



DISASTER RISK REDUCTION AND MANAGEMENT AT LOCAL GOVERNMENTS IN NEPAL: POLICIES, CHALLENGES & ROAD AHEAD

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Abstract

Diverse physiography, climatic variation and high seismicity exposes Nepal as one of the hot spots for multi-hazard disasters. The country experiences in average 2 disaster events and three deaths every day. Moreover, such events have repeatedly caused serious interruption in developmental pace and significant drop in GDP of the country. Thus, the Disaster Risk Reduction and Management (DRRM) planning should be the national priority in Nepal. In the context of recently adopted Federal System in Nepal, the Constitution of Nepal, 2015 and newly enacted Disaster Risk Reduction and Management Act 2017 (DRRMA) have provided the authority to Local Governments (LGs) for developing policies and guidelines in local context. Thus, several policies and plans for DRRM have been developed, however, still there is lack of mechanism while they come into implementation. The 2015 Gorkha Earthquake has revealed several gaps and challenges in DRRM at local levels. For instance, lacking vertical coordination of LGs with Provincial and Federal Governments and horizontal coordination among LGs, which affected in the post-disaster coordination and support mechanism. Similarly, lack of comprehensive DRRM plans, with defined roles and responsibilities at different phases of DRRM, caused confusion among the stakeholders that ultimately delayed in decision making affecting overall performance of LGs in post-earthquake activities.

This research reviews the existing policies, plans and guidelines regarding the DRRM at local level. Based on the review of documents, interaction/discussions with relevant stakeholders and experts through workshop and focus group discussions, identifies the gaps and challenges and draws some recommendations to overcome with the challenges. Thus, in the context of given responsibilities to LGs for developing policies and plans, this paper will be of their help to some extent for developing comprehensive DRRM plans.

Keywords: DRRM policy; Local Governments; gaps and challenge; Gorkha Earthquake

1. Introduction

Nepal, a small landlocked Himalayan country spreads over 147,181 sq. km. area, occupying 0.03 percent land of the earth [1]. More than 70 percent area of the country is covered by mountains and rugged hills and the southern, and 23 percent area is flat and fertile for agriculture, which is densely populated. Within a small area, due to diverse physiography and climatic variation, the country exposes multiple type of hazards, and usually the hazards turn into disasters due to lack of effective DRRM plans including proper awareness, effective preparedness and response mechanism. Politically the country has been divided in different units with the passage of times depending on the decision of the respective Governments. Currently, after adaptation of Federal Republican System, the country has been divided into 7 Provinces and 753 Local Governments (LGs). Thus, basically, there are three levels of Governments: Federal, Provincial and Local. However, in between Provinces and LGs, there are also 77 Districts. The LGs are represented by 6 Metropolitan Cities, 11 Sub-metropolitan Cities, 276 Municipalities and 460 Rural Municipalities. Thus, in this study, the LGs are presented as Municipalities. The Municipalities have been divided further in 6,684 wards. The Municipalities are chaired by elected Mayors and Rural Municipalities by elected Chairs. As of 2017, with the increasing



number of Municipalities, 58.4 percent of the total population leaving in urban areas, however, most of the newly upgraded Municipalities lack even the basic urban services [2].

During the past couple of decades, several efforts have been made for DRRM in Nepal. The decentralization of authority and responsibility begun with the enactment of Local Self Governance Act (LSGA) in 1999, which provided the authority to LGs for developing DRRM policies and plans [3]. It has been reviewed that the plans and policies developed after LSGA, namely, the Tenth Five Year Plan, approved Nepal National Building Code, the guidance note for Disaster Preparedness and Response Planning (DPRP) 2011 [4], Local Disaster Risk Management Plan (LDRMP) 2011 [5], establishment of District Emergency Operation Centers (DEOCs, and several other policies and plans have significantly emphasized on the DRRM at local levels. Nevertheless, due to the lack of leadership, proper understanding and resources, the implementation of such policies and plans in the Municipality and community levels was very weak [6], [7]. The 2015 Gorkha Earthquake revealed several gaps and challenges, and one of the major gaps was the absence of comprehensive DRRM Plan in the Municipalities. Thus, the learnings and gaps from Gorkha Earthquake reactivated the process for finalization of new Constitution of Nepal 2015, mentioning about the DRRM for the first time in country's constitution; and a new Disaster Risk Reduction and Management Act (DRRMA), 2017. The DRRMA 2017 has provided the responsibility and authority to LGs for developing plans, policies and guidelines for DRRM in their local context [8]. Similarly, the Local Governance Operation Act (LGOA) 2017, National Policy for Disaster Risk Reduction (NPDRR), 2018 and Disaster Risk Reduction National Strategic Plan of Action (DRRNSPA) 2018-2030 also have emphasized on the DRRM at local level [9], [10].

Based on series of consultation with experts, politicians, mayors, academia, municipal senior professionals, security forces and civil societies, through personal communication, focus group discussions (FGD) and workshops, this study has proposed a structure of DRRM committee with a working team within the Municipality to ensure the implementation of policies, plans and the decisions made by the committee. In the context of the majority of LGs are still in the initial stage for developing DRRM plans, the identified gaps and recommendations can contribute significantly for making the plan and policies better and realistic.

