guideline

Source: JICA Project Team



Source: JICA Project Team

Figure 5.3.2 Basic components of first draft SOP

2) Workshop and Meeting (April 2017 – September 2017)

Developed first draft SOP included experience and knowledge based on existent documents in Nepal and Japan. It should be considered as opinions and suggestions from the counterpart and officials for actual response. So project team had a several meeting with MoHA and workshops in three municipalities as shown as follows in Table 5.3.2.

Table 5.3.2 List of conducted meetings and workshops for modification SOP

Name	Date	Venue
4th Working Group Meeting of WG3	19-Dec-16	MoFALD
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	12-Jun-17	Budhanilkantha
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	30-Jun-17	Lalitpur
5th Working Group Meeting of WG3	7-Jul-17	MoFALD
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	25-Jul-17	Bhaktapur
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	11-Sep-17	Budhanilkantha
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	13-Sep-17	Lalitpur
6th Working Group Meeting of WG3	14-Sep-17	MoFALD
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	22-Sep-17	Bhaktapur
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	18-Dec-17	Budhanilkantha
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	19-Dec-17	Lalitpur
7th Working Group Meeting of WG3	20-Dec-17	MoFALD
Workshop for Developing "Standard Operation Procedures (SOP)" and "Disaster Risk Reduction and Management Plan (DRRMP)"	20-Dec-17	Bhaktapur

Source: JICA Project Team

Source: JICA Project Team

Figure 5.3.3 Photo of each workshops in three municipalities
(Left: Budhanilkantha, Center: Bhaktapur , Right: Lalitpur)

Participants on above working group meeting and workshops provided many comments for revise SOP. Some of comments are as follows. The draft SOP was modified based on these opinions and suggestions.

[Working Group Meetings of WG3]

- ✓ District level SOP from DEOC is available and the documents should align with them too. Especially for SAR, municipality might not have the capacity, so they get help from the district level.
- ✓ Nepal has the condition of multi-hazard, including hurricane, forest fire, epidemic, flood and landslides etc. The project is being implemented considering earthquake hazard. Still, it can be better if SOP in general form can be prepared and that considering multi-hazard, then it can be more useful for the context of Nepal.
- ✓ Regarding draft SOP, only 72 hours after the earthquake has been considered. But, in case of Nepal, 72 hours is quite less and it has to be extended up to seven days.
- ✓ LDCRP has to consider of local level EOC, and the link has to be connected to district level and providential level to make disaster response, management and coordination mechanism can be made smooth.

[Workshops in Bhaktapur]

- ✓ This SOP needs some revision as it has been made before the election. The municipal situation has changed as now there are elected representatives. The written comments will be provided by the municipality.
- ✓ Rather than finalizing the SOP through this workshop, the draft document needs to be presented to the municipal council for the review and approval.

[Workshops in Budhanilkantha]

- ✓ Ward leaders and secretaries are more active in disaster management. This part is missing in the current SOP.
- ✓ The structural organization of the Municipality is under revision and new divisions/sections will be formed in near future. The "Responsible Division in Appendix A, Activity Flowchart" needs to be modified as per the newly proposed division/ section names.

[Workshops in LMC]

- ✓ SOP could have been distributed prior to the meeting.
- ✓ Health sector should also be prioritized while preparing the SOP and DM plans. Preparedness, development of facilities, and management of resource, capacity and mobilization can be focused.

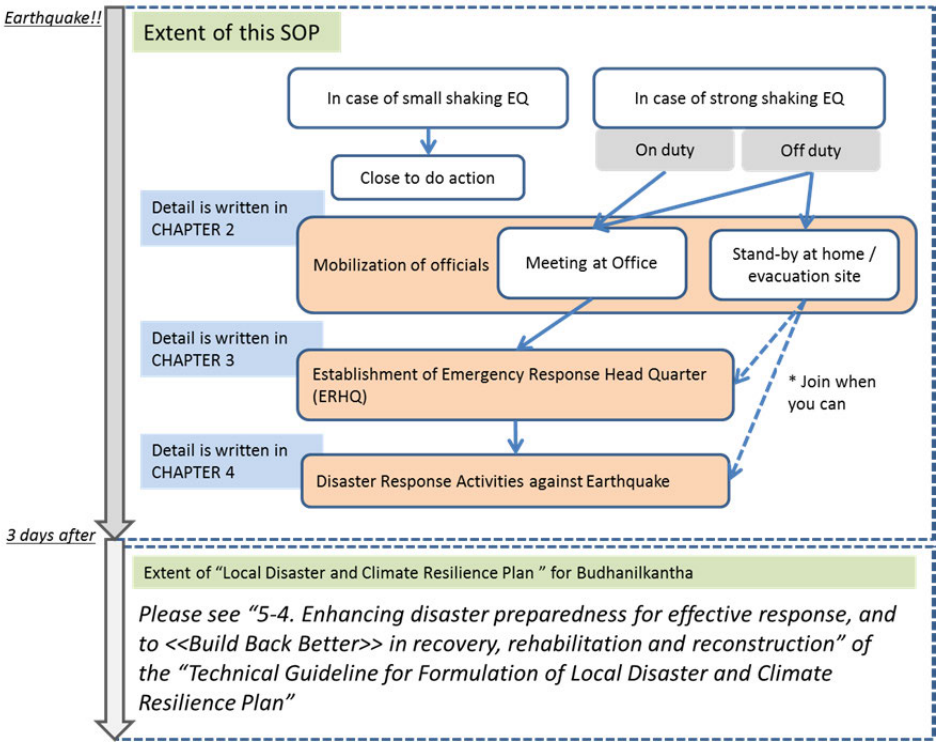
(4) Contents of SOP

Figure 5.3.4 shows a Table of Contents. The finalized SOP consists of four chapters, and four appendixes have been added.

Source: JICA Project Team

Figure 5.3.4 Table of Contents of the finalized SOP

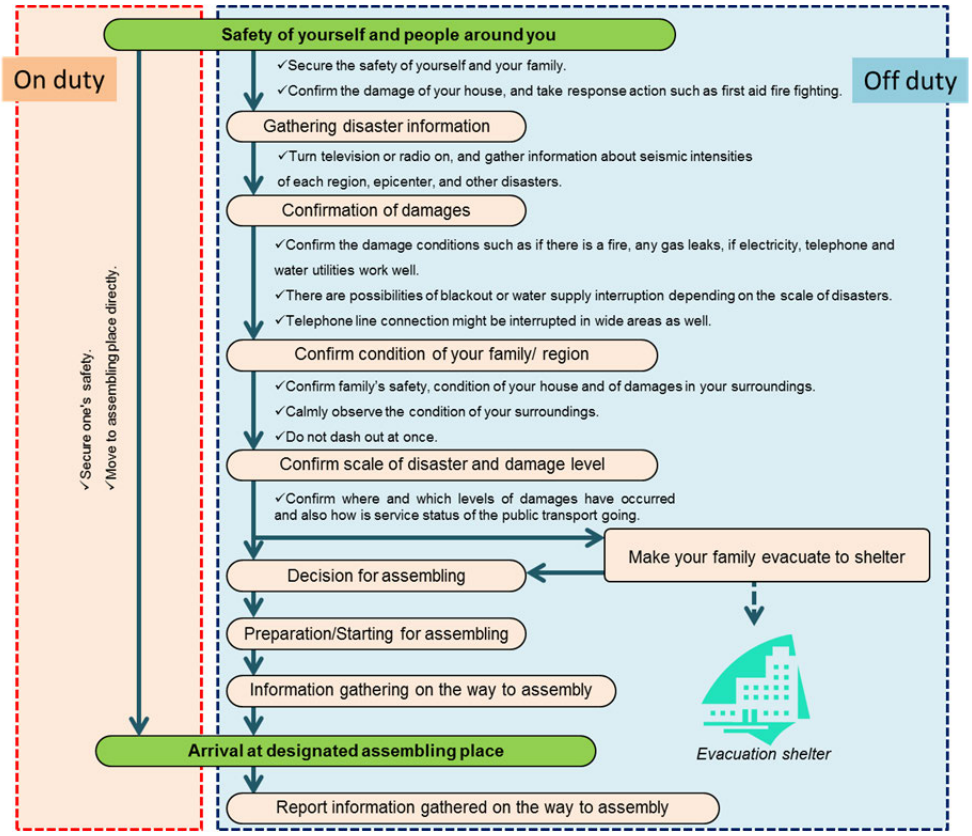
In Chapter 1, the "Introduction" and "Objectives" of this SOP are shown. Also in "Preparedness of Officials", it is mentioned that it is responsibility of all officials to consider the appropriate response against disaster before a disaster occurs. Furthermore, "Duration of this SOP and Basic Flow" is described. This SOP covers the emergency response activity for three days (72hours) after an earthquake as shown in Fig. 5.3.5. However, it is possible to change or extend the time schedule depending on the situation.



Source: JICA Project Team

Figure 5.3.5 Flow of Action till 3 days after Earthquake

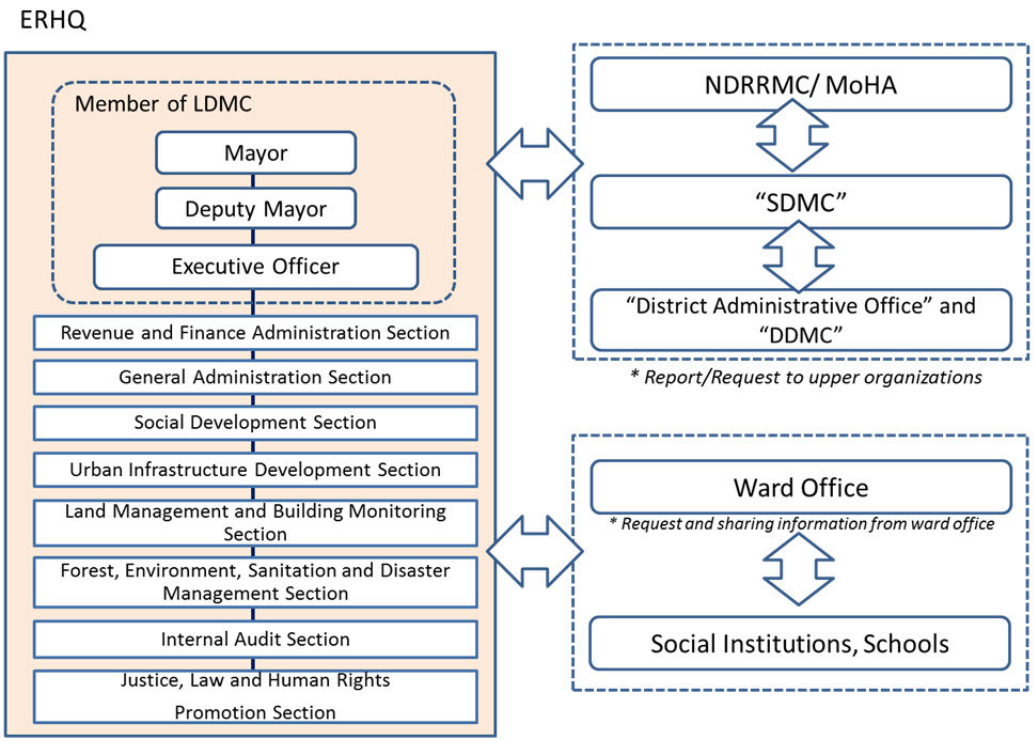
In Chapter 2, the "Flow of Mobilization" and "Preparation for Mobilization" are described. This SOP is supposed to be for On-duty and Off-duty activities as shown in Fig 5.3.6. Also the importance in preparing emergency tools before a disaster is mentioned.



Source: JICA Project Team

Figure 5.3.6 Procedure for mobilization in case of earthquake

In Chapter 3, the Project Team suggested a new idea, named "Emergency Response Headquarters (ERHQ)". First, the responsibility to establish an ERHQ is mentioned. This is regarding a high priority person who can make a decision for the establishment of ERHQ. Next shown is "Structure of ERHQ". This structure was adjusted based on present government structure in each municipality. And "Function of ERHQ" is also described. Members of ERHQ and Contents of discussion points are shown in the table. Last is "Relationships of ERHQ with other Organizations and Divisions". In case of an earthquake, coordination of municipalities with other related agencies and committees in Nepal is very important. So a simple explanation is included in this chapter as shown in Fig 5.3.7.

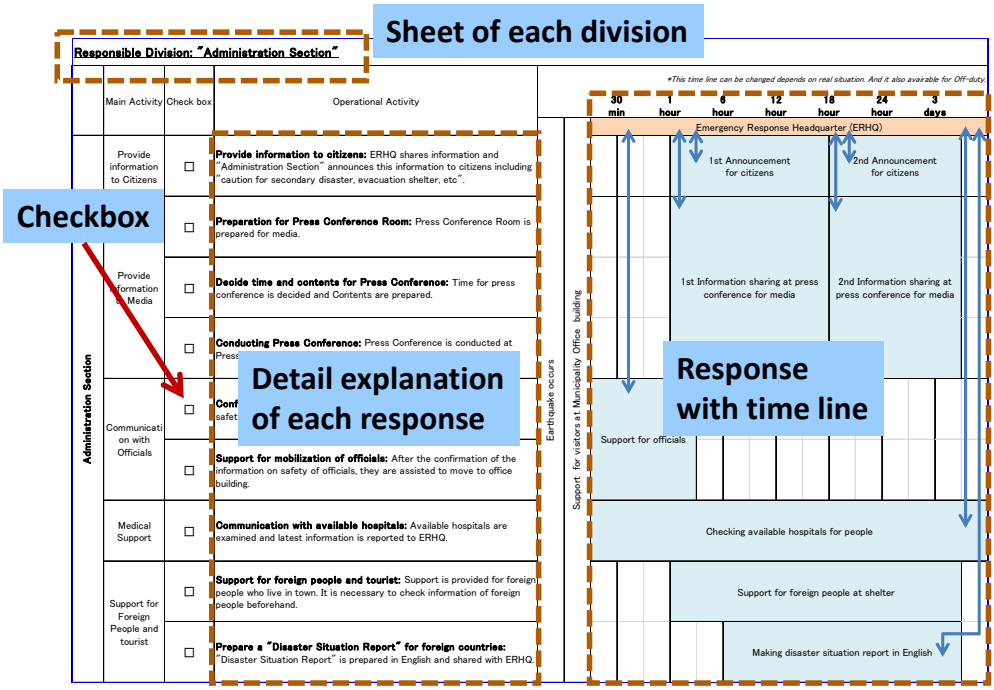


Source: JICA Project Team

Figure 5.3.7 Relationship of ERHQ with other organizations

In Chapter 4, Preparedness and Response Activities against Earthquake are shown. It is mentioned that the collecting of information regarding official facilities (evacuation shelters, Schools and number of students/teachers, hospitals, etc.) must be done in the preparedness phase.

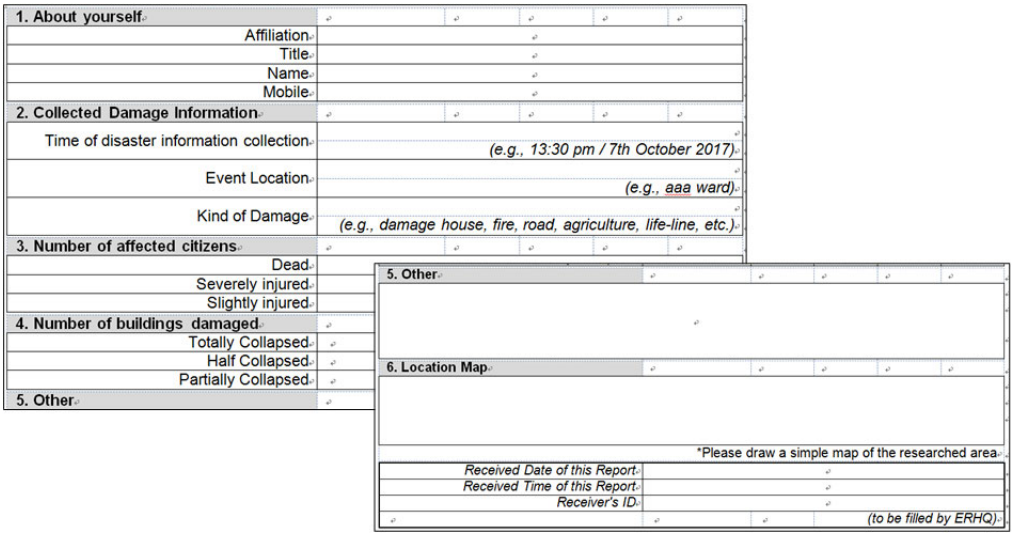
Appendix A as shown in Fig 5.3.8 is "Activity Flowchart". This figure shows specific activities to be followed in case of disaster and developed for each present division. Officers can understand what, when and how the activities should be performed.



Source: JICA Project Team

Figure 5.3.8 Flow of SOP activity

Appendix B as shown in Fig 5.3.9 is "Disaster Information Format". Before starting this SOP activity, no unified disaster information format was prepared yet in the three municipalities. So The Project Team suggested a new disaster information format in this SOP. The purpose of this attached form is to collect the information in case of a disaster. Also it will be submitted to the upper level organizations such as the District Administration Office.



Source: JICA Project Team

Figure 5.3.9 Disaster Information Format

Appendix C as shown in Fig 5.3.10 is “List of Evacuee at Evacuation Shelter”. This figure was referring from Japanese Guideline and Manuals. In the case of a disaster, it is supposed that many affected people will be evacuated to evacuation shelter. So that it is important to manage a number of evacuated people at evacuation shelter for keeping safety circumstance at shelter.

								as of	
1. Name of Management Person									
Staff ID	Name			Name of Division				Mobile	
2. About Evacuation Shelter									
Shelter ID	Name of Evacuation Shelter					TEL		FAX	
3. List of Evacuees									
Evacuee ID	Name of Evacuee	Gender	Age	Date of Admission	Date of Departure	Name of Transferred Place	TEL of Transferred Place	Address of Transferred Place	Other
1									
2									
3									
4									
5									

Source: JICA Project Team

Figure 5.3.10 List of Evacuees at Evacuation Shelter

Appendix D as shown in Fig 5.3.11 is “Personal Data of Officials”. In the case of a disaster, it is necessary to have contact with all officials. So the Project Team suggested this form to collect information from officials. This format is expected to be compiled before a disaster.

				as of	
1. About You					
Staff ID	Name	Home Address		Mobile	Blood Type
2. About Your Division					
ID	Name of Division	Office Address		Office TEL	Office FAX
3. About Emergency Contact					
Name		Mobile			
4. To do list in case of Disaster (about yourself)					
1	☐				
2	☐				
3	☐				
4	☐				
5	☐				

Source: JICA Project Team

Figure 5.3.11 Personal Data of Officials

In the future, since Appendices A, B, and C are intended to be utilized in emergency situations, it is important to accumulate experience to utilize these forms through trainings and actual disasters. On the other hand, since information related to Appendix D can be collected and managed in normal times, it is expected that municipal officials who are familiar with this form through the workshops will use this form on a daily basis.

(5) Conclusion and Way Forward

The SOP was developed over approximately one year. Through several meetings and workshops, we got lots of opinions and suggestions and modified the SOP for finalization. We also found out important points on this activity, i) Research is needed on existing Manuals and Guidelines of Nepal and Japan, ii) Mutual consensus from Municipalities, MoHA and related stakeholders required for formulation of SOP, and iii) Understanding of latest government structure as well as updated and revised Guidelines.

And this SOP should be utilized for next the disaster and modified based on latest government situation. We expect local officials to, i) Update SOP as per the latest government structure regularly, ii) Confirm each role and responsibility of each division/section for preparedness, and iii) Collect & share updated basic statistical information such as number of hospitals, students and teachers in each school, staff information, etc.

5.4 Technical Guideline for Formulation of Local Disaster and Climate Resilience Plan (TG LDCRP)

The JICA Project Team developed a Technical Guideline for Formulation of Local Disaster and Climate Resilience Plans (TG LDCRP) for local level of Nepal in this project. TG LDCRP helps the local level, such as a municipality, to easily formulate the practical and effective Local Disaster and Climate Resilience Plan (LDCRP) and is a supporting manual aiming to give guidance; and is to be utilized as a reference document so that the local level, such as a municipality, can understand its detailed contents, formulation procedures, examples of descriptions and notes to be considered. TG LDCRP was developed for all local governments in Nepal and contributes to the global target (e) of the Sendai Framework for disaster risk reduction 2015-2030 which is "Substantially increase the number of countries with national and local disaster risk reduction strategy by 2020" (Sendai Framework). TG LDCRP was developed both in English and Nepali.

Before the formulation of the Technical Guideline, the JICA Project Team reviewed the existing guideline "Local Disaster Risk Management Planning (LDRMP) Guideline, 2011" (2011 guideline) by MoFALD, and examined its issues. While the JICA Project Team and MoFALD were having discussions, it was perceived that the 2011 guideline was scheduled to be revised by MoFALD and the members of NRRC Flagship 4, and the context of the revised guideline was reviewed. Therefore, the JICA Project Team decided to follow and support their activities for revision of 2011 guideline, and determined to develop the TG LDCRP to formulate LDCRP easily by local level. On the basis of this situation, the JICA Project Team discussed with MoFALD regarding the positioning and structure of the TG LDCRP. As a result of discussions, TG LDCRP was drafted and finalized while discussing with WG3 meeting, etc. Details are as given as follows.

5.4.1 Review of Existing Guideline related to Disaster Management Planning

(1) Review of 2011 guideline

Existing guidelines related to disaster management planning for local level were reviewed. At the commencement of this project in 2015, two guidelines were present in Nepal. The first one is 2011 guideline by MoFALD and the other one is "Guidance Note for Disaster Preparedness and Response Planning 2011" by MoHA. However, since the guideline by MoHA is focused on the only disaster preparedness and response activities, 2011 guideline by MoFALD was given the main focus for review. Structure and main contents of 2011 guideline is shown in Table 5.4.1.

Table 5.4.1 Structure and main contents of 2011 guideline

Table of Contents				Main Contents of Description
Body				
	Preface and Preamble			"National Strategy for Disaster Risk Management (NSDRM), 2009" has given special priority risk reduction and management activities. Legal Framework: Articles 234, 235, 265 of "the Local Self Governance Act, 1998"
1	**Preliminary**			
	1-1		Short Title and Commencement	Short title of guideline is "LDRMP Guideline, 2011" and commencement date of this guideline.
	1-2		Definitions	Definitions of specific words in this guideline
	1-3		Introduction of Disaster Risk Management Planning	DRM Planning is including "Disaster Risk Reduction", "Emergency Response Operation", and "Post Disaster Rehabilitation and Reconstruction"
	1-4		Introduction to the Guideline and Objectives	Objectives of guideline
	1-5		Guideline Implementation and Limitations	This guideline shall be used by the local bodies for their formulating, implementing, monitoring and evaluating Disaster Risk Management Plans.
2	**Disaster Risk Management Planning**			
	2-1	**Phase-1 : Coordination and Initial Preparation**		
		2-1.1	District-Level Coordination and Selection of VDCs and/or Municipalities	Coordination responsibility of Municipality and VDCs in the planning process
		2-1.2	Primary Gathering and Committee Formation	Formation of "Local Disaster Management Committee"
		2-1.3	Formation of Planning Subcommittee	Formation of "Planning Subcommittee" in the planning process
		2-1.4	Capacity Building Training	Training shall be organized to enhance plan formulation capabilities.
	2-2	**Phase-2 : Vulnerability and Capacity Assessment (VCA)**		
		2-2.1	Collection of Disaster Data and Information	Sub-Committee shall collect information and data. VCA tools shall be used as per **Annex-5**.
		2-2.2	Vulnerability and Capacity Assessment	For VCA, collected information shall be analyzed as per **Annex-6**. Integrated disaster risk profile shall be prepared as per **Annex-7**.
	2-3	**Phase-3 : Development of LDRMP**		
		2-3.1	Identification and Prioritization of Risk Management Activities	Disaster risk management activities shall be identified & prioritized as per the format, **Annex-8**.
		2-3.2	Preparation of Plan	Disaster risk management activities shall be integrated into LDRMP as per Annex-9. The draft plan prepared by Planning Subcommittee shall be discussed in the workshop with all sectors and groups, and finalized and submitted to Municipality/VDCs. For implementation of the plan, the task forces shall be constituted as per Annex-10.
	2-4	**Phase-4 : Approval and Implementation of Plan**		
		2-4.1	Approval of Plan	Municipality / VDC shall duly approve the LDRMP.
		2-4.2	Allocation of Budget	Municipality / VDC shall allocate necessary budget and resources to carry out activities prioritized by the plan.
		2-4.3	Implementation of Plan	LDM Committee shall implement approved plan with support of line agencies, community, various organizations, private sector and Community Disaster Management Committee (CDMC).
	2-5	**Phase-5 : Monitoring, Evaluation and Review**		
		2-5.1	Monitoring and Evaluation	Municipality / VDC shall monitor and evaluate the implementation of LDRMP as well as their annual policy and program.
		2-5.2	Review and Update of Plan	Every year, plans have to be reviewed and reflected in annual program. Every five years, plans have to be subjected to a major review.
3	**Miscellaneous**			
	3-1		Responsibilities of the	Responsibilities of MOFALD

Table of Contents			Main Contents of Description
		Ministry of Local Development (MOFALD)	
	3-2	Responsibilities of the DDC	Responsibilities of DDC
	3-3	Special Responsibilities of Municipality and VDC	Responsibilities of DDC : Disaster Risk Management Programs shall be included in the Annual and Periodic Plan of Municipality / VDCs.
	3-4	Plan and Program Implementation	All disaster management should be treated as complementary to the development plan of local bodies.
	3-5	Additions, Deletions and Changes	MOFALD has the rights to explain, make additions, deletions, amendments on guideline.
Annex			
Annex-1	Structure, Function, Duties and Scope of "Local Disaster Management Committee (LDMC)"		LDMC members are mainly nominated from the local body and its roles are formulation, implementation and monitoring of their DRMP (defined by NSDRM).
Annex-2	Functions, Duties and Powers of "Planning Subcommittee"		Functions and duties of "Planning Subcommittee" are coordination of stakeholders, collection and analysis of data and information for VCA, formulation and submission of DRMP.
Annex-3	Subject Manner of Training on Community Based Disaster Management and Vulnerability and Capacity Assessment		Time schedule of Training on Community Based Disaster Management and Vulnerability and Capacity Assessment (5 days) (can be amended as per the requirement)
Annex-4	Causes of Disasters and Losses (for the past 25 years and last 5 years)		Data Format on "Causes of Disasters and Losses" (past 25 years)
Annex-5	**Tools for Vulnerability and Capacity Assessment (VCA tools)**		
	5-1	Hazard Mapping and Ranking	Format of Hazard Ranking
	5-2	Hazard Calendar	Format of Hazard Calendar
	5-3	Historical Timeline	Format of Historical Timeline on disaster and damages (by hazard type)
	5-4	Hazard Analysis	Format of Hazard Analysis. Causes, factors, impacts and possible measures are identified by hazard type.
	5-5	Social Resources Mapping and Identification of Vulnerability and Capacity	Explanation of Social Resources Map Format of community well being ranking Format of Ranking Vulnerability of Families in the Community(each community)
	5-6	Problem Tree Analysis	Format of Problem Tree Analysis and brief explanation
	5-7	Transect Walk	Format of transect walk(walk area, vulnerability, cause, available capacity, gap, impact)
	5-8	Stakeholders Analysis/Venn Diagram	Format of Stakeholders Analysis and an example of Venn Diagram
	5-9	Mobility Map	Instruction and format of mobility map (access of community to outside organizations)
	5-10	Focus Group Discussion	Instruction of FGD and format of information which should be listed through FGD. (Problem, Causes, Causal Factors, Impacts, Possible solutions)
	5-11	Direct Observation	Instruction and format of Direct Observation
	5-12	Documentation of Local Knowledge, Skills and Technology	Format of Coping analysis (preparedness and DRR measures of communities on previous disasters)
	5-13	Things that need to be Paid Attention	Ensuring participation of vulnerable, women, Dalits etc. and minute analysis of five livelihood capitals should be paid attention during collecting information by using VCA tools.
Annex-6	Vulnerability and Capacities Assessment of Community and Wards		Method of vulnerability assessment based on past disasters (High, Medium, Low by each Ward) through ranking of vulnerability of Wards.
Annex-7	Sample of Vulnerability, Capacity and Risk Analysis Profile		Sample of Profile: The profile consists of main vulnerability, demographic information, nature of hazards as per 1,2,3,4 of Annex-5, and resource lists and maps. Format of resource list in community to map the resources at Municipality / VDCs.
Annex-8	Identification and Prioritization of Risk Management Activities		Format of activities list
Annex-9	**Local Disaster Risk Management Plan Template**		
	9-1 Introduction		Brief instruction of "Part-1: Introduction" : 1-1Background, 1-2Objective of Plan, 1-3Rationale and Significance of Plan, 1-4Limitation of Plan, 1-5Methodology of Planning, 1-6Plan Implementation Strategy, 1-7Monitoring, Evaluating and Assessment.

Table of Contents		Main Contents of Description
	9-2 Hazard, Vulnerability, Capacity and Risk Assessment	Brief instruction of "Part-2: Hazard, Vulnerability, Capacity and Risk Assessment": 2-1Hazard Identification and Ranking, 2-2Hazard Analysis(result of Annex-5-4) by using VCA tools, 2-3Vulnerability Ranking of Village/Ward, 2-4Capacity Analysis of Municipality/VDC, 2-5Risk Identification and Assessment
	9-3 Disaster Risk Management Plan	Brief Instruction and format of activity list of "Part-3: Disaster Risk Management Plan" for each disaster: 3-1 Policy Level Decision and Management, 3-2Awareness Raising and Capacity Building Activities, 3-3Risk Reduction Activities, 3-4Emergency Preparedness Activities, 3-5Activities during Disaster, 3-6Activities in the Aftermath of Disaster
Annex-10	Types of Taskforce and their Duties, Responsibilities and Powers (For Implementation)	Sample Types of Taskforce (1 Information and Early Warning, 2 Search and Rescue, 3 Relief Management and Rehabilitation, 4 First Aid and WASH, 5 Damage Assessment and Needs Analysis), and their Duties, Responsibilities and Powers in "Pre" and "During" and "Post" Disaster phases.

Source: JICA Project Team

The 2011 guideline consists of two parts, the main part and the annex part. In the main part, the framework of the plan and the outline of the planning process are as follows: Phase-1 Coordination and Initial Preparation, Phase-2 Vulnerability and Capacity Assessment, Phase-3 Development of LDRMP. In the annex, the provisions for the establishment of committees related to local disaster management, the tools which are utilized for assessment of vulnerability and capacity such as the format of tables for analysis and simple instruction, and a template showing the basic structure of the local disaster risk management plan, etc. are shown.

On the other hand, it is seen that there are several major issues to be improved in the 2011 guideline as shown in Table 5.4.2.

Table 5.4.2 Major issues in 2011 guideline and measures for improvement

Issues	Points to be improved
Annex-9 Local Disaster Risk Management Plan Template is shown including the table of contents and structure of plan, but not in detail for overall contents of plan.	2011 guideline is not a model but a strategic guideline. In order for local levels to formulate LDRMP, it is necessary that technical guidelines such as formulation manuals with contents of each section and examples of descriptions is developed.
LDRMP is not based on the risk assessment. Contents of detail risk assessment such as damage estimation are not shown.	Risk assessment has advantageous points to formulate an effective plan, such as setting numerical targets for disaster risk reduction and consideration of countermeasures with priority. Thus, risk assessment part should be included in the guideline.
Examples of detailed activities are not	Examples of detailed activities are important for

shown. The local level cannot understand what countermeasures should they implement for disaster risk reduction and preparedness for effective emergency response.	local levels to consider the necessary activities in each municipality. Therefore, examples of activities with detailed contents should be included in the guideline.

Source: JICA Project Team

As shown in Table 5.4.2, since there are several issues in 2011 guideline, it is difficult for local levels to formulate a plan based on this guideline on their own, and it seems that there are big differences in the content and quality of plan in each local level. Therefore, in order to solve these issues, it is required that the 2011 guideline is revised and technical guidelines such as formulation manuals should be developed with the contents of each section and examples of description.

(2) Revision of 2011 guideline as the Local Disaster and Climate Resilience Planning (LDCRP) Guideline, 2074

While the JICA Project Team was having the discussion with MoFALD for the formulation of a technical guideline, it was observed that the 2011 guideline was scheduled to be revised by MoFALD and the members of NRRC Flagship 4. Therefore, the JICA Project Team decided to follow and support their activities for revision of 2011 guideline, and determined to develop the TG LDCRP to formulate LDCRP easily by local level.

The contents of the revised guideline were reviewed. The revised guideline has changed the title from the Local Disaster Risk Management Planning (LDRMP) Guideline to the Local Disaster and Climate Resilience Planning (LDCRP) Guideline (LDCRP guideline) in order to cope with climate change as well. Since the Government of Nepal developed the Climate Change Policy in 2011 and National Framework on Local Adaptation Plans for Action (LAPA) in 2012, LDCRP has to be formulated in consideration of the disaster risk reduction and management with climate resilience. In addition, it was revised in accordance with the recently changed legal framework in Nepal such as the Constitution, new Disaster Risk Reduction and Management Act 2017 and Local Government Operation Act 2017. The table of contents and major revision points of the revised guideline is shown in Table 5.4.3.

Table 5.4.3 Structure and major revised points of LDCRP guideline

Table of Contents			Major revised points (There are minor revisions besides following points.)
Body			
	Preface and Preamble		Significance of "Disaster Risk Reduction and Management Act 2017" and "Local Governance Operation Act 2017" are added.
1	**Preliminary**		
	1-1	Short Title and Commencement	Change of Title "Local Disaster and Climate Resilience Planning Guideline (LDCRP)"
	1-2	Definitions	Several changes according to new act and structure of committee
	1-3	Introduction of LDCRP	-
	1-4	Introduction to the Guideline and Objectives	-
	1-5	Guideline Implementation and Limitations	-
2	**Formulation of LDCRP**		
	2-1	Phase-1 : Coordination and Initial Preparation	Formation, structure, roles and responsibilities of Local Disaster and Climate Resilience Committee (LDCRC) and other relevant committees are revised.
	2-2	Phase-2 : Vulnerability and Capacity Assessment (VCA)	**Utilization of earthquake risk assessment** and risk sensitive land use assessment are added.
	2-3	Phase-3 : Preparation of Local Disaster and Climate Resilience Plan	-
	2-4	Phase-4 : Approval and Implementation of Plan	Mainstreaming to the development processes of the plan is added.
	2-5	Phase-5 : Monitoring, Evaluation and Review	-
3	**Miscellaneous**		
	3-1	Responsibilities of the Ministry of Local Development	Several relevant organizations are added, and name of organizations are changed.
	3-2	Responsibilities of State Ministry	
	3-3	Responsibilities of State DM Committee	
	3-4	Responsibilities of DDMC	
	3-5	Responsibilities of Ministry of population and Environment	
	3-6	Responsibilities of District Coordination Committee	
	3-7	Responsibilities of other agencies	
	3-8	Implementation of the Guideline	-
	3-9	Additions, Deletions and Changes	-
	3-10	Dismissal and Saving	Dismissal of 2011 guideline
Annex			
Annex-1		Structure of Local Disaster and Climate Resilience Committee	Name and structure of each committee is revised.
Annex-2		Structure of Planning and Coordination committee	
Annex-3		Structure of Ward level Disaster and Climate Resilience Committee	
Annex-4		Contents of Local Disaster and Climate Resilience Plan formulation training	Several programs are revised.
Annex-5		Tools for Vulnerability and Capacity Assessment (VCA tools)	-
Annex-6		Sample of Vulnerability, Capacity and Risk Analysis Profile	-
Annex-7		Identification and Prioritization of Risk Management Activities	-
Annex-8		**Local Disaster Risk Management Plan Template**	**Revision based on the input from JICA Project**
Annex-9		Structure of sub-committees and their Duties, Responsibility and Authority	Name, structure duties, responsibility and authority of each sub-committee are revised.

Source: JICA Project Team

Note: The underlined part is the changed point of each section.

As shown in Table 5.4.3, several revisions of LDCRP guideline were based on the input from the JICA Project Team. Mainly the utilization of risk assessment in main part and Local Disaster Risk Management Plan Template of Annex-8 were the inputs from the JICA Project Team. For the hazard and risk identification part, the 2011 guideline had only one way of VCA tool, however, by integrating the utilization of risk assessment, LDCRP guideline now comprises of two ways of VCA and risk assessment.

5.4.2 Consideration of Structure of Technical Guideline for Formulation of LDCRP

As described in 5.4.1, the 2011 guideline was revised as the LDCRP guideline by MoFALD and the members of NRRC Flagship 4 based on the adaptation for climate changes, changes of legal framework, and input from the JICA Project Team. TG LDCRP was developed completely in accordance with LDCRP guideline. In order to formulate the TG LDCRP, JICA Project Team had several discussions with MoFALD and together developed the TG LDCRP. List of main meetings for TG LDCRP with MoFALD and relevant organizations is shown in Table 5.4.4.

Table 5.4.4 List of main meeting with MoFALD and relevant organizations

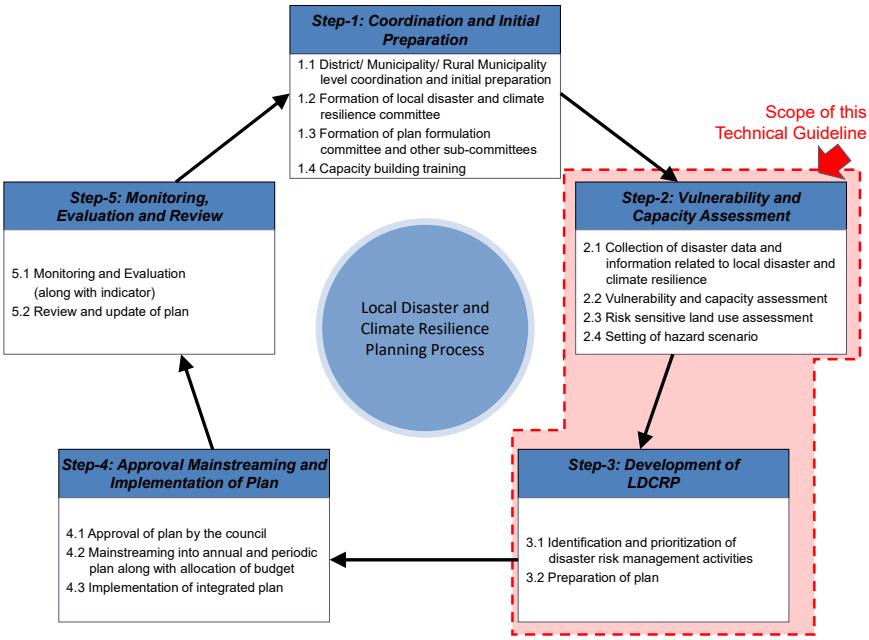
Year	Date	Name	Organization	Remarks
2016	11-Sep	Mr. Rishi Raj Acharya	MoFALD	
	4- Dec	Mr. Purushotam Subedi	MoFALD	
	16-Dec	Mr. Purushotam Subedi	MoFALD	
	19-Dec	WG3 members	MoFALD, MoHA and relevant organizations	4th WG3 meeting
2017	9-Mar	Mr. Purushotam Subedi	MoFALD	
	10-Mar	Mr. Krishna Kumar K.C.	IFRC	
	15-Mar	Mr. Purushotam Subedi	MoFALD	
	7-Jun	WG3 members	MoFALD, MoHA and relevant organizations	5th WG3 meeting
	1-Aug	Mr. Purushotam Subedi	MoFALD	
	15-Aug	Mr. Purushotam Subedi	MoFALD	
	30-Aug	Mr. Purushotam Subedi	MoFALD	
	11-Sept	Mr. Purushotam Subedi	MoFALD	
	14-Sep	WG3 members	MoFALD, MoHA and relevant organizations	6th WG3 meeting
	30-Nov	Mr. Yubaraj Subedi	MoFALD	
	5-Dec	Mr. Yubaraj Subedi	MoFALD	
	14-Dec	Mr. Krishna Kumar K.C.	IFRC	
	18-Dec	Mr. Yubaraj Subedi	MoFALD	
	20-Dec	WG3 members	MoFALD, MoHA and relevant organizations	7th WG3 meeting

Source: JICA Project Team

Mainly from September 2016, the JICA Project Team discussed the position and structure of TG LDCRP with MoFALD. On the basis of a series of discussion, TG LDCRP was drafted in June 2017 and was discussed on the 5th WG3 meeting. Thereupon it was revised as per the discussions with MoFALD and relevant stakeholders. The final draft of TG LDCRP was presented in the 7th WG3 meeting, and was agreed for position, structure and overall contents by MoFALD and WG3 members.