2. Nepal, a multi-hazard risks country

Combining diverse physiography, climatic variation with existing poor socio-economic conditions, unplanned urbanization, rapidly increasing population and inadequate understanding of DRRM, has put the country in highest risk to multi-hazard events [11], [12]. Floods, landslides, Glacial Lake Outbursts Flood (GLOF), avalanches, fire and epidemics are the most frequent hazard events, which cumulatively, have caused a significant loss of lives and property every year [1]. The Ministry of Home Affairs (MOHA) maintains the loss and damage information on 16 types of events, namely, hailstones, avalanche, boat capsized, cold wave, drowning, earthquake, epidemic, fire, flood, heavy rain, high altitude, landslide, lightning, snowstorm, wind storm and "other" [13]. However, analyzing the disaster impact during 2017-2018, MOHA [12] has listed 7 major disasters in Nepal namely, flood, landslide, thunderbolt, fire, cold wave, high altitude and heavy rain, respectively. During this time, the disaster caused 968 deaths and 3639 injuries. Out of total deaths, 183 were caused due to flood followed by landslide, thunderbolt and fire, however, fire was the most frequent event followed by landslide and thunderbolt. The total loss was estimated approximately 6.84 billion Nepali Rupees.

DesInventar is a database system developed by the Network of Studies on Disaster Prevention in Latin America (LARED) in 1990s [14], which has been used by more than 80 countries around the world for developing national and state level databases. In Nepal the National Society for Earthquake Technology-Nepal (NSET) has been maintaining this database in daily basis collecting disaster information mainly through national and local newspapers, Government records and event reports prepared by other agencies. So far, the database covers all small, medium and large-scale disaster events occurred due to 29 types of hazards in Nepal. This database has recorded 25,849 disaster reports causing 45,781 deaths, 71,000 injuries and more than 800,000 buildings damaged during 1971-2016. During this period of 46 years, almost 53 percent of the events have occurred in hilly regions causing about 50 percent of total deaths followed by Tarai and mountain region



respectively. The data analysis shows, that the maximum epidemics and water induced events, i.e. flood, landslides have occurred during July and August and fire events have been reported during March and April [1]. Among other many disasters, earthquake, though it is not frequent, is the major concern as the country sits astride boundary of two major active plates. Predicting earthquakes is impossible in combination of magnitude, location and the time. The history has shown that every generation in Nepal has experienced a big earthquake. Therefore, the risk of earthquake has been considered very high in Nepal, which may cause huge loss of lives and property leading to serious humanitarian crisis and may trigger several other secondary hazards. The 2015 Gorkha Earthquake alone caused about 9,000 deaths, more than 22,000 injuries and destruction of about a million buildings and several infrastructures and heritages sites.

3. A review of initiatives on DRRM policies in Nepal

In recent decades the global trend for DRRM has been gradually shifted from conventional response and recovery focused approach to proactive approach comprehensively addressing all phases of DRRM. Moreover, the disasters have been considered as opportunities for improving the impact area than it was earlier- the concept of 'Build Back Better' rather than just reconstruction. The national and the international forums and global platforms have been working towards this direction through developing and implementing the policies, acts and plans. All nations have not been equally able to achieve this goal mainly due to differences in financial strengths, variation in the type of hazards, level of risks, the country's political environment, and differences in technical and institutional capability, etc. However, the shortcomings are mainly regarded as a consequence of weak governance that combines political and economic factors [15]. A brief review of DRRM policy progression in Nepal has been provided in consecutive sections.

3.1 Ad-hoc response, no legal documents dedicated to DRRM

The DRRM mechanism before 1930s has not been formally described and documented in Nepal. There were no written policies or acts, however, the people in the past might have a strong culture of mutual assistance among the relatives and neighborhood to manage the adverse situation created by disasters. The tradition of storing supplies in individual and community, not specially for disasters, could work for emergencies. In addition, the emperors and people had strong beliefs in religious works and trust in doing charitable services to people in need, which might have collectively helped at that time to manage the situation [16], which was reflected also in 1934 Bihar-Nepal Earthquake [17].

3.2. Legal documents: response centric- reactive approach

The Natural Calamity Relief Act (NCRA) 1982, came into action as the first written and dedicated act to address the disaster related issues in Nepal, which was a historical initiative taken after the 1980 Bajhang Earthquake. Defining the 8 major natural calamities in Nepal, NCRA made provision of three different level of Natural Calamity Relief Committees (NCRCs) at Central, Regional and District levels, and two sub-committees for relief and treatment, and supply, shelter and rehabilitation [18]. The central power was given to MOHA. The NCRA got amended three times, however, the act could not address the all phases of DRRM, as it was focused to provide rescue and relief services after disaster leaving behind the whole pre-disaster sector, and could not develop a proper mechanism at the local level [19].

3.3 DRRM responsibilities to Local Governments (LGs)

Several initiatives were taken after 1982 NCRA, however the major initiative was the development of Nepal National Building Code (NBC) after severe effect by 1988 Udayapur Earthquake and 1993 south central Nepal Flood in Nepal. The Local Self Governance Act (LSGA) 1999, was another major step for decentralization of responsibility and authority of DRRM in local levels. Providing the authority to develop policies and plans and mobilizing the local resources, LSGA made LGs responsible to DRRM activities at their respective jurisdiction in coordination with other stakeholders [20]. Several policies and plans got formulated with the



guidance of LSGA, namely Local Disaster Risk Management Plan (LDRMP) 2011, District Disaster Preparedness Plans (DPRP), etc.