(1) Scope and position of Technical Guideline for Formulation of LDCRP

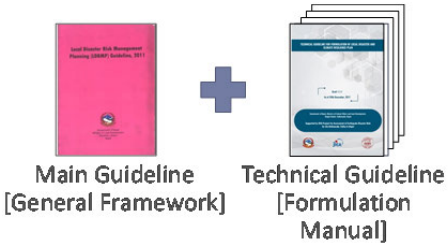
According to the LDCRP guideline, the LDCRP planning processes consist of five steps: Step1: Coordination and Initial Preparation, Step2: Vulnerability and Capacity Assessment, Step3: Development of LDCRP, Step4: Approval, Mainstreaming and Implementation of Plan, Step5: Monitoring, Evaluation and Review. The scope of TG LDCRP which the JICA Project Team developed in this project is mainly focused on the Step2 and Step3 as shown in Figure 5.4.1. TG LDCRP is a manual for LDCRP formulation, subsidiary to the Step3. Nonetheless, in order to consider the activities for disaster and climate resilience, hazard and risk identification is important as well. Therefore, the contents for Step2 are also included in TG LDCRP.



Source: JICA Project Team

Figure 5.4.1 Scope of TG LDCRP

Setting of TG LDCRP was discussed and agreed with MoFALD as described here. Figure 5.4.2 shows the arrangement of TG LDCRP in relation to the LDCRP Guideline developed by MoFALD.

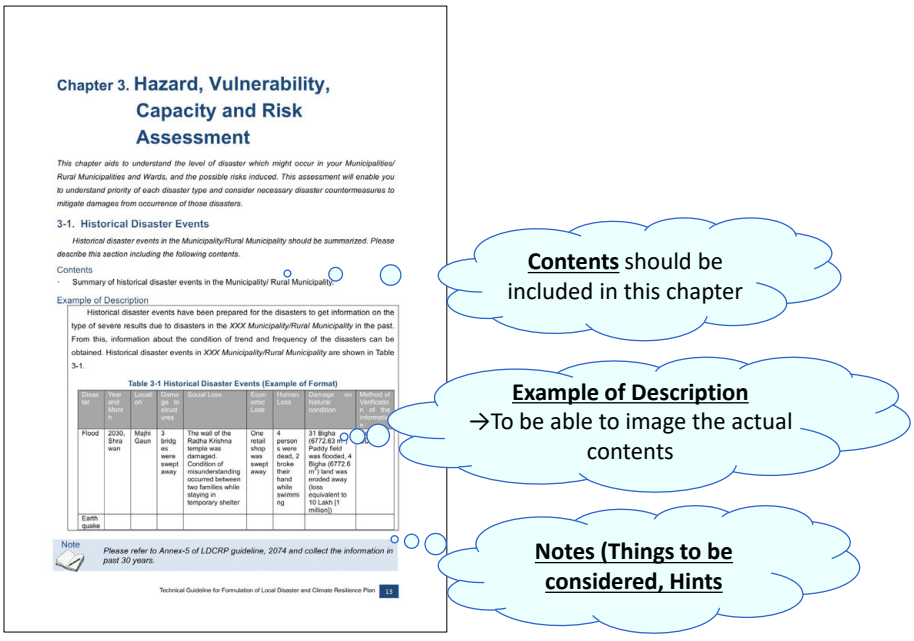


Source: JICA Project Team

Figure 5.4.2 Position of TG LDCRP

(2) Structure of Technical Guideline for Formulation of LDCRP

TG LDCRP was developed completely in accordance with the LDCRP guideline which was formulated as a revision of LDRMP Guideline, 2011. The concept of TG LDCRP is that the local level can easily understand the contents and grasp the overall picture of the LDCRP, and can formulate a practical LDCRP. Therefore, the structure of TG LDCRP is presented as a supporting manual aiming to give guidance, and is to be utilized as a reference document so that the local level can understand its detail contents, formulation procedures, examples of description and notes to be considered. The structure of TG LDCRP is shown in Figure 5.4.3.



Source: JICA Project Team

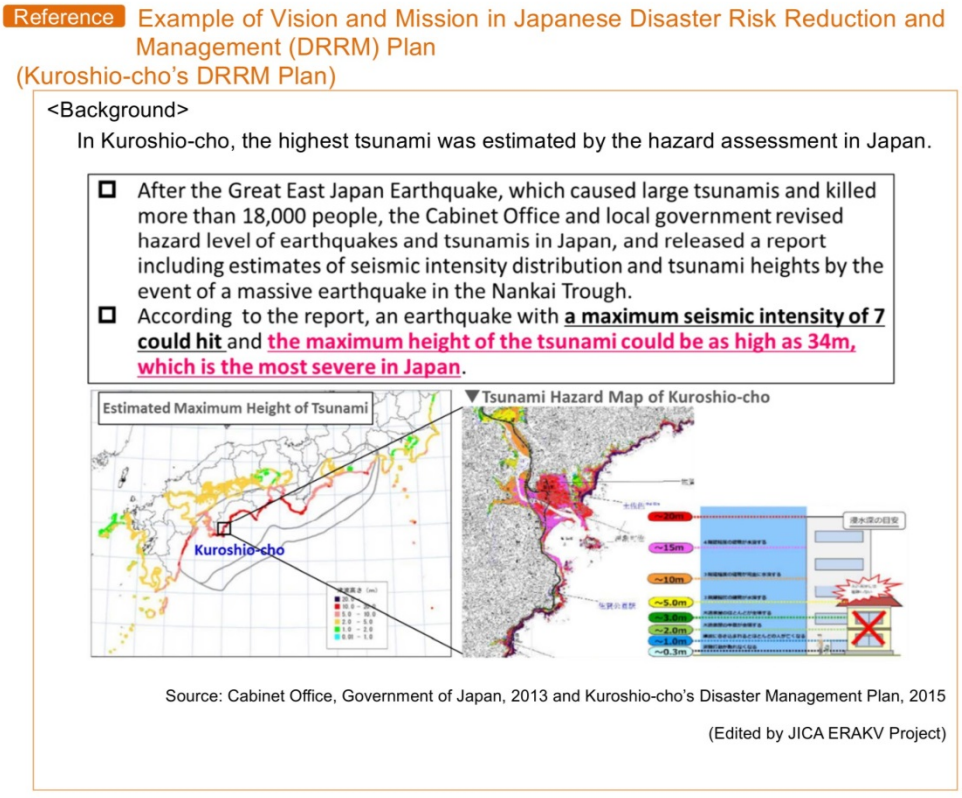
Figure 5.4.3 Structure of TG LDCRP

TG LDCRP includes concrete examples and images of descriptions for local levels to be able to understand what kind of contents to include and how to describe them easily when they formulate the LDCRP. In TG LDCRP, the following items are mainly included in each

chapter and section.

- Contents
- Examples of description for easy conceptualization of the actual contents
- Notes, implying the things to be considered

The TG LDCRP is not just a template but a manual which includes the necessary information such as the methodology for collection of data and information, the way to decide priority among activities, and other supporting information for formulating LDCRP. For assuring the adaptation of various characteristics and differences of target disasters, the characteristics of municipalities as well are to be well considered. In addition, several reference information sources are included in TG LDCRP to support formulate the LDCRP such as information from the Japanese experiences, the contents of Sendai Framework, etc. Figure 5.4.4 shows the example of reference in TG LDCRP indicating the case of Japan.



Source: JICA Project Team

Figure 5.4.4 Example of reference in TG LDCRP

The table of contents for TG LDCRP has been developed referring to the ones stipulated by the LDCRP Guideline, such that the same can be followed for actual LDCRP formulation by local levels. The table of contents for TG LDCRP is shown in Table 5.4.5.

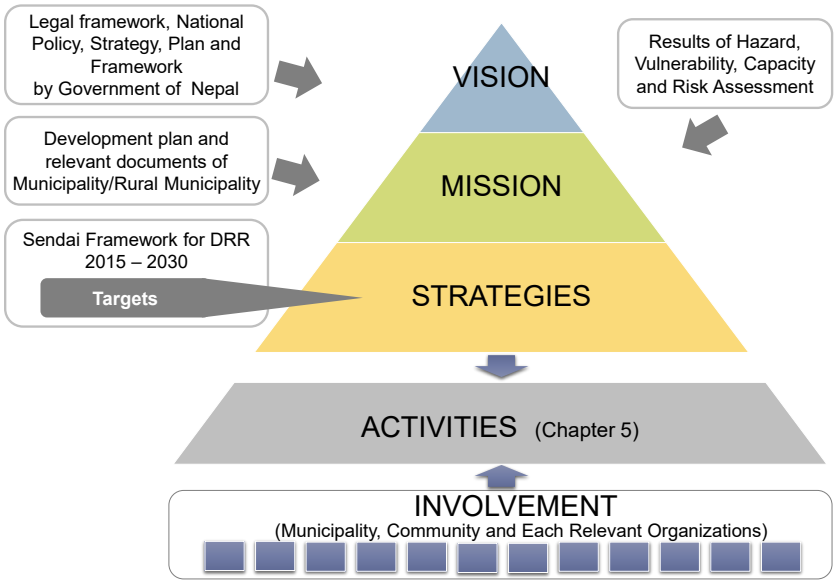
Table 5.4.5 Table of contents for TG LDCRP

Table of Contents	
Chapter1 Introduction	
	1.1 Background
	1.2 Objective of Plan
	1.3 Rationale and Significance of Plan
	1.4 Limitations of Plan
	1.5 Methodology
	1.6 Plan Implementation Strategy
Chapter2 General Description	
	2.1 Physical Condition
	2.2 Social Condition
Chapter3 Hazard, Vulnerability, Capacity and Risk Assessment	
	3.1 Historical Disaster Events
	3.2 Hazard Identification and Ranking
	3.3 Hazard Analysis
	3.4 Vulnerability Analysis
	3.5 Capacity Analysis
	3.6 Risk Identification and Assessment
Chapter4 Local Disaster and Climate Resilience Policy	
	4.1 Vision and Mission
	4.2 Disaster and Climate Resilience Strategy
	4.3 Institutional Structure of Disaster and Climate Resilience
Chapter5 Local Disaster and Climate Resilience Activities	
	5.1 Understanding disaster risk
	5.2 Strengthening disaster risk governance to manage disaster risk
	5.3 Investing in disaster risk reduction for resilience
	5.4 Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction
Chapter6 Monitoring, Evaluation and Update of LDCRP	
	6.1 Monitoring and Evaluation
	6.1 Review and Update of LDCRP

Source: JICA Project Team

Chapter 1 is the “Introduction”, which is the fundamental part of LDCRP that indicates the background and objectives of the plan. In TG LDCRP, the contents that should be included are described in the example of description. Chapter 2 is the “General Description”, which indicates regional characteristics of the local level. This part is the basic information for understanding the specific region type to help identify the target disasters and issues in the municipalities. This chapter consists of two components, physical conditions such as topography, geology, land use, etc. and social conditions such as information of population and buildings, etc. Also, the data sources for collecting the necessary information have been included in the TG LDCRP (e.g. geological maps from Department of Mines and Geology, etc.). Chapter 3 is the “Hazard, Vulnerability, Capacity and Risk Assessment”, which aids in understanding the level of a disaster which might occur in the municipalities, and the possible risks induced. This assessment is essential to understand the priority of each disaster type and consider necessary disaster countermeasures to mitigate damages from occurrence of those disasters. Primarily, examples of formats and maps for hazard, vulnerability, capacity and risk assessment have been described in this chapter. Chapter 4 is the “Local Disaster and Climate Resilience Policy”, which aids in the formulation of the Disaster and

Climate Resilience Policy with Vision, Mission and Strategies. It indicates the considerations for setting the vision and mission, along with a soulful message for residents, according to the legal framework, national policies, development plan of municipality and results of hazard, vulnerability, capacity and risks assessment in Chapter 3, and how to set the strategies and targets for disaster risk reduction in consideration of the Sendai Framework as shown in Figure 5.4.5. In addition, it indicates the confirmation of national and provincial action plans related to DCR in order to understand the residual risks to formulate it as a practical plan.



Source: JICA Project Team

Figure 5.4.5 Hierarchy of Vision, Mission, Strategies in TG LDCRP

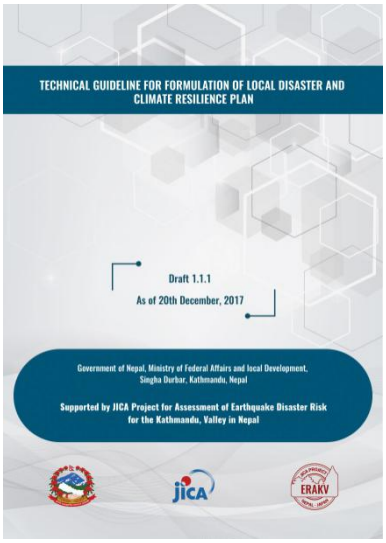
Chapter 5 is the "Local Disaster and Climate Resilience Activities", which is the main and the most significant part of LDCRP comprised of necessary activities related to disaster and climate resilience that need to be considered for implementation for all phases. This chapter is divided into four sub-chapters according to the priorities for action of the Sendai Framework. It outlines how to consider the activities based on the previous chapters and according to the strategies set in Chapter 4. In addition, example of format for activities' list is shown. Chapter 6 is the "Monitoring, Evaluation and Update of LDCRP" which details the principles of monitoring, evaluation, and update of the plan. In this part, the general concept of monitoring, evaluation, and update of the plan, and example format for monitoring and evaluation has been described.

Additionally, example of activities and summary of risk assessment for earthquake disaster implemented by this project have been included in Appendixes.

5.4.3 Formulation of Technical Guideline for Formulation of LDCRP

On the basis of consideration of structure as shown in 5.4.2, TG LDCRP was formulated.

The detailed contents of TG LDCRP are referred in the Attachment 7. In this section, distinctive points of TG LDCRP are shown as follows.

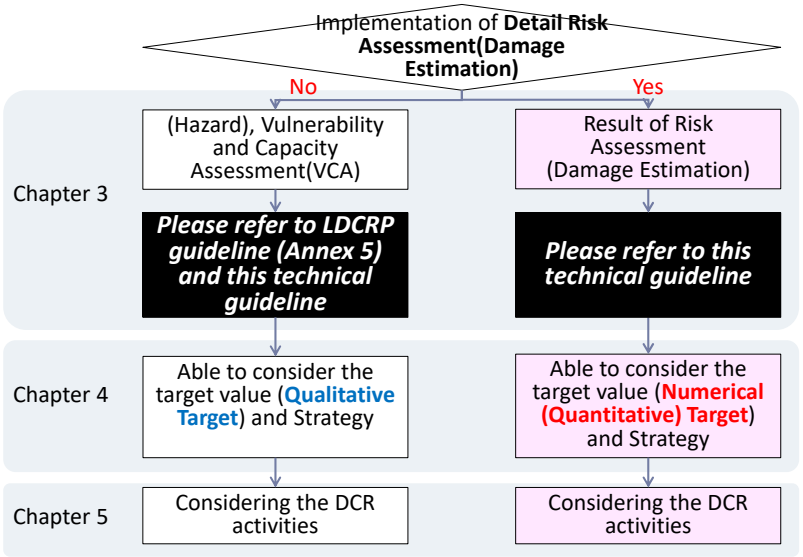


Source: JICA Project Team

Figure 5.4.6 Cover page of TG LDCRP

1) Vulnerability and Capacity Assessment (VCA) and Risk Assessment

As described in 5.4.1, for the hazard and risk identification part, the 2011 guideline had only one way of using the VCA tool. However, by integrating the utilization of risk assessment, the LDCRP guideline now comprises two ways of using VCA and risk assessment. According to the LDCRP guideline, the detail of contents and differences between VCA and risk assessment (damage estimation), are also included in TG LDCRP.



Source: JICA Project Team

Figure 5.4.7 Formulation procedures from VCA and Risk Assessment (Damage Estimation) [Figure in TG LDCRP]

VCA is concerned with collecting, analyzing and systematizing information on a given community's vulnerability to hazards in a structured and meaningful way. This information is then used to diagnose the key risks and existing capacities of the community, leading to activities aimed at reducing people's vulnerability to potential disasters and increasing their capacity to survive them and resume their lives. On the other hand, seismic risk assessment by this project was implemented by a scenario oriented deterministic approach. The risk was estimated, in principle, by considering seismic hazard (PGA of ground motion), vulnerability of structure (damage function) and exposure (total number of vulnerable structures), as an engineering assessment. Benefits of risk assessment for LDCRP are as follows.

- It can be utilized to set the numerical DRR target based on the engineering results.
- On the basis of the target, the countermeasures to achieve DRR targets can be considered.
- It can be used for the prioritizing of countermeasures for critical infrastructures such as schools, health facilities, governmental buildings and bridges.
- Activities can be implemented with effective monitoring based on the DRR ratio (what level of DRR target to achieve)

In addition, contents of risk assessment for earthquake disaster are summarized in Appendix 2 of TG LDCRP.

2) Structure in accordance with Sendai Framework

The Sendai Framework for Disaster Risk Reduction 2015-2030 applies to the risk of small-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks. Sendai Framework aims to guide the multi-hazard management of disaster risk in development at all levels including local level as well as within and across all sectors.

The Government of Nepal is preparing the National Strategic Action Plan for Disaster Risk Reduction 2017-2030, which succeeds the National Strategy for Disaster Risk Management (NSDRM) 2009, in line with Sendai Framework. Integrating the concept of Sendai Framework into LDCRP, a close collaboration between national and local level has been expected. Therefore, several contents in the TG LDCRP are based on the Sendai Framework.

Sendai Framework has the seven Global Targets as follows:

- (a) Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015.

- (b) Substantially reduce the number of affected people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020 -2030 compared to the period 2005-2015.
- (c) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
- (d) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- (e) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
- (f) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.
- (g) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

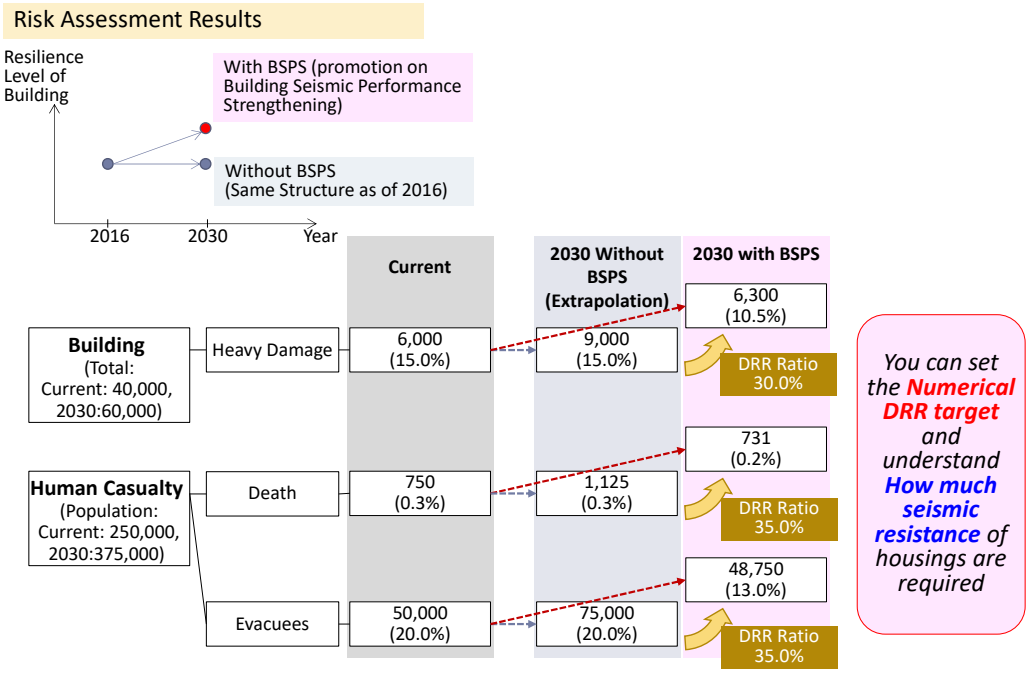
For consideration of disaster and climate resilience strategies in Chapter 4 of the LDCRP, since the global targets of the Sendai Framework can be referred to, the example format for disaster and climate resilience strategies in TG LDCRP is based on the Sendai Framework as shown in Table 5.4.6.

Table 5.4.6 Disaster and Climate Resilience Strategies (Example of Format) [Table in TG LDCRP]

Targets of Sendai Framework for DRR 2015-2030	Strategies of *XXX Municipality/Rural Municipality*
(a) Substantially reduce global disaster **mortality** by 2030	*XX%* Reduce
(b) Substantially reduce the **number of affected people** globally by 2030	*XX%* Reduce
(c) Reduce direct disaster **economic loss** in relation to global gross domestic product (GDP) by 2030	Reduce
(d) Substantially reduce disaster damage to **critical infrastructure** and disruption of basic services, among them **health and educational facilities**, including through developing their resilience by 2030	Reduce
(e) Substantially increase the number of countries with national and **local disaster risk reduction strategies** by 2020	This Plan and Strategy

Source: JICA Project Team

Actually it is difficult to set the specific numerical DRR targets with the disaster risk reduction ratio. As described in Chapter 4, the JICA Project Team conducted seismic risk assessment for 2016 at present and 2030 in future. Considering future situations of increased building number and promotion of building seismic performance strengthening for 2030, five cases and case of extrapolation of building damages were assessed with the reduction ratio from 2016. If the result is available, it is better to set the numerical targets for considering concrete countermeasures to achieve the targets. Figure 5.4.8 shows the approach to set the DRR targets based on the result of risk assessment as shown in TG LDCRP.



Source: JICA Project Team

Figure 5.4.8 How to set the DRR targets based on the result of risk assessment [Figure in TG LDCRP]

In addition, the Sendai Framework has the four Priorities for Action as follows:

- Priority 1. Understanding disaster risk: Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.
- Priority 2. Strengthening disaster risk governance to manage disaster risk: Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

- Priority 3. Investing in disaster risk reduction for resilience: Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.
- Priority 4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction: The growth of disaster risk means there is a need to strengthen disaster preparedness for response, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phase is a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

These priorities for action are directly connected to the disaster management cycle: prevention and mitigation, preparedness, emergency response, and recovery and reconstruction as shown in Table 5.4.7. Thus, the Chapter 5, Local Disaster and Climate Resilience Activities, in the TG LDCRP, is divided into four sub-chapters according to the priorities for action of the Sendai Framework.

Table 5.4.7 Relation between disaster management cycle and priorities for action of Sendai Framework

Priorities for Action of Sendai Framework (Sub-Chapter)	Disaster Management cycle
1. Understanding disaster risk	Risk Reduction (Prevention and Mitigation)
2. Strengthening disaster risk governance to manage disaster risk	
3. Investing in disaster risk reduction for resilience	
4. Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction	Preparedness
	Emergency Response (during disaster)
	Recovery and Reconstruction

Source: JICA Project Team

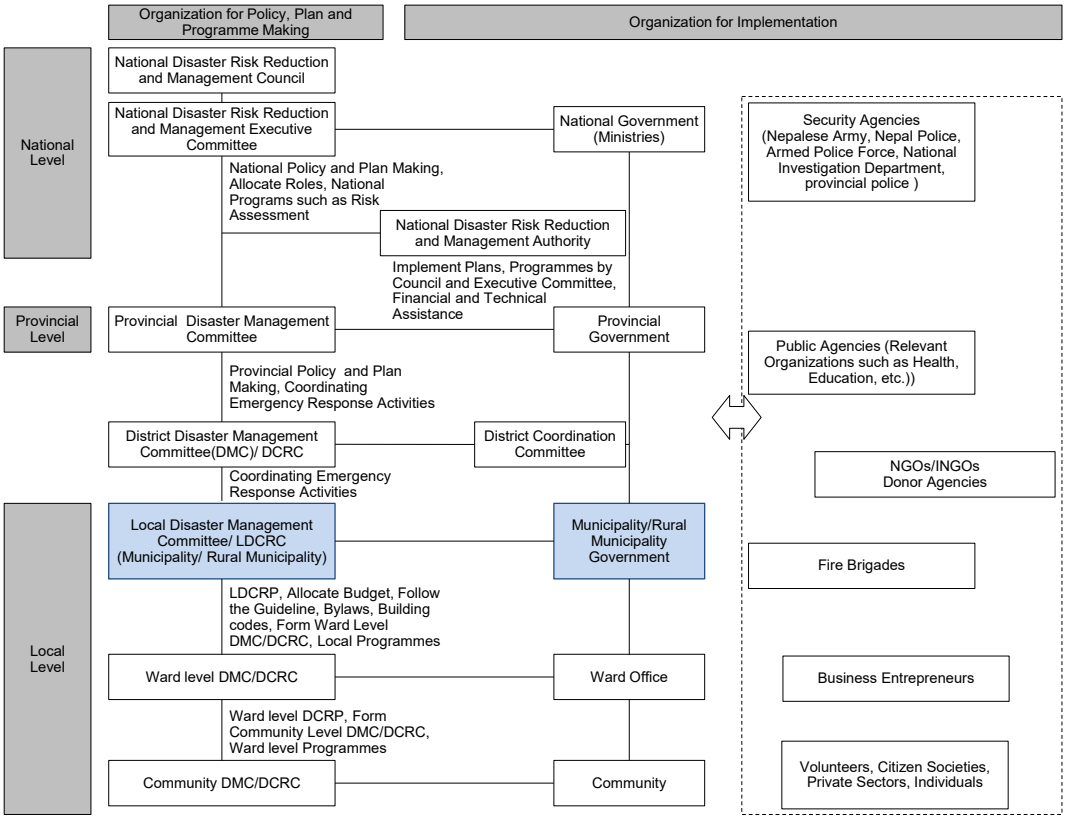
3) Consistency with legal framework

The legal framework related to disaster risk reduction and management in Nepal mainly consists of the Constitution, the Disaster Risk Reduction and Management Act 2017, and the Local Government Operation Act 2017, which was recently revised. These changes have been appropriately reflected in the TG LDCRP according to the current legal framework. Details are shown as follows.

The Constitution of Nepal has clearly stipulated that DRM is a shared responsibility of all levels of the governments. According to the Schedule 8, disaster management is one of the twenty-two tasks assigned to local level. DRM has been kept as one of the subjects in the

Schedule 9 of concurrent powers of federal, provincial and local level.

The New Disaster Risk Reduction and Management Act of Nepal was enacted in 2017. The Act is considered far more progressive than the hitherto existing Natural Calamity Relief Act, 1982 in many aspects. The Act has proposed a clear multi-tier institutional structure of disaster risk reduction and management at the national, provincial, district and local level. For the local level, it stipulates the establishment of Local Disaster Management Committee for formulating the local disaster management plan, allocating the budget for disaster management, and coordinating with all stakeholders, etc. Figure 5.4.9 shows the framework of related organizations based on Disaster Risk Reduction and Management Act.



Source: JICA Project Team

Figure 5.4.9 Framework of related organizations [Figure in TG LDCRP]

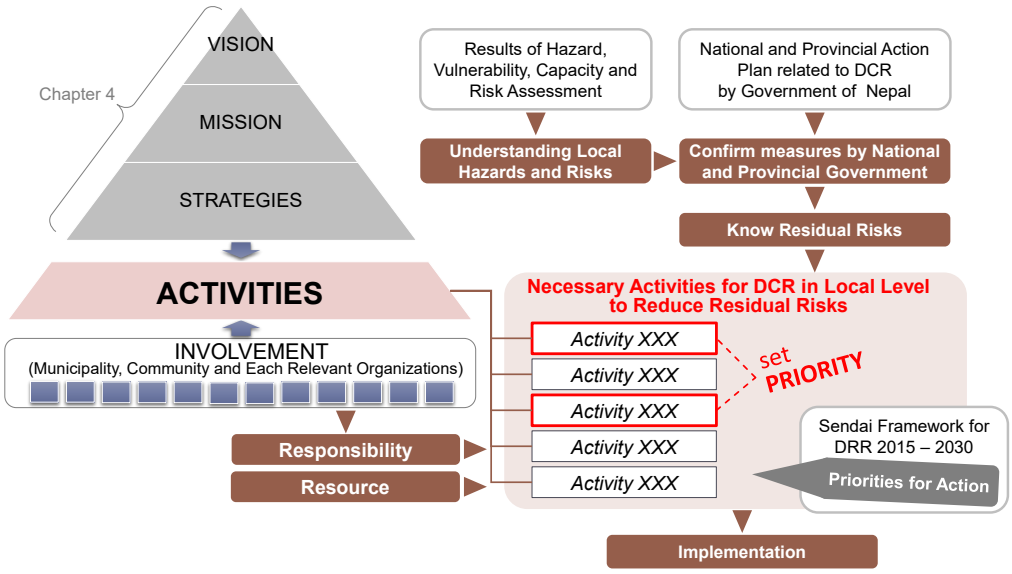
In addition, the Local Government Operation Act was enacted in 2017. The Local Self Governance Act 1999, which had existed so far, promoted the concept of local authorities and accentuated the interrelationship between the development process, environment, and disaster. It also encourages the DDCs, Municipalities, and VDCs to resolve problems through their own action. As described above, the new Constitution of Nepal was promulgated in 2015 and involves provisions for local government institutions and has reorganized the local governments as rural municipalities and municipalities. In the new federal context, there are now three levels of government i.e. federal, provincial and local. The existing role of the DDC has been transformed with the revised name as District

Coordination Committee (DCC). Major authorities and roles of the previous DDC have now been transferred to the rural municipalities and municipalities. In the federal context, some functions such as secondary education, health, agriculture and other local services have been assigned to the local bodies with the basic principle that functions should be assigned to the lowest level of government. In accordance with the Constitution, the Local Government Operation Act was enacted which stipulates the roles and responsibilities for the local level as rural municipalities and municipalities. Disaster management has been included as one of the responsibilities of the local level. Furthermore, several roles and responsibilities related to development with disaster risk reduction and resilience have been stipulated in the act.

TG LDCRP appropriately reflects these changes and shows that these legal frameworks are to be considered when rural municipalities and municipalities formulate the LDCRP.

4) Consideration of disaster and climate resilience activities

The main purpose for formulation of LDCRP is to reduce the disaster risks, damages and save residents' lives and their assets by implementing the disaster and climate resilience activities. In that sense, consideration of activities is the most important component for the planning. The purpose of seismic hazard and risk assessment which JICA Project Team conducted is to be utilized for policy making and planning. Therefore, TG LDCRP outlines how to consider the disaster and climate resilience activities in detail. Figure 5.4.10 indicates the structure for considering the disaster and climate resilience activities.



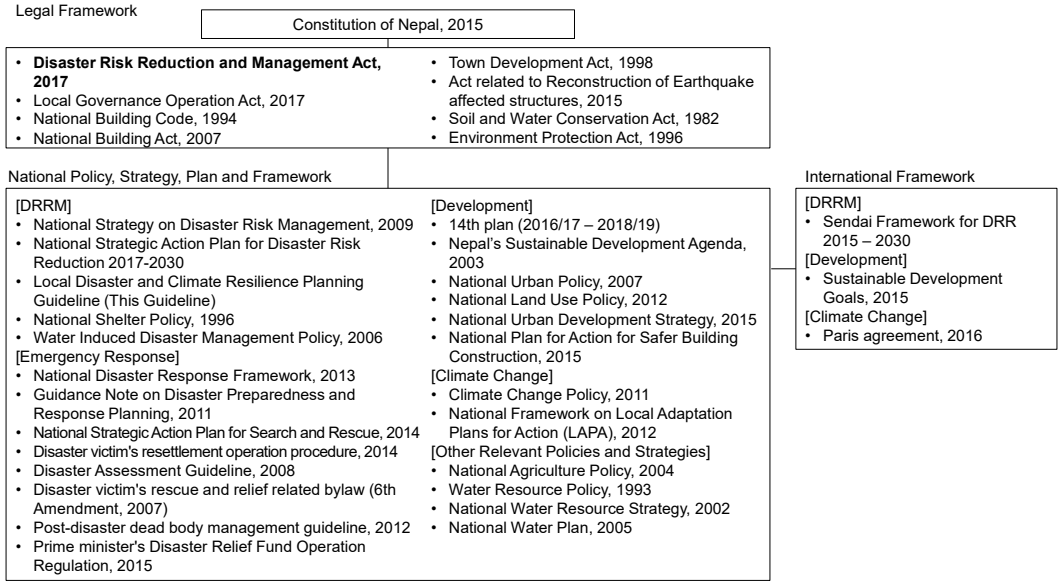
Source: JICA Project Team

Figure 5.4.10 How to consider the DCR activities [Figure in TG LDCRP]

DCR activities should be considered based on the results of the hazard, vulnerability, capacity and risk assessment, vision and mission, and prioritize them based on the strategies which were set in chapters 3 and 4 of LDCRP. In addition, to formulate it as a practical plan,

national and provincial action plans related to DCR should be confirmed in order to know residual risks and to consider necessary activities at the local level to reduce its residual risks. To confirm the measures planned by national and provincial government, TG LDCRP cites the major national action plans related to DCR as shown in Figure 5.4.11.

Prioritization of local disaster risk and climate resilience activities is important to implement efficiently and effectively on a limited budget of the local level. Prioritization should be done by taking into account the fundamental steps of disaster risk management such as understanding risks, strengthening governance, investing in disaster risk reduction and enhancing disaster preparedness for effective response, and to Build Back Better in recovery, rehabilitation and reconstruction. Activities shall be divided into priorities for action of the Sendai Framework for Disaster Risk Reduction 2015-2030.



Source: JICA Project Team

Figure 5.4.11 Major legal framework and national policies related to DCR [Figure in TG LDCRP]

5) Development of example of disaster and climate resilience activities

Considering the capacities of local governments, it is difficult for officials of local governments to grasp the overall picture of the activities related to the disaster and climate resilience and consider the necessary activities. Thus, JICA Project Team developed the example of disaster and climate resilience activities as an appendix of TG LDCRP so that local level entities can refer to it for considering their activities. The example of the activities shows not only the title of the activity but also its detail contents. Hence, the local level can understand each component of the activities, can consider their additional requirements, and easily formulate and implement the activities. Table 5.4.8 shows the part of example of disaster and climate resilience activities in TG LDCRP. The overall contents are referred in

the Volume 5: Attachment 7.

Table 5.4.8 Example of disaster and climate resilience activities (part of understanding disaster risk) [Table in TG LDCRP]

Sector		S/N	Disaster and Climate Resilience Measures	
			Activity List	Contents
1.Understanding disaster risk				
1-1Understanding disaster risk				
	Understanding disaster risk	1-1-1	Accumulation of disaster data for the historical disasters	Accumulation of disaster data ・Accumulation and database compilation of historical disaster data ・Studying the past disasters and disaster trends
		1-1-2	Development of a disaster information database for DRRM	Development of a disaster information database ・Information of past disasters ・Information of physical and social conditions such as geology, people and buildings ・Regularly update database
		1-1-3	Update of VCA in ward level	Update of VCA in ward level (Examples of contents) ・Historical timeline analysis, hazard ranking ・Institutional analysis ・Target group discussion
		1-1-4	Update of VCA in municipal level	Update of VCA in municipal level ・Integration of results of VCA in ward level
		1-1-5	Identification of risk area	Understanding and Identification of the risk area of the municipality ・Risk area by VCA and, results of hazard and risk assessment (if any) ・Risk area on risk sensitive land use plan ・Understanding the risk area
1-2.Effective dissemination of disaster risk information				
	Effective dissemination of disaster risk information	1-2-1	Development of risk maps and DRRM maps	Development of risk maps and DRRM maps ・Development of risk maps and DRRM maps based on the risk assessment
		1-2-2	Dissemination of disaster risk information to the residents	Dissemination of disaster risk information to the residents ・Dissemination of risk maps and DRRM maps to the residents ・Development of hoarding boards for disaster risk information and public awareness
1-3.Awareness Raising and Capacity Building for Understanding Disaster Risk				
	Enhancement of public awareness of Disaster Risk Reduction/ Management (DRRM)	1-3-1	Development of a handbook on DRRM for families	Development and Distribution of a handbook about DRRM for families (Examples of contents) ・Learning about disasters (disaster mechanisms, etc.) ・What to do in the event of disaster
		1-3-2	Implementation of public awareness-raising programs on DRRM	Implementation of awareness-raising programs on DRRM (Examples of programs) ・Community workshop for learning disaster risks and DRRM ・Development/Utilization of educational tools ・TV/Radio awareness program
		1-3-3	Construction and management of DRRM training center	Construction and management of DRRM training center for all municipality (communities, municipal staffs) ・Consideration of the concept of DRRM training center ・Designing the building ・Consideration of the training course/contents ・Planning of the operation and management for the training center

Source: JICA Project Team

5.5 Local Disaster and Climate Resilience Plan for Pilot Municipalities

The JICA Project Team formulated the Local Disaster and Climate Resilience Plan (LDCRP) for Lalitpur Metropolitan City, Bhaktapur Municipality and Budhanilkantha Municipality as pilot municipalities. The purpose of the earthquake hazard and risk assessment which this Project implemented as described in Chapter 3 and 4 is not assessment but to connect the results to the real disaster management countermeasures and disaster risk reduction. So LDCRPs for pilot municipalities were developed by utilizing the result of the earthquake risk assessment to consider the target for disaster risk reduction according to Sendai Framework and consider the necessary activities to achieve its targets. As described in 5.4, JICA Project Team developed a TG LDCRP for local level of Nepal. In accordance with TG LDCRP, LDCRPs for pilot municipalities were developed and the structure and basic contents of LDCRP follow the contents of TG LDCRP as well as LDCRP guideline by MoFALD.

Before the formulation of LDCRP for pilot municipalities the JICA Project Team reviewed the existing local disaster management plan based on the 2011 guideline. Necessary information for planning of each municipality was collected. In accordance with this information, JICA Project Team held workshops three times to make the plan practical and based on the local conditions and ensure direct and inclusive participation of all stakeholders in each municipality for planning. On the basis of the results of the workshops, LDCRP was drafted and finalized. Details are shown as follows.

5.5.1 Review of Existing Disaster Risk Management Plan in Municipalities

The contents of the existing disaster management plan were reviewed to consider the structure and contents of the plan in the pilot municipalities. Only Lalitpur Metropolitan City had an existing disaster risk management plan in the municipal level, formulated in 2016, among the three pilot municipalities. Hence, JICA Project Team collected the existing disaster risk management plan of municipal level as well as district level from MoFALD and relevant organizations. Existing disaster risk management plans which were collected are shown in Table 5.5.1.