3.4 Proactive approach- centralized mechanism

Further, having suffered from several disasters including 2008 Koshi Flood, the Government realized to be more proactive for DRRM. Hence, the implementation of NBC was made mandatory in 2003 [19], following this, Lalitpur Sub-metropolitan City became the first to implement the NBC. Nepal actively participated in commitments in several international platforms in DRRM, which helped significantly to prepare and improve policies and provisions. Based on the guidelines of Hyogo Framework for Actions (HFA) 2005-2015, the National Strategy for Disaster Risk Management (NSDRM) 2009 was prepared in leadership of MOHA involving all Ministries and stakeholders [21]. NSDRM helped strengthening institutional mechanism and developing capacity for resilient communities in Nepal. It emphasized on the collective efforts of all national and local stakeholders for DRR through mitigation and preparedness initiatives integrating DRR in development activities. Thus, NSDRM is one of the major steps towards global practice of shifting from reactive to proactive approach. Since then, the policies and plans have been guided by the principle of NSDRM, for instance, establishment of National Emergency Operation Centre (NEOC), development of National Disaster Response Framework (NDRF), National Adaptation Program of Action (NAPA), Local Adaptation Plan for Action (LAPA), District EOCs, District DPRP, LDRMP and National Strategic Action Plan for SAR (NSAPSAR).

3.5 Proactive approach with decentralized mechanism

Despite several efforts, the country suffered with huge loss of lives and property due to 2015 Gorkha Earthquake. However, this earthquake can be taken as “eye-opener” in Nepal for improving DRRM policies and institutional arrangements. The Government took important steps, namely, promulgation of constitution of Nepal 2015 and endorsement of the long-awaited Disaster Risk Reduction and Management Act (DRRMA) 2017. Beside these, the Disaster Risk Reduction and Management Policy (DRRMP), Disaster Risk Reduction National Strategic Action Plan (DRRNSAP) 2018-2030, Local Government Operation Act (LGOA) 2017 and Local Disaster and Climate Resilience Planning (LDCRP) guideline in 2017. The DRRMA 2017, replacing NCRA 1982, envisions to level up from reactive approach of DRRM to the proactive actions. It has made an arrangement of a National Council for DRRM chaired by the Prime Minister and Executive Committee led by Home Minister. An authority has been established under the Executive Committee for execution of plan and policies approved by the council and Executive Committee. DRRMA 2017 has made accountable and responsible to all three levels of Government, i.e. Federal, Provincial and Local for DRRM in their respective levels providing authority for developing and implementing the policies, plans and guidelines.

As stated above, the progression of DRRM policies and institutional arrangements in Nepal is mainly based on the reactive approach, as many policies, acts, and guidelines have been triggered after the disasters, though some have come into action to supplement the main act and policies. However, this is a common trend of making major shift in DRRM approaches even in the countries where the DRRM has been regarded as the best example for others. For instance, the Disaster Countermeasures Basic Act, the major turning point for strengthening disaster management system in Japan, came into action in 1961, after devastating 1959 Ise-wan Typhoon [22]. Similarly, the conventional concept of reacting for post disaster response and recovery was shifted to total proactive approach after devastating floods of late 1980s and the cyclone of 1991 in Bangladesh [23], after Bhuj Earthquake and Orrisa Super Cyclone in India [24] and after 2005 devastating Kashmir Earthquake in Pakistan [25].

4. Challenges for DRM in Local Governments (LGs)

Being closest to the grassroots, LGs know the local context better than any others, therefore, they are the key and foremost actors, who can coordinate with other stakeholders, make arrangements and mobilize local



resources for effective and sustainable DRRM in their respective areas. Therefore, strengthening capacity, transforming responsibility and authorities with increased accountability of LGs is prerequisite for DRRM at local levels. This has been emphasized by HFA (2005-2015) to empower the communities and local authorities for DRRM by having access to information, resources and authorities for implementation of actions for DRRM [26]. Similarly, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 also emphasizes on the DRRM at different levels through 4 priority actions [27]. In line with such international guidelines and realizing the need for DRRM focus at local level, as mentioned above sections, several plans and policies have been developed in Nepal. However, despite these policies and provisions, the implementation in real world has been realized very weak [7]. Therefore, effectual legal framework implemented at the local level itself is crucial for enhancing capacity and sustainable DRRM. In this section, the challenges for DRRM at LGs are discussed.

4.1 Comprehensive DRRM Plans

Developing DRRM plans by LGs is still in progress in Nepal. Ideally, all 753 municipalities (both, urban and rural) in Nepal should have developed DRRM plans. However, practically it has not been implemented while going to the real world, mainly due to lack of leadership, proper guidance and capacity/expertise [7]. Therefore, a standard guideline for preparing plans, including detail procedure, is required for the LGs. The LDCRP 2017 [28] has provided an overall guidance to the municipalities, however, it has to be adopted in local context by the municipalities. An implementable and sustainable plan demands scientific analysis of local context and comprehensiveness. Multi-hazard risk assessment based on spatio-temporal analysis of hazards, vulnerabilities and available resources is prerequisite for an efficacious DRRMA. Considering all spectrum of DRRM, the plan should have long-term vision guided by proactive, decentralized and inclusive approach and it should have developed a clear vertical and horizontal linkage. And, it has to have well-defined and prioritized disaster countermeasures with defined roles and responsibilities among the stakeholders based on the current and local context. However, due to different constraints, developing comprehensive DRRM plan has become one of the major challenges for LGs.