Table 5.5.1 Collected existing disaster risk management plans

District, Municipality		Document	Content/Format	Sequence of most prioritized hazards	Language
District level	Parsa, Nawalprashi	District Disaster Management Plan, 2065		Flood, cold wave, fire, landslide	Nepali
		District Disaster Management Plan (2071-75), 2071	Prepared by DDC, supported by UNICEF	Drought, cold wave, flood, fire, wild animals, epidemic	Nepali
	Dolpa	District Disaster Management Plan (2073-78), 2073		Earthquake, drought, epidemic, landslide, avalanche, fire, wind storm, hailstone, snow, lightning	Nepali
	Dhanusha	District Disaster Management Plan (2071-75), 2071		Drought, flood, fire, epidemic, wind storm, flood, wild animals, snakebite	Nepali
	Arghakhanchi	District Disaster Risk Management Plan, April 2011	Almost same format, prepared under FAO Technical Assistance with the then Ministry of Agriculture and Cooperatives as counterpart ministry	Soil erosion, landslide, flood, crop damage by insects, drought	English
	Kapilvastu	District Disaster Risk Management Plan, April 2011		Fire, drought, flood, cold wave, crop disease and pests	English
	Siraha	District Disaster Risk Management Plan, April 2011		Flood, drought, pest and crop disease, epidemics, cold wave	English
	Udayapur	District Disaster Risk Management Plan, April 2012		Flood, landslide, pest and crop disease, drought, snake bite	English
	Chitwan	Municipality and VDC Level DMP, September 2009	Prepared by DDC-Chitwan, Supported by DFID, Practical Action	Flood, landslide, drought	Nepali
Municipal level	Lalitpur Sub-Metropolitan City	Disaster Risk Management Plan, 2015	Prepared in support of "Urban drinking water and sanitation, and, CBDRM" project, supported by UK Government and conducted by ENPHO in collaboration with OXPHAM	Earthquake, fire, windstorm, flood, epidemic, lightning, landslide	Nepali
	Kirtipur Municipality	Disaster Risk Management Plan, 2015		Earthquake, fire, windstorm, road accident, epidemic, landslide, lightning, flood	Nepali
	Nepalgunj Sub-Metropolitan City	Disaster Risk Management Plan (2072-2076)		Inundation, epidemic, flood, frost, hail, earthquake, fire, windstorm	Nepali
	Faleni VDC, Lamjung District	Local Disaster Risk Management Plan (November 2014)	Prepared and technical support by NRCS-Lamjung District Chapter, Community resilience Program (CORE)	Health and sanitation, lack of safe drinking water, flood, drought, hail, problem of irrigation, fire	Nepali
	Dodheni VDC, Lamjung District	Local Disaster Risk Management Plan (2014/15)		Lack of safe drinking water, health and sanitation, flood, fire, drought, hail, wind storm, trail ways, problem of irrigation	Nepali

Source: JICA Project Team

As a result of the review of this existing plan, the issues in the following table were identified, while the plan had been formulated based on the Local Disaster Risk Management Planning Guideline published in 2011 by MoFALD. Thus, the structure of the plan and the guideline which enables to solve these issues and reflect the result of seismic hazard and risk assessment into the plan was considered in this project as shown in 5.4.

Table 5.5.2 Identified issues by the review of the existing disaster risk reduction and management plan

Part	Issues
Overall	➢ Not based on (future) risk assessment and target level of DRR. ➢ Some templates and contents are different from the guideline, and they might be less effective. ➢ The interrelationship is not clear between each section in the plan, such as the VCA and the activity list. Thus, targets, necessity and priority of each activity in the plan are not clear.
Part 1: Introduction	➢ Contents of part 1 may be different for each municipality, since there is no detailed instruction in the guideline.
Part 2: Hazard, Vulnerability, Capacity, Risk Assessment	➢ There are a number of blanks in the tables especially in the VCA part, where templates in LDRMP Guideline were utilized. It seems ineffective.
Part 3: Disaster Risk Management Plan	➢ No detailed information about the role sharing and the cooperation for the implementation. "Who, When, What" should be clarified. ➢ Standard for deciding priority is not explained. ➢ Each content of planned activities in the plan should be elaborated and sophisticated as much as possible, since most descriptions of actions are rough.

Source: JICA Project Team

5.5.2 Information Collection for formulation of LDCRP

LDCRP is the comprehensive plan including many contents and connects to the development plan and relevant documents closely. Accordingly, a lot of information needs to be collected for the formulation of LDCRP. The contents of the LDCRP for pilot municipalities and the necessary information for the planning were considered based on the review of the existing plan, the LDCRP guideline and TG LDCRP which JICA Project Team developed as shown in 5.4. The following table shows the information collected from pilot municipalities and relevant organizations for formulation of the LDCRP. This list does not include the related laws, policies and plans of the Government of Nepal, and they are referred in the Appendix 1 and collected data and information in this project are referred in the Attachment 1.

Table 5.5.3 Collected information for formulation of LDCRP

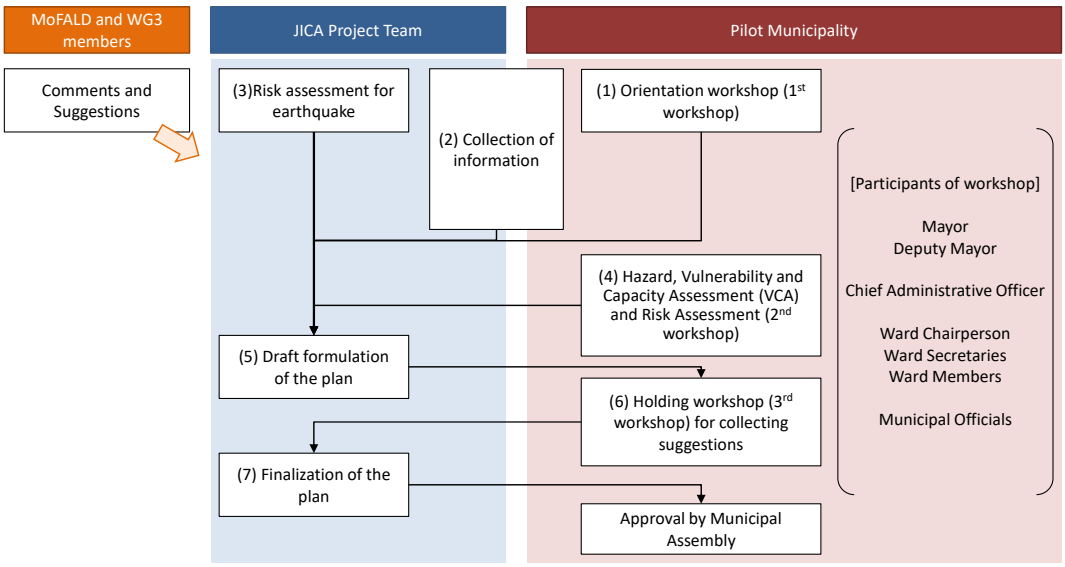
S.N.	Collected information/Documents	Lalitpur	Bhaktapur	Budhanilkantha	Remarks	Language
1	Organization chart, 2072, 2074	○	○	○		Nepali
2	Damage data of Gorkha Earthquake, 2072	○	○	○	Various (dead/injured, household, heritage) , collected from all municipalities of KV	Nepali
3	Periodic Development Plan (2070/71-2074/75), LSMC	○				Nepali
4	Report, Organization Development Study Program	○				Nepali
5	Periodic Plan Formulation, progress report, 2068		○			Nepali
6	Bhaktapur Monthly, First Municipal Assembly Special 2074		○			Nepali
7	Annual Municipal Development Plan F.Y. 2074/075, Budhanilkantha Municipality			○		Nepali
8	Resource map, Budhanilkantha Municipality, 2073			○		Nepali
9	Details on number of staffs in each department	○	○	○	2015/16 and updated	Nepali
10	DRM Plan of LSMC, 2072	○				Nepali
11	DM Plan of Ward 8, LSMC, 2071	○				Nepali
12	CBDRRM Plan of Ward 6, LSMC, 2070	○				Nepali
13	VCA Report of Ward 6, LSMC	○				Nepali
14	VCA Reports of several wards, LSMC	○				Nepali
15	Land Pooling Program sites, Bhaktapur Municipality, 2015		○			Nepali
16	Budget Lists	○	○	○	Past 5 years	Nepali
17	Data/Documents from DDC	○	○		Damage data of Gorkha Earthquake, GIS data, etc.	Nepali
18	District level Disaster Preparedness and Response Plan	○	○	○		Nepali
19	Risk Sensitive Land Use Plan	○	○	○		English
20	Census 2011	○	○	○	Population and Building	English
21	Climate data	○	○	○	Data of each station	English

Source: JICA Project Team

5.5.3 Formulation of Local Disaster and Climate Resilience Plan

The JICA Project Team formulated the Local Disaster and Climate Resilience Plan (LDCRP) for pilot municipalities based on not only the collected information but also holding workshops as participatory planning. Figure 5.5.1 shows the planning framework and processes of LDCRP. JICA Project Team discussed the contents of LDCRP with counterpart of each pilot municipality, and organized the workshop three times for the formulation of LDCRP in each pilot municipality. The workshops were held not only for LDCRP but also for SOP as shown in 5.3. The first workshop was held for discussion of the basic principles of LDCRP such as vision and mission. The second workshop was held for discussion of hazard, vulnerability, capacity and risk assessment since the risk assessment, which this project conducted, is only for earthquake and LDCRP is for all target disasters.

On the basis of collected information, the results of first and second workshops and the result of seismic risk assessment, the draft of LDCRP was formulated. The third workshop was held for discussion of disaster and climate resilience activities with priority and provision of necessary suggestions, and LDCRP was finalized based on the result of the third workshop. Members of the municipal assembly, who would be members of local disaster and climate resilience committees, as indicated in the LDCRP guideline, participated in the workshops. MoFALD and WG3 members provided comments and suggestions in the WG3 meetings while the JICA Project Team shared the progress of formulation of LDCRP.



Source: JICA Project Team

Figure 5.5.1 Planning framework and processes of LDCRP

The table of contents of LDCRP for pilot municipalities is same as proposed under TG LDCRP which was developed in this project as shown in 5.4. All of the contents of LDCRP are based on the LDCRP guideline, TG LDCRP, collected information, results of hazard and risk assessment of this project, and the results of workshops which were organized in each municipality as shown in Table 5.5.4.

Table 5.5.4 Contents and Basis of contents for LDCRP

Contents			Basis of contents
Chapter 1. Introduction			
1-1	Background	- Summary of history, population and location	- Collected from each municipality - Refer to LDCRP guideline and TG LDCRP
1-2	Objective of Plan	- Objectives of Plan	
1-3	Rationale and Significance of Plan	- Rationale and Significance of Plan	
1-4	Limitation of Plan	- Limitation of Plan	
1-5	Methodology	- Methodology	- Description of methodology adhered to this project
1-6	Plan Implementation Strategy	- Plan Implementation Strategy	- Refer to LDCRP guideline and TG LDCRP
Chapter 2. General Description			
2-1	Physical Condition	1) Topographic & geological conditions (Data & GIS)	- Collected from DMG and outputs of this project
		2) Land use (Data and GIS Map)	- Collected from Risk Sensitive Land Use Plan, UNDP Project
		3) Climate conditions (Data)	- Collected from Department of Hydrology and Meteorology
2-2	Social Condition	1) Population (Data & GIS Map)	- Collected from Census 2011 by CBS
		2) Building (Data and GIS Map)	- Collected from Census 2011 by CBS
Chapter 3. Hazard, Vulnerability, Capacity and Risk Assessment			
3-1	Historical Disaster Events	- Historical Disaster Events (Table)	- Based on the second workshop
3-2	Hazard Identification and Ranking	- Hazard Ranking in Municipality	
3-3	Hazard Analysis	- Earthquake	- Based on the risk assessment of this project
		- Results of VCA for Other disasters	- Based on the second workshop
3-4	Vulnerability Analysis	- Results of VCA for Other disasters	
3-5	Capacity Analysis	- Results of VCA for Other disasters	
3-6	Risk Identification and Assessment	- Earthquake	- Based on the risk assessment of this project
		- Other disasters	- Based on the second workshop
Chapter 4. Local Disaster and Climate Resilience Policy			
4-1	Vision and Mission	- Vision and Mission for disaster and climate resilience	- Based on the first workshop
4-2	Disaster and Climate Resilience Strategy	- Target and strategy for disaster and climate resilience	- Drafted based on the risk assessment of this project and discussed/finalized based on the second workshop
4-3	Institutional Structure of Disaster and Climate Resilience	1) Framework of related organizations	- Refer to LDCRP guideline and TG LDCRP
		2) Organization chart of municipality	- Collected from each municipality
Chapter 5. Local Disaster and Climate Resilience Activities			
5-1	Understanding disaster risk	- Necessary Activities for understanding disaster risk	- Drafted based on the TG LDCRP, Risk assessment of this project and second workshop, and discussed/finalized based on the third workshop
5-2	Strengthening disaster risk governance to manage disaster risk	- Necessary Activities for strengthening disaster risk governance to manage disaster risk	
5-3	Investing in disaster risk reduction for resilience	- Necessary Activities for investing in disaster risk reduction for resilience	
5-4	Enhancing disaster preparedness for effective response, and	- Necessary Activities for enhancing disaster preparedness for effective response, and to «Build Back Better»	

Contents			Basis of contents
	to «Build Back Better» in recovery, rehabilitation and reconstruction	in recovery, rehabilitation and reconstruction	
Chapter 6. Monitoring, Evaluation and Update of LDCRP			
6-1	Monitoring and Evaluation	- Framework of monitoring and evaluation	- Refer to LDCRP guideline and TG LDCRP
6-2	Review and Update of LDCRP	- Framework of review and update of LDCRP	

Source: JICA Project Team

In this section, details of each formulation process are shown as follows. The LDCRP of pilot municipalities are referred to in Attachment 8.

(1) Orientation workshop for plan making (1st workshop)

A 1st workshop was held in each municipality as an orientation workshop, organized by the municipality and facilitated by JICA Project Team. In this workshop, JICA Project Team explained the overall contents of the project and concepts for formulation of LDCRP, and the participants discussed basic topics such as the objectives of LDCRP, formulation processes and vision and mission for DCR of municipality. The mayor, deputy mayor and ward leaders who had been newly elected and municipal officials were invited to the workshops. Table 5.5.5 shows the summary of the workshops.

Table 5.5.5 Summary of 1st workshops for LDCRP and SOP in pilot municipalities

Municipality	Lalitpur Metropolitan City	Bhaktapur Municipality	Budhanilkantha Municipality
Date	June 30, 2017	June 25, 2017	June 12, 2017
Participants	Ward Chairpersons, Municipal Officials, JICA Project Team (Approx. 35 people) *Mayor and deputy mayor were absent because of urgent tasks.	Mayor, Deputy Mayor Ward Chairpersons, Khowpa College, Municipal Officials, JICA Project Team (Approx. 45 people)	Mayor, Deputy Mayor Ward Chairpersons, Municipal Officials, JICA Project Team (Approx. 50 people)
Summary of Contents / Discussions related to LDCRP	・Explanation of the Project ・Explanation and discussion about the outline, procedure and contents of LDCRP ・Discussion about the Vision and Mission of LDCRP		

Source: JICA Project Team

Budhanilkantha Municipality

Bhaktapur Municipality

Lalitpur Metropolitan City

Source: JICA Project Team

Figure 5.5.2 Photo of 1st workshops for LDCRP and SOP in pilot municipalities

In accordance with 1st workshops, the vision and mission of LDCRP were summarized as the fundamental principle of LDCRP and disaster risk reduction and management for future in pilot municipalities as follows.

Lalitpur Metropolitan City:

Vision Disaster Resilient and Safe Metropolitan

Mission

1. To Encourage Everyone to Build Earthquake Resistant Buildings with Incorporation of Building Codes, Bylaws, Land Use Plan and Other Policies to Protect People
2. To Increase the Capacity and enhance awareness to Implement Efforts for Disaster Prevention/Mitigation and Preparedness, Emergency Response, and Rehabilitation/Reconstruction in planned, integrated, coordinated and comprehensive manner.
3. To Mainstream the DCR Activities to Development programs and to Establish Community's Right to Live being Safe from the Disaster

Bhaktapur Municipality:

Vision Develop Bhaktapur Municipality as a Resilient City towards Zero Casualties from Disasters

Mission

1. To develop policies for disaster risk reduction and management to be safe from the disaster
2. To encourage everyone to build seismic resistant buildings with incorporation of building codes, bylaws to protect people's lives
3. To Increase the capacity and enhance awareness to implement efforts for various disasters in planned, integrated, coordinated and comprehensive manner

Budhanilkantha Municipality:

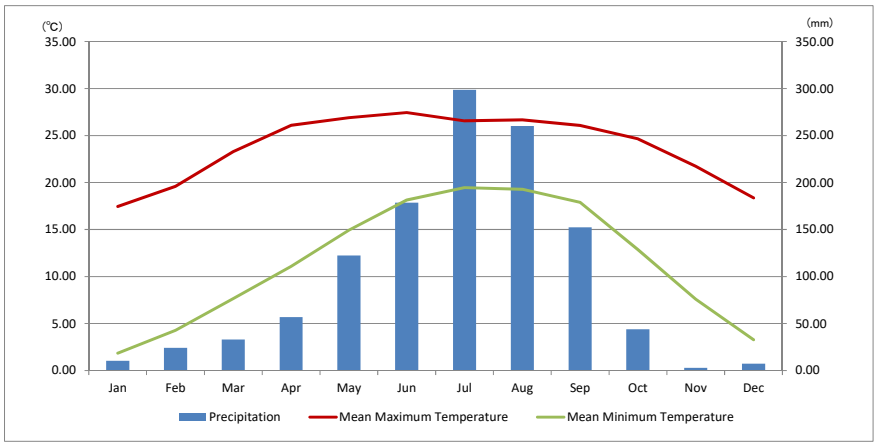
Vision Build a Safer, Prosperous and Disaster Resilient Budhanilkantha Municipality for Future

Mission

1. To protect people's lives from disasters through risk reduction
2. To ensure proper planning and coordination for implementation of LDCRP with incorporation of various development plans
3. To enhance resource management and to raise the level of awareness for strengthening disaster risk reduction and management capacities

(2) Collection of information

During the process of preparing LDCRP, information was collected. Specially, relevant laws and plans of district and national level, social and financial information along with information on what type of activities have been carried out, and in which location, were collected as shown in 5.5.2. On the basis of collected information, several tables, figures, maps and description were prepared for the general description in Chapter 2 of LDCRP for pilot municipalities, especially climate conditions and population and building data as the social conditions. Figure 5.5.3 shows the climate condition which were prepared for LDCRP from data of Department of Hydrology and Meteorology, as an example of Lalitpur Metropolitan City.

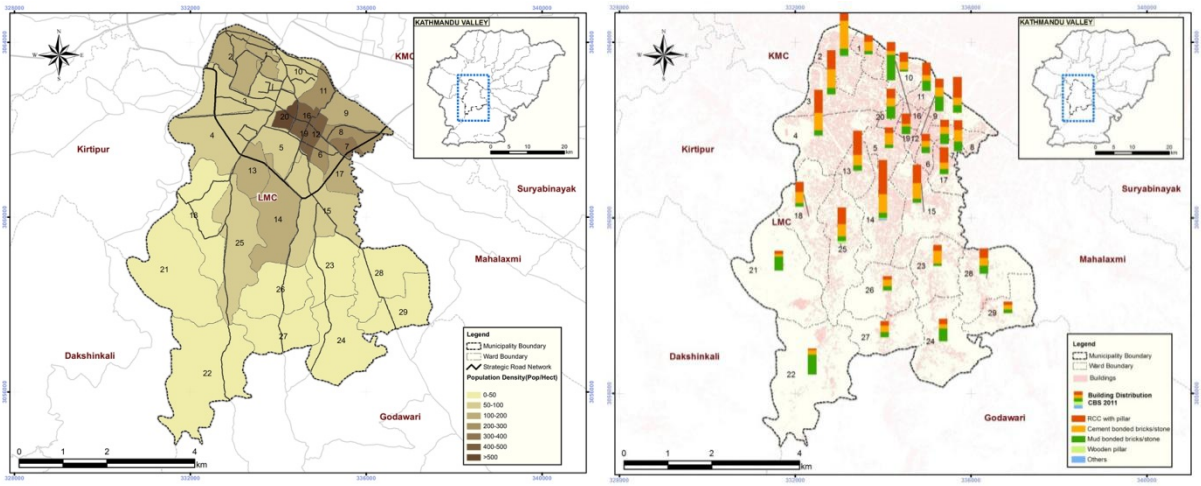


Data Source: Department of Hydrology and Meteorology

Figure 5.5.3 Rainfall and Temperature 1997 - 2016 (Khumaltar station) (Example of LDCRP for Lalitpur Metropolitan City)

Total amount of rainfall of July and August is around 250mm – 300 mm. In the rainy season, the risks of flood, landslide and other storm and rain related disasters increase. On the other hand, in the dry season, the risk of drought increases. In LDCRP, climate trend is also summarized for the climate change adaptation and climate resilience according to the "Observed Climate Trend Analysis of Nepal" (Department of Hydrology and Meteorology, 2017). All Nepal minimum temperatures show a significantly positive trend only in the monsoon season. No significant trend is observed in precipitation in any season. All Nepal annual maximum temperature trend is significantly positive (0.056 ^{o}C/yr). All Nepal annual minimum temperature trend is also positive (0.002 ^{o}C /yr) but it is insignificant.

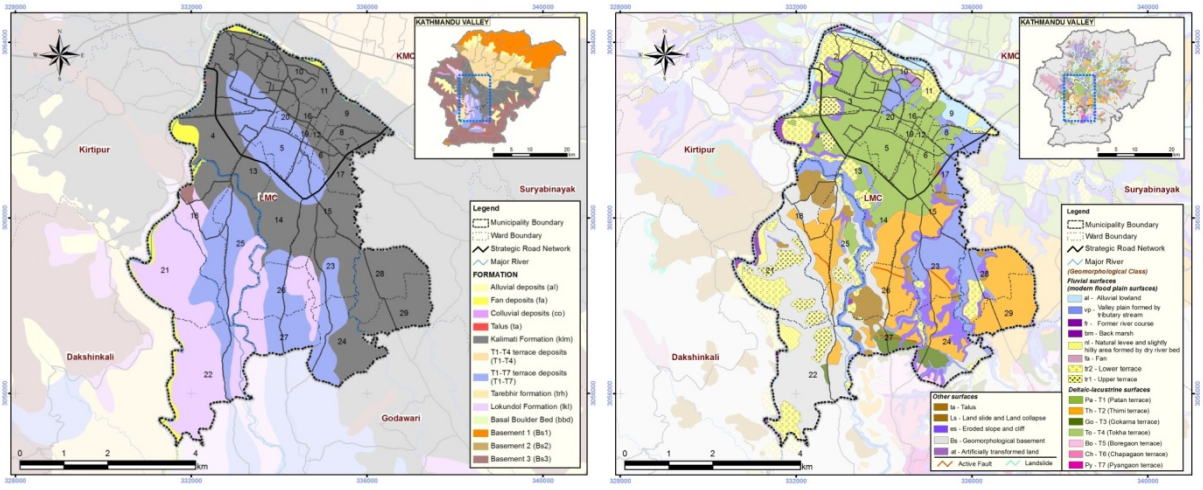
Information on social conditions such as population and building structure is important considerations for DCR to identify the high density areas of the population and old buildings as the exposure and vulnerability connected to disaster risks. Thus the data was summarized based on the Census as shown in Figure 5.5.4.



Data Source: Census 2011, CBS, edited by JICA Project Team

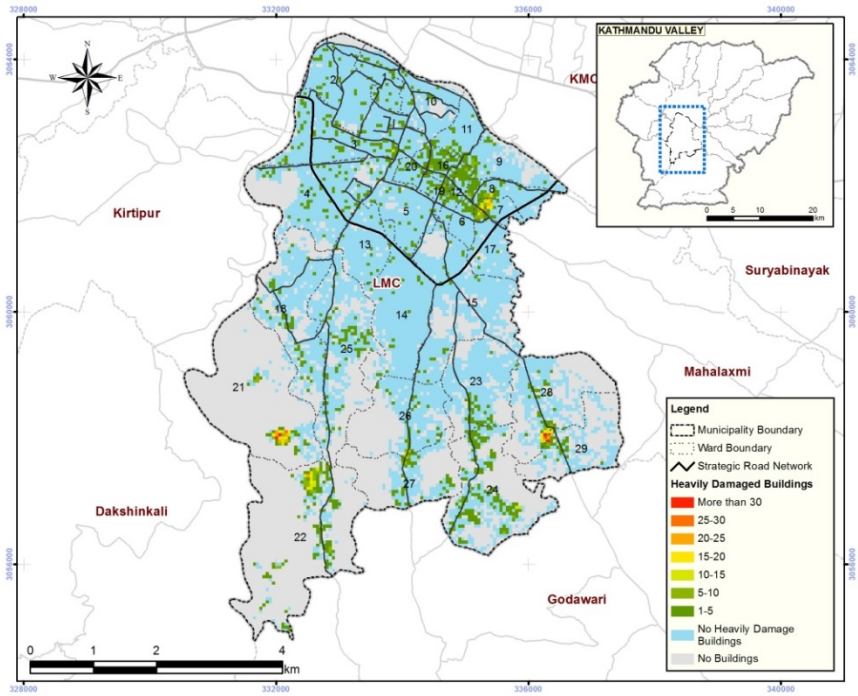
Figure 5.5.4 Population Density Map in 2011 (Left) and Household by type of foundation of house at war level in 2011 (Right) (Example of LDCRP for Lalitpur Metropolitan City)

In addition, for the general description in Chapter 2 of LDCRP, maps which were created for the whole of KV by hazard and risk assessment in this project were arranged for pilot municipalities, such as geological map and geomorphological map, etc. as shown in Figure 5.5.5. The disaster which caused most serious damage in recent years in pilot municipalities is the Gorkha Earthquake in 2015. As shown in Appendix 6; Building Inventory, Damage and Seismic Intensity Survey, building damage data by the Gorkha Earthquake were gathered, and data was summarized for LDCRP. Figure 5.5.6 shows the heavily damaged buildings by Gorkha Earthquake in case of Lalitpur Metropolitan City.



Source: (Left) Department of Mines and Geology, edited by JICA Project Team, (Right) JICA Project Team

Figure 5.5.5 Geological Map (Left) and Geomorphological map (Right) (Example of LDCRP for Lalitpur Metropolitan City)



Source: JICA Project Team

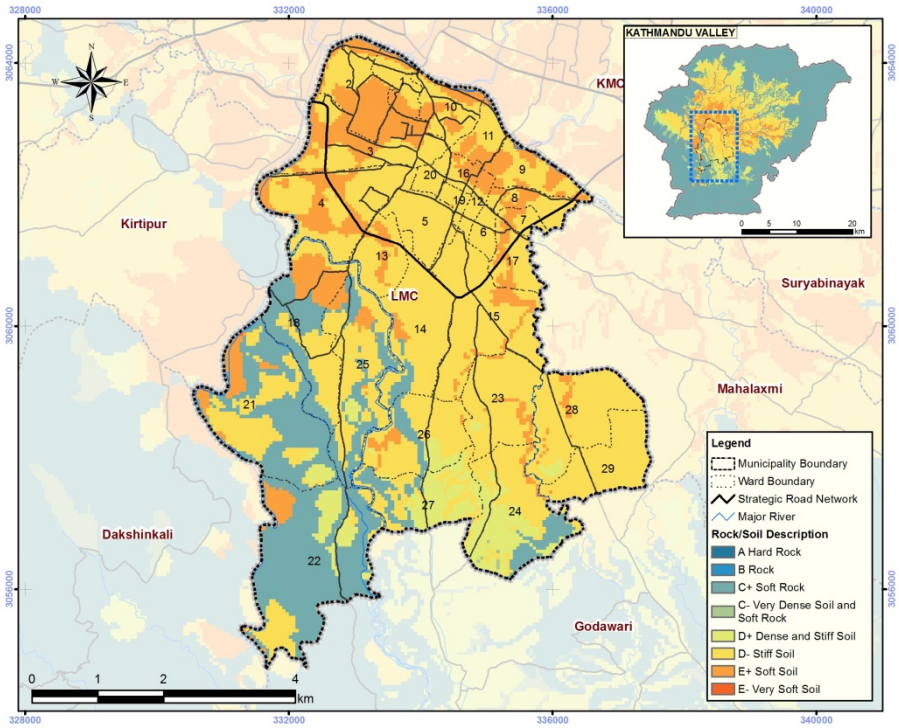
Figure 5.5.6 Heavily Damaged Buildings by 2015 Gorkha Earthquake (Example of LDCRP for Lalitpur Metropolitan City)

(3) Risk assessment for earthquake

As described in Chapter-3 and 4, the JICA Project Team conducted the hazard analysis and risk assessment for earthquake for understanding the risk for earthquake and to consider countermeasures to reduce the disaster risks. The results of hazard analysis and risk assessment were summarized for LDCRP in pilot municipalities as follows.

1) Hazard analysis

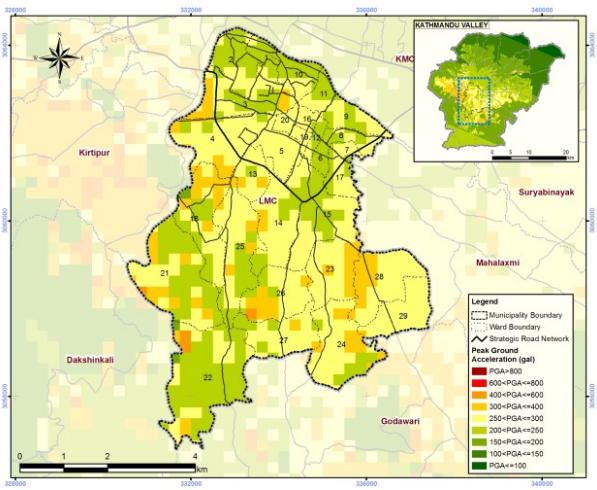
As per the hazard analysis of earthquake, AVS30, the average value of the Shear-wave velocity to a depth of 30m from the surface, which shows the softness of ground in each location, is as follows based on the geomorphological unit and a variety of survey results.



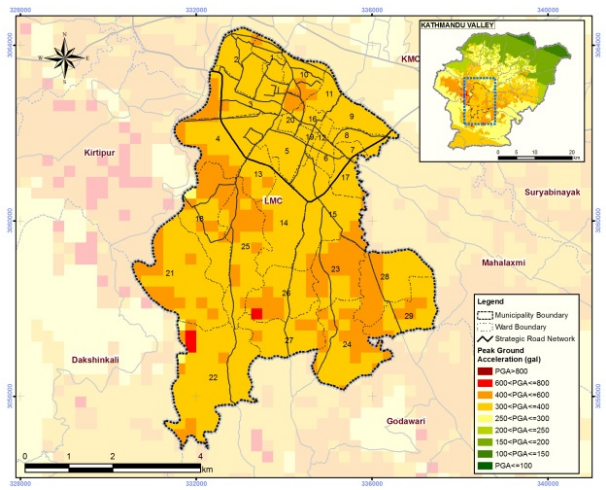
Source: JICA Project Team

Figure 5.5.7 AVS30 Map based on Geomorphological Unit (Example of LDCRP for Lalitpur Metropolitan City)

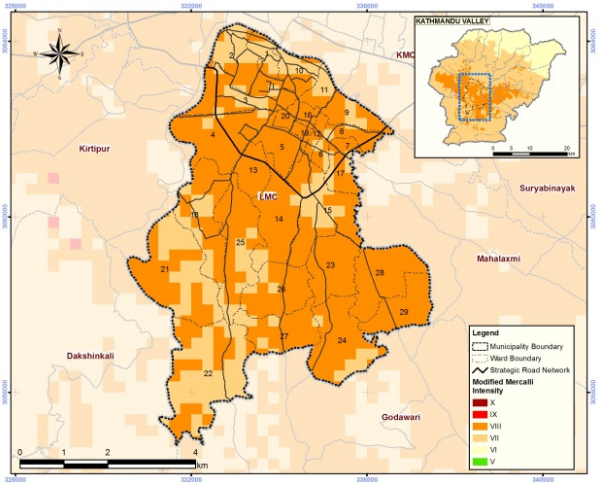
Based on the Figure 5.5.7, PGA (Peak Ground Acceleration) and MMI (Modified Mercalli Intensity) has been calculated. The results for CNS-1 and 2 are shown as follows.



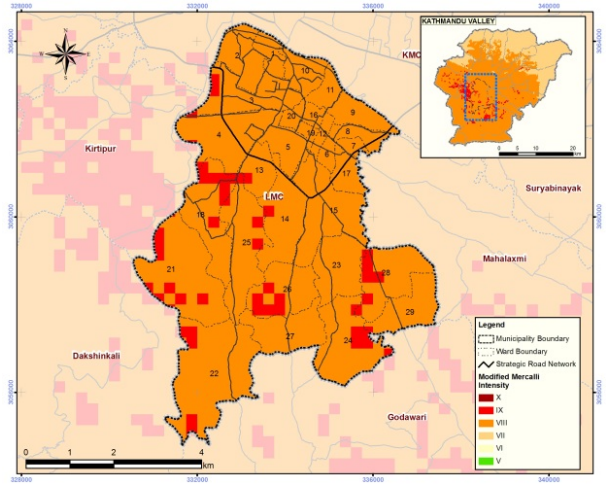
PGA(CNS-1)



PGA(CNS-2)



MMI(CNS-1)

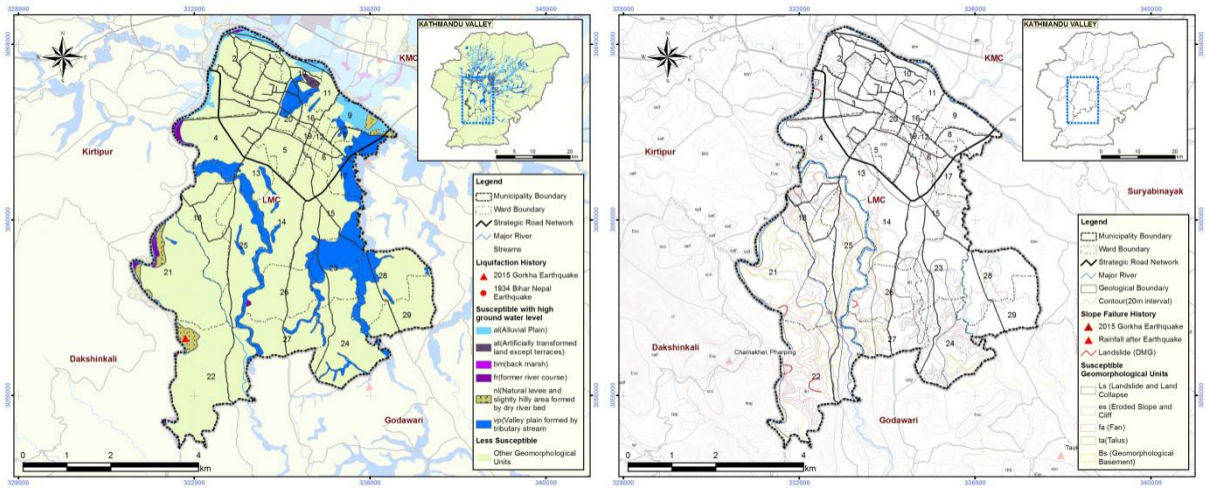


MMI(CNS-2)

Source: JICA Project Team

Figure 5.5.8 PGA (Above) and MMI (Below) of Scenario Earthquakes (Example of LDCRP for Lalitpur Metropolitan City)

In addition, there are the possibilities of liquefaction and slope failure induced by the earthquake after the occurrence of the earthquake. Therefore, susceptibility of liquefaction and slope failure were analyzed by the JICA Project Team based on the several survey results. The maps are shown as follows.

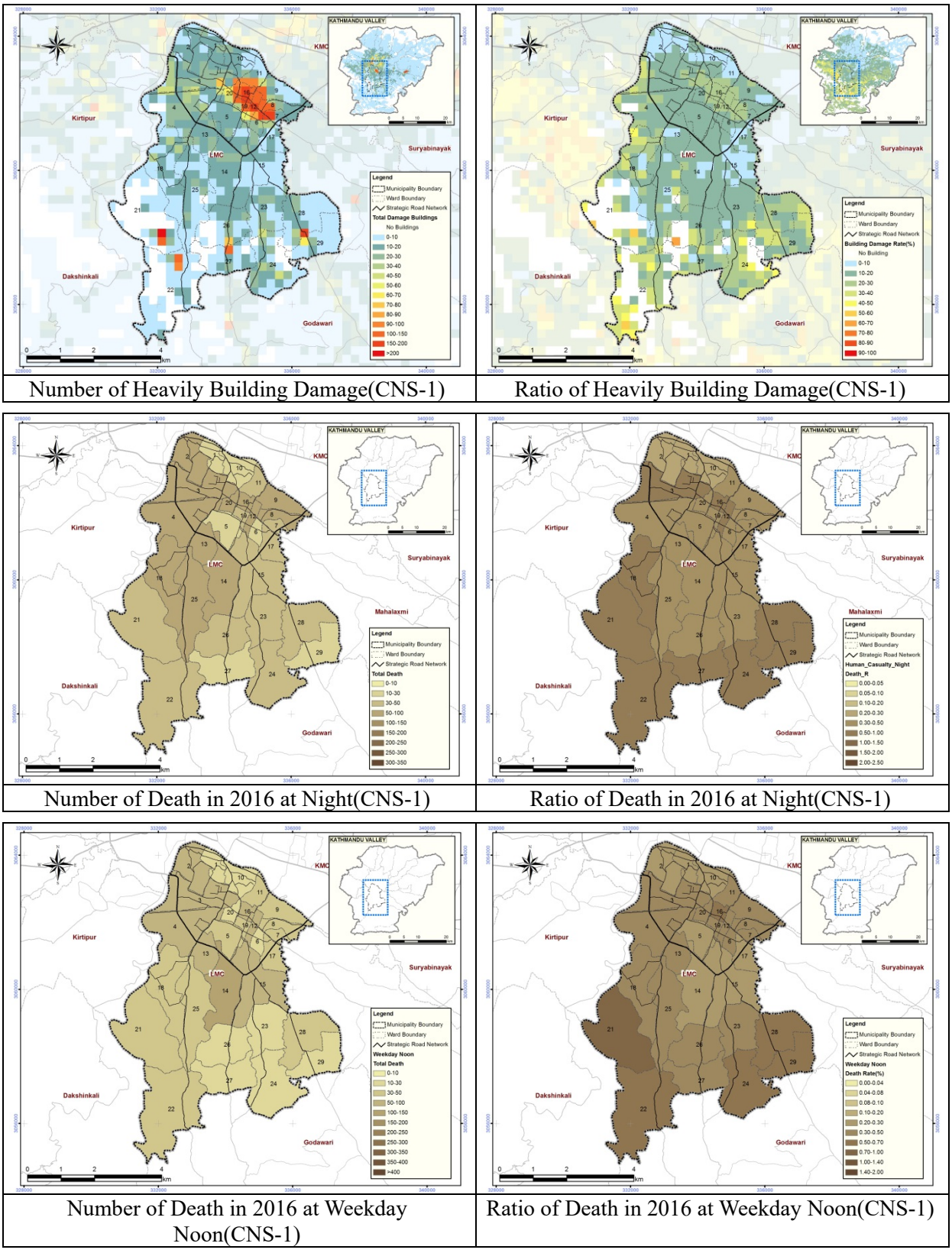


Source: JICA Project Team

Figure 5.5.9 Liquefaction Susceptibility Map (Left) and Earthquake Induced Slope Failure Susceptibility Map (Right) (Example of LDCRP for Lalitpur Metropolitan City)

2) Risk assessment for earthquake

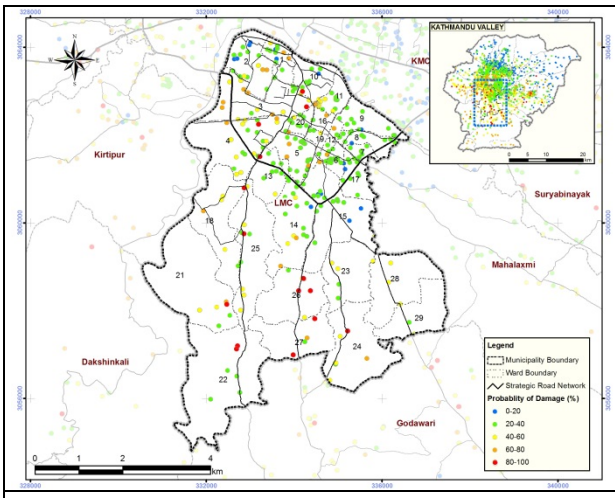
The results of risk assessment for earthquake by this project were summarized as follows.