4.2 Institutionalization of DRRM plan and policies

In the context of decentralized authority and responsibility, now LGs can develop and implement DRRM plan and policies, and make decision as per the local context, nonetheless institutionalization of the policies and plans is crucial for effective implementation and sustainability. LGs in Nepal were seriously affected from political unrest and absence of elected leadership for more than 15 years. Just in 2017, the newly elected political leaders have taken the leadership. Therefore, in many Municipalities, the leadership has no clear understanding about the policies and plans and scope of DRRM activities within their jurisdiction. In this context, there is still lack of common understanding between the elected leaders and municipal professionals/officials, while it comes to make decisions and implementation of plan and policies [29], [7], [6]. The DRRM policies are being prepared, and the committees have been formulated in the chairmanship of mayors, however, there is no provision of capable working committee/team accountable with defined roles and responsibilities to implement the decisions. Practically, the DRRM has not been integrated in development activities, as it was not in priority while developing annual budget of the Municipalities [6]. Further, there is lack of sectoral and thematic plans within the Municipality and similar mechanism/plans at Ward levels, which is indispensable for addressing all themes and reaching to all sectors and communities. Thus, there is risk to continuation of the tradition of developing “the best plans/policies without implementation”. To overcome with such mechanism is another big challenge for the LGs.

4.3 Ownership and implementation of DRRM plan and activities

The DRRM activities conceptualized with the involvement of stakeholders, including targeted beneficiaries, ensures the inclusiveness and leads to transfer ownership. Therefore, the planning process should include the provision for engaging multi-sectoral stakeholders, including political alliance, line agencies, private sectors,



professional societies, academia, health, security, and community, etc., through different platforms such as workshop/seminars, field survey/interaction, media and personal communications. Further, implementation of activities should ensure the process beginning with the need assessment and end up with the monitoring and evaluation (M&E). Each DRRM activities implemented by any stakeholders, including Municipality, should be in line with the periodized action plans and problem solving at the grassroots levels using local resources. Clear roles and responsibilities are instrumental for implementing the policies and plans by multiple stakeholders. There were opinions while implementing Nepal National Building Code (NBC) in the municipalities, that one of the key reasons for weak implementation is the overlapping in the policies of Department of Urban Development and Building Construction (DUDBC) and MOFALD. Due to the different authorities for regulatory and implementation, the policy enforcement and implementation has been affected [30]. Thus, in the context of low level of awareness on DRRM, inadequate understanding of newly issued policies and guidelines and majority of peoples' engagement in other survival activities, developing inclusive DRRM plans and other activities is quite challenging for the municipalities.

4.4 Effective awareness, preparedness and capacity

One of the major challenges for effective DRRM in the Municipalities is the lack of effective awareness amongst people at different levels, meaning, lack of proper understanding of DRRM issue. The effective awareness is the key for preparedness, and preparedness increases the capacity for overall DRRM [11]. People without clear understanding cannot have the contextual and sequential imagination resulting weak preparedness to response [31]. This is applicable to stakeholders at all levels, for instance, the leaders of LGs, who doesn't have clear imagination of the consequences after disaster, cannot develop the effective plan. Similarly, an individual who is not capable to imagine the consequences of disaster in his/her context, cannot be well prepared. Therefore, people with clear understanding, who can imagine the potential consequences of disasters, can develop effective plans and accordingly can be prepared. Thus, well-aware people can make better preparedness, including preparation of functional response plans, stockpiling emergency supplies, with adequate safety measures, and etc. Similarly, if the Government has a clear understanding of local context and imagination of the situation, which can be achieved through risk assessments, coordination/consultations, and review of past experiences, etc., can develop effective and implementable policies, action plans guidelines for better preparedness. Several Municipalities, mainly, which have been recently upgraded from earlier Village Development Committees (VDCs), have not been provide or have less access to several urban facilities including human resources [7], [6], hence they are even deprived of basic requirements for disaster risk management, e.g. human resource, fire brigade, trained responders, Search and Rescue (SAR) equipment, training facilities, etc., which has directly affected in the implementation of DRRM plan and activities. Therefore, enhancing of awareness, preparedness and capacity at different levels is another biggest challenge for the LGs.

4.5 Periodic evaluation, review and update in the plans

The DRRM activities should be designed and developed with assessment of local context and concluded with the evaluation for further actions. Having sound plans and guidelines in place alone is not sufficient, until and unless they are practiced with the stakeholders periodically and updated as per the new contexts. In the context of Nepal, needful review and amendment of policies, as compare to other countries is far behind, which pushed the country's risk management approach backward and primarily reactive for many years [13], however, there have been several initiatives to update and revising the plans based on the learnings from recent disasters i.e. 2015 Gorkha Earthquake. In this regard, Japan has good practice of reviewing disaster management plan and policies based on the learnings from recent disasters. For instance, the Disaster Countermeasures Basic Act, a major DRM Act of Japan, has been revised several times, since it was enacted in 1961; and several other acts, including Basic Disaster Management Act, have been revised and developed as per the new context [22]. The policies and plans developed at different levels should have interdependent relation and linkage. For instance, the Municipal Disaster Risk Reduction and Management Plan (MDRRMP) should be linked with the plans of the District, Province and Federal levels on the top and Ward at the lower level, and also with the plans of



neighboring Municipalities. In addition, the plan and policy itself should have the provision for periodic review and contextual revision based on the learnings from recent disasters and/or simulation exercises conducted among the stakeholders. However, due to lack of proper mechanism and understanding, it is a big challenge for LGs for review and update the policies and plans periodically with the involvement of all stakeholders.

5. Road ahead for improved DRRM

In the present context of LGs progressive engagement in developing DRRM policies and plans, it is relevant to draw needful and logical way forwards for making policies and plans effective and sustainable. This section provides some way forwards for improved DRRM for the Municipalities. The major way forwards are, strategy for effective awareness, preparedness and capacity development, research and studies, institutionalization, processes based DRRM, prioritized DRRM countermeasures and comprehensive DRRM structure. Some of the major recommendations have been discussed in detail.

5.1 Process based DRRM plan

A broad understanding of natural science and technological knowledge is important for DRRM, however, the scientific and technological approach alone cannot solve the problems, subsequently, integration of technological approach with social approach is very important [32]. Therefore, developing a logical, and acceptable methodological process to prepare DRRM plans for LGs is essential. The LDCRP Guidelines 2017 has proposed 5 phases, namely, a) coordination and initial preparation, b) vulnerability and capacity analysis, c) LDCRP preparation, d) approval, mainstreaming and implementation and e) review, monitoring and evaluation for the preparation of LDCRP [28]. However, keeping in consideration the five phases proposed by LDCRP, this study emphasizes on 10 logical phases of developing DRRM for municipalities (Fig. 1).



Fig. 1: Process for developing DRRMP for municipalities

Proposed additional key phases are, multi-hazard risk (including climate change issues) assessment, identification and prioritization of DRRM countermeasures and prioritization and identification of key players



at different levels. Further, this study suggests testing/evaluating the plans before getting approval from the authorities to ensure the quality and practicality. The plans and policies are dynamic documents requiring periodic updates and revision; therefore, it should be a continuous process even after monitoring and evaluation for updating the plans following same process in the changing context.

5.2 Prioritized DRRM countermeasures

Regardless of the amount of investment, it is difficult for saving lives and property only by post-disaster countermeasures [32]. Therefore, DRRM plan should have well addressed the both, pre and post-disaster, countermeasures. A list of prioritized and actionable countermeasures for whole spectrum of DRRM (mitigation, preparedness, early warning, damage assessment, response, recovery and reconstruction/build back better), based on local context, including physical, socio-cultural, economic and political, is one of the major components of effective and sustainable DRRM plan. A stepwise process for prioritizing DRRM countermeasures, has been briefly discussed here (Fig. 2).