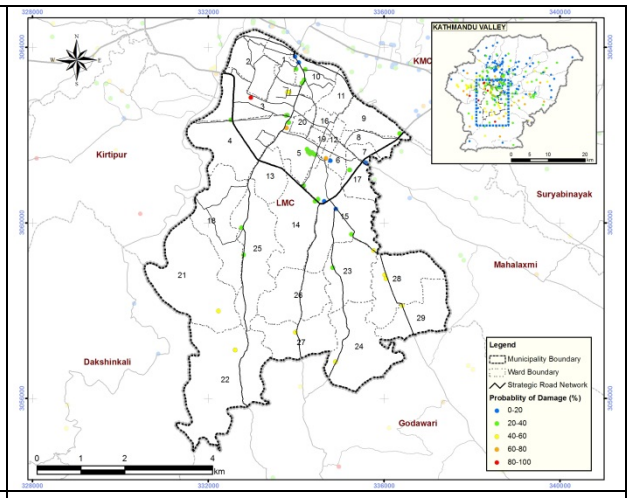
Number of Heavily Building Damage(CNS-1)	Ratio of Heavily Building Damage(CNS-1)
Number of Death in 2016 at Night(CNS-1)	Ratio of Death in 2016 at Night(CNS-1)
Number of Death in 2016 at Weekday Noon(CNS-1)	Ratio of Death in 2016 at Weekday Noon(CNS-1)

Source: JICA Project Team

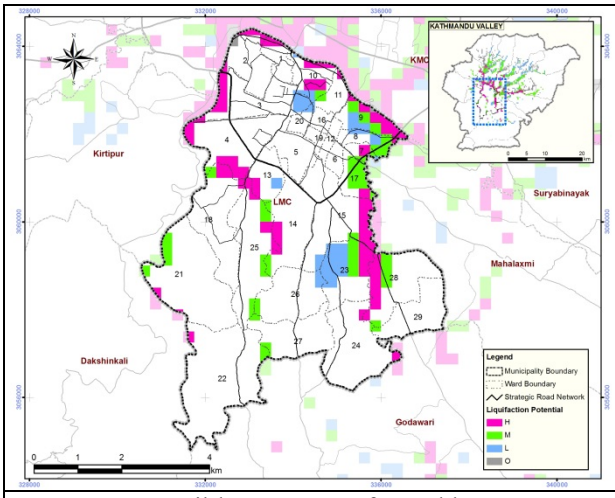
Figure 5.5.10 Result of risk assessment (1) (Example of LDCRP for Lalitpur Metropolitan City)



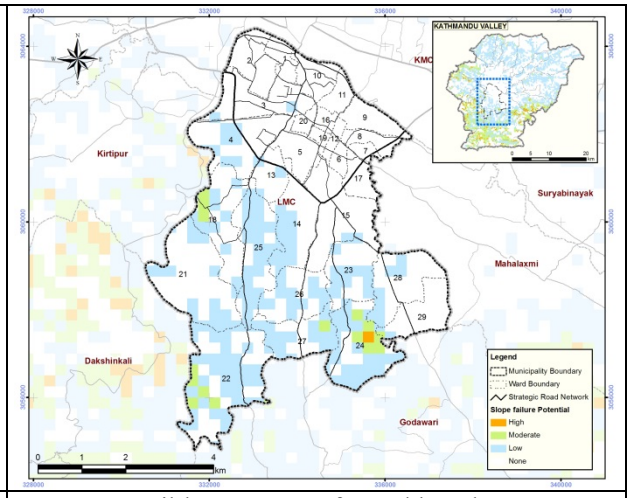
School Building Damage (CNS-2)
Probability of Heavy Damage (Damage Level 4+5 by EMS-98)



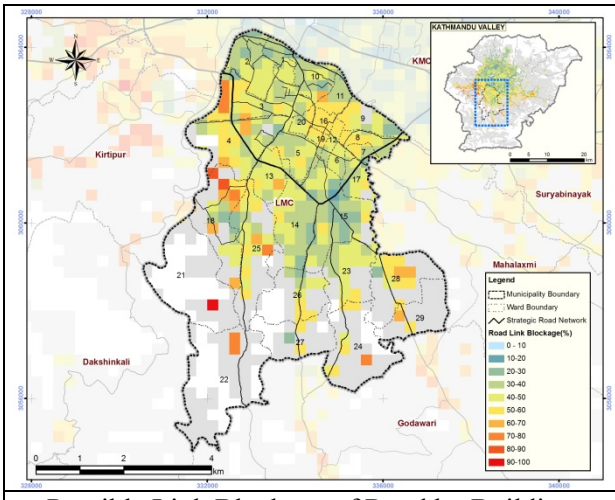
Health Facility Building Damage (CNS-2)
Probability of Heavy Damage (Damage Level 4+5 by EMS-98)



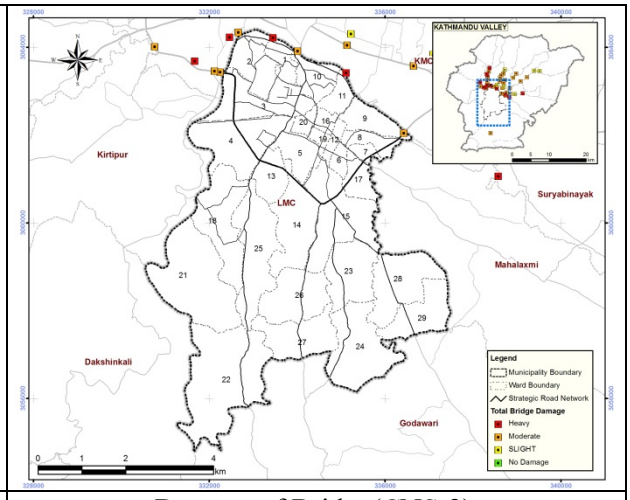
Possible Damage of Road by Liquefaction(CNS-2)



Possible Damage of Road by Slope Failure(CNS-2)



Possible Link Blockage of Road by Building Damage(CNS-2)



Damage of Bridge(CNS-2)

Source: JICA Project Team

Figure 5.5.11 Result of risk assessment (2) (Example of LDCRP for Lalitpur Metropolitan City)

(4) Hazard, Vulnerability, Capacity Assessment (VCA) and Risk assessment (2nd workshop)

The hazard and risk assessment of this project was targeted only for earthquakes as the most prioritized disaster. However earthquakes are not the only target disaster in the pilot municipalities considering past disasters and possible disasters which might occur in the future. LDCRP is a comprehensive plan to reduce risks for target disasters in each municipality, not only earthquake, but also other possible disasters. Therefore, the 2nd workshop was organized by the municipality and JICA Project Team in order to collect the community and ward level disaster and climate resilience related information and data. In this workshop, different methods were used to carry out VCA of municipality, under which are the assessment of social and natural resources of municipality. On the basis of the VCA results, disaster risks were identified and assessed. As same as 1st workshops, mayor, deputy mayor, ward chairpersons, chief administrative officer and municipal officials were invited to the workshops. Table 5.5.6 shows the summary of the workshops.

Table 5.5.6 Summary of 2nd workshops for LDCRP and SOP in pilot municipalities

Municipality	Lalitpur Metropolitan City	Bhaktapur Municipality	Budhanilkantha Municipality
Date	September 13, 2017	September 22, 2017	September 11, 2017
Participants	Mayor, Deputy Mayor, Ward Chairpersons, Municipal Officials, JICA Project Team (133 people)	Deputy Mayor, Chief administrative officer, Ward Chairpersons, Municipal Officials, JICA Project Team (64 people) *Mayor was absent because of urgent tasks.	Mayor, Deputy Mayor, Chief administrative officer, Ward Chairpersons, Municipal Officials, JICA Project Team (85 people)
Summary of Contents / Discussions related to LDCRP	・Explanation of Local Disaster and Climate Resilience Plan (LDCRP), Chapter 1: Introduction, Chapter 2: General Description ・Discussion on Chapter 3: Hazard, Vulnerability, Capacity and Risk Assessment 3-1 Historical Disaster Events 3-2 Hazard Identification and Ranking 3-3 Hazard Analysis 3-4 Vulnerability Analysis 3-5 Capacity Analysis 3-6 Risk Identification and Assessment ・Discussion on Chapter 4: Disaster Risk Reduction and Management Policy 4-1 Vision and Mission 4-2 Strategy		

Source: JICA Project Team

Budhanilkantha Municipality

Lalitpur Metropolitan City

Bhaktapur Municipality

Source: JICA Project Team

Figure 5.5.12 Photo of 2nd workshops for LDCRP and SOP in pilot municipalities

Budhanilkantha Municipality **Lalitpur Metropolitan City** **Bhaktapur Municipality**

Source: JICA Project Team

Figure 5.5.13 Photo of result of mapping on 2nd workshops in pilot municipalities

In the workshops, participants deliberated on the hazard, vulnerability, capacity assessment on the map as shown in Figure 5.5.13. On the basis of mapping, information for the hazard, vulnerability, capacity assessment was summarized for LDCRP. The results of 2nd workshop are as follows.

1) Historical disaster events

Historical disaster events list have been collected from the 2nd workshop in each pilot municipality with information on the type of severe results due to disasters in the past. Consequently, information about the condition of trends and frequency of disaster can be obtained. The example of historical disaster events are shown in Table 5.5.7.

Table 5.5.7 Historical Disaster Events in the past around 30 years (Example of LDCRP for Lalitpur Metropolitan City)

S/N	Disaster Type	Year (Approximately)	Cause, Causal Factor	Damage Descriotion
1	Flood	2046 (1989/90 AD)	-	-
2	Drought	2047 (1990/91 AD)	-	Social loss, economic loss and damage on natural condition
3	Drought	2049 (1992 AD)	Deforestation	Damage on natural condition
4	Flood	2049 (1992/93 AD)	-	Building damage, social loss, economic loss
5	Epidemic	2054 (1997 AD)	Lack of purified drinking water	3-4 dead
6	Fire	2054 (1997 AD)	High dense settlement	Economic loss
7	Epidemic	2055 (1998/99 AD)	-	1 injured, 1 dead
8	Fire	2058 (2001/02 AD)	-	-
9	Flood	2061 (2004/05 AD)	-	1 dead
10	Fire	2070 (2013/14 AD)	Load shedding	Social loss and economic loss
11	Epidemic	2072 (2015 AD)	-	1 injured, 1 dead
12	Earthquake	2072 (2015 AD)	Huge 7.8 magnitude (USGS) earthquake	Around 2,300 private houses collapsed completely, around 5,000 buildings damaged partially 49 dead, 128 injured and, social, economic loss
13	Fire	2072 (2015/16 AD)	Many old buildings	9 houses damaged, 4 injured
14	Heavy rainfall	2072 (2015/16 AD)	-	Building damage, 1 dead
15	Fire	2072 (2015/16 AD)	Gas cylinder explosion	3 dead and economic loss
16	Fire	2072 (2015/16 AD)	Electric pole fell down	-
17	Fire	2073 (2016/ 17 AD)	-	Social loss and economic loss
18	Flood, Landslide	2074 (2017 AD)	River encroachment	-

Note: Information is based on the workshop for formulation of LDCRP in Lalitpur Metropolitan City
Source: JICA Project Team

2) Hazard identification and ranking

Assessing the past disasters, potential future disasters were summarized that could be a threat and pose risks such as loss of life, property damage, or damage to the environment. According to Disaster Risk Reduction and Management Act, 2017, Disasters in Nepal are defined as follows for natural hazard and unnatural hazard.

Natural Hazard: Snow, hailstorm, avalanche, explosion of glacier lake, heavy rainfall, less rainfall, flood, land slide and soil erosion, submergence/water logging, drought, hurricane, storm, cold waves, heat waves, thunderstorm, earthquake, volcano, wildfire or other similar natural hazard

Unnatural hazard: Epidemic, famine, wild fire, chemical and biological threat, flu due to animal and birds, Pandemic Flu, snake bite, wildlife attack, mining, airline, road, water and industrial accident, fire, poisonous gas, chemical or radioactive emission, gas explosion, consumption of poisonous food, environmental pollution, deforestation, damage to physical infrastructure, accident during rescue work and other similar unnatural hazard

Based on the discussions in the 2nd workshop for formulation of LDCRP, disaster identification and ranking was summarized for the pilot municipalities. On the basis of standardization done with the wards, disasters were prioritized. Earthquakes were prioritized as the most hazardous disaster according to the LDCRP guideline. Flood disasters were the second prioritized disaster for all three pilot municipalities. However other target disasters and priorities are different for each municipality. Distinctively, drought was identified only by Lalitpur Metropolitan City and wild fire and wildlife attack were identified only by Budhanilkantha Municipality as target disasters according to the characteristics of land use and topographic conditions. In addition, fire and road accident were indicated by Lalitpur Metropolitan City and Bhaktapur Municipality but not by Budhanilkantha Municipality due to urbanization.

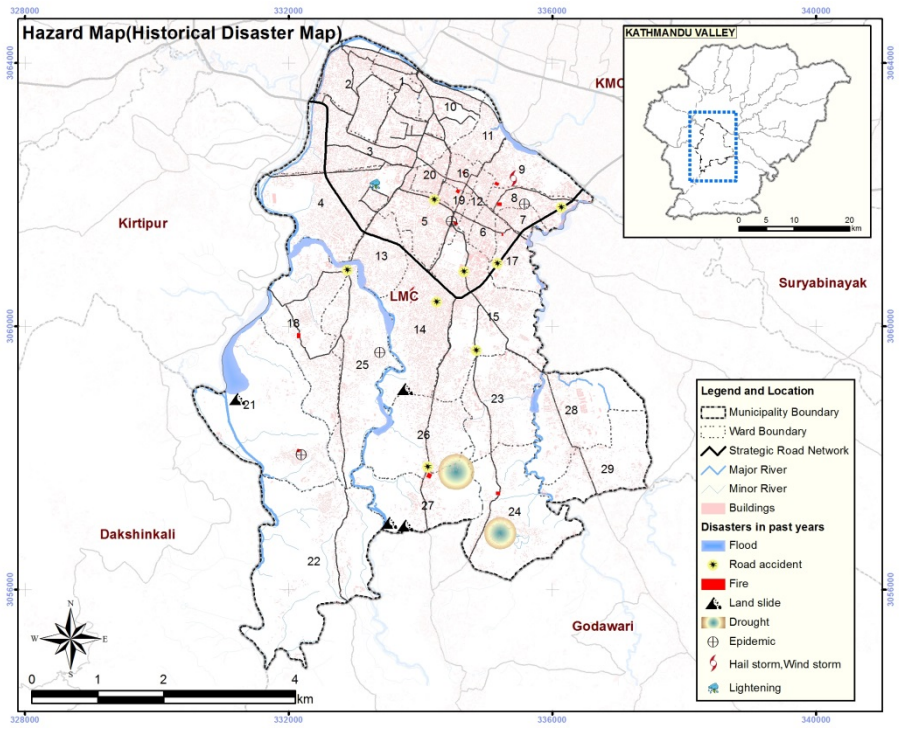
Table 5.5.8 Target disasters with priority for pilot municipalities

Priority	Lalitpur Metropolitan City	Bhaktapur Municipality	Budhanilkantha Municipality
First	Earthquake	Earthquake	Earthquake
Second	Flood	Flood	Flood
Third	Road Accidents	Fire	Landslide
Fourth	Fire	Windstorm	Wild Fire
Fifth	Landslide	Road Accidents	Wildlife Attack
Sixth	Drought	-	-

Note: Information is based on the workshop for formulation of LDCRP
Source: JICA Project Team

3) Hazard analysis

The hazards of disasters other than earthquake were summarized from the results of the 2nd workshop for formulation of LDCRP in each municipality based on the historical disasters. The Hazard map makes it possible to grasp where the disasters in past have occurred within the municipal area. For example in case of Lalitpur Metropolitan City as shown in Figure 5.5.14, fires have occurred mainly in the city centre of northern area with high dense buildings and population, and drought and landslide have occurred in the southern area.



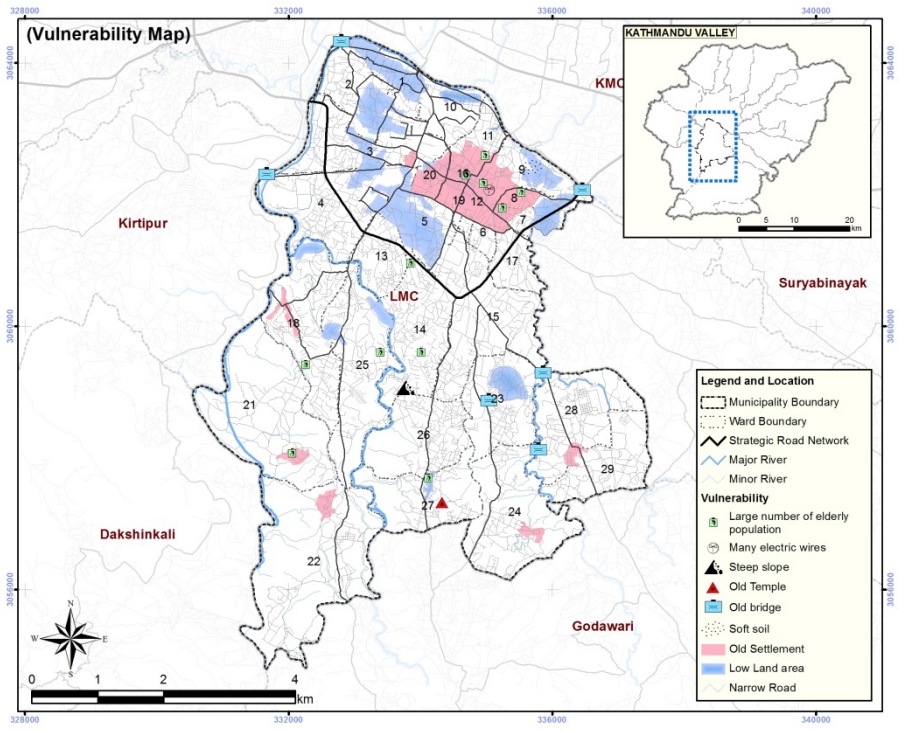
Note: Information is based on the workshop for formulation of LDCRP in Lalitpur Metropolitan City
Source: JICA Project Team

Figure 5.5.14 Hazard Map for disasters except earthquakes (Example of LDCRP for Lalitpur Metropolitan City)

4) Vulnerability analysis

Vulnerability is the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard (UNISDR, 2009). There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors such as poor design and construction of buildings, inadequate protection of assets. Vulnerability varies significantly within a community and over time.

The results of vulnerability analysis were summarized based on the 2nd workshop for formulation of LDCRP in each municipality. The vulnerability map makes it possible to grasp where the vulnerable areas within municipal area is. For example in case of Lalitpur Metropolitan City as shown in Figure 5.5.15, there are old settlements mainly in city centre area and lowland area which is vulnerable for flood and inundation around rivers.



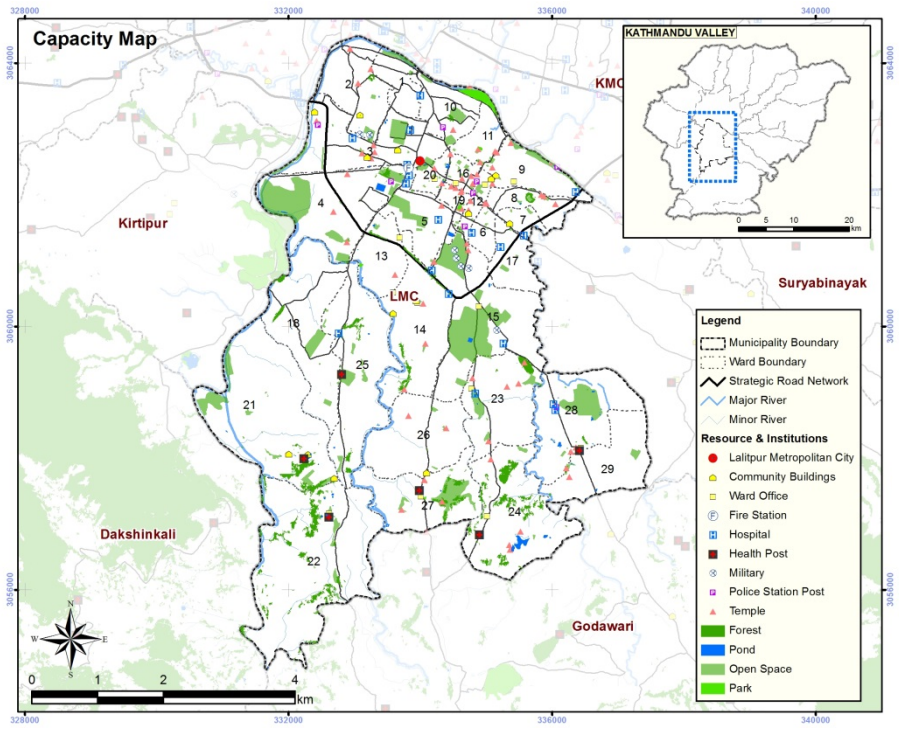
Note: Information is based on the workshop for formulation of LDCRP in Lalitpur Metropolitan City
Source: JICA Project Team

Figure 5.5.15 Vulnerability Map (Example of LDCRP for Lalitpur Metropolitan City)

5) Capacity analysis

Capacity is the combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals (UNISDR, 2009). Capacity includes infrastructure and physical means, institutions, societal coping abilities, as well as human knowledge, skills and collective attributes such as social relationships, leadership and management.

The results of capacity analysis were summarized based on the 2nd workshop for formulation of LDCRP in each municipality. The capacity map makes it possible to grasp the location of resources within municipal area. For example in case of Lalitpur Metropolitan City as shown in Figure 5.5.16, there are several open spaces which could be utilized as temporary shelter.



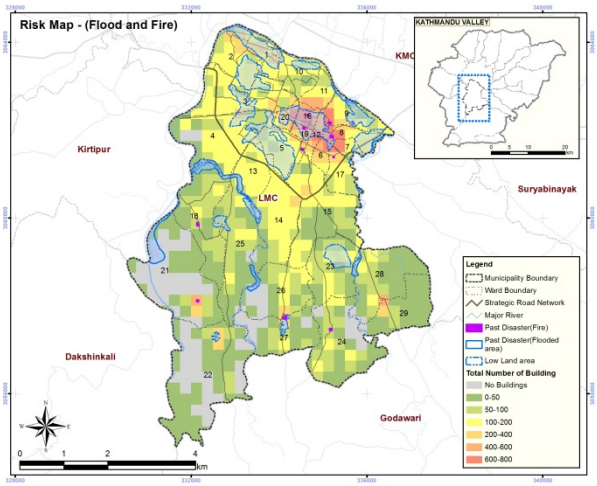
Note: Information is based on the workshop for formulation of LDCRP in Lalitpur Metropolitan City and JICA RRNE Project

Source: JICA Project Team

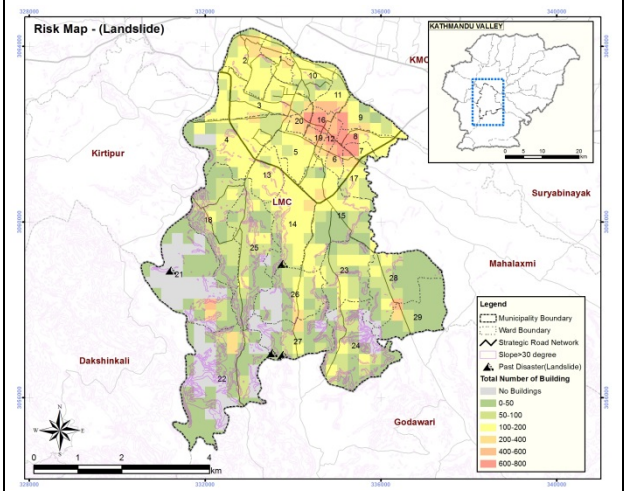
Figure 5.5.16 Capacity Map (Example of LDCRP for Lalitpur Metropolitan City)

6) Risk Identification and Assessment

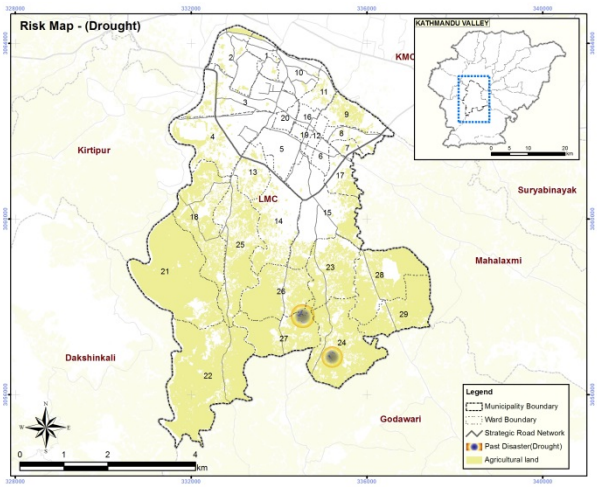
The risks of disasters other than earthquake were identified from the hazard, vulnerability, and capacity assessment and land use conditions such as built-up area by considering exposure to damages in each municipality. The risk map makes it possible to grasp where the risk area is. For example in case of Lalitpur Metropolitan City as shown in Figure 5.5.17, since the city centre of northern area is highly dense with lowland area, these areas are at high risk for flood as well as fire. On the other hand, southern area is at high risk for drought and landslide.



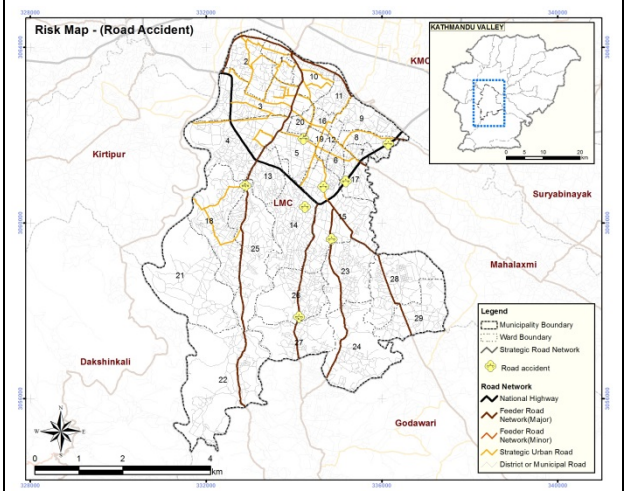
Flood and Fire



Landslide



Drought



Road Accident

Note: Information is based on the workshop for formulation of LDCRP in Lalitpur Metropolitan City
Source: JICA Project Team

Figure 5.5.17 Risk Maps (Example of LDCRP for Lalitpur Metropolitan City)

(5) Draft formulation of the plan

LDCRP in pilot municipalities was drafted in accordance with the risk identification and assessment for earthquake by this project and for other disasters by the 2nd workshop. The framework and structure of LDCRP follows the format of TG LDCRP developed by JICA Project Team.

In the 2nd workshops as shown above, participants discussed the disaster risk reduction target for 2030 based on the results of seismic risk assessment by this project. As described in Chapter 4, the JICA Project Team conducted seismic risk assessments for 2016 and for 2030. Considering the future situations of the increase in the number of buildings and promotion for providing seismic performance strengthening for 2030, five cases and a case of extrapolation of building damages were assessed with the reduction ratio from 2016. The

JICA Project Team explained the comparison of the result between the present and future of risk assessment in the 2nd workshop. Participants decided the disaster risk reduction target for reduction in the number of heavily damaged buildings in each municipality. On the basis of these target numbers, the JICA Project Team drafted the target value for the disaster and climate resilience strategy in accordance with the Sendai Framework as shown in Table 5.5.9 .

Table 5.5.9 Disaster and climate resilience strategies in pilot municipalities

DRR target for 2030		Lalitpur Metropolitan City	Bhaktapur Municipality	Budhanilkantha Municipality
Heavily damaged buildings		35% (12,362 ⇒ 8,035)	40% (3,730 ⇒ 2,238)	40% (1,380 ⇒ 828)
Target of Sendai Framework				
	(a)Mortality	Approx. 35% Reduction (1,761 ⇒ 1,150)	Approx. 40% Reduction (546 ⇒ 330)	Approx. 40% Reduction (235 ⇒ 140)
	(b)Number of affected people	Approx. 35% Reduction (Evacuees) (118,485⇒77,000)	Approx. 40% Reduction (Evacuees) (37,843 ⇒ 22,700)	Approx. 40% Reduction (Evacuees) (20,803 ⇒ 12,000)
	(c) Economic Loss related to heavy damage to buildings	Approx. 15% Reduction (43,377⇒37,000 (mil. NPR))	Approx. 20% Reduction (8,433⇒7,000 (mil. NPR))	Approx. 20% Reduction (4,373⇒3,500 (mil. NPR))
	(d)Critical infrastructure	Reduction	Reduction	Reduction
	(e)Local disaster risk reduction strategy	LDCRP and this strategy	LDCRP and this strategy	LDCRP and this strategy

Source: JICA Project Team

Disaster and climate resilience activities were drafted based on the earthquake risk assessment and results of 2nd workshop during which, the hazard, vulnerability, capacity and risk assessment were discussed, to achieve the disaster and climate resilience strategies for risk reduction. Since the target disasters are different in each municipality, necessary activities to be implemented are also different. Table 5.5.10 shows the draft of activity list for Lalitpur Metropolitan City.

Table 5.5.10 Draft of activity list for Lalitpur Metropolitan City

Sector		Disaster Type	S/N	Disaster and Climate Resilience Measures Activity List
1.Understanding disaster risk				
1-1Understanding disaster risk				
	Understanding disaster risk	Common	1-1-1	Accumulation of disaster data for the historical disasters
		Common	1-1-2	Development of a disaster information database for DRRM
		Common	1-1-3	Update of VCA in ward level
		Common	1-1-4	Update of VCA in municipal level
		Disasters except Earthquake	1-1-5	Identification of risk area
1-2.Effective dissemination of disaster risk information				
	Effective dissemination of disaster risk information	Common	1-2-1	Development of risk maps and DRRM maps
		Common	1-2-2	Dissemination of disaster risk information to the residents

Sector	Disaster Type	S/N	Disaster and Climate Resilience Measures Activity List
1-3.Awareness Raising and Capacity Building for Understanding Disaster Risk			
Enhancement of public awareness of Disaster Risk Reduction/ Management (DRRM)	Common	1-3-1	Development of a handbook on DRRM for families
	Common	1-3-2	Implementation of public awareness-raising programs on DRRM
	Common	1-3-3	Construction and management of DRRM training center
2. Strengthening disaster risk governance to manage disaster risk			
2-1.Developing regulatory frameworks			
Enhancement of policy on DRRM	Common	2-1-1	Formulation of regulation on DRRM
	Common	2-1-2	Mainstreaming of DRRM in development
	Common	2-1-3	Formulation of the local regulation for disaster emergency fund
2-2.Resilient DRRM Governance			
Establishment of a resilient DRRM system	Common	2-2-1	Establishment of Local Disaster and Climate Resilience Committee (LDCRC)
	Common	2-2-2	Enhancement of DRRM organization
	Common	2-2-3	Establishment of task forces
	Common	2-2-4	Management and enhancement of the fire brigade/equipment
	Common	2-2-5	Establishment of Ward level Disaster and Climate Resilience Committee and Community Disaster and Climate Resilience Committee (CDCRC)
	Common	2-2-6	Formulation of community DRRM plans
	Common	2-2-7	Human resource development for DRRM administration
	Common	2-2-8	Monitoring and Evaluation of implementation on the LDCRP
	Common	2-2-9	Update of the LDCRP
Building alliance, collaboration and partnership	Common	2-2-10	Strengthening cooperation with other municipalities, the establishment of a support and acceptance system, and conclusion of agreements
	Common	2-2-11	Establishment of DRR platforms to strengthen the cooperation with other agencies (Red Cross, NGOs/INGOs), the establishment of a support and acceptance system, and conclusion of agreements
3. Investing in disaster risk reduction for resilience			
3-1.Risk Reduction for Buildings			
Resilience and safety of houses	Earthquake	3-1-1	Application of National Building Codes(NBC), enforcement of the building permission and inspection system
	Earthquake	3-1-2	Financial and technical support for seismic diagnosis, seismic resistant measures of houses, and the dispatch of experts for seismic diagnosis
	Earthquake	3-1-3	Development of capacity and public awareness for seismic resistant houses
3-2.Risk Reduction for Critical Facilities and Infrastructures			
Resilience and safety of public buildings	Earthquake	3-2-1	Seismic diagnosis of all public buildings and the reinforcement of public buildings
	Earthquake	3-2-2	Construction of community buildings
	Common	3-2-3	Designation, development, improvement and enhancement of DRRM base facilities
Enhancement of medical, health care and social welfare services	Earthquake	3-2-4	Seismic diagnosis and seismic resistant measures of hospitals on the municipal level, health centers and health posts
	Common	3-2-5	Formulation of a disaster waste management plan
	Common	3-2-6	Ensuring of temporary stock places for disaster waste
Enhancement of school education	Earthquake	3-2-7	Seismic diagnosis and seismic resistant measures of schools
	Common	3-2-8	Education for DRRM
	Common	3-2-9	Enhancement of the DRRM functions of schools
Enhancement of infrastructure	Common	3-2-10	Improvement of roads with disaster resistance for smooth emergency response, transportation and evacuation
	Flood	3-2-11	Removal of debris and waste in the river
	Flood	3-2-12	Conservation of river and construction works for flood and river erosion
	Flood	3-2-13	Development and management of monitoring system for Flood
	Landslide	3-2-14	Conservation of slope area and construction works for landslide
	Road Accident	3-2-15	Installation of traffic signs and signals to control the traffic
	Road Accident	3-2-16	Construction of facilities for safety of pedestrians
	Drought	3-2-18	Development and management of monitoring system for drought

Sector	Disaster Type	S/N	Disaster and Climate Resilience Measures Activity List
Enhancement of lifeline facilities	Earthquake	3-2-20	Taking seismic resistant measures for supply lines and other related facilities, and improve their supply systems
	Flood	3-2-21	Conservation, construction and maintenance of sewage and drainage system
	Fire	3-2-22	Construction of water supply pipe lines for fire fighting
	Fire	3-2-23	Management of electric poles and wires
	Fire	3-2-24	Identification, construction and maintenance of water resources for fire fighting
	Drought	3-2-27	Improvement of irrigation systems
	Drought	3-2-28	Identification, construction and maintenance of water resources for drought
3-3.Resilient DRRM system			
Development of effective evacuation system for DRRM	Common	3-3-1	Formulation and dissemination of evacuation plan
	Common	3-3-2	Designation and development of open spaces as evacuation sites and DRRM bases
	Common	3-3-3	Designation and development of evacuation shelters
	Common	3-3-4	Development of stockpile warehouses, and ensuring disaster stockpiles
Promotion of land use restriction	Common	3-3-5	Revision of the land use zoning and building regulations based on hazard and risk assessment
	Flood	3-3-6	Promotion on relocation of unplanned settlement and settlement in high risk areas
Promotion of a DRRM cooperation system	Common	3-3-7	Strengthening cooperation with private enterprises, and conclusion of agreements
	Common	3-3-8	Support for the formulation of BCP for private enterprises
	Common	3-3-9	Development of an acceptance system for volunteers
4. Enhancing disaster preparedness for effective response, and to «Build Back Better» in recovery, rehabilitation and reconstruction			
4-1. Emergency Preparedness			
Capacity enhancement of emergency response	Common	4-1-1	Establishment of an information collection and dissemination system
	Common	4-1-2	Development of an information sharing system for vulnerable people and deprived/marginalized people (Pichadiyeko barga)
	Common	4-1-3	Establishment of early warning system
	Common	4-1-4	Establishment of Emergency Operation Centre (EOC)
	Common	4-1-5	Establishment of the initial system and mobilization system for emergency response
	Disasters except Earthquake	4-1-6	Formulation of a disaster emergency response manual（SOP）
	Common	4-1-7	Implementation of DRRM exercises for emergency response
Capacity enhancement of rescue, first-aid and emergency medical activities	Common	4-1-8	Designation of disaster base hospitals, medical centers
	Common	4-1-9	Establishment of an emergency medical transportation system
Traffic/transportation and lifeline management	Common	4-1-10	Development of a plan/manual for the elimination of road obstacles, strengthening of elimination of road obstacles system, strengthen cooperation with the police
	Common	4-1-11	Conclusion of agreements related to emergency recovery for roads with the construction companies
	Common	4-1-12	Strengthening of emergency response capacities in cooperation with lifeline operators
Enhancement of CBDRRM (Community Based Disaster Risk Reduction and Management)	Common	4-1-13	Promotion of the preparation of emergency stockpiles by families
	Common	4-1-14	Formulation of "community carte" for summarized information of current conditions on DRRM at the community level
	Common	4-1-15	Implementation of DRRM capacity development programs for community leaders
	Common	4-1-16	Carrying out of community DRRM exercises
DRRM measures for tourist sites	Common	4-1-17	Designation and development of evacuation sites adjacent to tourist sites
	Common	4-1-18	Establishment of a guidance system for tourists in the event of a disaster
	Common	4-1-19	Enhancement of stockpiles for tourists

Sector	Disaster Type	S/N	Disaster and Climate Resilience Measures Activity List
4-2. Emergency Response activities during disaster			
	Common	4-2-1	Establishment and management of Emergency Response Headquarter (ERHQ)
	Common	4-2-2	Gathering disaster information
	Common	4-2-3	Emergency rescue activities (Search and Rescue (SAR), and first-aid) for disaster victims
	Common	4-2-4	Fire extinguishing activities
	Common	4-2-5	Management of evacuation shelters (distribution of emergency kit such as food, clothing, health care, drinking water and sanitation)
	Common	4-2-6	Environment management (temporary toilet, management of dead bodies, cleaning hygiene and epidemic prevention measures, treatment for solid waste and debris)
	Common	4-2-7	Providing information to public
	Common	4-2-8	Protection and support for vulnerable groups
	Common	4-2-9	Emergency recovery for the function of critical facilities, infrastructures and lifelines to secure the transportation network
	Common	4-2-10	Accepting the support of volunteers
	Common	4-2-11	Safety control and panic prevention measures
	Common	4-2-12	Management of emergency fund
	Common	4-2-13	Collaboration and request for support and acceptance with other organizations
4-3. Activities in the Aftermath of Disaster with Build Back Better			
	Common	4-3-1	To conduct assessment of damage and loss due to disaster
	Common	4-3-2	To formulate action plan for rehabilitation and reconstruction with BBB
	Common	4-3-3	Recovery of public facilities and infrastructure and reconstruction of disaster victims' houses
	Common	4-3-4	To recover/normalize the life of disaster victims
	Common	4-3-5	To conduct social, economic, and cultural rehabilitation of disaster victims

Source: JICA Project Team

(6) Organizing workshop (3rd workshop) for collecting suggestions

The plan prepared in the form of framework was again reviewed by organizing 3rd workshops between the municipality and JICA Project Team. After formulating the draft version of the LDCRP with a list of activities to be implemented, the JICA Project Team distributed it at the workshop and the participants of the workshop deliberated especially on the DCR activities with priority and provided necessary suggestions and points to be added. Countermeasures for disaster and climate resilience cannot be prepared only by municipality. Hence, collaboration with national and provincial government and related organizations is essential. Sharing the roles and responsibilities among the above organizations is most important and participants discussed about the responsibilities of each level of government on each activity. Moreover, participants identified the location for evacuation and priority activities. In the workshop, mayor, deputy mayor, ward chairpersons, chief administrative officer and municipal officials were invited to the workshops. Table 5.5.11 shows the summary of the workshops.