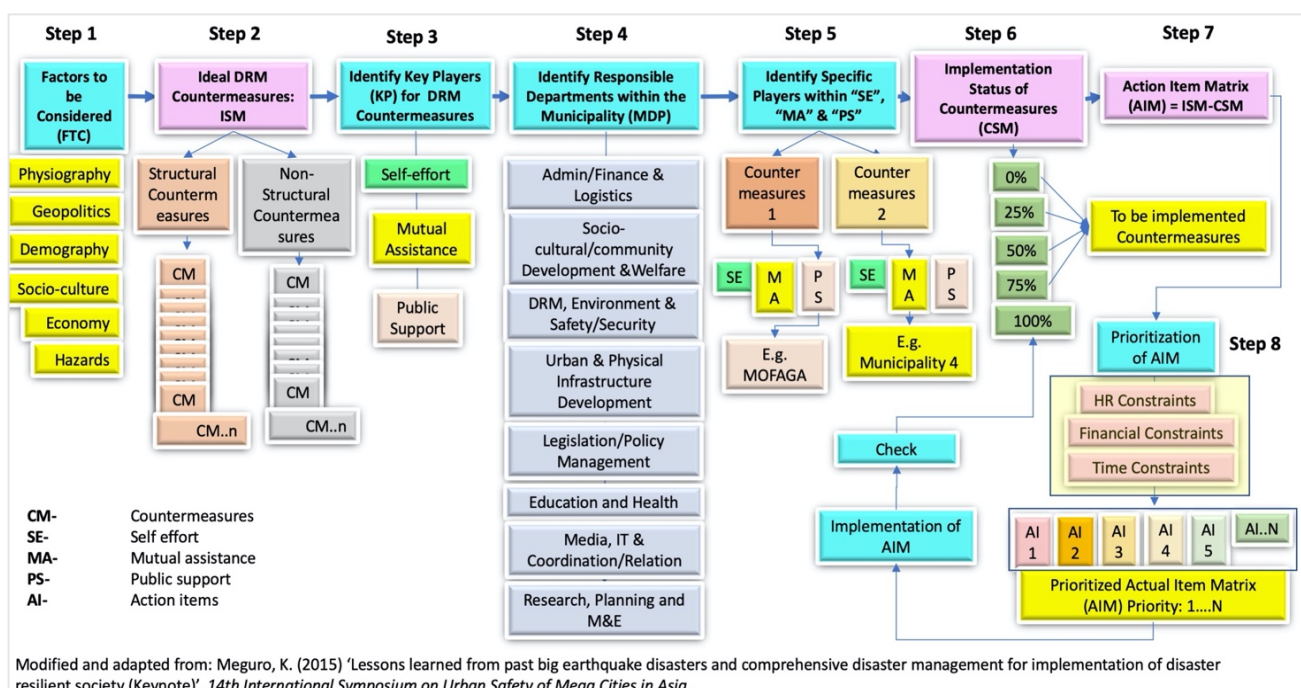


Fig. 2: Process for prioritizing DRM countermeasures

- Step 1: Understanding and assessment of local context in terms of physical, socio-economic environment
- Step 2: A list of all potential/expected countermeasures for different phases of DRRM, categorizing either hardware or software (this will give the ideal situation matrix "ISM" of countermeasures).
- Step 3: Identify possible key players (support mechanism) to implement the listed countermeasures.
- Step 4: Identify divisions/expertise, within the Municipality, required to implement countermeasures.
- Step 5: Identify specific organizations (stakeholders) responsible for each countermeasure from support mechanism of step 3.
- Step 6: Find out the current status of the countermeasures, ranging from 0 to 100 percent completion (this will give the current situation matrix "CSM" of countermeasures).
- Step 7: From ideal situation matrix "ISM" subtract the completed activities calculated in "CSM" to find out the action item matrix "AIM" ($ISM - CSM = AIM$).
- Step 8: Considering the current status, required time, budget constraints and urgency and importance, list all countermeasures action item matrix "AIM" in priority order.

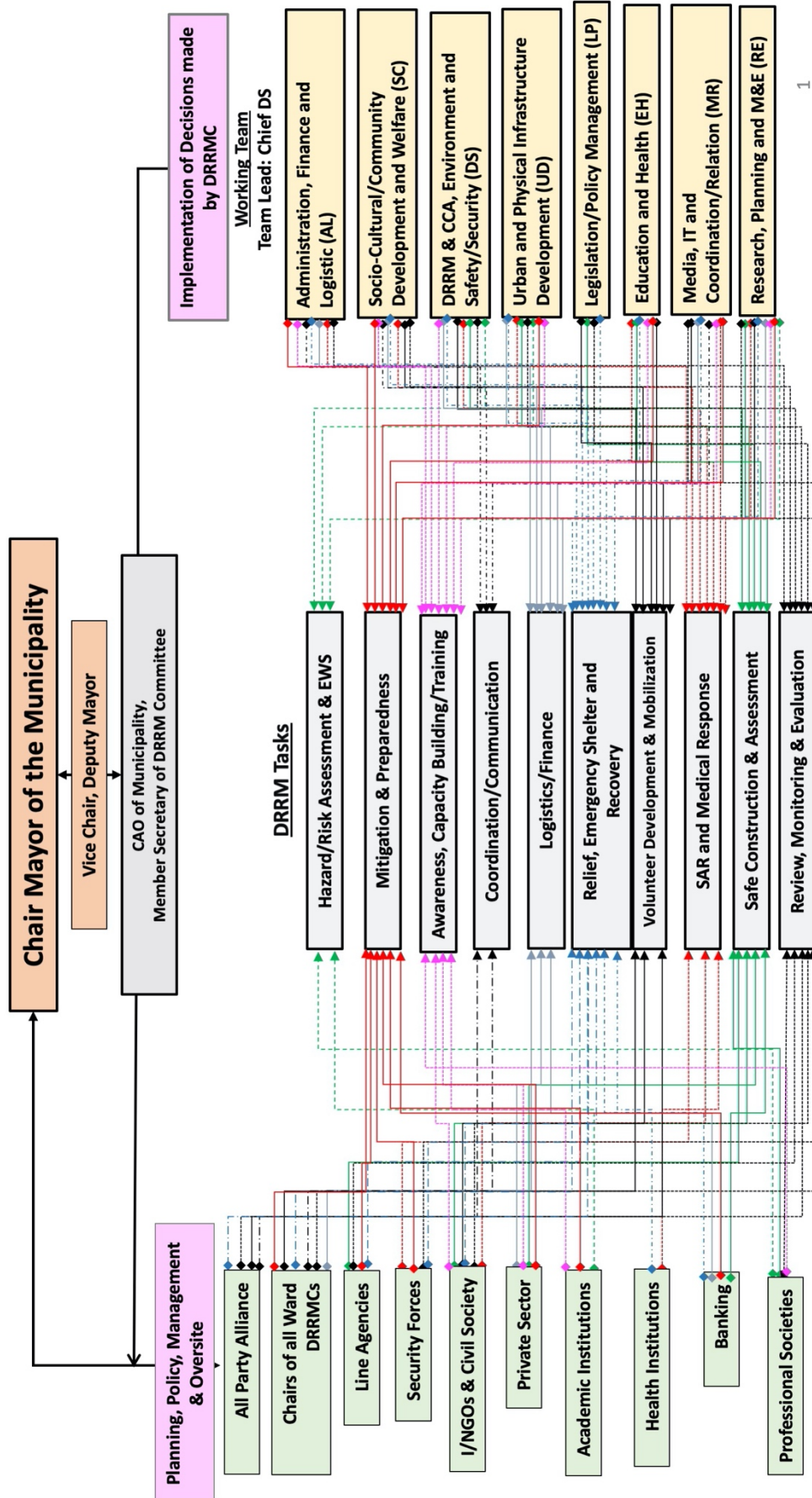


Hence, once the action item matrix (**AIM**) is achieved, the LGs can take strategic decisions for implementing the countermeasures for each phase of DRRM, starting from mitigation to reconstruction/BBB. The details can vary due to local context (geography, demography, socio-culture, economy and size of the Municipality), however, the methodology and the process can be applied by any of the LGs.

5.3 Comprehensive DRRM structure

A clear structure of DRRM with defined roles and responsibilities serves as a guiding reference for implementation of decisions and enforcement of accountability. Proposed DRRM structure of the Municipality has been prepared based on the review of existing DRRM national and local policies, current policies of municipalities and series of discussions with municipal authorities and relevant experts. Learning lessons from weak implementation of plan and policies in the past, this study has proposed two committees/team for DRRM in Municipalities, 1) planning committee chaired by Mayor and co-chaired by the Deputy Mayor of the Municipality, and 2) working team under Chief Administrative Officer (CAO) of the Municipality, who is also the member secretary of planning committee. The planning committee will be inclusive, represented by key stakeholders including, all party (political) alliance, experts, line agencies, private sector, civil society, health/education and community representatives. The Municipal DRRM committee should formulate an advisory team consist of a group of individuals representing from District, Province and other relevant experts, who can provide advice and help the committee. The working team is a group of technical people within Municipality, for implementation of decisions made by planning team, working under direct supervision of CAO, led by Chief of DRRM division of the Municipality. Basically, the working team is a group of representing from different departments of Municipality, however, the Municipality can involve the experts from outside as per the need. Based on the review of existing divisions in the Municipalities, discussions with Municipal personnel and the nature of work they are doing, 8 divisions/sections have been proposed in Municipalities to address the tasks related to DRRM. However, the divisions can be expanded as per the need for regular works of municipalities. The study has come up with 929 DRRM activities (ideal list of countermeasures) to be implemented by the Municipalities in different phases of DRRM. These are broadly categorized in 10 major tasks (Fig. 3). For effective implementation of tasks, role and responsibilities from both teams have been defined, so that there will not be confusions and no tasks will be overlooked. Many cross-cutting tasks require involvement of multiple team members, therefore, one of the team members will act as focal and others will have supportive role. A similar structure has been proposed in Ward levels, and linkage with the plans of higher authorities has been proposed for effective implementation.

Feedback workshop/meetings were conducted in 1 Metropolitan City from Kathmandu Valley and 3 Municipalities from outside the valley, inviting 28 senior representatives, including Mayors, Chief of disaster management division/section, administrative officers, engineers, Ward representatives and media personnel. After presenting proposed DRRM structure of Municipality and wards, an anonymous survey was conducted through designed questionnaire to receive their opinions indicating “strongly agree” or “agree” or “neutral” or “disagree” or “strongly disagree”. As per the survey 96 percent of the participants opinioned either “strongly agreed” or “agreed” with the overall structure, while 3 percent “disagreed”, and 1 percent were “neutral”. The 3 percent “disagreed” was mainly in the arrangement of two DRRM committees/teams in the Municipal DRRM structure. However, this was considering the current limitation of human resources in the Municipalities, which is not the strategic problem, rather a temporary one.



CAO: chief administration officer, CCA: climate change adaptation, EWS: early warning system, FNCCI: federation of Nepalese chambers of commerce, IT: information and Technology, M&E: monitoring and evaluation, SAR: search and rescue,

Fig. 3: Proposed Disaster Risk Reduction and Management (DRRM) Structure in Municipality



6. Summary

Nepal is at risk of multiple type of hazards. These events, every day causing a huge loss of lives and property occurring one or other part of the country. Therefore, the country has to consider DRRM as national priority paying attention to all phases. The Local Governments are the one highly affected by disasters; therefore, they need to be well prepared with comprehensive DRRM plan prepared based on local context and with the involvement of all concerned stakeholders. Identifying the key challenges, this study has proposed 10 logical steps for the preparation of DRRM, a methodological process for identifying and prioritizing DRRM countermeasures and a comprehensive structure for DRRM at the municipalities. In the context of the majority of Municipalities are still in the initial stage for developing DRRM plans, the identified gaps and recommendations can contribute significantly for making the plan and policies more functional and realistic.