Table 5.5.11 Summary of 3rd workshops for LDCRP and SOP in pilot municipalities

Municipality	Lalitpur Metropolitan City	Bhaktapur Municipality	Budhanilkantha Municipality
Date	December 19, 2017	December 20, 2017	December 18, 2017
Participants	Ward Chairpersons, Municipal Officials, JICA Project Team (34 people) *Mayor and deputy mayor were absent because of urgent tasks.	Mayor , Deputy Mayor, Chief administrative officer, Ward Chairpersons, Municipal Officials, JICA Project Team (52 people)	Mayor, Deputy Mayor, Chief administrative officer, Ward Chairpersons, Municipal Officials, JICA Project Team (32 people)
Summary of Contents / Discussions related to LDCRP	・Explanation of Local Disaster and Climate Resilience Plan (LDCRP), Chapter 1-4 ・Discussion on Local Disaster and Climate Resilience Activities (1) Prioritization of Activities (2) Designation of Location for Evacuation and Priority Activities		

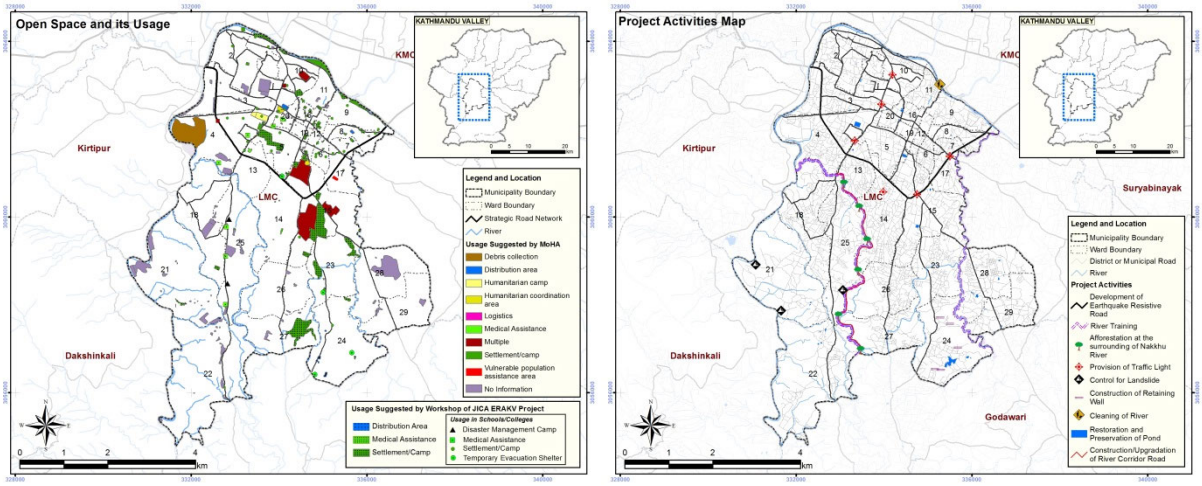
Source: JICA Project Team

Source: JICA Project Team

Figure 5.5.18 Photo of 3rd workshops for LDCRP and SOP in pilot municipalities

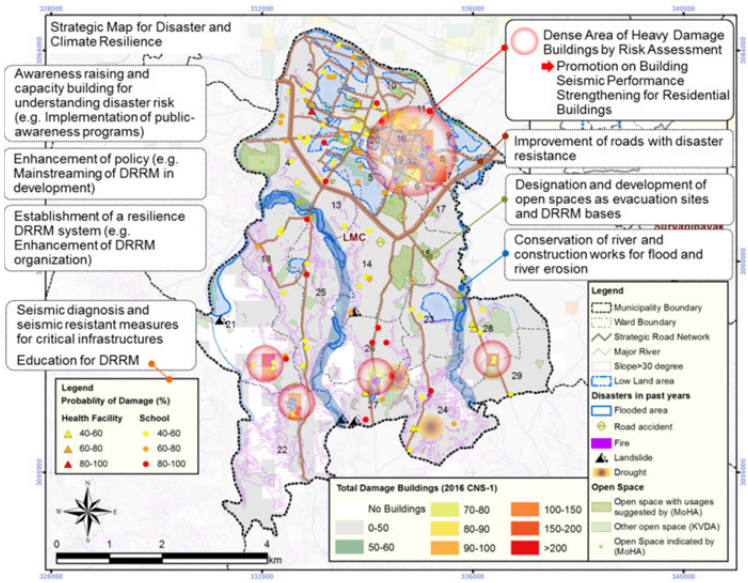
In this workshop, participants discoursed about necessity, priority, time-period and responsibilities for each activity which the JICA Project Team had drafted. As a result, several activities were modified and added based on the discussion. In addition, participants identified the location for evacuation and priority activities. For the evacuation, MoHA and

KVDA have specified the open spaces with usage of disaster management. On the basis of that information, participants discussed and suggested the usage of other open spaces and usage of buildings for temporary evacuation shelter, etc. The participants also discussed the requirement and location of necessary project activities to be conducted. Figure 5.5.19 shows the results of 3rd workshop in Lalitpur Metropolitan City. Several activities were identified as priority. This information shall be the basis for actual implementation of activities.



Source: JICA Project Team

Figure 5.5.19 Results of 3rd workshop (Left: Open Space Map, Right: Project Activities Map) (Example of LDCRP for Lalitpur Metropolitan City)



Source: JICA Project Team

Figure 5.5.20 Map for Priority Activities (Lalitpur Metropolitan City)

Figure 5.5.20 shows examples of priority activities. In order to achieve the above disaster risk reduction targets, it is essential to strengthen the buildings first of all. It is important to newly build buildings with high seismic resistance as well as the seismic retrofitting of existing buildings. There are more than 400,000 buildings in the whole of Kathmandu

Valley and this will contribute greatly to achieve the target. Therefore, based on the risk assessment results, the JICA Project Team estimated the cost of seismic retrofitting for Lalitpur Metropolitan City as an example. The economic loss due to damage to the buildings that were included in the risk assessment which was implemented in this project is the total of the restoration cost in each damage grade. If it is assumed that the seismic retrofitting of buildings can be made at 20% of this restoration cost, the cost of seismic retrofitting of existing buildings in Lalitpur Metropolitan City is estimated as shown in Table 5.5.12 and the cost is about 11 billion NPR. The annual budget of Lalitpur Metropolitan City (2016 - 2017) is about 1.08 billion NPR and seismic retrofitting cost is more than 10 times that. Therefore, in order to promote the strengthening of the buildings and to achieve the disaster risk reduction targets, not only financial support is necessary by the provincial and national government for seismic retrofitting, but also technical support is important so that the citizens understand the importance of the strengthening of buildings and promote seismic retrofitting on their own.

Table 5.5.12 Estimated cost of seismic retrofitting for buildings (Lalitpur Metropolitan City)

		Building Damage	Economic Loss (million NPR)	Estimated cost of seismic retrofitting (million NPR)
Total number of buildings (52,821)	Heavy	9,603 (18.2%)	57,335	11,471
	Moderate	6,277 (11.9%)		
	Slight	9,322 (17.6%)		

Source: JICA Project Team

(7) Finalization of the plan

LDCRP of pilot municipalities were finalized by including the suggestions from the municipality, and participants of the workshop. Full document of LDCRP is referred in the Volume 5: Attachment 8.

Source: JICA Project Team

Figure 5.5.21 Cover page of LDCRP (Lalitpur Metropolitan City)

5.6 Community-based Disaster Risk Reduction and Management (CBDRRM) Activities

5.6.1 Background and Situation of CBDRRM Activities in Nepal

(1) Background

To reduce damage caused by disasters, it is important for the residents to understand the disaster risks in their areas and take appropriate actions based on the knowledge. This is one of the lessons learned through the Gorkha earthquake experience. Also, in order to ensure the sustainable disaster risk management activities by the residents, it is necessary to officially support and promote the community's disaster risk management activities by government policy. Further, with sound understanding by the residents, the results of the risk assessment can be more effectively utilized for the measures to be taken for reducing disaster vulnerabilities in the area. In this context, it is essential to include DRR public awareness activities in the local disaster management plan with the view of strengthening people's DRRM capacities to take appropriate actions based on the proper understanding of risks.

(2) Situation of CBDRRM Activities in Nepal at the Time of the Project Initiation

In the Local Disaster Management Planning Guideline 2011 formulated by the MoFALD, it is requested to develop community disaster management plans, enhance community's DRR capacities, and register/renew the Community Disaster Management Committees (CDMC) as the responsibilities of municipalities and VDCs. With this guideline, primarily in forward-looking municipalities, activities for the strengthening of community's capacity on DRR had been promoted, and especially in Lalitpur MC, CDMCs had been established in all wards.

Further, recently in Nepal, in cooperation with NGOs and others, many CBDRR activities had been actively conducted. For the purpose of coordinating these activities, conducting activities effectively without any duplication, and providing more standardized activities, the Flagship 4 of the Nepal Risk Reduction Consortium (NRRC, established on May 2009), which is a network of international and other organizations to support the DRR activities coordinated by the Nepal government, had led the coordination activities such as discussion among relevant organizations and the formulation of guidelines. The MoFALD had been promoting the activities as a lead organization of the Flagship 4 of the NRRC with the support of the International Federation of Red Cross and Red Crescent Societies (IFRC).

Under the activities of the standardization in the Flagship 4 of the NRRC, the nine activities are recommended to be conducted as minimum CBDRR activities as shown in the Figure 5.6.1. These activities are designed in line with the local disaster management planning guideline.

Source: Flagship 4 Handbook – Nepal's 9 Minimum Characteristics of a Disaster Resilient Community

Figure 5.6.1 Minimum Characteristics of the NRRC Flagship 4

In the Flagship 4 Consultative Meeting held on October 2015, it was recommended to share the above Minimum Characteristics with wider stakeholders including other sectors such as development sectors, and promote the standardized CBDRRM activities widely throughout the nation. Also, to involve the local government for ensuring sustainable CBDRR activities was considered as an important task.

With the above mentioned situation, the CBDRRM activities in the Project were conducted with the consideration of the following points; to incorporate the CBDRRM activities in the municipality disaster management plan, and to integrate the 9 Minimum Characteristics suggested by the NRRC Flagship 4 for the standardized CBDRR activities into the Project activities.

5.6.2 Situation of Community's Awareness on DRR in the Pilot Municipalities before the Project activities

(1) Outline of the Community Baseline Survey

It is necessary to grasp the current situation of awareness on DRR and knowledge of earthquakes in the communities and residents when formulating a local disaster management plan. Also, it is important to verify how people's awareness has changed through the pilot activities. For these purposes, a community baseline survey was conducted to figure out the

profile and analyze the current condition of the communities and residents as information before the pilot activities. In consultation with the counterparts of each pilot municipality, communities with different area characteristics were selected for the targets of the survey as shown in Table 5.6.1. More details are described in Appendix 6.3.

Table 5.6.1 Target Communities of the Community Baseline Survey

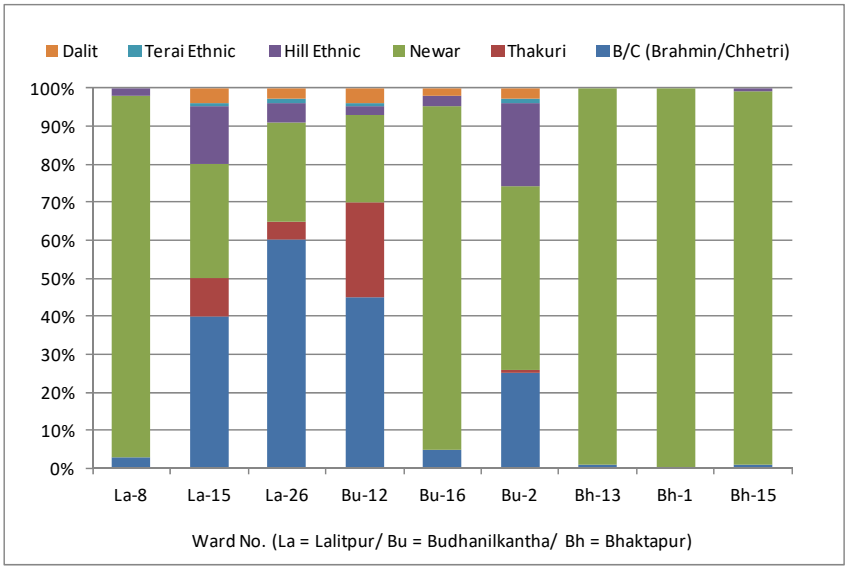
Characteristics of Community	Ward No. /Ward Name		
	Lalitpur MC	Budhanilkantha Municipality	Bhaktapur Municipality
■ Core Urban Settlement	Ward-8*/ Gokul Chaur	Ward-12/ Kapan	Ward-13/ Kolachen
■ Developing/ Semi-Urban Settlement	Ward-15/ Satdobato	Ward-16/ Chunikhel	Ward-1/ Suryamadhi
■ Newly Added Emerging Ward	Ward-26/ Sunakothi	Ward-2/ Chapali-Bhadrakali	Ward-15/ Itachen

Source: JICA Project Team

(2) Result of the Baseline Survey

1) Basic Information of Each Target Community for the Survey

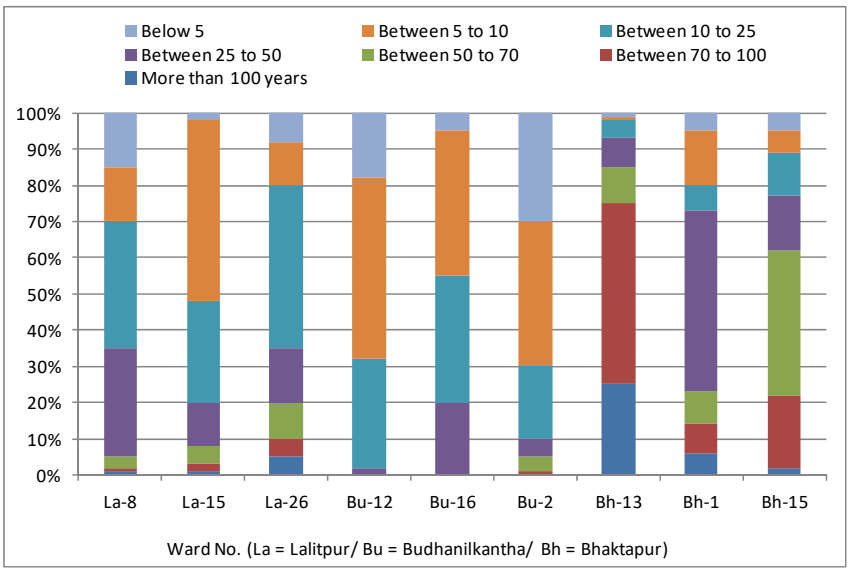
The ethnic composition of the each target community is as shown in Figure 5.6.2. The three target wards in Bhaktapur Municipality are dominated by Newar. Also, Ward 8 of Lalitpur SMC and Ward 16 of the Budhanilkantha Municipality are dominated by Newar. In other wards, several ethnic groups such as Brahmin/Chhetri, Newar, and Thakuri are mixed.



Source: JICA Project Team

Figure 5.6.2 Ethnic Composition of Each Target Community

The ratio of ages of the housing in each target community is as shown in the Figure 5.6.3. The three target wards in Bhaktapur Municipality have more aged housing compared to those in the other two municipalities. In Budhanilkantha, there is much newer housing.

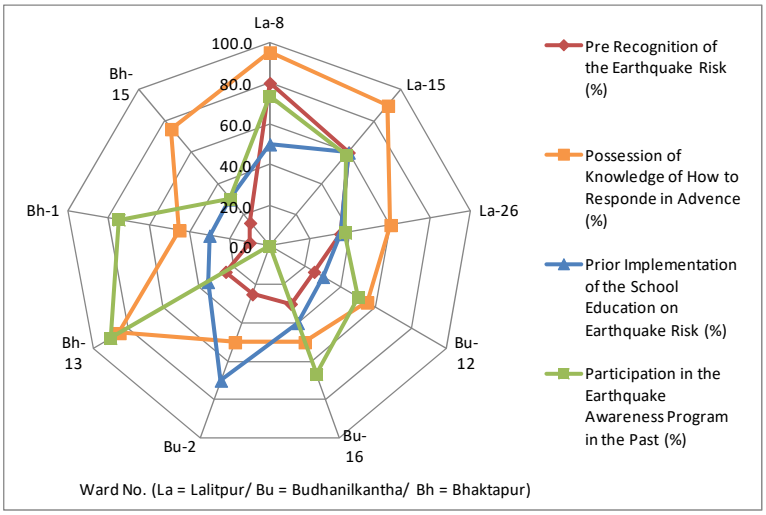


Source: JICA Project Team

Figure 5.6.3 Ratio of Ages of Housing in Each Target Community

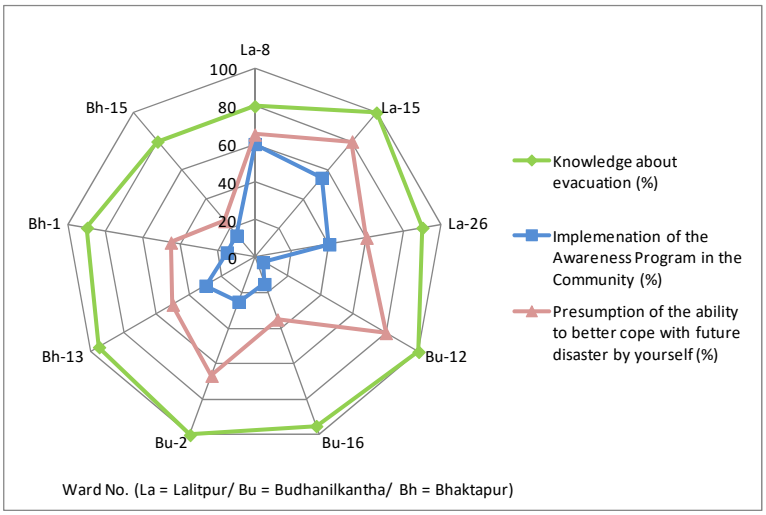
2) Situation of Community's Awareness on DRR in the Pilot Municipalities

In the community baseline survey, the questionnaire survey of the DRR knowledge and awareness was conducted in the above mentioned three wards in each pilot municipality. Figure 5.6.4, Figure 5.6.5, and Figure 5.6.6 show results of answers on the knowledge of earthquakes before and after the Gorkha Earthquake.



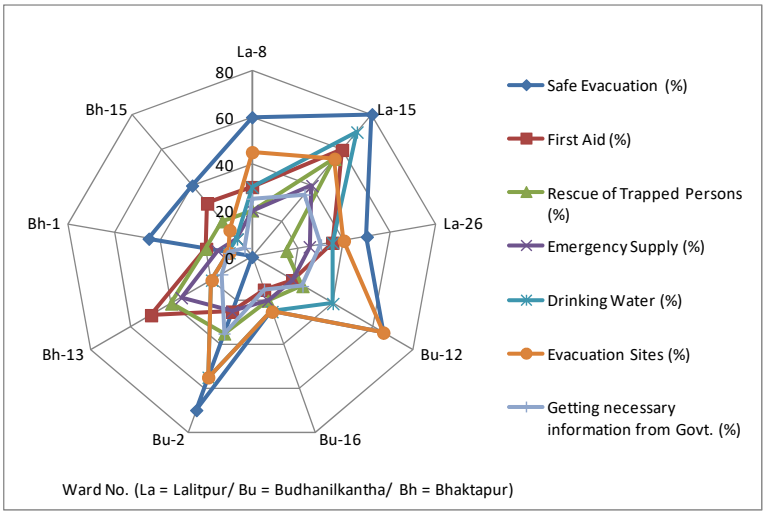
Source: JICA Project Team

Figure 5.6.4 Responders' Knowledge before the Gorkha Earthquake



Source: JICA Project Team

Figure 5.6.5 Responders' Knowledge after the Gorkha Earthquake



Source: JICA Project Team

Figure 5.6.6 Responders' Knowledge after the Gorkha Earthquake (by theme)

As a whole, as compared to the other two municipalities, more people in Lalitpur had knowledge of earthquake DRR before the Gorkha Earthquake, by virtue of the establishment of the CDMC which is consisted of ward secretary and representatives of residents, etc. Also, they are enhancing their knowledge by conducting awareness programs after the earthquake. In Budhanilkantha and Bhaktapur Municipalities, knowledge before the earthquake was limited and few awareness programs have been conducted after the earthquake. Their main knowledge is based on their actual experience of the Gorkha Earthquake, such as evacuation action, and is not thorough systematic learning.

Meanwhile, as for the questions on the future improvement of the community capacities of DRR in the survey, many responders selected the following answers: "would like to know

community's disaster risks and vulnerabilities," "would like to acquire knowledge on how to rescue people," "would like to learn earthquake resistant building," "would like to stockpile for disasters in the community," "would like to conduct DRRM exercise." DRR and DRM draw increasing attention on the whole.

5.6.3 Pilot Activities for Enhancing Community Capacities on Disaster Risk Reduction and Management

(1) Selection of the Target Communities

One ward from each of the three targets wards of the community baseline survey in each pilot municipality is selected as a pilot community of each municipality. The selection of the three pilot communities in total is considered on the grounds such as having difference in the area characteristics such as core urban area, newly developed area, or historical tourist area and in the community background such as the establishment of CDMC, and so on. Also, the possibility of collaboration of the activities in the Project on Rehabilitation and Recovery from Nepal Earthquake (RRNE) is considered for selection. Final selection of the target communities was made in September 2016 in consultation with counterparts of MoFALD and each pilot municipality.

After the final selection, due to the restructuring of administrative divisions of the KV in March 2017, the selected wards in Budhanilkantha and Bhaktapur have been integrated with other wards. Final target wards for the pilot municipalities were decided as shown in the Table 5.6.2.

Table 5.6.2 Target Communities for the Pilot CBDRRM Activities

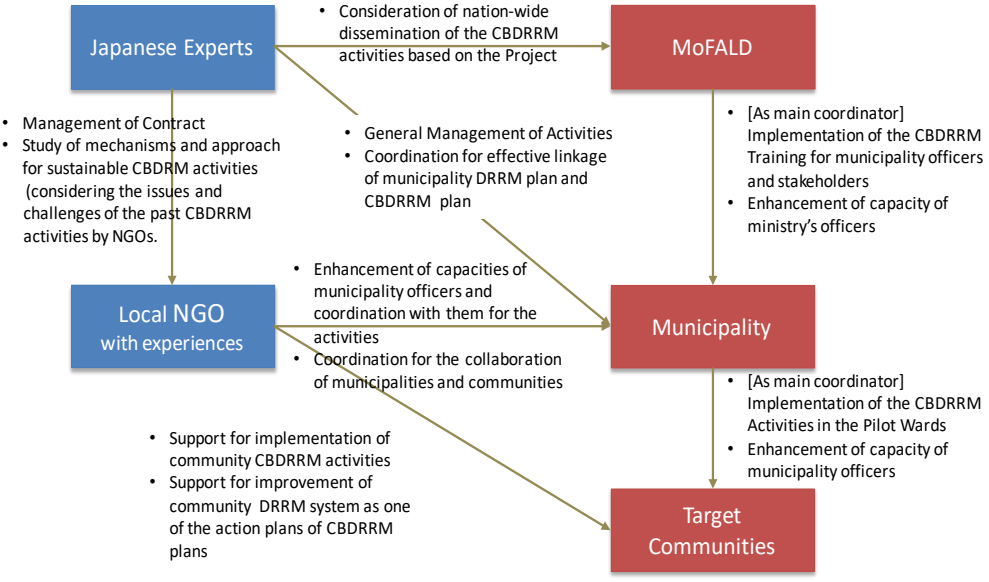
	Ward No. /Ward Name	Reasons for Selection	Ward No. after Restructuring
Lalitpur	Ward-8/ Gokul Chaur	As Core Urban Settlement For collaboration with RRNE Project (DM park is to be developed)	**Ward 8**
Budhanilkantha	Ward-2/ Chapali-Bhadrakali	As Newly Added Emerging Ward	**Ward 2** (former Ward 2 and 3)
Bhaktapur	Ward-13/ Kolachen	As Core Urban Settlement with the Historical/ Tourist Sites	**Ward 3** (former Ward 13 and 16)

Source: JICA Project Team

(2) Implementation Structure of the CBDRRM Activities

CBDRRM activities were designated as one of the activities in the Reconstruction Plan and the DRRM Plan in each municipality. Figure 5.6.7 shows the implementation structure of the CBDRRM activities. The structure was considered primarily focusing on enhancing initiatives of the MoFALD and municipalities who play the most important roles for sustainability of the activities. The mechanism and approach for sustainable CBDRRM

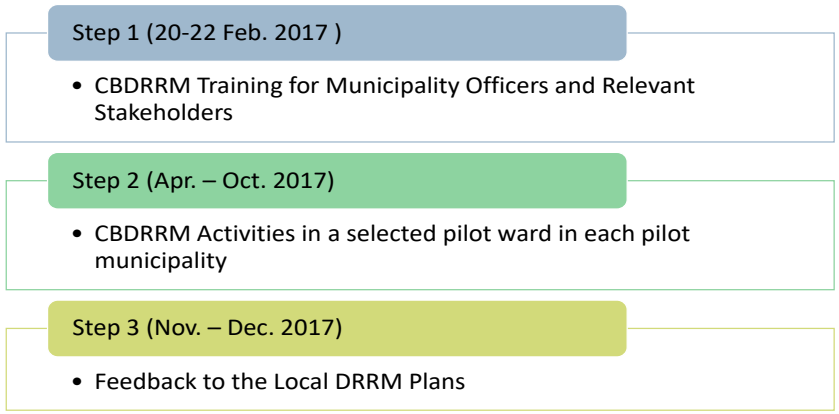
activities were examined through minimal involvement of Japanese experts and subcontract to the NGO (Environment and Public Health Organization, ENPHO) who had experiences of the CBDRRM activities. (Refer to more details on the subcontract in the Appendix 6.5).



Source: JICA Project Team

Figure 5.6.7 Implementation Structure of the Pilot Activities

With the consideration of the necessity for enhancing the capacities of the municipality officers on implementation of the CBDRRM activities at the beginning, the pilot activities were conducted by the three steps described in the Figure 5.6.8



Source: JICA Project Team

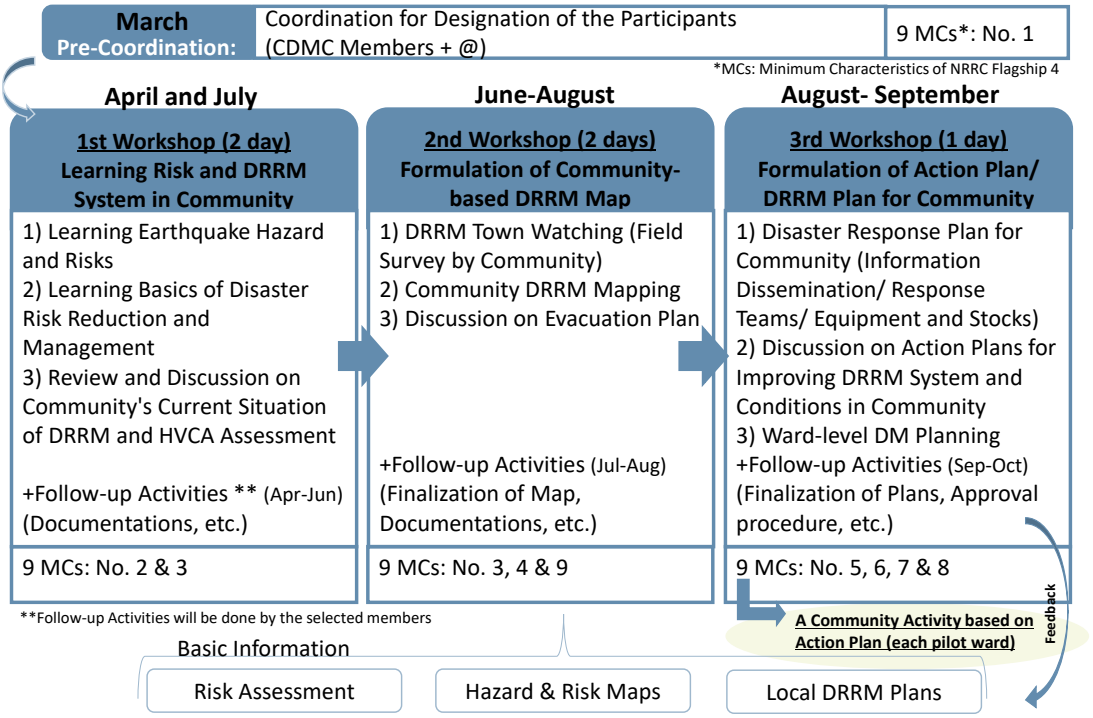
Figure 5.6.8 Steps of Implementation of the CBDRM Activities

(3) Contents and Flow of the CBDRRM Activities

The result of the Safe Kathmandu Campaign conducted in the Phase 1 of the Project revealed that the residents could not properly acquire what they have learned in the past training due to the lack of recognition that the earthquake risk was as their own. The contents of the pilot activities were designed focusing on sound understanding of their own risks based on the

result of the risk assessment of the Project and for improving and enhancing community's DRRM system. Further, incorporation of the Nine Minimum Characteristics of a disaster resilient community in Nepal suggested by the Flagship 4 of the NRRC was considered for the pilot activities. The basic contents and flow of Step 2 activities was decided as shown in the Figure 5.6.9.

The training program in Step 1 was designed for the municipality officers to understand each of the contents in Step 2. Also, the detailed activities in each target ward in Step 2 were slightly adjusted according to the current implementation situation of the CBDRRM activities in the selected pilot wards through the discussion with the counterparts.



Source: JICA Project Team

Figure 5.6.9 Basic Contents and Flow of the Pilot Activities

(4) Step1: CBDRRM Training for Municipality Officers and Stakeholders

A 3-day CBDRRM training was conducted on 20 – 22 February 2017 with the view to actively involve municipality officers in the CBDRRM activities and strengthen their ownership of the activities. The training also aimed for ensuring that the CBDRRM activities are widely conducted in each pilot municipality after the Project.

With the presence of Mr. Purushotam Subedi, US of MoFALD, for opening and closing session and Mr. Gopi Krishna Khanal, JS of MoFALD, for certificate distribution, 30 participants including of Mr. Rohit Raj Pokhrel, CEO of Bhaktapur Municipality and Mr. Bishwa Raj Marasini, CEO of Budhanilkantha Municipality learned and actively discussed

how to promote community DRRM activities and officially support the initiatives. The training was contributed to create a basis for the municipality officers to take initiatives to provide sustainable community activities in each pilot municipality with an understanding of the importance of the CBDRRM even when they do not directly operate the detailed community activities and outsource the work of detailed operation.


Source: JICA Project Team

Figure 5.6.10 Lecture and Discussion in the Training Program

Lectures and discussion which was conducted in the CBDRRM training was as shown in the below table.

Table 5.6.3 Main Lectures and Discussion in the CBDRRM Training

Lectures/ Group Discussion	Resource Persons
Disaster Terminology/ Definition	ENPHO
Earthquake Hazard and Risk Assessment in the pilot municipalities	JICA Project Team
Introduction to the CBDRRM Activities	ENPHO and JICA Project Team
NRRC Flagship 4 Activities and 9 Minimum Characteristics of CBDRRM Activities	MoFALD
Community-based Hazard, Vulnerability, and Capacity Assessment (HVCA)	National Society for Earthquake Technology (NSET)
Sharing of Learning in the Counterpart Training in Japan	Training Participants
Introduction to the DRM Policies: LDRMP Guideline	MoFALD
Establishment of Community-based DM Committee (CDMC) and Disaster Response Team	ENPHO
Access to DM Information in the community	Nepal Rec Cross Society (NRCS)
Community-based DRR Mapping	NSET
Municipality DRRM Plan and Community DRRM Plan	MoFALD
Awareness Program for Safe House Construction	IOE, Tribhuvan University
Action Plan for Promoting CBDRRM Activities	MoFALD and JICA Project Team

Source: JICA Project Team

(5) Step2: CBDRRM Activities

1) Planning of the CBDRRM Activities in the Pilot Wards

a) Contents of the Training

Based on the discussion with counterparts in the above mentioned training in Step 1 or others,

the final CBDRRM activities in each ward were decided based on the basic contents and flow of the activities shown in Figure 5.6.9, and adjusting according to the implementation situation of the CBDRRM activities in each pilot ward. Some significant consideration was made as mentioned below.

Ward 8 of the Lalitpur MC

In Lalitpur MC, CBDRRM activities have been promoted by municipality before the Gorkha Earthquake and they are considered as one of the most advanced municipalities which have conducted the CBDRRM activities in Nepal. Based on the baseline survey, the Ward 8 community members have some extent of basic understanding of earthquake DRR and have conducted DRR activities with the establishment of CDMC. In the meanwhile, result of the survey on the knowledge by themes after the Gorkha Earthquake, shows that many of the residents think they need to learn more and expressed their intention to learn more about earthquake DRR. Further, the CDMC established before the earthquake have become inactive and the developed DRR map is not effectively utilized. Thus, the reactivation of the CDMC is required.

In this context, the activities of Ward 8 were modified from the above flow and started from the review of the past activities focusing on the CDMC members. Further, the Project activities supported discussion for effective and sustainable use of the DRM Park to be constructed by the JICA Project on Rehabilitation and Recovery from Nepal Earthquake (RRNE). Due to the delay of the construction of the DRM Park by RRNE, discussion of the DRM Park utilization was only limited the introduction of the plan of the DRM Park, however, it contributed rising awareness of the plan for the DRM Park in the community.

Ward 2 of the Budhanilkantha Municipality

Budhanilkantha Municipality is newly established with the recent integration of some VDCs and has not conducted CBDRRM activities compared to other municipalities. The CDMC of the ward 2 was very recently established by the support of the Nepal Red Cross Society according to the interview in September 2016. Result of the baseline survey shows that many people did not have basic knowledge of earthquake DRR before the Gorkha Earthquake and less effort was made for the disaster awareness after the Gorkha Earthquake than in the other areas. Many residents in Ward 2 work outside of the area and less number of farmers as newly developed residential area. Ward 2 has varieties of ethnic groups and good balance of ethnicity, including of Chhettri and Newar. Infrastructure such as water pipe and road network is well established.

In this context, the Project activities were conducted basically based on the basic flow and aimed to identify the issues for the sustainable CBDRRM activities as a newly developed

residential area. Also, enhancing DRR capacities of the municipality officers with less experience was paid attention.

Ward 3 of Bhaktapur Municipality

In Bhaktapur Municipality, as is the case with Lalitpur Municipality, some CBDRRM activities have conducted before the Gorkha earthquake. In the previous Ward 13 (before integration into Ward 3), the CDMC was established before the earthquake. The baseline survey shows that some residents participated in the DRR awareness activities in the past though not to the extent of Lalitpur. While, many respondents felt that their knowledge was not enough, especially in some areas through the Gorkha earthquake experience. The understanding on CBDRRM of the present officer in charge and other relevant officers in the Municipality was low.

Ward 3 is mostly occupied by Newar residents who have lived for long time in the area. Meanwhile, the area has a historical tourist area with many non-residents (short-time visitors). Further, since the area has many old buildings, many people live in mud-mortar traditional houses. The damage caused by the Gorkha Earthquake was quite large and many people put the priority on recovery and reconstruction work. Further, due to the local election conducted in May 2017, the Project activities were suspended till July 2017.

In this context, the CBDRRM activities in Ward 3 had started a little late from July 2017, focusing on seismic resistant building and cities, and discussing build back better activities. Also, for the consideration of the community DRRM system as a historical touristic area so that many people feel safe to visit the area, lecture on the relevant theme was provided.

b) Participants of the Training

Before the implementation of the activities, target participants were selected from CDMC and the residents who are supposed to become members of the CDMC or be involved in disaster response in each pilot ward. Members of health volunteer groups and/or women groups were joined in the activities in each pilot ward.

Each pilot municipality was requested to be actively involved in the implementation of the CBDRRM activities, however, mainly due to the limitation of number of the staff in charge, and the political change along with the local election in May 2017, their involvement was limited to the presence in some of the activities. Especially in Ward 2 of the Bhaktapur municipality, most of the activities were not attended by municipality officers. On the other hand, chairpersons and chief executive officers (CEOs) of the target ward were very actively involved in the many of the activities.

The counterparts of the MoFALD were also requested to participate in the pilot activities in

each ward for understanding of the activities and nation-wide dissemination of the practices. Although they couldn't participate all of the activities, they joined at least the workshop held in one of the pilot wards in each of the series of the workshops.

2) Implementation of the CBDRRM Activities in the Pilot Wards

a) The 1st CBDRRM Workshop

Based on the flow of the Figure 5.6.9, the 1st CBDRRM workshop was conducted in each pilot ward. The main purpose of the 1st workshop was to learn their own disaster risks and DRRM system in the community through interactive lectures and participatory methods. The major contents of the lectures and activities in the workshops were as shown in the Table 5.6.4.

Table 5.6.4 Major Lectures and Activities in the 1st CBDRRM Workshop

Lectures/ Activities	Resource Persons
◆ Objective of the workshop and outline of the project	JICA Project Team
◆ Disaster Terminology and definition, Disaster causes and effects , Disaster Management cycle	ENPHO
◆ Earthquake Hazard and Risks in Nepal	Pilot Municipality (with the support of the JICA Project Team)
◆ LDRMP Guideline and DRR Mainstreaming ◆ 9 Minimum Characteristics	MoFALD / Pilot Municipality
◆ DRM and Cultural Heritage and Tourism (only for Bhaktapur Musicality)	Khowpa Engineering College
◆ Lecture on Hazard, Vulnerability, and Capacity Assessment (HVCA) Tools	ENPHO
◆ Group Discussion for HVCA	Group works by the participants

Source: JICA Project Team

Based on the learning in the training program, the municipality officers provided some lectures focusing on the importance of the community DRRM activities. In the meantime, insufficient parts of the intended theme by their explanation were compensated by the lecture of the JICA Project team. It was considered that more training programs or the opportunities to learn disaster risk reduction were required for enhancing the capacities of the municipality officers to provide more improved lectures.

Some participants including of the members of CDMC had experiences of learning of DRR in the events organized by other organizations, however, it was first time for most of the participants to learn DRR intensively through participatory approach. Many of them actively involved in discussion and had more interest in DRR. Further, as participants could easily imagine the disaster situation by reminding of the experience of the Gorkha Earthquake, the discussion was made in more concrete terms, and led to more deep understanding and identification of their own disaster risks. Table 5.6.5shows the summary of the Hazard, Vulnerability and Capacity Assessment (HVCA) discussed in the 1st workshop in each target ward.

Table 5.6.5 Summary of the HVCA in Each Pilot Ward

Ward 8, Lalitpur MC
✓ People of Ward-8 seem to be vulnerable to earthquake and fire, since the settlement pattern is quite traditional with narrow alleys and compact houses. ✓ The ward has capacities regarding water sources in almost every community but the sources are not well protected. ✓ The community seems less sensitized on disaster preparedness and response plans. Furthermore, they need to develop DRR plan incorporating plans for proper mobilization of available resources and capacities.
Ward 2, Budhanilkantha Municipality
✓ The ward has various community groups and committees and these groups need to educate themselves on disaster preparedness and response accordingly in order to minimize disaster risk. ✓ The ward has adequate open spaces and natural resources that can be used during disaster. Hence, conservation of the resources are highly required. ✓ Since Ward 2 is prone to risks of flood, landslide, fire, earthquake, disaster risk reduction plans are vital to incorporate in the annual development plan.
Ward 3, Bhaktapur Municipality
✓ The ward has capacities regarding water sources in almost every community, open spaces and tourist public toilets but the capacities are not well managed. ✓ People living within narrow alleys, damaged houses, unmanaged electric poles and wires are found to be major vulnerable of the ward. ✓ The community seems less sensitized on disaster preparedness and response plans. Therefore, proper DRM plans and its implementation is highly important.