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References

- [1] Jimee, GK, Meguro, K, and Dixit, AM (2019): Nepal , a multi-hazard risk country : Spatio-temporal analysis. vol. 58, pp. 145–152.
- [2] Devkota, K (2018): Challenges of Inclusive Urbanization in the Face of Political Transition in Nepal,” a *Handbook of Research on Urban Governance and Management in the Developing World*, J. Mugambwa and M. Katushiimeh, Eds. Hershey PA: IGI Global. pp. 159–171.
- [3] MOFALD (1999): *Local Self Governance Act 2055*. Kathmandu, Nepal.
- [4] MOHA (2011): Guidance Note: Disaster Preparedness and Response Planning 2011. Ministry of Home Affairs, Government of Nepal, Kathmandu, Nepal, p. 45.
- [5] MOLD (2011): Local Disaster Risk Management Planning Guideline (LDRMP) 2011. Ministry of Local Development, Government of Nepal, Kathmandu, Nepal, p. 29.
- [6] Jimee, GK (2019): Focus Group Discussion (FGD) with DRM Stakeholders in Vyas Municipality, Nepal. Vyas, Tanahu.
- [7] Jimee, GK (2019): Focus Group Discussion (FGD) with DRM Stakeholders in Nepal, 17 August 2019.” Kathmandu, Nepal.
- [8] GON (2017): *Disaster Risk Reduction and Management Act (DRRMA), 2017*. Kathmandu, Nepal: Nepal Law Commission, Government of Nepal. pp. 1–29.
- [9] MOHA (2018): *National Policy for Disaster Risk reduction 2018*. Kathmandu, Nepal: Ministry of Home Affairs, Government of Nepal. p. 40.
- [10] MOHA (2018): *Disaster Risk Reduction National Strategic Plan of Action (2018-2030)*. Kathmandu, Nepal: Ministry of Home Affairs, Government of Nepal. pp. 1–202.
- [11] Jimee, GK, Westen CV and Botero, V (2008): Seismic Vulnerability and Capacity Assessment at Ward Level A Case Study of Ward No . 20 , Lalitpur Sub - Metropolitan City , Nepal. *14th World Conference on Earthquake Engineering (14WCEE)*.
- [12] MOHA (2019): Nepal Disaster Report 2019. Kathmandu, Nepal.
- [13] MOHA (2017): *Nepal Disaster Report 2017: The Road to Sendai*, no. December. Kathmandu, Nepal: Ministry of Home Affairs, Government of Nepal.
- [14] UNDRR (2020): United Nations DesInventar Open Source Initiative - Official Website.” [Online]. Available:



<https://desinventar.net/whatisdesinventar.html>. [Accessed: 22-Jan-2020].

- [15] Williams, G (2011): The Political Economy of Disaster Risk Reduction. *Study Disaster Risk Reduction, Decentralization Polit. Econ. Anal. Prep. as UNDP's Contrib. to Glob. Assess. Rep. Disaster Risk Reduct.* pp. 1–38.
- [16] Vaidya, TR (2019): Personal Communication. Kathmandu, Nepal, 2019.
- [17] Rana B (1935): *The great earthquake of Nepal 1934 (Nepalko Mahavukampa BS 1990)*, Third Edit. Kathmandu, Nepal: Bookhill Publication, Anamnagar.
- [18] GON (1982): *Nepal Calamity (Relief) Act 2039 (1982 AD)*. Kathmandu, Nepal: Ministry of Home Affairs, Government of Nepal. pp. 1–10.
- [19] MOHA (2011): Nepal Disaster Report: Policies, Practices and Lessons, Kathmandu, Nepal.
- [20] MOFALD (1999): *Local Self Governance Act of Nepal 1999 (2056)- Nepali*. Kathmandu, Nepal: Ministry of Local Development, Government of Nepal, pp. 1–113.
- [21] MOHA (2009): National Strategy for Disaster Risk Management. Kathmandu, Nepal.
- [22] Jimée, GK, Meguro, K, and Dixit, AM (2019): Learning from Japan for Possible Improvement in Existing Disaster Risk Management System of Nepal,” *Open J. Earthq. Res.*, vol. 08, no. 02, pp. 85–100.
- [23] Nawaz, F and Shah, NN (2013): Mechanisms and Challenges for Managing Disasters in Bangladesh. *SSRN Electron. J.*, vol. 3, no. August, pp. 104–112.
- [24] Patil, P (2012): Disaster Management in India,” *Indian Streams Res. J.*, vol. 2, no. 1: February 2012, pp. 1–4.
- [25] World Bank (2012): Disaster Risk Management in South Asia: A Regional Overview. Washington, DC.
- [26] ISDR, ITC, UNDP, and U. Nations (2010): Local Governments and Disaster Risk Reduction: Good Practices and Lessons Learned A contribution to the ‘Making Cities Resilient’ Campaign. Geneva, Switzerland.
- [27] UNISDR (2015): Sendai Framework for Disaster Risk Reduction 2015-2030,” in *Third UN World Conference in Sendai, Japan*, pp. 1–37.
- [28] MOFAGA (2017): *Local Disaster and Climate Resilience Planning Guidelines (LDCRP)*. Kathmandu, Nepal, Nepal: Ministry of Federal Affairs and General Administration (MOFAGA), Government of Nepal. p. 53.
- [29] The Asia Foundation, (2017): Diagnostic Study of Local Governance in Federal Nepal 2017. The Asia Foundation, Kathmandu, Nepal.
- [30] USAID (2011): U S Disaster Risk Reduction Strategic Framework - Nepal,” Kathmandu, Nepal.
- [31] Meguro, K (2008): Strategy For Taking Full Advantage Of Earthquake Early Warning System For Earthquake Disaster Reduction. *14th World Conf. Earthq. Eng.*
- [32] Meguro, K (2015): Lessons learned from past big earthquake disasters and comprehensive disaster management for implementation of disaster resilient society (Keynote),” *14th Int. Symp. Urban Saf. Mega Cities Asia*, p. 11.