Source: JICA Project Team

The result of the workshop in each target ward was as summarized in the Table 5.6.6.

Table 5.6.6 Result and Issues for CBDRM activities in the 1st CBDRRM Workshop

Ward 8, Lalitpur MC (6-7 April 2017)	
Result	Issues and Challenges
✓ Identification that earthquake is the major hazard in the ward ✓ Enhanced awareness of the participants on disasters ✓ Preparation of VCA report	✓ Difficulties of regular participation of community members due to other priority matters ✓ Some difficulties in implementation and coordination mechanism due to the local election ✓ Collaboration with the RRNE team on the development of DM park due to the delay of the construction schedule
Ward 2, Budhanilkantha Municipality (9-10 April 2017)	
Result	Issues and Challenges
✓ Identification that earthquake is the major hazard in the ward after forest fire ✓ It is the first time for most of the participants to join this kind of participatory risk assessment activities ✓ Preparation of VCA report	✓ Difficulties of the regular participation of community members due to other priority matters ✓ Some difficulties in Implementation/ coordination mechanism due to local election
Ward 3, Bhaktapur Municipality (21-22 July 2017)	
Result	Issues and Challenges
✓ Identification that earthquake is the major hazard in the ward after forest fire ✓ Understanding of importance of the consideration of the DRR for Tourism ✓ Preparation of VCA report	✓ No Participation from the counterparts of the Municipality by the government administrative policy

Source: JICA Project Team

Ward 8, Lalitpur MC

Ward 3, Budhanilkantha Municipality

Ward 2, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.11 Pictures of the 1st Workshop in Each Target Ward

b) The 2nd CBDRRM Workshop

After compiling all the discussion result on HVCA in the 1st workshop, the 2nd CBDRRM workshops were conducted in the pilot wards. The main purposes of the 2nd workshop were to specifically identify their issues and problems in DRR through field surveys and hazard mapping with the result of the HVCA discussions and to draft DRM plan of the community. Major contents of the lectures and activities in the 2nd workshop were as shown in the follows Table. Contents of the DRM plan were decided referring to the "Local Disaster Risk Management Planning (LDRMP) Guideline, 2011" as shown in the Table 5.6.8 .

Table 5.6.7 Major Lectures and Activities in the 2nd CBDRRM Workshop

Lectures/ Activities	Resource Persons
◆ Japan's Good Practice on Community DRR Mapping and Utilization of the DRR Map	JICA Project Team
◆ Investment based on disaster risk assessment and past disaster experiences	JICA Project Team
◆ Introduction of the construction plan of the DRM Park by the RRNE Project	JICA RRNE Project Team
◆ Recap on Disaster Terminology, DRM Cycle, and Sharing of the HVCA Report	ENPHO
◆ Town Watching for DRR	Group Work
◆ Community-based DRR Mapping	Group Work
◆ Discussion on Community Disaster Risk based on the result of HVCA and DRR Mapping	Group Work
◆ Ward-level DRM Plan and Municipality DRM Plan	ENPHO
◆ Discussion on DRM Plan	Group Work

Source: JICA Project Team

Table 5.6.8 Table of Contents of the Ward-level DRM Plan in the Pilot Wards

TABLE OF CONTENTS for the Ward-level Disaster Risk Management Plan	
PART I: INTRODUCTION	2.8. Capacities of Ward
1.1. Background	2.9. Vulnerabilities of Ward
1.2. Objective of Plan	2.10. Stakeholders Analysis/Venn Diagram
1.3. Rationale and Significance of Plan	2.11. Mobility Mapping
1.4. Limitation of Plan	2.12. Risk Assessment
1.5. Methodology	
1.6. Plan Implementation Strategy	PART III: Result of Risk Assessment of ERAKV
1.7. Monitoring, Evaluation and Review	
	PART IV: DISASTER RISK MANAGEMENT PLAN
PART II: HAZARD, VULNERABILITY AND CAPACITY ASSESSMENT	
2.1. Hazard Ranking	APPENDIX
2.2. Hazard Calendar	Annex I: Some glimpses for formulation of DRM plan
2.3. Historical Timeline	Annex II: Name List of Community Disaster Management Committee (CDMC)
2.4. Hazard Analysis	Annex V: Name list of participants in the workshops for formulation of the plan
2.5. Problem Tree Analysis	Annex VI: Attendance sheet of workshop participants
2.6. Town Watching / Transect Walk	
2.7. Vulnerability and Capacity Identify Mapping	

Source: JICA Project Team

Through the field survey and DRR mapping, the participants could understand their current DRRM situation more precisely and deeply, and discuss actively the points to be improved for increasing disaster resilience of their communities. Also, they could recognize that by identifying their current situation and making DRM plan, they can share the actions required for the improvement of their DRM system with the municipality officers and the ward representatives and request for the official provision of development budget to them and other stakeholders.

In the 2nd workshop, although more than half of participants were those who attended the 1st

workshop, some were new participants along with the result of the local election in May 2017. Taking the lead by the participants who attended the 1st workshop, discussion in the group works became active and intensive.

Along with the local election, many duties and responsiveness for disaster risk reduction and management were transferred to the municipalities. Although the counterparts from the municipality in Budhanilkantha and Lalitpur could not attend all of the workshop activities, however, they partially participated in the discussion and this was a good opportunity for them to learn the community DRRM situation and how they can involve in promoting community DRR activities.

Table 5.6.9 Result and Issues for CBDRM activities in the 2nd CBDRRM Workshop

Ward 2, Budhanilkantha Municipality (27-28 June 2017)	
Result	Issues and Challenges
✓ Community DRR map was drafted ✓ Actions and activities for DRM plan were discussed ✓ Newly selected Mayor made an opening remark and encouraged residents for the CBDRRM activities ✓ Ward chairperson also attended some of the discussion	N.A.
Ward 8, Lalitpur MC (1-2 July 2017)	
Result	Issues and Challenges
✓ Community DRR map was drafted ✓ Actions and activities for DRM plan were discussed ✓ Ward chairperson fully attended the program including of field visit and mapping activities ✓ The construction plan of the DRM park was introduced	✓ Even the CDMC members, the detailed information of the DRM park was not shared before the workshop. More coordination among the community groups and stakeholders are necessary for the effective utilization of the park
Ward 3, Bhaktapur Municipality (16-17 August 2017)	
Result	Issues and Challenges
✓ Community DRR map was drafted ✓ Actions and activities for DRM plan were discussed ✓ Ward chairperson fully attended the program including of field visit and mapping activities and encouraged residents for active involvement.	✓ After the restructuring of the wards along with local election, the setting of the reorganization of the CDMC in the new wards is still pending and waiting for the direction from the municipality.

Source: JICA Project Team

Ward 2, Budhanilkantha Municipality

Ward 8, Lalitpur MC

Ward 3, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.12 Drafted Community DRR Map for Each Target Ward



Ward 2, Budhanilkantha Municipality



Ward 8, Lalitpur MC



Ward 3, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.13 Pictures of the 2nd Workshop in Each Target Ward

c) The 3rd CBDRRM Workshop

Based on the discussion in the 1st and the 2nd workshops and the follow-up meetings, draft DRM plan, DRR map, and DRR Carte for each target ward were compiled. In the 3rd workshop, the participants review the draft plan, map and carte in details and discussed for finalization of them.

Also, they discussed about the priority activities in the DRM plan and chose one of the activities to be implemented with the budgetary support by the Project.

Table 5.6.10 Lectures and Activities in the 3rd CBDRRM Workshop

Lectures/ Activities	Resource Persons
◆ Summary of the past activities and future actions for sustainable CBDRRM activities	JICA Project Team
◆ Review of the compiled draft DRM plan and DRR map	ENPHO
◆ Review of the draft DRR Carte	JICA Project Team
◆ Group discussion for finalizing of the DRM plan, DRR map, and DRR Carte	Group Work
◆ Discussion on the priority activities in the DRM plan	Group Work
◆ Presentation of the priority activities	Group Work

Source: JICA Project Team

Table 5.6.11 Result and Issues for CBDRM activities in the 3rd CBDRRM Workshop

Ward 2, Budhanilkantha Municipality (27-28 June 2017)	
Result	Issues and Challenges
✓ Final review of the DRM plan, DRR map, and DRR carte was conducted ✓ Mayor, ward chairperson and secretary attended for validation of the plan, map and carte ✓ Setting up of a community storage of DRM equipment in the DRM plan was selected as the follow-up activity	✓ Implementation plan of the selected follow-up activities with the coordination of the construction of the storage using the ward budget.
Ward 8, Lalitpur MC (1-2 July 2017)	
Result	Issues and Challenges
✓ Final review of the DRM plan, DRR map, and DRR carte was conducted with full participation of the ward chairperson ✓ Preparation of DRM equipment for each Tole in the DRM plan was selected as the follow-up activity	✓ Operation and maintenance plan of the DRM equipment should be formulated to provide and manage the items in each Tole
Ward 3, Bhaktapur Municipality (16-17 August 2017)	
Result	Issues and Challenges
✓ Final review of the DRM plan, DRR map, and DRR carte was conducted ✓ Deployment of DRM Equipment to the important facility in the DRM plan was selected as the follow-up activity	✓ The CDMC was not formulated till the 3rd workshop, thus ward chairperson's initiative is important for future activities.

Source: JICA Project Team

Ward 2, Budhanilkantha Municipality

Ward 8, Lalitpur MC

Ward 3, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.14 Pictures of the 3rd Workshop in Each Target Ward

d) Finalization of DRM plan, DRR map, and DRR carte

Based on the result of the final review and confirmation in the 3rd workshops, the DRM plan for each pilot ward was finalized through some follow-up meetings. Then, the finalized DRM plans were submitted and approved in each pilot municipality. Table 5.6.12 shows the priority actions designated in the DRM plan formulated in each pilot ward.

Table 5.6.12 Priority Actions Designated in the DRM Plan of Each Pilot Ward

Ward 8, Lalitpur MC
➢ To arrange a fire extinguisher in each Tole and organize firefighting training to generate response team within ward. ➢ To storage disaster response and relief materials like tarpaulins, ropes, rescue and first aid equipment near ward office. ➢ To demolish and clear partially damaged and about to collapse buildings due to earthquake 2072 as soon as possible with community participation and support of municipality. ➢ To protect available water sources, reservoir tanks and open spaces of ward, even if it is not in use. To cover and clean wells and open spaces at ward. ➢ To sensitize community on safe building and building codes of municipality and organize awareness activities for disaster preparedness in community (schools, various groups and stakeholders.) ➢ To form response and first aid team with ward and train them.

➢ To establish disaster/emergency fund in ward.
Ward 2, Budhanilkantha Municipality
➢ To preposition disaster response materials especially for camps, rescue and first aid. ➢ To conduct training/orientation on earthquake disaster risk management to CDMC members, stakeholders, social leaders, teachers and students. ➢ To identify and develop map of open spaces, capacities and vulnerabilities and establishment as hoarding boards. ➢ To set up landslide hazards signs and symbols at landslide prone areas. ➢ To construct bridge above junction of Dhobi Khola and Jhamle Khola (Panchakanya Mandir/Way to BMCA school) ➢ To construct shed at Kalika Chaur with purpose to use during disaster as temporary shelter ➢ To establish emergency fund.
Ward 3, Bhaktapur Municipality
➢ To preposition emergency materials (Tarpaulin sheet, rope, shovel, helmet, medicines, and first aid materials) nearby Barahi temple. ➢ To setup fire extinguisher in each Tole and form fire control committee and orient them. ➢ To renovate existing damaged public toilet as per requirement. ➢ To install dustbins in every corner of ward to manage wastes. ➢ To reform community disaster management committee. ➢ To protect existing water sources and open spaces of the ward. ➢ To determine penalty for encroachment of Hunumante River bank and construct retaining wall across the bank.

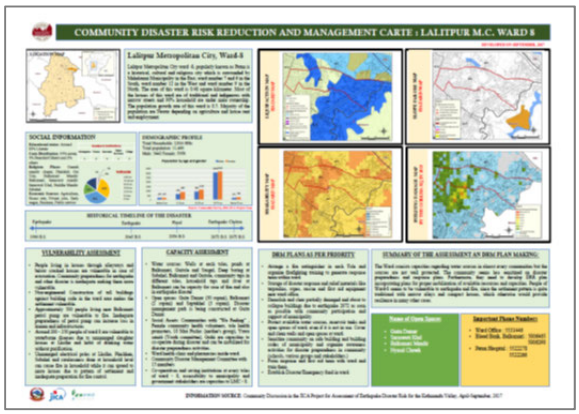
Source: JICA Project Team

Table 5.6.13 Data and Information in the DRR Carte

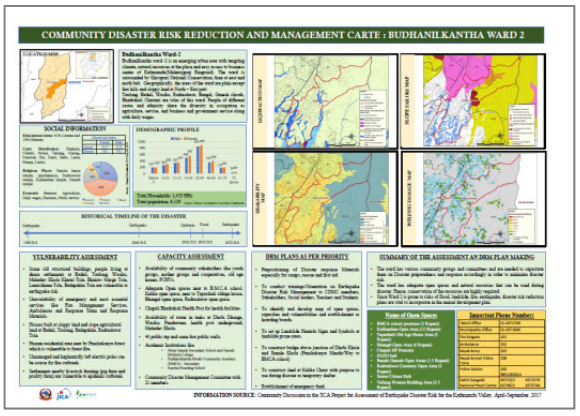
Data and Information of the DRR Carte
[Front Page] • Profile of the Ward: Brief outline, Location map, and social information • History of disasters • Hazard maps of the wards (results from ERAKV hazard and risk assessment) • Summary of the result of vulnerability and capacity assessment • Priority activities in the DRM Plan • Name of Open Spaces • Important Phone Numbers [Back Page] • Community DRR Map

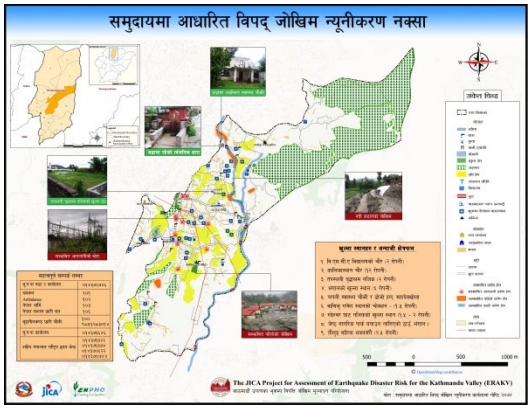
Source: JICA Project Team

Also, the DRR maps and DRR carte for the pilot wards were finalized according to the result of the final review in the 3rd workshop as shown in the Figure 5.6.15. The DRR map for each pilot ward were printed out for the hoarding and put up as information board for the community in the public place in the respective wards as shown in the Figure 5.6.18. Further, the summary of the finalized plan with DRR Map and DRR Carte was distributed to each household of the pilot wards in three pilot municipalities.

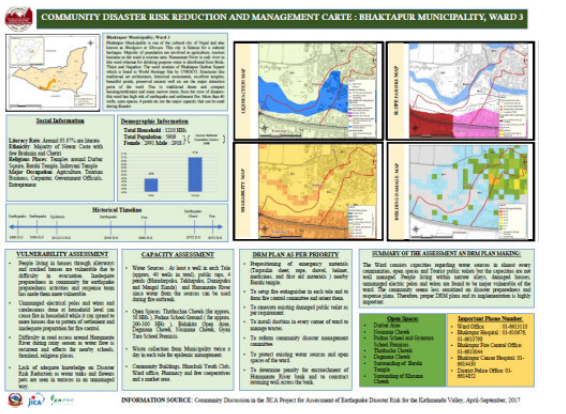


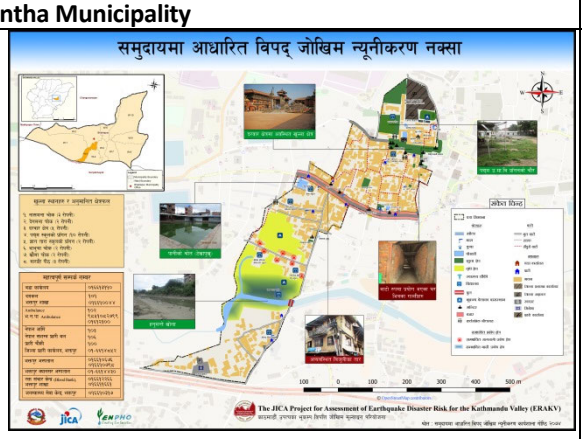
Ward 8, Lalitpur MC





Ward 2, Budhanilkantha Municipality





Ward 3, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.15 DRR Carte (front page) and DRR Map of Each Pilot Ward

e) Follow-up Activities

For the purpose of encouraging community people to continuously conduct community activities for DRR and to realize and implement the proposed activities and actions in the DRM plan, the Project provided budgetary support to each pilot ward for implementing one of the proposed activities in the plan.

In all the pilot wards, through discussion and as per the mutual agreement among community members, ward office and the Project team, it was planned to stockpile emergency management tools and equipment in the community as a disaster preparedness activity. The details of the activity were decided based on the result of the workshop and through a series of meetings with ward office and CDMC.

Specific plans, including of items to be purchased, who and how to manage and maintain them, and where to keep them, were formulated to ensure the proper and effective utilization of the tools and equipment in all the pilot wards. After procurement of the items, the orientation program for the tools and equipment was conducted along with the handover program for all the Project outputs including of DRM plan, DRR map, DRR carte, and the DRM tools and equipment with operation and maintenance plan (O&M Plan) as a final activity of the Project as shown in the Table 5.6.14 and Figure 5.6.16. Mayors of Bhaktapur and Budhanilkantha municipalities, and Vice-mayor of Lalitpur metropolitan city attended the event and gave remarks on the importance of CBDRRM activities and their intention to expand these kinds of activities in other wards of the municipalities. Also, the ward chairpersons of all the pilot wards expressed their continuous commitment to making the community more resilient utilizing the knowledge learned through the activities and undertaking of effective utilization of the provided equipment and tools.

Table 5.6.14 Lecture and Activities in the Final CBDRRM Workshop

Lectures/ Activities	Resource Persons
[Orientation of the DRM Equipment and Tools]	
◆ Introduction and Sharing of Operation and Maintenance Plan including of Briefing of Materials	ENPHO
◆ Lecture and Practical Exercise on Fire Fighting (including of Use of Fire Extinguisher)	Nepal Red Cross
◆ Evaluation of the CBDRRM Activities in the ERAKV Project	
[Handover Program]	
◆ Summary of the Overall Project Activities	JICA Project Team
◆ Handover of the Project Outputs and DRM Equipment	Mayor/ Vice Mayor, JICA Project Team, ENPHO
◆ Closing Remark	Ward Chairperson

Source: JICA Project Team

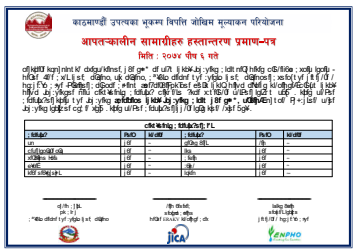
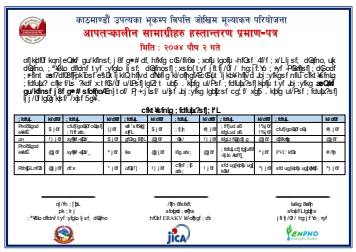
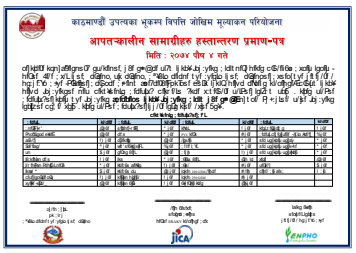
Ward 3, Bhaktapur Municipality (17 December 2017)

Ward 2, Budhanilkantha Municipality (19 December 2017)

Ward 8, Lalitpur MC (21 December 2017)

Source: JICA Project Team

Figure 5.6.16 Pictures of the Final Handover Program in Each Target Ward

		
Ward 8, Lalitpur MC	Ward2, Budhanilkantha Municipality	Ward 3, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.17 Certificates of Handover of the DRM Equipment and Tools

Ward 8, Lalitpur MC

Ward2, Budhanilkantha Municipality

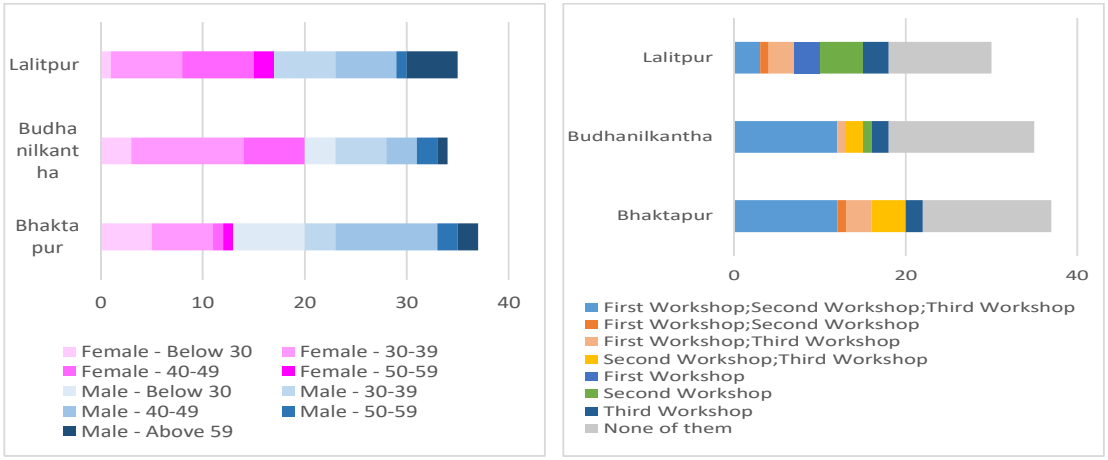
Ward 3, Bhaktapur Municipality

Source: JICA Project Team

Figure 5.6.18 DRR Map Set Up in the Pilot Wards

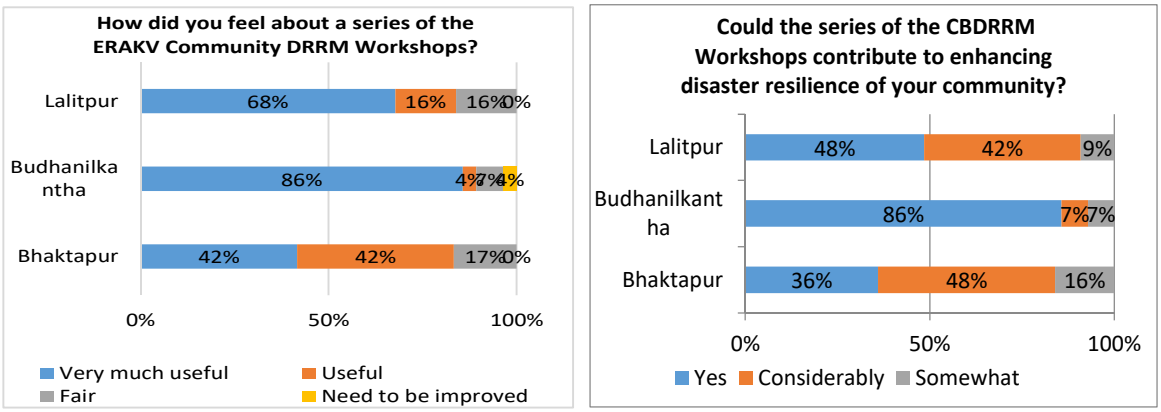
f) Evaluation of the CBDRRM Activities by the Participants

In the Final Workshop, a questionnaire survey was conducted for evaluating the CBDRRM activities in the ERAKV Project. Numbers of the valid response were 36 from Ward 8 of Lalitpur MC, 36 from Ward 2 of Budhanilkantha Municipality, and 37 from Ward 3 of Bhaktapur Municipality. Responders' profiles are as shown in the Figure 5.6.19. Almost half of the responders were the participants of one or some of the past workshops.



Source: JICA Project Team

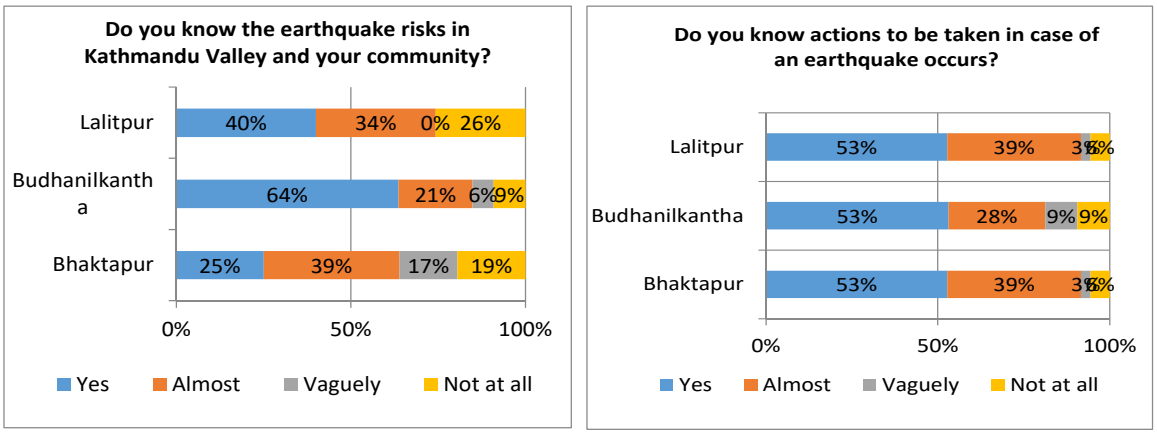
Figure 5.6.19 Responders' Profiles (exclude invalid answers)
(Left: Gender and Age/ Right: Participation Situation in the Series of Workshops)



Source: JICA Project Team

Figure 5.6.20 Evaluation of the ERAKV Community Workshops

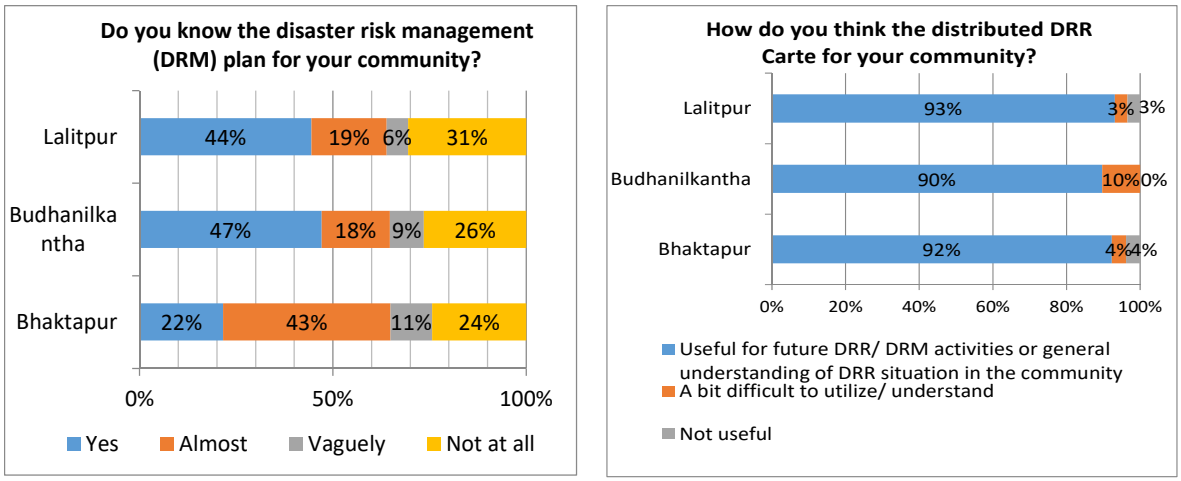
As shown in the Figure 5.6.21, around 85% of responders recognize the ERAKV Community Workshops were useful and considerably contributed to the enhancement of the disaster resilience of the community. Also, as shown in the Figure 5.6.21, most of the responders had confidence about their knowledge on the earthquake.



Source: JICA Project Team

Figure 5.6.21 Understanding of Earthquake related Knowledge

In the meantime, the DRM plans formulated through the Project activities were only recognized by the participants in the workshops and some residents who only attended the final workshop had no information about it as shown in the Figure 5.6.22. The activities to disseminate the contents of the DRM plans are required by the efforts of the communities. The DRR Carte which includes summary of the DRM plans will be useful for the dissemination.



Source: JICA Project Team

Figure 5.6.22 Understanding of DRM Plan and DRR Carte

Finally, as free comments, the many responders suggested that implementation of this kind of program periodically and expansion of the program to much wider areas.

(6) Lessons Learned from the CBDRRM activities in the Pilot Wards

Most of the Project activities in the pilot wards were conducted as originally planned except the period of the implementation. From the experiences, the following points were identified to be necessary and important for the effective and successful implementation of the activities.

- "Minimum Characteristics of a Disaster Resilient Community in Nepal" proposed by the flagship 4 of the Nepal Risk Reduction Consortium (NRRC) provided a good indicators as a guideline for the actors to implement the CBDRRM activities in Nepal with the initiatives of the MoFALD. It is still unclear which national organizations take over the responsibility to formulate, revise and promote such kind of National guideline for the CBDRRM after the reorganization of the MoFALD. Update and promotion of the guideline is essential for further strengthening the community activities for the disaster risk reduction and management.
- In all the pilot wards, the chairpersons involved in the pilot activities very actively and led the successful implementation of the programs, including of the official approval of the ward-level DRM plan with the consensus of the community members. Sound understanding of the representatives of the wards is one of the important keys for the successful CBDRRM activities.
- The participants of the workshops in the pilot wards were not stable all the time, however, nearly half of them attended all of three workshops conducted in the Project in each ward. Especially members of the women groups and health volunteer groups actively participated in the activities. In the evaluation of the final workshops, the members expressed their intention to introduce what they learned through the Project

to the other members of the groups. It is considered the collaboration between the existing community groups and the CDMC is very effective.

- In the Project, the activities were coordinated by the subcontracted NGO, ENPHO. Discussion results of each workshop were compiled by them and finalized by their coordination through the follow-up meetings with the ward representatives and community members. Considering the limited time for the municipality officers, the involvement of the NGOs or other organizations for implementation of the CBDRRM activities are indispensable for producing the outcomes. How to secure the budget for getting their support for the activities needs to be considered.
- The Project activities were conducted in the wards with different characteristics, however, significant differences and difficulties to proceed the activities were not observed. In the meanwhile, in ward No.2 in Budhanilkantha, a newly emerging urban area, there were less male participants through the three workshops compared to other two pilot wards. In case of a disaster, we need active involvement of both male and female. More consideration for the timing, venue, and program would be required for getting more participation of male.
- In the Lalitpur case, the management of the park is done by the park management committee and the management of the DRM matters is done by the CDMC. The big park has sometimes stakeholders and beneficiaries from the areas belong to more than two wards and not always same as the ward boundaries. It is required for paying attention to the management situation when coordinating the utilization of parks as "Open Spaces" for evacuation and response activities for disasters.

5.7 Recommendations for Future Disaster Risk Reduction and Management Activities in the Municipal Level and Nationwide Dissemination of Pilot Activities

As described in the earlier sections, this project implemented several disaster risk reduction and management activities for the three pilot municipalities and their wards as its pilot activities. For the municipal level, BBB Recovery and Reconstruction Plan, Standard Operation Procedure based on the Emergency Response Chronicle Survey of the Gorkha Earthquake in 2015, and Local Disaster and Climate Resilience Plan were formulated in the three pilot municipalities. And for the ward level, DRR Awareness Activities and CBDRRM activities were conducted mainly in the pilot wards of the pilot municipalities. The purposes of pilot activities was not just capacity building and promotion of the systematic DRRM activities in the pilot municipalities, but also, through the utilization of outcomes of these activities, get an overview on considering similar activities in all of the local governments in Nepal. Although the project has finally completed its scheduled tasks such as formulating the plans and implementing various activities, it is a continuous process, and disaster risk

reduction and management measures are endless. Moreover, municipalities and wards, as local governments, are in the forefront to save resident's lives and their assets by reduction of disaster risks and effective emergency response. Hence, the JICA Project Team has deliberated on sustainability of these processes and activities after the project. In order to strengthen the resilience in the future, it is necessary for the municipalities to continually implement the DRRM measures as well as improve them in collaboration with the national and provincial government. In this regard, the issues and challenges observed during implementation of the pilot activities of this project have been described in the following sections followed by the summarization of the recommendations for future DRRM activities in the municipalities.

Additionally, the JICA ERAKV project, in particular, developed the TG LDCRP which can be utilized by the local governments in Nepal for formulating LDCRP, thus contributing to the global target (e) of the Sendai Framework: "Substantially increase the number of countries with national and local disaster risk reduction strategy by 2020". The measures of nationwide dissemination for formulation of LDCRP are summarized in the conclusion of this section.

5.7.1 Recommendations for Future Disaster Risk Reduction and Management Activities in the Municipal Level

Through the implementation of the pilot activities in the target municipalities and wards, the issues and challenges for conducting the DRRM activities were identified. Based on those issues and challenges, the following are the recommendations for future disaster risk reduction and management activities in the municipalities:

- The number of the municipality officers in charge of DRRM is limited and it is difficult for them to be involved in each and every step of the DRRM activities. By enactment of the Constitution in 2015, and Disaster Risk Reduction and Management Act and Local Government Operation Act in 2017, the roles and responsibilities of municipality have now been clarified for DRRM. Also, after the local election in May 2017, many DRRM activities now fall under the municipalities' responsibilities following the decentralization of authority in Nepal. Thus, it is necessary to increase the number of staffs in charge of DRRM activities. Before then, it is crucial to establish a section or department related to DRRM in the municipalities for strengthening of the organization framework to implement DRRM activities smoothly, as was recently done by the Budhanilkantha Municipality.

  As a role of a section or department related to DRRM, it is necessary to promote the matters stipulated in the Disaster Risk Reduction and Management Act, and its work includes many things. Therefore, it is important to increase the number of staff in

charge of DRRM, and for reference, Table 5.7.1 shows the number of staff in charge of DRRM by population scale in municipalities in Japan. Considering the population of the pilot municipalities of 50,000 to 300,000 scales, in Japan, 5 to 10 staff are engaged in DRRM. However, in the pilot municipalities, currently only a few staffs are engaged. In addition, in Japan, as an example, Kuroshio Town in Kochi Prefecture, all staffs are responsible for parts of DRRM with several different duties, and with reference to this information regarding Japan, it is important to promote strengthening of the DRRM system at the municipal level.

Table 5.7.1 Current situation of staffs in charge of DRRM of municipalities in Japan

Population scale of municipality	Number of staff in charge of DRRM/municipality (Average)	Total Number of staff of general administration work (including DRRM)/municipality (Average)	Ratio of staff in charge of DRRM to total number of staff of general administration work (Average)
Less than 50,000	1.66	131.87	1.26%
50,000 – 100,000	5.15	387.27	1.33%
100,000 – 150,000	7.08	602.11	1.18%
150,000 – 200,000	8.98	841.34	1.07%
200,000 – 300,000	11.29	1,207.44	0.93%
300,000 – 500,000	14.14	1,791.90	0.79%
500,000 – 1,000,000	22.33	3,098.75	0.72%
More than 1,000,000	41.27	8,273.36	0.50%
Total Average	(Ratio of Number of staff of general administration work in Population):0.53%)		1.00%

Source: Ministry of Internal Affairs and Communications, Japan, edited by JICA Project Team

- The capability of the municipalities to implement the DRRM measures is low, shortage of budget being one of the contributing factors. Some counterparts mentioned that their municipality as a whole recognizes the importance of the DRRM activities, but their budget is not enough for conducting those activities. For instance, it is difficult for them to conduct similar CBDRRM activities as implemented as the pilot activities of the project in all of their wards. After the local election, the local governments are expected to play more important roles in DRRM. Thus, allocation of the regular budget for the DRRM activities in the municipality should now be reconsidered. In addition, it is necessary to implement not just the structural measures requiring more budgets, but also the non-structural measures such as the formulation of the plan, and prioritized CBDRRM activities. On the other hand, the Government of Nepal is now preparing the National Strategic Action Plan for Disaster Risk Reduction 2017-2030, which clearly mentions “Ensure annual budgetary allocation for risk reduction to be at least 5 % of all development sectors”. It is strongly expected that this plan will be approved as stipulated above and that the budget will be appropriately allocated to the municipal level.

- In connection with the limited budget of the municipal level, it is necessary to strengthen cooperation with national and provincial government in order to enhance the capability for implementation of the measures. At present, DRRM related organizations, at each government level, are undergoing many changes. In accordance with the Constitution and Disaster Risk Reduction and Management Act, provincial governments will have the responsibilities for DRRM as the intermediate level government in Nepal. However, it has not yet started to function officially. Similarly, then the DDC, which held an important position for DRRM, have now been replaced by District Coordination Committee (DCC), with a revised scope of work. Likewise the national level institutional structure for DRRM shall also be reorganized according to the Disaster Risk Reduction and Management Act, such that the National Disaster Risk Reduction and Management Authority shall be established to lead such activities. In this manner, it is imperative for the municipalities that the confirmation of the latest situation of institutional structure on the national and provincial level be done sequentially, and to coordinate and collaborate with each of those levels of government along with the confirmation of DRRM measures planned by national and provincial governments in consideration of the residual risks.
- To ensure the budget and to prioritize DRRM in the policy of municipalities toward resilience, it is essential to mainstream and prioritize the LDCRP to periodic and annual development processes. The budget formulation and allocation processes are clearly mentioned in the Local Government Operation Act enacted in 2017. For synchronization of LDCRP and periodic, annual plans, the timing of formulation of LDCRP should be properly considered. Concretely, according to the act, the annual budget has to be approved by the municipal assembly by around middle of July (Asadh in Nepali calendar). Prior to that, for around three months, municipalities discuss and prepare the policies and programs. The formulation and approval of LDCRP has to be scheduled to be in line with this time frame. This will enable the smooth mainstreaming of DRRM into development processes.
- Monitoring and evaluation is very important in order to enhance the effectiveness of the LDCRP as well as effectively promote the implementation of DRRM activities. The regular monitoring and evaluation, can reflect the progress of the implementation as well as issues observed during the process. The LDCRP guideline requires the establishment of the monitoring and evaluation sub-committee in municipality. Furthermore, the plans which were developed in this project, LDCRP, SOP, Community DRM Plan, need to be reviewed and updated periodically as the social conditions, organizational structure and necessity of activities, etc. change with time.
- There are no regular opportunities of the training for municipality officers to learn CBDRRM activities as well as the DRRM aspects. Therefore, the activities are left entirely up to the NGOs and other organizations who implement such kind of activities.

More training programs, preferably regular training opportunities should be considered for enhancing their awareness on the importance of the CBDRRM and strengthening their capacities to understand and manage the CBDRRM activities.

- In the case of Lalitpur and Bhaktapur, the community disaster management committees (CDMC) existed before starting of the Project activities. However, they were inactive at the time of the initiation of the Project. Restructuring of the local administration and the change of the boundaries of the wards can greatly affect the sustainability of the activities. Hence, stability of the local governance is also one of the important facts for the sustainable CBDRRM activities.

5.7.2 Nationwide Dissemination of Pilot Activities

The outcomes of this project can be utilized for nationwide dissemination of pilot activities to all other municipalities in Nepal. The measures of utilization of nationwide dissemination of pilot activities including formulation of LDCRP are summarized as follows.

(1) Nationwide dissemination of pilot activities

All outcomes developed through the pilot activities can be utilized for other municipalities as follows. Mainly the outcomes can be utilized as a model and sample for the other municipalities.

Table 5.7.2 Measures for utilization of outcomes of pilot activities to other municipalities

Outcomes	Target level	Chapter in the report and Attachment	Measures for utilization to other municipalities
BBB Recovery and Reconstruction Plan	Municipality	5.2, Volume 5: Attachment 5	Utilize as a model and sample plan, and the contents, overall structure and action list can be referred toward BBB through integrating disaster risk reduction measures.
Outcomes of DRR Awareness Activities		Volume 4: Appendix 5	
Earthquake awareness brochure	Community, Residents	Volume 5: Attachment 3	Distribute widely to other municipalities, stakeholders and residents.
Radio awareness programs	Community, Residents	Volume 5: Attachment 4	Broadcast regularly such as the anniversary season of the Gorkha Earthquake so that the misery of earthquake damage is not forgotten by the residents with passing of time.
SOP	Municipality	5.3, Volume 5: Attachment 6	Utilize as a model and prototype since SOP has not been developed at the municipal level in Nepal

Outcomes		Target level	Chapter in the report and Attachment	Measures for utilization to other municipalities
TG LDCRP		Municipality	5.4, Volume 5: Attachment 7	Described in (2)
LDCRP		Municipality	5.5, Volume 5: Attachment 8	Described in (2)
Outcomes of CBDRRM Activities			5.6	
	Community DRM Plan	Ward	Volume 5: Attachment 9	Utilize as a model and sample plan
	DRR map and DRR carte	Ward	Volume 5: Attachment 10	Contents can be utilized as a sample

Source: JICA Project Team

(2) Nationwide dissemination for formulation of LDCRP

For LDCRP, this project developed the TG LDCRP for all the local governments in Nepal and LDCRP for the pilot municipalities. LDCRP developed in this project includes the local disaster risk reduction strategy. One of the global targets of the Sendai Framework is "Substantially increase the number of countries with national and local disaster risk reduction strategy by 2020" (global target (e)). Therefore the outcomes for LDCRP in this project contribute in achieving targets of the Sendai Framework, and the JICA Project Team recommends nationwide dissemination of the system and the framework in order to promote understanding of the LDCRP and its methodology. As per that concept, the measures of nationwide dissemination for formulation of LDCRP have been summarized in the following section. It is divided into two types, utilization of TG LDCRP and utilization of LDCRP as a model plan.

- Utilization of TG LDCRP

  The LDCRP has a broad scope as a comprehensive master plan for disaster risk reduction and management with the consideration of climate resilience, and it might be difficult for the municipal officials to formulate it on their own. Therefore, TG LDCRP was developed in this project so that it could be circulated to all local levels of Nepal. TG LDCRP helps to formulate a practical and effective LDCRP easily at the local level such as municipality. It is a supporting manual aiming to give guidance, and is to be utilized as a reference document so that the local level can understand its detail contents, formulation procedures, examples of descriptions and notes to be considered. Since the TG LDCRP includes several referential information, it also contributes for capacity enhancement of municipal officials. For consideration of disaster and climate resilience strategies in Chapter 4 of LDCRP, since the global targets of Sendai Framework can be referred, a sample format has been included along with approaches in the TG LDCRP for determining the policies considering legal framework and national policies.

In addition, considering the capacities of local governments, it is difficult for officials of local government to grasp the overall picture of the activities related to the disaster and climate resilience and devise the necessary activities. Thus, TG LDCRP includes the list of examples of disaster and climate resilience activities in an appendix in order that the local level can refer to it while preparing the plans. The list not only specifies the title of activity, but also its detail contents. The sample list of activities leads to the action plan, which is the most important part in the LDCRP and its implementation. The local governments can understand each content of the activities, can consider their additional requirements, and easily formulate and implement the activities. Accordingly, this list can be utilized as a sample list by every municipality, and they can select the necessary activities while perceiving the whole image for DRRM. The overall contents are referred in the Attachment 7.

- Utilization of LDCRP as a model plan

  As described in 5.1, the three pilot municipalities were selected based on their regional characteristics and the target disasters in each municipality are different. If other municipalities have similar characteristics to one of the pilot municipalities, it is possible for them to refer to the plan formulated by this project as a model plan and formulate their own plan.

  In addition, LDCRPs of pilot municipalities are based on the hazard and risk assessment in this project. Since disaster risk management plans that exist so far have not been formulated by considering the results of hazard and risk assessment, LDCRP formulated in this project with TG LDCRP act as a model plan in order to set the numerical disaster risk reduction target to be achieved for the resilience. It thus helps to promote the plan formulation processes in accordance with the understanding of disaster risks by hazard and risk assessment.

- Required system and cost estimation for nationwide dissemination

  Utilizing the outcomes formulated in this project, the required system and cost estimation to disseminate this information to all local levels in Nepal for formulation of LDCRP. First of all, involvement of MoFALD is indispensable for nationwide dissemination. MoFALD is currently revising the Local Disaster Risk Management Planning (LDRMP) Guideline as the LDCRP Guideline, and in this project, TG LDCRP were formulated in accordance with the contents of the revised guideline. That is, MoFALD has a responsibility to promote the formulation of LDCRP to local level entities by utilizing the guidelines. In addition, the TG LDCRP was formulated while discussing with MoFALD. Thus, officials of MoFALD are familiar with the contents, and as the main counterpart of this project, they understand the importance

of formulating an LDCRP based on the hazard and risk assessment implemented in this project. For this reason, it is required that MoFALD (or another Organization with the function of MoFALD after restructuring of the Ministries) continues to disseminate the LDCRP guideline with TG LDCRP widely such as by holding seminars and other events for municipalities.

Also, each municipality has responsibility for actual formulation of the plan. Required duration and cost for formulation of the plan are estimated as shown in Table 5.7.3. Approximately 3 million NRP per municipality are estimated for total costs such as expenses of staff personnel, holding workshops, printing, etc. If the budget can be secured, the utilization of resources such as NGOs or consulting companies is realistically conceivable. Since it is very difficult to promote the formulation in all municipalities in parallel, in order to promote the plan formulation more effectively in consideration of the effects of disaster risk reduction for the whole of Nepal, it is desired that the plan is formulated for large cities preferentially.

Table 5.7.3 Estimated cost and duration for nationwide dissemination of formulation of LDCRP

	Unit cost and duration /municipality	Total cost and duration for 753 municipalities	Remarks
Duration	1 year	5 years	Assumption: 150 municipalities / year
Cost	3,000,000 NPR	2,250,000,000 NPR	

Source: JICA Project Team

Chapter 6 Capacity Building Activities

This chapter describes Capacity Building Activities implemented in the Project. Capacity Building is one of the important activities ensuring sustainability of activities to be implemented by Nepal side in the future.

Capacity building was mainly implemented through series of WG periodically such as WG1 (Working Group 1) meetings on Seismic Hazard Assessment, WG2 (Working Group 2) meetings on Seismic Risk Assessment, and WG3 (Working Group 3) meetings on Pilot Activities. And the Join Working Group (JWG) meetings were held as necessary for collaboration among WGs. The 1st JWG meeting was organized to share the progress of each working group. The 2nd JWG meeting focused on the progress of Seismic Hazard Analysis, especially for the calculation of PGA (Peak Ground Acceleration of seismic motion at ground surface) for the Scenario Earthquakes.

Series of public Seminars were held to increase DRRM awareness of all stakeholders including central and local government officials, relevant organizations, international organizations, I/NGOs, academia, students, media, and others. The 1st public seminar was held for understanding seismic hazard assessment. The 2nd public seminar was held for understanding of results of seismic risk assessment and discussing the disaster resilient KV. The final seminar was held for dissemination of whole components of project, and way forward to achieve DRR and increase resilience against disasters.

In addition, three times of Counterpart Trainings in Japan were conducted and enhanced understanding of disaster risk reduction and management system in Japan, and considers utilization of knowledge acquired. Also these trainings gave opportunities to discuss faces to faces among participants from various central and local government and they could deeply understand aim of project and measures to be taken to strengthen the implementation system.

6.1 WG and JWG Meeting

This section describes the detail of the each WG activities and JWG. JWG held for information sharing between each WG

6.1.1 WG1 (Working Group 1) Meeting

WG1 (Working Group 1) meetings relating to issues of earthquake and geology have been held. Active exchanges were achieved through various presentations and attendance at other related meetings such as JCC, JWG, academic conferences, as follows:

Table 6.1.1 Exchange list by presentations and attendance to meetings related to WG 1

Y/M/D	Title	Contents
2015/06/17	International Seminar by NAST	(atte.) Gorkha earthquake
2015/06/18	1st JCC meeting	(pres.) Concept of seismic hazard assessment
2015/07/24	SATREPS kick off meeting	(pres.) process of seismic hazard assessment
2015/08/07	**1st WG1 meeting**	**(pres.) plan of seismic hazard assessment**
2015/10/29-30	USMCA conference	(atte.) Gorkha earthquake
2015/11/09	**2nd WG1 meeting**	**(pres.) midterm report of seismic hazard assessment, technical transfer**
2015/12/06	1st JWG meeting	(pres.) midterm report of seismic hazard assessment
2015/12/16	2nd JCC meeting	(pres.) midterm report of seismic hazard assessment
2016/03/17	Meeting at Training in Japan	(disc.) Scenario earthquakes
2016/04/11	2nd JWG meeting	(pres.) seismic motion and correction factor
2016/04/24-25	One year anniversary seminar by DMG	(pres.) midterm report of seismic hazard assessment
2016/05/10	3rd JCC meeting	(pres.) seismic motion and correction factor
2016/06/16	Mid-term report meeting	(pres.) seismic motion and correction factor
2016/06/21-22	J-RAPID report conference	(atte.) liquefaction due to Gorkha earthquake, etc.
2016/06-07	**Each explanation to WG1 member**	**(expl.) midterm report of seismic hazard assessment**
2016/09/11	**3rd WG1 meeting (plan)**	**(pres.) final report of seismic hazard assessment**
2016/09/14	4th JCC meeting (plan)	(pres.) final report of seismic hazard assessment
2016/09/16	Open Seminar (plan)	(pres.) final report of seismic hazard assessment

Source: JICA Project Team

In addition to above, participation, attendance and exchange of information on research results took place at the meetings in Japan or in a reconnaissance report on the Gorkha earthquake. Further, monthly reports, and bi-monthly progress reports, after trip reports have been submitted or carried out from time to time. In Nepal, reports and consultation were conducted at the weekly meetings with MoUD, DMG, and KVDA. Towards DMG, WG1 counterpart, technical transfer on microtremor measurement, Geomorphological map preparation (mainly Aug. to Nov. 2015), and ground motion assessment, etc. (mainly Dec. 2015 to Apr. 2016) have been carried out.

6.1.2 WG2 (Working Group 2) Meeting

Risk assessment working group, WG2, is composed of the experts from project team and the relevant organizations of Nepal, chaired by MoUD. The working group meeting was convened four times during the project period. In order to share information and having consensus on data, method and results of seismic risk assessment, project team discussed various issues not only in the working group meetings but also individually with related counterpart organizations and persons frequently during the progress of the project.

(1) First WG2 Meeting

The first WG2 meeting was conducted on 27 July 2015. Main agenda is,

- Self-introduction
- Opening remarks by chair person, JS, MoUD
- Presentation on risk assessment framework
- Discussion on method of data collection,
- Working group activities, schedule, etc.
- Discussion
- Closing remarks

The meeting agreed on the contents of WG2 and general schedule. It discussed on the information sharing of available inventory data, past project results and damage data of Gorkha earthquake. It also suggested that there needs to be a proper coordination between WG1, WG2 and WG3 and decided to hold a coordination meeting among the WGs before the second WG2 meeting, to be organized by KVDA. As a consequence, the first joint group meeting was held on 6th December 2015.

Source: JICA Project Team

Figure 6.1.1 Photo of the 1st WG2 Meeting

(2) Second WG2 Meeting

The second WG2 meeting was convened on 8 February 2016. Main agenda is,

- Opening Remarks
- Progress and schedule of WG2
- Approach for risk assessment of buildings
- Approach for risk assessment of infrastructure and lifeline
- Approach for human and economic loss assessment
- Data collection and GIS database
- Discussion

- Closing Remarks from MoUD

Project team explained the risk assessment method for buildings, roads, bridges, water supply, sewage, electricity, and telecommunication, and the situation of data collection and GIS database construction. The comments were received on building damage function that should specify separately for new and old masonry buildings. Nepal Telecommunication Authority (NTA) suggested to make risk assessment for whole telecommunication system. Project explained that it needs detailed investigation and is difficult within the current assignment and it is agreed the damage of Base Transceiver Stations (BTS) will be assessed in this project.

Source: JICA Project Team

Figure 6.1.2 Photo of the 2nd WG2 Meeting

(3) Third WG2 Meeting

The Third WG2 meeting was held on 4 August 2016. Main agenda is,

- Opening Remarks
- Introduction of seismic hazard results (WG1) and schedule of WG2
- Approach for risk assessment of buildings
- Approach for risk assessment of infrastructure and lifeline
- Approach of human loss and earthquake occurrence scene
- Approach for economic loss assessment
- Discussion and confirmation
- Closing Remarks

Prior to the meeting, project team visited the relevant organizations to explain and discuss the risk assessment method. The major comments are the building damage function and bridge damage estimation should consider more details of the structures. The difference between Nepal and Japan for sewage damage assessment should be considered and human casualty assessment should be separated for masonry and RC buildings. In response to the comments, project team made modifications on the method subjected to the data availability.

As a result, the risk assessment method and earthquake occurrence scene proposed by project were agreed.

Source: JICA Project Team

Figure 6.1.3 Photo of the 3rd WG2 Meeting

(4) Forth WG2 Meeting

The forth WG2 meeting was held on 23 February 2017. The purpose of the meeting is to discuss and confirm the seismic risk assessment results of building, infrastructure and lifeline damage, human casualty estimation and economic losses. After presentation from project team, the meeting confirmed the results and discussed on short- and long-term risk reduction target, issues for future update of risk assessment as well.

Source: JICA Project Team

Figure 6.1.4 Photo of the 4th WG2 Meeting

6.1.3 WG3 (Working Group 3) Meeting

The working group 3 (WG3) meetings were held for working and discussing on the pilot activities of the project with the representatives from all the pilot municipalities and related organizations, chaired by MoHA and MoFALD. The WG3 meeting was held seven times in total during the project period. The summary of the meeting is shown in chapter 1 and the details for each meeting are shown below.

(1) 1st WG3 meeting

The first WG3 meeting was held on August 5, 2015 with the prior consultation with MoFALD, the chairman of the meeting. All the member organizations participated and the JICA Project Team made the presentation for the role sharing of each member organization, which was then confirmed. In addition, the JICA Project Team presented and shared information regarding the direction, the draft of the table of contents and description image of the recovery and reconstruction plan, as well as the contents of urban planning and land use policy as the one component of the plan and so on. Each content was confirmed with the working members and many of the members commented that the results coming out are more than expected.

Source: JICA Project Team

Figure 6.1.5 Photo of 1st WG3 meeting

(2) 2nd WG3 meeting

The second WG3 meeting was held on March 1, 2016. In the meeting, the JICA Project Team made a presentation on the progress of the formulation of the recovery and reconstruction plan, mainly the draft of the basic plan. In addition, Dr. Iuchi, associate professor of the Tohoku University and a member of the JICA Project Team, introduced the current situation of reconstruction from the Great East Japan Earthquake since which five years has passed. More than twenty people participated in the meeting from the Nepal side, specially two people from NRA participated, and could share the information and discuss. In the discussion, several comments came out such as the cooperation with the NRRC Flafship4 for activities related to the CBDRM, separation of planning period, opinions on the draft of the recovery and reconstruction plan and so on. Based on these opinions, the plan was revised.

Source: JICA Project Team

Figure 6.1.6 Photo of 2nd WG3 meeting

(3) 3rd WG3 meeting

Third WG3 meeting was held on May 6, 2016. In the meeting, the JICA Project Team explained the entire contents of BBB RR Plan which was formulated as the final draft. More than fifteen participated in the meeting from the Nepal side, and shared various information with each other. As for the comments, it was observed that the plans will be a prototype of the recovery and reconstruction plan to be expanded to all other municipalities, and the most important thing would be to actually implement the actions in the plan. And finally the contents of the recovery and reconstruction plan were confirmed at the meeting.

Source: JICA Project Team

Figure 6.1.7 Photo of 3rd WG3 meeting

(4) 4th WG3 meeting

Fourth WG3 meeting was held on December 19, 2016. There were fourteen participants from the Nepali side who are officials of MoFALD, MoUD, MoHA, DUDBC and the pilot municipalities. In addition to the overall progress of the project, the structure and contents of the guideline for local disaster risk reduction and management planning, the disaster risk reduction and management plan and SOP for pilot municipalities were presented by the JICA Project Team. As a result of the discussions, the outline of the study procedures was agreed upon by the participants.

(5) 5th WG3 meeting

The Fifth WG3 was held in order to report the progress of the pilot activities and collect a wide range of opinions from the WG3 members on June 7, 2017. The progresses of the local disaster risk reduction and management planning, SOP and CBDRRM activities were shared and discussed. Regarding the formulation of the guideline for local disaster risk reduction and management planning, it was agreed by participants that the inputs from the JICA Project Team which indicates how to consider the seismic risk assessment in the planning process shall be maximally applied in the revision process of the existing guideline by MoFALD.


Source: JICA Project Team

Figure 6.1.8 Photo of 5th WG3 meeting

(6) 6th WG3 meeting

The Sixth WG3 meeting was held on September 14, 2017. In addition to overall progress of the project, the progresses of the LDCRP and LDCRP for Pilot Municipalities, SOP and CBDRRM activities were presented by the JICA Project Team. The participants expressed specific comment for carrying out each plans and activities. Based on the opinions, the JICA Project Team agreed to that and continued to formulate each plan and implement activity reflecting their opinions.


Source: JICA Project Team

Figure 6.1.9 Photo of 6th WG3 meeting

(7) 7th WG3 meeting

The Seventh WG3 meeting was held on December 20, 2017. There were eleven participants from the Nepali side who are officials of MoFALD, MoUD, MoHA, DUDBC, KVDA and the pilot municipality. The result of the formulation of TG LDCRP, LDCRP for Pilot Municipalities, formulation of SOP and CBDRRM Activity were presented by Nepali representatives and the JICA Project Team and . As a result of discussions, MoFALD decided to include TG as an annex of the Main LDCRP Guideline.


Source: JICA Project Team

Figure 6.1.10 Photo of 7th WG3 meeting

6.1.4 JWG (Joint Working Group) Meeting

The JWG meetings have been held two times as of April 2017. Summary of each JWG is described below.

(1) 1st JWG meeting

The 1st Joint Working Group (JWG) meeting was organized to share the works of each working group before the JCC meeting. The Development Commissioner of KVDA chaired the meeting. The presentation was prepared by the JICA Project Team, and the comprehensive ideas including the themes of three WGs were discussed.


Source: JICA Project Team

Figure 6.1.11 1st JWG meeting

(2) 2nd JWG meeting

The 2nd JWG meeting focused on the progress of Seismic Hazard Analysis, especially for the calculation of PGA (Peak Ground Acceleration of seismic motion at ground surface) for the Scenario Earthquakes. The importance of PGA for Risk Assessment and DRRM was shared among participants.

Source: JICA Project Team

Figure 6.1.12 2nd JWG meeting

6.2 Public Seminar

The public seminar was planned to be held three times during the project, and two times have already been conducted. The public seminar aims to disseminate the activities of the each component and cultivate disaster prevention awareness to the relevant organizations and the interested persons.

6.2.1 First Public Seminar

The 1st public seminar was held on 16 September 2016. The main topics of the public seminar are understanding of seismic hazards and risk governance and building disaster resilient society. The exchange ideas through the conference are effectively utilized as risk evaluation, formulation of the disaster prevention plan and so on.

Source: JICA Project Team

Figure 6.2.1 1st Public Seminar

6.2.2 Second Public Seminar

The 2nd public seminar was held on 11 April 2017. The participants are central government, local government, disaster prevention related organization, donor agency, I/NGO, academician, media and so on. The JCC members of the project also took part in the meeting such as Mr. Deependra Nath Sharma (MoUD) of JCC chairman and Dr. Bhai Kaji Tiwari (KVDA). A lot of students also attended this seminar. For that reason, the seminar also contributed human resource development of disaster prevention field to young generation.

Source: JICA Project Team

Figure 6.2.2 2nd Public Seminar

6.2.3 Third Public Seminar

In order to disseminate the project results to general public, the 3rd public seminar was held on 14 February 2018. Over 200 persons from central and local government organizations, disaster management related donor and I/NGOs, professors, students as well as interested individuals attended the seminar. The seminar was composed of two sessions: one is Overview of the Activities and Results of the Project and another focuses on Construction of Robust and Resilient Society against Natural Disaster Risk in the future by utilizing the seismic risk assessment results. The brochure and newsletter, which summarized mainly the

risk assessment results and pilot activities, were distributed. A press release conference was held separately during the seminar, which attracted more than ten news agencies, covering newspaper and TV broadcasting.

Figure 6.2.3 3rd Public Seminar

Figure 6.2.4 Press Release Conference

6.3 C/P Training in Japan

This section describes counterpart training in Japan as other activities of this project. The training was held three times during the project. The training aims to give each counterpart organization opportunities to lean about Japanese disaster management and recovery system for improving their activities in Nepal. The 1st training in October 2015 was titled “BBB Recovery and Reconstruction and Disaster Management System” targeting outputs 3 and 4. The 2nd second training namely “Seismic Hazard and Risk Assessment in Japan” held in March 2016 targeted outputs 1 and 2. And in the 2nd phase, 3rd and last training namely “Disaster Risk Reduction and Management Planning and Disaster Management Policy” was held in January to February 2017 targeted output 4.

Through implementation of three counterpart trainings in Japan, many principal members of this project, such as Secretary of MoUD, Joint Secretary of MoUD, PD and JCC members, participated and enhanced their basic understanding of necessity of disaster risk reduction efforts. Since the participants could study the Japanese system and techniques and make time for discussing face to face among project members, they could deeply understand this project and as well as measures to strengthen the implementation system. The summary of the training is described in the following sections.

6.3.1 First C/P Training in Japan

Theme: BBB Recovery and Reconstruction and Disaster Management System

(1) Objectives

The objectives of the 1st training consisted of the following three items.

I. To be able to propose measures for recovery and reconstruction planning and disaster management planning in each level of government by learning the “Planning after the Earthquake in Japan” and DM planning in each governmental level in Japan.

II. To be able to propose measures for strengthening the cooperation among organizations in Kathmandu Valley by learning the cooperation framework among the national, prefectural, and municipal governments in Japan.

III. To be able to propose measures for concrete initiatives, activities for recovery, reconstruction and DM Planning by learning the lessons learned from the experience of recovery and reconstruction in Japan

(2) Participants

The participants of the training were as shown in Table 6.3.1.

Table 6.3.1 The Participants of the 1st Counterpart Training in Japan

	Name	Organization	Title
1	Mr. Nawal Kishor Mishra	Planning Monitoring & Foreign Aids Division, Ministry of Urban Development	Joint Secretary
2	Mr. Dwarika Shrestha	Urban Roads Division, Ministry of Urban Development	Joint Secretary
3	Mr. Shambhu K.C.	Planning & Urban Division, Ministry of Urban Development	Joint Secretary
4	Mr. Suman Salike	Housing & Building Section, Ministry of Urban Development	Senior Divisional Engineer
5	Mr. Sagar Krishna Joshi	Division Office, Kathmandu, DUDBC	Senior Divisional Engineer
6	Mr. Krishna Sapkota	Human Resource Division, Ministry of Home Affairs	Section Officer
7	Mr. Khem Raj Ojha	Disaster Management, Ministry of Federal Affairs & Local Development	Under Secretary
8	Mr. Rishi Raj Acharya	Disaster Management, Ministry of Federal Affairs & Local Development	Under Secretary
9	Mr. Shobhakhar Regmi	Disaster Management, Ministry of Federal Affairs & Local Development	Section Officer
10	Mr. Uddav Prasad Rijal	Bhaktapur Municipality	Executive Officer
11	Mr. Birendra Dev Bharati	Budhanilkantha Municipality	Executive Officer

Source: JICA Project Team

(3) Schedule

The schedule of the training was as in Table 6.3.2.

Table 6.3.2 Schedule of the 1st Counterpart Training in Japan

	Date			Activity	Place
-	24-Oct	Sat	AM		
			PM	Leaving Nepal (Kathmandu-Tokyo)	-
1	25-Oct	Sun	AM	Arriving Tokyo	-
			PM	Orientation and preparation for the Training (Before check in)	Hotel
2	26-Oct	Mon	AM	Briefing	JICA Tokyo
			PM	Program Orientation(Explanation of this Training)	JICA Tokyo
				JICA support for Reconstruction from Typhoon Yolanda	JICA Tokyo
3	27-Oct	Tue	AM	Visit to Reconstruction Agency/ Lecture on Role of National Government for Reconstruction Measures in Japan	Reconstruction Agency
			PM	Visit to Ministry of Land, Infrastructure, Transportation and Tourism	MLIT
				Preparation for the Seminar on 5th November	GRIPS
4	28-Oct	Wed	AM	Transfer Tokyo -(Bus and Train)→Sendai	
			PM	Visit to Miyagi Prefecture/ Role of Prefecture in Reconstruction from Great East Japan Earthquake	Miyagi Prefecture
5	29-Oct	Thu	AM	Visit to Higashi Matsushima City/ Damage of city and role of Municipality in Reconstruction from Great East Japan Earthquake/ Nobiru Relocated Developed Land, Relocated housing complex, Mega Solar Park	Higashi Matsushima City
			PM		
6	30-Oct	Fri	AM	Talk with Story teller/ Site visit to Disaster Stricken Area from the Great East Japan earthquake 2011	Ishinomaki City
			PM	Visit to NEWSee	Newsee
				Lecture on Community based reconstruction	Downtown Creative Reconstruction Committee
				Transfer Sendai -(Air)→Osaka -(Bus)→ Kobe	
7	31-Oct	Sat	AM/ PM	Arrangement of Documents and Data	JICA Kansai
8	1-Nov	Sun	AM/ PM	Arrangement of Documents and Data	
9	2-Nov	Mon	AM	Visit to Kobe Institute of Urban Research Lecture on Damage overview and Lessons Learned & Reconstruction situation from Great Hanshin-Awaji Earthquake	JICA Kansai
			PM	Visit to Hyogo Earthquake Research Centre (E-defense) / Visit to large laboratory equipment for seismic resistance	Hyogo Earthquake Research Center
10	3-Nov	Tue	AM	Visit to Disaster Reduction and Human Renovation Institute	Disaster Reduction and Human Renovation Institute
			PM	Preparation and discussion for the Final presentation	JICA Kansai
				Transfer from Kobe to Tokyo (Bus and Train)	
11	4-Nov	Wed	AM	Visit to Tokyo Metropolitan Government Lecture on Prefectural Level Disaster Management and preparation for Reconstruction	Shirahige danchi
			PM	Visit to Sumida City Government Lecture on Municipal Level Disaster Management and preparation for Reconstruction	Sumida City
12	5-Nov	Thu	AM	Symposium on Reconstruction from the 2015 Nepal Earthquake	GRIPS(National Graduate Institute for Policy Studies)
			PM	Building Research Institute	Building Research Institute
				National Research Institute for Earth Science and Disaster Prevention	National Research Institute for Earth Science and Disaster Prevention
13	6-Nov	Fri	AM	Preparation for Final Presentation	JICA Tokyo
			PM	Final Presentation, Evaluation, Closing Ceremony	
14	7-Nov	Sat	AM	Leaving Tokyo	
			PM	Arriving Kathmandu	

Source: JICA Project Team

(4) Discussion of the Effects of Training

The participants answered questionnaires and judged their understanding for each content by a five grade point evaluation by themselves (i.e. five indicates very good understanding and one indicates limited understanding). Most of the answers evaluated by the participants were four or five, which indicated that they could deeply understand the contents of the training. The dialogue style that encouraged the participants to exchange their opinions and present their ideas generally got a high grade compared to the lecture style. The understanding to the contents held at MLIT and the reconstruction agency got fewer ratings of five than other contents. Therefore, follow up activities are considered to be required if it is necessary for the participants who will contribute to this project regarding the contents presented by MLIT and the reconstruction agency.

Furthermore, the degrees of recognized gaps between Nepal and Japan for the contents explained in the each programme were judged by a five grade point evaluation (i.e. five indicates recognizing very big gaps and one indicates recognizing very small gaps). Almost all answers were concentrated at four and five points, which indicated that the participants have felt huge gaps throughout the programme.

The comments for the reasons to recognized gaps clarified that the participants recognized the limited human resources particularly in local administration agencies and an insufficient network system between local and national administration agencies in Nepal. Therefore, the BBB recovery plan designed after the training paid attention to the gaps. For example, the planning at municipality level considered the overall framework such as the sharing of roles on the national level and placing the proposed plan into the national level's plans as well as the current system at the municipal level. Such kind of attention is necessary for the 2nd year activities.

(5) Output of the Training

At the end of the training, the participants were separated into three groups, and they made presentations about technical and political issues in Nepal after the Gorkha Earthquake, lessons in Japan including disaster management and reconstruction governance, reconstruction projects, coordination among multi-stakeholders, seismic resistant buildings, and so on, and about the necessary measurement for reconstruction after the earthquake in Nepal from the technical, political and budget-wise views. The 1st group focused on the national level measurement, the 2nd one was from the view of local government and the 3rd one discussed more about the necessary techniques for safer building based on current National Building Code. Though the proposals include wider components than the project, they are useful for considering the support from JICA for long term recovery, reconstruction and disaster management in Nepal.

Temporary houses in Higashi Matsushima city

Panel Discussion in GRIPS

Source: JICA Project Team

Figure 6.3.1 Photos in the 1st Counterpart Training in Japan

(6) Challenges and Suggestion

1) At the Preparation Phase

Since this training took much time to select the participants by the committee in MoGA. The examination of training dates and early commencement of requisite procedures should be considered in the future. Hiring vehicles to the airport because of the shortage of gasoline was offered and detailed plans after the arrival to Japan were asked by some participants to the JICA Project Team. To avoid such kind of inconvenience, the JICA Project Team staying in Kathmandu could conduct the lecture about the schedules of training, description of each destination and the contents to be leaned at the same time with briefing the participants.

2) At the Training Implementation Phase

Most of the activities were well conducted along the planned schedule during the training implementation phase. One participant suddenly expressed bad health and needed to go to hospital, but a well experienced training supervisor appropriately judged and brought him to the hospital without delaying the overall schedule. The training itself was successfully finished without causing any trouble.

6.3.2 Second C/P Training in Japan

Theme: Seismic Hazard and Risk Assessment in Japan

(1) Objectives

The objectives of the 2nd training consisted of following three items.

I. To understand and to become able to propose measures for “Seismic Hazard Analysis” of future earthquakes in KV.

II. To understand and to become able to propose measures for “Seismic Risk Assessment” based on the hazard analysis in KV.

III. To increase knowledge on "total disaster risk management", and become able to propose measures for utilizing the results of seismic risk assessment into the BBB reconstruction from the Gorkha Earthquake and disaster risk management.

(2) Participants

The participants of the training were as shown in Table 6.3.3.

Table 6.3.3 The Participants of the 2nd Counterpart Training in Japan

	Name	Organization	Title
1	Deependra Nath Sharma	Ministry of Urban Development	Secretary
2	Padma Kumar Mainalee	Housing and Building Division, Ministry of Urban Development	Joint Secretary
3	Jagadish Regmi	Administration, Ministry of Urban Development	Joint Secretary
4	Gopi Krishna Khanal	Municipal Management Division , Ministry of Federal Affairs and Local Development	Joint Secretary
5	Krishna Raj Pandey	DUDBC, Building Construction Maintenance Division Office, Ministry of Urban Development	Superintendent Engineer
6	Damber Bahadur Karki	Finance Division, Ministry of Urban Development	Under Secretary
7	Nava Raj Pyakurel	DUDBC, Ministry of Urban Development	Senior Divisional Engineer
8	Monika Maharjan	Housing and Building Division, Ministry of Urban Development	Engineer
9	Lok Bijaya Adhikari	National Seismological Centre Department of Mines and Geology, Ministry of Industry	Senior Divisional Seismologist
10	Ram Raj Subedi	District Administration Office, Rautahat, Ministry of Home Affairs	Assistant Chief District Officer
11	Roshan Aryal	Disaster Risk Reduction and Recovering Section, Ministry of Home Affairs	Section Officer
12	Ganesh Bikram Shah	Dakshinkali Municipality, Ministry of Federal Affairs and Local Development	Executive Officer

Source: JICA Project Team

(3) Schedule

The schedule of the training was as in Table 6.3.4.

Table 6.3.4 Schedule of the 2nd Counterpart Training in Japan

Date				Activity	Place
-	15-Mar	Tue	PM	Depart from Kathmandu, Nepal (Kathmandu-Tokyo)	-
1	16-Mar	Wed	AM	Arrive at Tokyo, Japan	
			PM	Briefing	TIC
				Orientation	
				Lecture on Disaster Management System in Japan (from JICA HQ)	
2	17-Mar	Thu	AM	Visit Japan Meteorological Agency : Presentation on seismic observation, data processing, ground motion estimation, etc. : Lecture and facilitation tour on real time seismic early warning system	Japan Meteorological Agency
			PM	Visit OYO Cooperation(Research centre) : Presentation on examples of soil survey for ground modelling	OYO Cooperation (Research centre)
				Visit Building Research Institute(BRI) : Presentation on Retrofitting for building resilience : Lecture and facilitation tour on shaking table	BRI
3	18-Mar	Fri	AM	Visit MLIT : High Level Meeting : Presentation from MLIT : Discussion for BBB reconstruction and mainstreaming Disaster Management	MLIT
			PM	Visit Tokyo Metropolitan Government : Presentation on seismic risk assessment of Tokyo for the earthquake underneath Tokyo and its utilization for disaster management plan	Tokyo Rinkai Disaster Prevention Park Lecture room 3
				Tour in Tokyo Rinkai Disaster Prevention Park : The Disaster Prevention Experience-learning Facility, where in case of the disaster, which will be a disaster countermeasure headquarters of the government and other local governments during a large-scale earthquake in the metropolitan area.	Tokyo Rinkai Disaster Prevention Park
4	19-Mar	Sat	AM	Visit Shirahige Disaster Management Base : Tour on Disaster Management Base Facilities	Shirahige Disaster Management Base
				Lunch and City walk in Asakusa (You can eat at Restaurants there)	
			PM	Visit Great Kanto Earthquake Memorial Museum	Great Kanto Earthquake Memorial Museum
				Visit Edo Tokyo Museum	Edo Tokyo Museum
				Visit Tokyo Sky tree	Tokyo Sky tree
5	20-Mar	Sun	AM	Arrangement of Documents and Data	TIC
			PM		
6	21-Mar	Mon	PM	Visit Honjo life safety learning centre	Honjo life safety learning centre
				Transfer from Tokyo to Sendai (by Shinkansen)	
7	22-Mar	Tue	AM	Workshop with the International Research Institute of Disaster Science(IRIDeS), Tohoku University : Lecture on risk assessment and strengthening seismic performance of buildings and technology of retrofitting : Discussion on BBB recovery and reconstruction based on risk assessment	Tohoku University
			PM	Tour in damaged area and reconstruction site in Sendai City	Sendai City
8	23-Mar	Wed	AM	Visit Higashimatsushima City :Lecture on urban development after the tsunami and considering the future risk	Higashimatsushima City
			PM	Tour in damaged area and reconstruction Site : Relocation, smart disaster resilient eco-town, environment-friendly city, etc.	Higashimatsushima City
				Transfer from Sendai to Tokyo (by Shinkansen)	
9	24-Mar	Thu	AM	Visit Yokohama City : Presentation on approach and results of seismic risk assessment of Yokohama : Presentation on disaster management plan based on the risk assessment results	Yokohama City Government Office
			PM	Wrap-up Meeting with JICA Project Team members	JICA HQ
10	25-Mar	Fri	AM	Discussion with JICA HQ and Presentation from MoUD Secretary	JICA HQ
			PM	Final Presentation, Closing Ceremony	
11	26-Mar	Sat	PM	Depart from Tokyo, Japan	
12	27-Mar	Sun	AM	Arrive at Kathmandu, Nepal	-

Source: JICA Project Team

(4) Discussion of the Effects of the Training

The participants answered questionnaires and judged their understanding for each content by a five grade point evaluation by themselves (i.e. five indicates very good understanding and one indicates limited understanding). Most of the answers evaluated by the participants were four or five, which indicated that they could deeply understand the contents of programme. Even though the understanding of the high-tech contents held at OYO Cooperation still got high understanding that averaged over four, the understanding was relatively less compared to other contents. Therefore, follow up activities are considered to be required if necessary for the participants who will contribute this project regarding the contents.

Furthermore, the degrees of recognized gaps between Nepal and Japan for the contents explained in the programme were judged by a five grade point evaluation (i.e. five indicates recognized very big gaps and one indicates recognizing very small gaps). The results indicated that recognized gaps were vastly different among the participants compared to the previous figure. For example, some participants recognized many gaps for the contents of applied geology and the others did not. The results indicated that the points to recognize gaps differed among the participants. This is because the position and specific background of participants were various and ground survey had not been progressed in Nepal. On the other hand, the evaluation of four was most concentrated, so gaps were recognized throughout the programme in general.

The comments for the reasons to recognize gaps clarified that the participants recognized the technical challenges of hazard risk evaluation, issues of the administrative system and human resources and the necessity to progress the plans targeting the critical issues based on the risk evaluation. It was considered that appropriate communication with the persons in charge were quite important for further activities on paying attention to the capacity development of the counterparts in this project. In addition, planning at the municipality level is required to consider the overall framework such as the sharing of roles at the national level and placing the plan into national ones as well as the system at the municipal level. Therefore, requisite suggestions should be proposed under the common understanding with the key persons of MoFALD, MoHA, and MoUD who participated in the training

(5) Output of the Training

Each group made presentations about what they had learnt through the training, and what is the necessary measurement for reconstruction and disaster management in Nepal from technical, political, and financial views. Necessary ideas for the national level were discussed in Group 1, and then Group 2 focused on the technical ideas, and finally Group 3 reported from the view of the local level. The JICA Project Team will continuously follow up the items discussed in the training through the project for deeper understanding.

(6) Challenges and Suggestions

1) At the Preparation Phase

Since unexpected participants were selected for the first time by the committee in MoGA, the selection of participants was conducted again and further arrangement of the training contents was required for the newly selected participants. Similar issues caused by the delay of the selection process and unexpected selection of participants are considered to happen in the future. Therefore, it must be necessary to examine the training dates and commence the requisite procedures early with the understanding of GoN to the importance of the training.

2) At the Training Implementation Phase

Most of the activities were well conducted along the planned schedule and the training itself was successfully finished without causing any trouble.

Visiting devastated areas in the Tohoku region

Visiting JICA HQ

Source: JICA Project Team

Figure 6.3.2 Photos in the 2nd Counterpart Training in Japan

6.3.3 Third C/P Training in Japan

Theme: Disaster Risk Reduction and Management Planning, Disaster Management Policy

(1) Objectives

The objectives of the 3rd training consisted of the following three items.

① To understand and to be able to propose measures for formulation and nationwide dissemination of ”DRRM Plan” based on the Hazard and Risk assessment in KV and Nepal

② To understand and to be able to propose measures for establishment of ”Disaster Risk Reduction and Management (DRRM) System” for future disasters in KV and Nepal

③ To increase knowledge on "Comprehensive DRRM", and be able to propose measures for utilizing the result of Seismic risk assessment into the BBB reconstruction from the Gorkha Earthquake and DRRM

(2) Participants

The participants of the training were as shown in Table 6.3.5.

Table 6.3.5 The participants of the 3rd counterpart training in Japan

	Name	Organization	Title
1	Mr. Mani Ram Gelal	Ministry of Urban Development, Department of Urban Development and Building Construction	Officiating Director General
2	Mr. Jeevan Kumar Shrestha	Ministry of Federal Affairs and Local Development Infrastructure Development Division	Joint Secretary
3	Mr. Madhab Prasad Sharma	Ministry of Urban Development	Secretary of Minister
4	Mr. Krishna Prasad Panthi	Ministry of Urban Development	Under Secretary
5	Mr. Purushotam Subedi	Ministry of Federal Affairs and Local Development Fire and Disaster Management Section	Under Secretary
6	Mr. Dil Kumar Tamang	Ministry of Home Affairs Disaster Management Section	Under Secretary
7	Mrs. Ramita Shrestha	Ministry of Urban Development	Senior Division Engineer
8	Mr. Deepak Shrestha	Kathmandu Valley Development Authority	Senior Division Engineer
9	Mr. Pradip Rai	Ministry of Home Affairs, Disaster Management Section	Section Officer
10	Mr. Om Hari Tha Shrestha	Bhaktapur Municipality	Architect Engineer
11	Mr. Harish Chandra Lamichhane	Lalitpur Metropolitan City	Engineer
12	Mr. Binod Poudyal	Budhanilkantha Municipality	Sub Engineer

Source: JICA Project Team

(3) Schedule

The schedule of the training was as in Table 6.3.6.

Table 6.3.6 Schedule of the 3rd counterpart training in Japan

No.	Date			Activity	Place
	22-Jan	Sun		Arrive at Tokyo, Japan	
1	23-Jan	Mon	AM	Briefing	JICA Tokyo
			PM	Program Orientation	
				JICA :Lecture on Japan's Efforts for Disaster Risk Reduction & The Sendai Framework for Disaster Risk Reduction	
2	24-Jan	Tue	AM	Visit Cabinet Office (Tokyo Rinkai Disaster Prevention Park) :Lecture on National Level Disaster Risk Reduction and Management (DRRM) system :Tour in Tokyo Rinkai Disaster Prevention Park	Tokyo Rinkai Disaster Prevention Park
			PM	Visit Japan Meteorological Agency :Lecture on seismic observation, data processing, ground motion estimation, etc. :Lecture and facilitation tour on real time seismic early warning system	Japan Meteorological Agency (JMA)
3	25-Jan	Wed	AM	Visit Fire and Disaster Management Agency :Lecture on Local DRRM Plan	Fire and Disaster Management Agency (FDMA)
			PM	MLIT: Lecture on Building Regulation for Resilience in Japan	TIC
				MLIT: Lecture on Urban Development for DRRM	
4	26-Jan	Thu	AM	Visit Tokyo Metropolitan Government :Lecture on DRRM plan and SOPs, DRRM system in metropolitan area	Tokyo Metropolitan Government
			PM	Transfer from Tokyo to Kobe (by Bullet Train (Shinkansen))	
5	27-Jan	Fri	AM	Visit Kobe City Government :Lecture on reconstruction from the Great Hanshin-Awaji Earthquake, BOKOMI activities (joint disaster management activities between community and schools)	Kobe City
			PM	Visit Miki Disaster Management Park :Tour in Hyogo Earthquake Research Center (E-defense) / Large laboratory equipment for seismic resistance	Miki Disaster Management Park
6	28-Jan	Sat		Arrangement of Documents and Data	
7	29-Jan	Sun	AM	Visit Community Disaster Risk Reduction and Management Activities (BOKOMI activities (joint disaster management activities between community and schools))	Kobe City Kashinodai elementary school
			PM	Visit Disaster Reduction and Human Renovation Institute	Disaster Reduction and Human Renovation Institute(DRI)
				Transfer from Kobe to Tokyo (by Bullet Train (Shinkansen))	
8	30-Jan	Mon	AM	Visit Honjo life safety learning center	Honjo life safety learning center
			PM	Visit to Sumida City Government :Lecture on Municipal Level DRRM plan, SOPs, Hazard map and CBDRRM activities :Town watching	Sumida City
9	31-Jan	Tue	AM	Visit Command Post Exercise for Emergency Response on Tokyo Metropolitan Government (Joint Exercise on the National Government, Tokyo Metropolitan Government and 3 Prefectural Governments)	Tokyo Metropolitan Government
			PM	Discussion on formulation of DRRM plan	OC Global
				Transfer from Tokyo to Kumamoto (by Plane)	
10	1-Feb	Wed	AM	Visit Kumamoto Prefectural Government :Lecture on overview and lessons of Kumamoto earthquake	Kumamoto Prefectural Government
			PM	Site visit to Disaster Stricken Area from the Kumamoto Earthquake 2016	Mashiki Town
11	2-Feb	Thu	AM	Workshop with Kumamoto University :Lecture on issues on the livelihood recovery and reconstruction :Discussion on reconstruction measures and DRRM measures against future earthquake	Kumamoto University
			PM	Transfer from Kumamoto to Tokyo (by Plane)	
12	3-Feb	Fri	AM	Preparation for Final Presentation	JICA Tokyo
			PM	Final Presentation, Closing Ceremony	
	4-Feb	Sat	AM	Leaving Tokyo	

Source: JICA Project Team

(4) Discussion of the Effects of Training

The participants answered questionnaires and judged their understanding for each content by a five grade point evaluation by themselves (i.e. five indicates very good understanding and one indicates limited understanding). Most of the answers evaluated by the participants were four or five, which indicated that they could deeply understand the contents of the training. The understanding to the contents held at Japan Meteorological Agency (JMA) got in average 4.42 which still high, although, compare with others it was relatively low. Therefore, follow up activities are considered to be required as necessary for the participants who will contribute to this project regarding the contents presented by JMA.

Furthermore, the degrees of recognized gaps between Nepal and Japan for the contents explained in the each programme were judged by a five grade point evaluation (i.e. five indicates recognizing very big gaps and one indicates recognizing very small gaps). Almost all answers were concentrated at four and five points, which indicated that the participants have felt huge gaps throughout the programme.

Considering the differences between Japan and Nepal, shortage and points to be improved in Nepal have been concretely clarified. In particular, many trainees mentioned that the coordination between the government, local governments and the community was inadequate and the role sharing was unclear. Recognizing the necessity of role sharing is a big achievement of this training, as it is the most important part in the development of disaster risk reduction and management plan, and, it is said that it will have a positive influence on the activities of development of the plan. While considering the role sharing, it is necessary to consider the framework of the entire level, not only within municipality but also the role sharing with the national level and to make understand the positioning of the plan. This counterpart training consisted of participants from MoFALD, MoHA, and MoUD, and local government who are key persons for implementation of the further pilot activities of the project, and this training is expected to have surely contributed for better implementation of the project.

(5) Output of the Training

At final presentation, participants were separated into 3 groups and made presentations using materials prepared during the busy schedule of training in Japan. Each group made presentations on necessary technology and policy on disaster risk reduction and management in Nepal based on what they have learnt in the training. The themes of each group were set as follows, and grouping was carried out according to the affiliation of participants.

- Group A: Technology and Policy to be adapted for future risk reduction through Urban Development and Building Resilience for DRRM (Mainstreaming DRR) from the view of National Government Level.

- Group B: Technology and Policy to be adapted for Nationwide Dissemination of DRRM Plan and SOP from the view of National Government Level.

- Group C: Technology and Policy to be adapted for formulation of Local DRRM Planning based on the hazard and risk assessments from the view of Local Government Level.

Table 6.3.7 summarizes the technologies and policies necessary for disaster risk reduction and management in Nepal, which each group presented.

Many of the proposals made at the final presentation were not within the range that can be handled directly by this project, but in supporting Nepal's disaster risk reduction and management from a long-term perspective, including other JICA projects, there were many points that are quite helpful. Also, it is believed that the participants themselves recognized technology and policy that are necessary for future disaster risk reduction and management in Nepal, through this training.

Table 6.3.7 Technology and policy necessary in Nepal presented by each group at the final presentation

Theme	Group A (Mainly Urban Development and Building)	Group B (Mainly Nationwide Dissemination to local governments)	Group C (Local Disaster Risk Reduction and Management Plan, Roles of Local Governments)
Institution	• Coordinated efforts of stakeholders in urban sector through One window approach • Integration of DRRM Program of each ministries • Establishment and institutional enforcement of DRRM Division in each municipality	• Institutional Enforcement of local government • Establishment of BOKIMI • Enforcement of Department of Mines and Geology	• Establish coordination between Self-help, Mutual help and Public help • Implementation of DRRM Program with harmonization of relevant organizations • Establishment of Fire Fighting Organization • Collaboration with Universities, and Research Institutes
Understanding and Utilization of Hazard and Risk	• Formulation and Implementation of Land Use Plan based on Risk Assessment	• Nationwide dissemination of Hazard and Risk Assessment	• Formulation and Implementation of Land Use Plan based on Risk Assessment • Implementation of Vulnerability Assessment and preparation of Hazard and Risk Maps
Urban Development	• Development of urban infrastructure and improvement of urban environment		• Development of Resilient Society including development of infrastructure
Building	• Thorough compliance with NBC • Seismic-resistance of buildings • Seismic-resistant building and infrastructure technology • Implementation of NaPA (National Plan of Action for Safer Building construction)	• Implementation of effective Building Code implementation and its nationwide dissemination.	• Assistance on through compliance of NBC by local governments
Local Disaster Risk Reduction and Management Plan, SOP		• Enforcement and Expansion of Emergency Operation Center （NEOC、REOC, DEOC） • Development and Assistance of SOP at Community Level	• Enforcement of Community DRRM Plan at District, Municipality, and VDC • Assistance on formulation of Local DRRM Plan and Community DRRM Plan
Recovery and Reconstruction	• Plan, program and resources for early relief and recovery incl evacuation places, fire fighters	•	• Implementation of Recovery Activities from Gorkha Earthquake • Thorough BBB Recovery and Reconstruction
Enlightenment	• Facilitation of Private Sector Involvement • DRR Education at Schools, etc. • Establishment of DRR Research and Learning Center	• Establishment of DRR Learning Center • Adaptation of DRR into Life Cycle	• Human Resource Development of Community, and local government staffs • Implementation of DRR Educational Schools, etc. • Establishment of DRR Learning Center
Other Technology	• GIS Mapping • River Protection, Flood Control Mechanism	• Enforcement of Early Warning • Expansion of installment of seismometers	• Technology on Early Warning, etc.

Source: JICA Project Team

Lecture on Disaster Risk Reduction and Management Policy of Japan by Cabinet Office

Site Visit at Sumida Ward, Tokyo

Experience at Sona Area Learning Center

Observation of Joint Table Top Exercise at Tokyo Metropolitan Government

Source: JICA Project Team

Table 6.3.8 Photos in the 3rd counterpart training in Japan

Chapter 7 Contribution to Sendai Framework for Disaster Risk Reduction and Recommendations for achieving Disaster Risk Reduction

This project, aiming at earthquake disaster risk reduction, which was started immediately after the Gorkha earthquake, has achieved all of its goals for seismic hazard assessment, seismic risk assessment and formulation of BBB plans, LDCRP and SOP for three pilot municipalities, and implementation of CBDRRM activities, which contributed considerably to the commitment of Nepal on the enhancement of DRR and the response to the priority for action and global target of the Sendai Framework for Disaster Risk Reduction (Sendai Framework). It must be understood that the seismic hazard and risk assessment are carried out based on limited data and recognize that there is a long way to go to implement the LDCRP developed by the project. The further actions for mainstreaming seismic disaster risk reduction must be implemented in a planned manner.

As a conclusion of the project, this chapter covers contribution of the project to the Sendai Framework and recommendations to achieve disaster risk reduction and increase resilience in Kathmandu Valley. And last, a roadmap is proposed for the purpose of concrete disaster risk reduction. It is highly expected that all of the project outcomes could be widely utilized by a variety of stakeholders and contribute to disaster risk reduction in Nepal.

7.1 Contribution for Achievement of the target of the Sendai Framework

Disaster risk management has been greatly promoted and enhanced globally after the adoption of the Hyogo Framework for Action (HFA) in the Second World Conference on Disaster Risk Reduction in 2005. Steady progress was achieved by a variety of activities including development of laws, establishment of DRR organizations, strengthening of collaboration among organizations and regions, capacity development of DRRM related organizations, and non-structural activities for reducing vulnerability. On the other hand, the common issues are the activities which directly reduce the risk are comparatively limited due to the lack of budget and knowledge.

The Sendai Framework for Disaster Risk Reduction (Sendai Framework) was adopted in the Third World Conference on Disaster Risk Reduction in 2015, where the development of sustainable society with mainstreaming of DRRM was emphasized. In order to concretely reduce natural disaster risk, Sendai Framework advocates four priorities for action:

Priority 1: Understanding disaster risk
Priority 2: Strengthening disaster risk governance to manage disaster risk
Priority 3: Investing in disaster risk reduction for resilience

Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

and sets seven global targets:

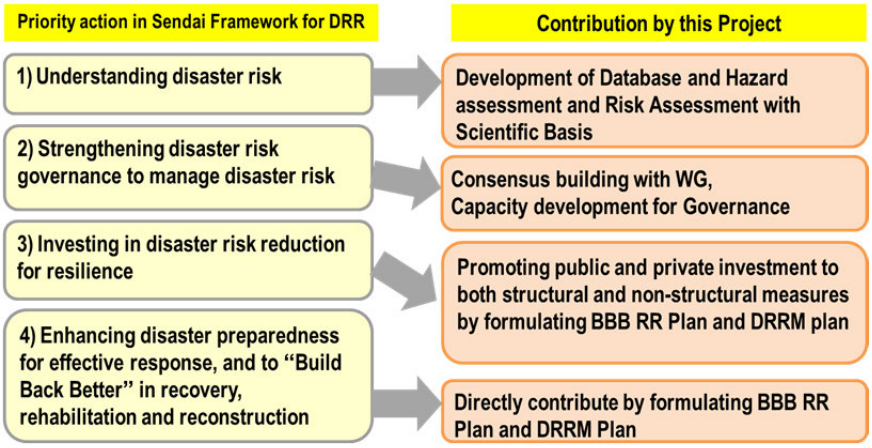
(a) Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005–2015;
(b) Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;
(c) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
(d) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;
(e) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
(f) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;
(g) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

The Gorkha Earthquake is the first devastating disaster after adoption of the Sendai Framework. The achievement of BBB reconstruction, which is stressed as the priority for action of Sendai Framework, has caught global attention. This project, through its diverse activities, contributed, as summarized in Figure 7.1.1, to the achievement of the priorities for action and global targets of the Sendai Framework.

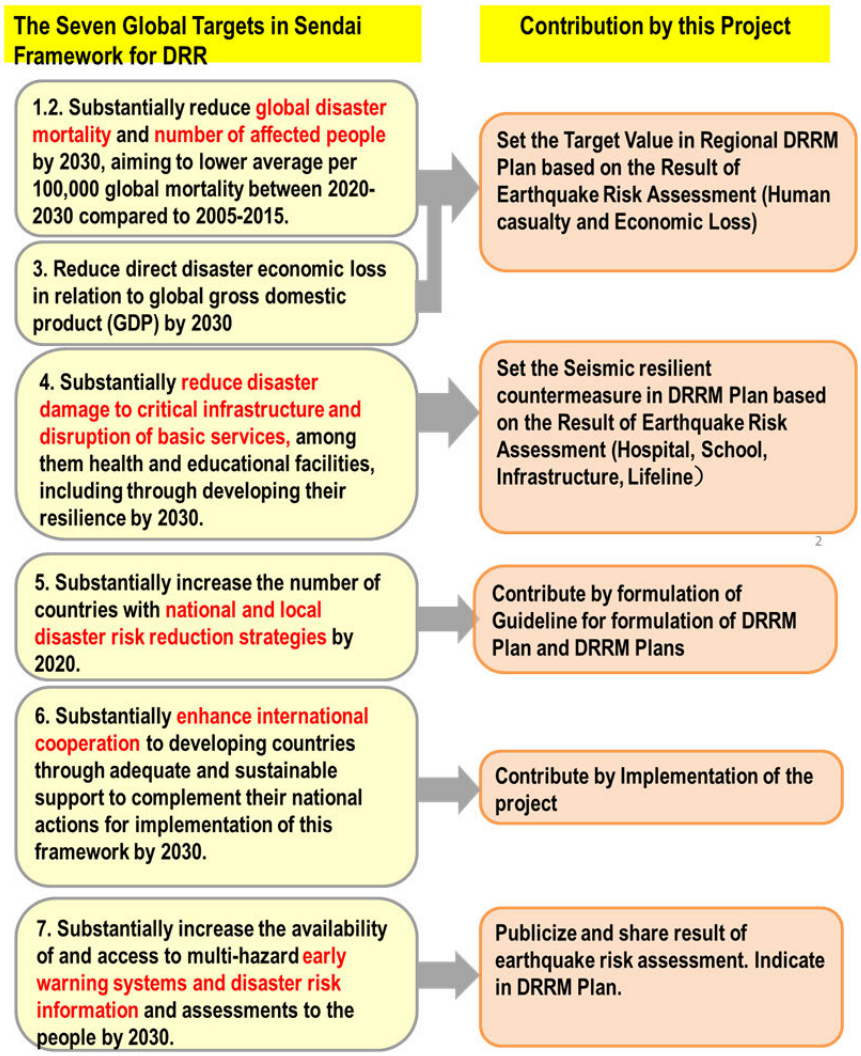
Disaster awareness in Nepal has been raised through the experience of the Gorkha Earthquake and a series of activities after the quake for recovery and reconstruction. However, the level of awareness will lower over time. Now, the time when many people have just experienced a real disaster, is the chance to further enhance mainstreaming DRRM into development. It is expected for Nepal to utilize this chance and implement the DRRM activities for reducing future risks.

The experience of risk assessment and development of DRRM plan in this project needs to be utilized for concrete DRRM activities. From the view of disaster prevention, the investment for reducing disaster risk should be implemented step by step together with economic development.

Contribution to Priority for Action in the Sendai Framework



Contribution to the Global Target in the Sendai Framework



Source: JICA Project Team

Figure 7.1.1 Contribution to the Priority for Action and Global Target in the Sendai Framework

7.2 Recommendations on Utilization of Risk Assessment Results

The Gorkha Earthquake of 2015 caused both severe building damage and human casualties in Kathmandu Valley. On the other hand, there may be a possibility of an earthquake in the south of KV along the Himalayan Frontal Thrust (HFT) in the future. A scenario earthquake was considered for this possibility. Since the fault of the scenario earthquake might come to the underneath of south of KV, it would produce stronger ground shaking and then lead to greater damage than the Gorkha Earthquake. From the risk assessment, the following risks and vulnerabilities of KV are observed.

- ✧ Future earthquakes may cause greater structural damage for buildings, infrastructure and lifeline facilities, and human casualties as well as economic loss than the Gorkha Earthquake.
- ✧ After the Gorkha Earthquake, the reconstruction of damaged buildings is required to follow Nepal Building Code (NBC) to avoid reproducing the same vulnerability. In the meantime, many of the existing structures are seismically vulnerable, including the critical facilities like schools, hospitals, government buildings and infrastructure and lifeline facilities, which need to be seismically strengthened.
- ✧ Urbanization of KV will go on and population and the number of buildings will increase in the future. In the case of inadequate countermeasures for land use regulation, urban planning and seismic strengthening for buildings, the damage will be enlarged along with the increase of vulnerable buildings and population.
- ✧ To reduce the vulnerability of buildings, it is important not only to require the new buildings to follow the building code, but also to promote the retrofitting and reconstruction of existing vulnerable buildings. Besides, it is also important to update the building code and enhance research on building materials and construction technology.

Risk assessment results give a warning on the possible future damage. In order to reduce future earthquake disaster, it is important for both central and local governments to make their necessary policies and establish a concrete implementation mechanism. A long term continuous effort is indispensable. Disaster risk reduction targets should be determined based on the seismic assessment results taking into account the available resources and budget. To reach the target, it is necessary to make central and local disaster risk management plans including feasible measures and detail activities. It is urgently needed to launch the seismic strengthening program for buildings, infrastructure and lifeline facilities with priority on the critical facilities, such as schools, hospitals, and government buildings as well as bridges. The recommendations for utilizing the risk assessment results for disaster risk reduction are as below.

- Design ground motion is not clearly specified in Nepal building code and it is estimated around 160 gal. The scenario ground motion (PGA) of CNS-1 is about 150 – 200 gal for the central part of KV, which is close to the design ground motion and could be considered appropriate as the baseline for disaster risk management of local governments. For important buildings, like schools, hospitals, etc. an importance factor of 1.5 is specified in the building code. Since scenario ground motion of CNS-2 is about 1.5 times that of CNS-1, it can be the risk management target for important structures.
- For scenario ground motion of CNS-1, it was estimated more than 65,000 buildings (about 15% of total buildings) will suffer heavy damage in KV. In order to reduce the risk, countermeasures for both new and existing buildings are necessary. It is important to raise public awareness on risk reduction and promote retrofitting through legal arrangement, technology development and securing budget.
- Risk assessment of this project is based on a statistical approach, which is effective for knowing total damage and providing information for relative risks among areas, but not the detail information for individual buildings. For the purpose of retrofitting or reconstruction of an individual critical structure, detail investigation on its seismic performance is necessary.
- It is important to make use of the risk assessment results of critical buildings for promotion of seismic strengthening. Taking school buildings as an example, 62 buildings have an 80% probability of heavy damage, which accounts for about 1% of all school buildings and those with 50% probability of heavy damage totals 750 buildings, accounting for about 13%. The buildings with high damage probability are mostly adobe or masonry. They should be given the priority for reconstruction, rather than retrofitting, especially for adobe and masonry with mud mortar and those that are more than 20 years old. The cost for reconstruction is estimated as shown in the following table. It is assumed that all the reconstructions are engineered RC with the area of 1,000 square meters or more. It is necessary for MoUD and MoE to develop a retrofitting and reconstruction program for public schools and promotion on seismic strengthening of private school buildings.

Structure type	Heavy damage and reconstruction cost			
	(Probability > 50%)		(Probability > 80%)	
	Number	Cost (mil. NPR)	Number	Cost (mil. NPR)
Adobe	9	318	8	282
BM with mud mortar, > 20 years	288	10,166	48	1,694
BM with mud mortar, < 20 years	103	3,636	5	177
BM with cement mortar	301	10,625	1	35
Non-engineered RC	46	1,624	0	0
Engineered RC	3	106	0	0
Total	750	26,475	62	2,189

- A number of schools, hospitals and government buildings were estimated to suffer heavy damage for the scenario earthquakes. The safety of this kind of building, which is important not only for securing emergency response but also for saving lives of children and patients, should have high priority in seismic strengthening policy. The development of retrofitting technology with local available building materials and technology is important.
- Risk assessment results were used for the development of disaster risk reduction and management plans and community risk reduction activities of the pilot municipalities. Since the risk assessment covers the whole KV, it can also be used, as horizontal expansion of the pilot activities, for the municipalities other than the pilot municipalities in KV for the same purpose. The commitment of MoFALD is required and an early implementation is expected.
- The results of risk assessment for 2016 and several cases for 2030 provide useful information for setup of numerical targets of disaster risk reduction based on the time span and budget, etc. The risk assessment results are expected for the effective utilization for the development of policy with feasible numerical targets.
- From the risk assessment results, relative risk level among areas, facilities and individual structures can be identified, which could be used for determination of the priority for risk reduction and management among many necessities but limited resources, which is one of the purposes of risk assessment.
- Historical buildings (monuments) are essential resources of the tourism industry. Their damage due to earthquake should be minimized. To reduce the damage, Structural Health Monitoring (SHM) on a regular basis is recommended for the maintenance of the historical buildings (monuments). Since natural materials are used in the historical buildings, the influence of the deterioration of timber and joint mortar due to rainwater is significant. It is important to repair and replace timber and roof tiles if the deterioration is observed by a visual inspection. It is also necessary to make an integrated maintenance and management plan and secure its implementation.

- Bridges in KV did not suffer serious damage during the 2015 Gorkha Earthquake, but more devastating damage, such as bridge collapse, might occur when subjected to large ground motion, as estimated in this project. The damage to bridges will cause difficulty for emergency vehicles, which could affect the emergency response activities and lead to damage increase. In order to avoid such kind of situation, it is very important to implement earthquake-resistant reinforcement or replacement for bridges on emergency transportation roads.
- It is difficult to completely prevent damage from an earthquake. The early resumption of urban functions would be critical for the recovery and reconstruction activities. It is recommended for both public and private entities to make a business continuity plan (BCP) based on the risk assessment results for the rapid resumption of social and industrial activities after a disaster.

- The purpose of seismic hazard and risk assessment of this project is to provide basic information for the formulation of LDCRP and CBDRRM activities for Kathmandu valley. Seismic hazard assessment was carried out by scenario oriented method rather than stochastic method, which is commonly used to decide seismic load for seismic design. Hence the seismic hazard assessment results of this project could not be directly used for the revision of seismic design code: NBC 105. However, the output of the project, such as seismicity analysis during the determination of scenario earthquake, soil structure and amplification characteristics of KV as well as the seismic performance capacity analysis of buildings, may be referred for the revision of NBC 105.

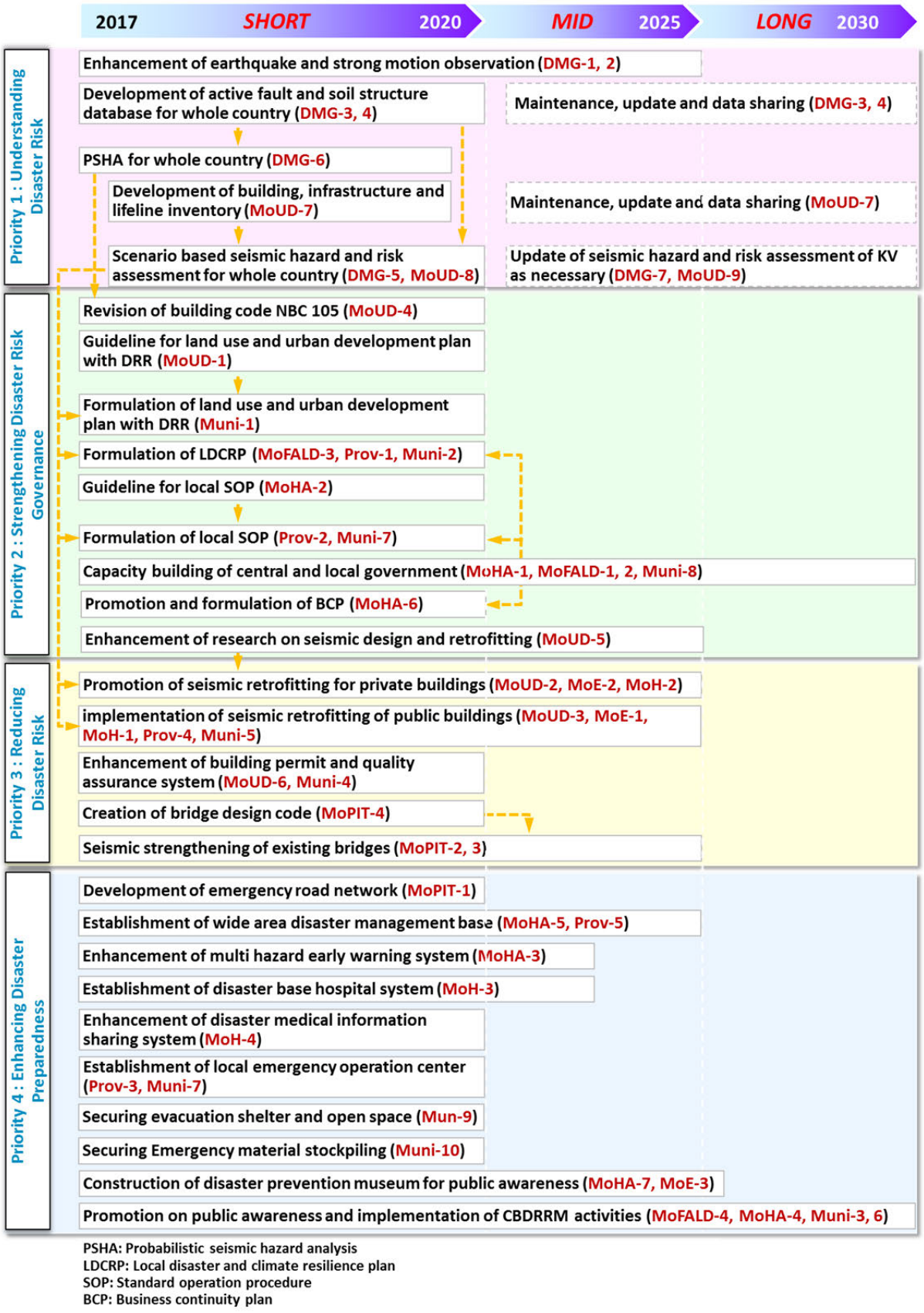
7.3 Recommendations for Mainstreaming Seismic Disaster Risk Reduction

Nepal is an earthquake prone country, and has suffered several earthquake disasters in the past century, such as the 1934 Bihar Earthquake and the 2015 Gorkha Earthquake. This project focuses on seismic disaster risk reduction from seismic hazard and risk assessment for the formulation of disaster risk management plans and standard operation procedures for emergency response as well as community based disaster risk reduction and management activities. Nepal has recently enacted the Bill for Revision and Unifying Law Related to Disaster Risk Reduction and Management, called the Disaster Risk Reduction and Management Act, 2017, formulated the National Strategic Action Plan for Disaster Risk Reduction: 2017 – 2030 and published Seismic Retrofitting Guidelines for Buildings in Nepal: Adobe, Masonry and RCC for enhancing disaster risk reduction. On the other hand, risk reduction needs a broad range policy for structural and non-structural measures and the implementation is a pressing issue. The effective implementation of disaster risk reduction policy requires the cross sectoral cooperation and collaboration at all levels of central, and

local government and private enterprise as well as individual citizens. It is also necessary to have an integrated scheme for effective and efficient implementation according to the priority and limited budget and manpower.

Referring to the priorities for action and the global targets of the Sendai Framework, the current situation of Nepal and the issues and challenges recognized through the implementation of this project, a road map for further enhancement of seismic risk reduction has been created and is shown in Figure 7.3.1, the detail of which is given in Table 7.3.1.

It is important to secure an organizational system for the concrete implementation of the recommendations. A leader agency to manage cross sectoral measures is necessary and the leadership of MoHA is highly expected based on the new Disaster Risk Reduction and Management Act. There is great variability of necessary cost among the recommendations depending mainly on whether it is a structural or non-structural measure. The development of guidelines and plans, requiring a relatively small amount of budget from several to several tens of million Nepal Rupee, should be created promptly, which is important for effectively promoting disaster risk reduction. While structural measures could directly reduce seismic risk, a large budget is needed. It is necessary to apply structural measures with priority to the structures of special importance, such as schools, hospitals, government buildings, bridges on emergency road networks and airports, etc. Seismic risk assessment results could be utilized for the determination of priority. The effect of disaster risk reduction measures doesn't clearly appear if no earthquake occurs, but the severe consequences of an earthquake, if one occurs, could cause great negative impacts on the sustainable development. The money used for disaster risk reduction should be considered as an investment, rather than simply expenditure. The results of this project could play an important role to encourage disaster risk reduction investment.



Source: JICA Project Team

Figure 7.3.1 Road map for seismic disaster risk reduction

Table 7.3.1 Recommendations for seismic disaster risk reduction

Responsible Organization	Recommendations	Time Frame			Priority for Action				Global Target
		2020	2025	2030	1	2	3	4	
Ministry of Urban Development (MoUD)	- Formulation of national guideline for land use, urban development and land readjustment for the effective disaster risk reduction in future urbanization and urban redevelopment (MoUD-1).					★			e
	- Promotion on seismic diagnosis and retrofitting of private buildings based on the "Seismic Retrofitting Guidelines of Buildings in Nepal 2016" with providing necessary technical and financial assistance (MoUD-2).						★		a,b,c
	- Formulation of national seismic strengthening program and implementation of seismic diagnosis and retrofitting for government buildings and state-owned public buildings (MoUD-3).						★		a,b,c
	- Revision of seismic design code (NBC105) with the latest seismic hazard assessment results and new design concept like performance based design, taking into account the lessons from the 2015 Gorkha Earthquake (MoUD-4).					★			a,b,c
	- Enhancement of research and investigation on seismic performance, technology of construction and retrofitting for adobe and masonry buildings through numerical analysis as well as shaking table test (MoUD-5).					★			a,b,c
	- Establishment and strengthening of building quality assurance system by enhancing building permit, mid-inspection and completion inspection (MoUD-6).					★			a,b,c
	- Construction, maintenance, updating and availability for public access of a GIS database for risk assessment, including earthquake damage data, building and infrastructure inventory and population distribution. (MoUD-7).				★				g
	- Implementation of seismic risk assessment for whole country with priority for major cities for the purpose of development of DRR strategy of local government (MoUD-8).				★				g
	- Updating of the risk assessment of KV when seismic hazard, building and infrastructure inventory are renewed or as need requires (MoUD-9).				★				g

Responsible Organization	Recommendations	Time Frame			Priority for Action				Global Target
		2020	2025	2030	1	2	3	4	
Ministry of Physical Infrastructure and Transport (MoPIT)	Identification of emergency road network and preparation of emergency operation manual to secure smoothing transportation for search and rescue and relief activities in case of a large scale earthquake disaster (MoPIT-1).							★	a, b
	Seismic diagnosis and strengthening for individual bridges in KV with the priority for that on the emergency road network (MoPIT-2).						★		g
	Formulation of national bridge seismic strengthening plan and securing budget for implementation of necessary measures for girder falling prevention, pier strengthening or reconstruction (MoPIT-3).						★		d
	Development of bridge seismic design standard of Nepal to avoid the bridges which are built in different standards depending on donor countries in the future (MoPIT-4).						★		d
Ministry of Education (MoE)	Formulation of national seismic diagnosis and strengthening plan and securing budget for the implementation of seismic retrofitting of public school buildings (MoE-1).						★		a,b,c
	Promotion on seismic diagnosis and retrofitting of private schools (MoE-2).						★		a,b,c
	Incorporating disaster risk reduction awareness program and activities into school education curriculum (MoE-3).							★	g
Ministry of Health (MoH)	Formulation of national seismic diagnosis and strengthening plan and securing budget for the implementation of seismic retrofitting of public hospital (MoH-1).						★		a,b,c
	Promotion on seismic diagnosis and retrofitting of private hospitals (MoH-2).						★		a,b,c
	Establishment of disaster base hospital system for large scale natural disasters (MoH-3).							★	a,b
	Enhancement of disaster medical information sharing system (MoH-4).							★	a,b

Responsible Organization	Recommendations	Time Frame			Priority for Action				Global Target
		2020	2025	2030	1	2	3	4	
Ministry of Federal Affairs and Local Development (MoFALD)	❖ Establishment and enhancement of the disaster risk reduction and management system by securing the organization, personnel and budget for both central and local level (MoFALD-1).					★			e
	❖ Development of capacity building program and implementation of training on disaster risk reduction and management for central and local government staff (MoFALD-2).					★			e
	❖ Promotion on the formulation and implementation of local disaster risk reduction and management plan based on seismic hazard and risk assessment results with providing necessary technical assistance (MoFALD-3).					★			e
	❖ Promotion on community based disaster risk reduction activities (MoFALD-4).							★	e
Ministry of Home Affairs (MoHA)	❖ According to Disaster Risk Reduction and Management Act, 2017, Disaster Risk Reduction and Management Authority under MoHA is to be organized. Since it has the responsibility for DRR of the nation, the comprehensive capacity development for the authority is important (MoHA-1).					★			
	❖ Formulation of national guideline for the purpose of creation of standard operation procedure (SOP) of local government (MoHA-2).					★			e
	❖ Enhancement of multi hazard early warning system and disaster information collection, management and dissemination system (MoHA-3).							★	g
	❖ Promotion on self-help and mutual-help in case of disaster (MoHA-4).							★	g
	❖ Establishment of wide area disaster management base for effective response to large scale earthquake disaster (MoHA-5).							★	a,b
	❖ Promotion on formulation of business continuity plan (BCP) for both public and private enterprises (MoHA-6)					★			e
	❖ Construction of public awareness facilities like disaster prevention museum to promote disaster prevention knowledge dissemination and foster disaster prevention culture (MoHA-7).							★	g

Responsible Organization	Recommendations	Time Frame			Priority for Action				Global Target
		2020	2025	2030	1	2	3	4	
Department of Mines and Geology (DMG)	- Enhancement of earthquake observation network by deploying especially broadband seismometers and ensuring real time data transformation system for the rapid and precise determination of earthquake source parameters (DMG-1).				★				g
	- Enhancement of strong motion observation network by deploying accelerometers and investigating on soil structure of installation site for improving ground motion estimation (DMG-2).				★				g
	- Collection and investigation on soil structure data for whole country to create ground motion amplification map for disaster risk management and the improvement of seismic hazard assessment (DMG-3).				★				g
	- Construction, maintenance, updating and available for public access of GIS database for seismic hazard assessment, including active fault and soil structure, etc (DMG-4).				★				g
	- Scenario based seismic hazard assessment with the latest research results and findings of the Gorkha Earthquake for the whole country for the purpose of the determination of disaster risk reduction target (DMG-5).				★				g
	- Probabilistic seismic hazard assessment for whole country for the revision of seismic design code (NBC105), making use of the state-of-the-art research results on active fault, seismicity, ground motion prediction model (attenuation) as well as the consideration of epistemic uncertainty (DMG-6).				★				g
	- Update for the seismic hazard assessment results of KV when new information on active fault and seismicity was obtained or as need arises (DMG-7).				★				g

Responsible Organization	Recommendations	Time Frame			Priority for Action				Global Target
		2020	2025	2030	1	2	3	4	
Province (Prov)	Determination of disaster risk reduction target and formulation of disaster risk reduction and management plan of province (Prov-1).					★			e
	Formulation of emergency standard operation procedure (SOP) of province (Prov-2).					★			e
	Establishment of emergency response center and enhancement of emergency response system for personnel, information collection and dissemination (Prov-3).							★	e
	Formulation and implementation of seismic diagnosis and retrofitting program for province-owned buildings (Prov-4).						★		a,b,c
	Establishment of wide area disaster management base for effective response to large scale earthquake disaster (Prov-5).							★	a,b
Municipality (Muni)	Formulation of land use plan and urban development plan with taking into account of population increase and the hazard of municipality (Muni-1).					★			e
	Determination of disaster risk reduction target and formulation of disaster risk reduction and management plan of municipality based on seismic hazard and risk assessment results (Muni-2).					★			e
	Creation and dissemination of seismic hazard map for disaster risk awareness and community based disaster risk reduction activities (Muni-3).				★				g
	Enhancement of building permit and inspection system to secure building quality (Muni-4).					★			a,b,c
	Formulation and implementation of seismic diagnosis and retrofitting program for municipality-owned buildings (Muni-5).						★		a,b,c
	Promotion on community based disaster risk reduction activities and providing assistance as necessary (Muni-6).							★	g
	Development of emergency operation center and formulation of emergency standard operation procedure (SOP) of municipality (Muni-7).					★			e
	Enhancement of disaster risk management and emergency response capability of municipality by securing staff, budget and training, etc. (Muni-8).					★			e
	Securing evacuation shelter and open space (Muni-9).							★	a,b
	Stockpiling of food, drink water, tent and blanket, etc. and securing distribution system in case of disaster (Muni-10).							★	a,b