FINAL REPORT

DISASTER WASTE MANAGEMENT
POLICY, STRATEGY & ACTION PLAN

Kathmandu, Nepal
December 2015

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ABBREVIATIONS

ADB	Asian Development Bank
AEPC	Alternative Energy Promotion Centre
CBS	Central bureau of Statistics
DDC	District Development Committee
DoUDBC	Department of Urban Development & Building Construction
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
DW	Disaster Waste
DWM	Disaster Waste Management
DWMCP	Disaster Waste Management Contingency Plan
EIA	Environmental Impact Assessment
GoN	Government of Nepal
IEE	Initial environmental Examination
IDP	Internal Displaced People
INGO	International Non-Government Organization
MoFALD	Ministry of Federal Affairs and Local Administration
MoFSC	Ministry of Forest and Soil Conservation
MoHA	Ministry of Human Affairs
MoI	Ministry of Industry
MoSTE	Ministry of Science, Technology and Environment
MoUD	Ministry of Urban Development
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
NCDM	National Council for Disaster Management
NCRC	Natural Calamity Relief Committee
NDC	National Development Council
NGO	Non-Government Organization
NPC	National Planning Commission
NPDRR	National Platform for Disaster Risk Reduction
RCC	Reinforced Cement Concrete
SWM	Solid Waste Management
SWMRMC	Solid Waste Management and Resource Mobilization Centre
SWMTSC	Solid Waste Management Technological Support Centre
VDC	Village Development Committee
WCDR	World Conference on Disaster Reduction

Executive Summary

Nepal experienced series of major earthquakes in 2015 that caused huge loss of life and generated large volume of disaster related waste, which the government was not prepared to handle. An estimate of 14 million tons of debris waste was generated from fourteen most affected districts and this volume could increase with more building in the process of being demolished. The damage and loss estimated is about U$7,065 million with large proportion of it being infrastructure (PDNA, National Planning Commission 2015). This large amount of disaster related waste mixed with hazardous wastes was observed exposed to various infections, resulting in adverse impact to human health and environment (REA, MoEST, 2015).

Nepal has ratified number of International Convention and formulated legislation, rules and regulations including the Constitution of Nepal 2015 on environment and waste management issues that can be linked to disaster waste management. However, the Disaster Waste Management Act 2011 and the Natural Calamity Relief Act 1982 is most favorable to disaster waste management as there are provisions that allow the formulation of necessary rules and by-laws to deal with disaster waste management. Further giving them instructions to coordinate with the Ministry of Finance to allocate appropriate budget for the disaster waste activities. While formulating the policy and by-laws there is a need to clearly specify the roles and responsibility of the different wings within the government hierarchy in relation to disaster waste management.

Based on the study, capacity building on disaster related waste is one of the major gaps that need to be addressed systematically from a household level to the community and within the government. The 3R principals with its link to the business chain to be a major element of capacity building including ensuring safety standards while maintaining the balance of the ecosystem. Monitoring and Evaluation is another important element that needs to be incorporated in different sectors of activities and it is advised to have a short-term, mid-term and long-term policies and strategies in placed for the effective operations of the disaster waste management situation in Nepal.

Section One: Introduction

1. Introduction

1.1 Background

Nepal is one of the highly disaster prone countries exposed to various natural disasters because of its steep topography of dynamic geology and monsoon rainfall pattern. The monsoon bringing 80% of Nepal's rainfall in less than three months in the summer (GoN/MoFSC, 2009) is one of the major reasons for hydro-meteorological disasters in Nepal. Nepal falls in top 20 lists of the multi hazard prone countries in the world and is ranked 4th, 11th and 30th in terms of climate change, earthquake and flood risk respectively. Nepal is vulnerable to multi natural disasters with an average of 900 natural disasters every year (MoHA, 2009).

Table 1: Disaster events and types of wastes generated

S.N.	Disaster event	Waste Generated
1	Earthquake	Construction & demolition materials; Human remains; Personal property; Animal carcasses; Hazardous wastes (batteries, solvent, oils, asbestos, etc.) from households and industrial premises (both small and large); Metals (iron rods, railings, iron, furniture and appliances);White metals (appliances with white enamels coatings) and other fabric clothes; Landslide debris and Vegetation; Electronic debris; Glasses; Relief waste such as packaging from the relief agencies; Healthcare waste including body parts, sharps and syringes, and spoiled or expired pharmaceuticals from hospitals
2	Flood	Washed household materials; land debris (soil and rocks) and vegetation
3	Landslide	Soil and rocks; Plants and vegetation; Construction and Demolition waste (if road is present); Household materials (if landslide occurred in the settlement area
4	Fire	Ashes; Un burnt remains; metals (if in a settlement area); glasses (if in a settlement area)

A major earthquake of shallow depth measuring 7.8 Richter scale struck central Nepal on 25 April 2015 followed by several after shocks causing large destruction. The Government reported about 9000 deaths and over 30,000 injured with approximately nine lack houses partially or fully damaged leaving

millions homeless. A total of 9,731,557.07 tons of debris waste alone is estimated from 14 most affected districts and the temporary shelters in Kathmandu valley generated an estimate of 12% increment plastic waste just in one time use of plastic cups and plates (PDNA, 2015). Therefore, destruction caused by disaster event comes with a huge amount of waste, which may include chemical waste as well. These wastes can have severe health and environments effects alone with land and vegetation destruction to water contamination.

Legal framework and institutional back-ups in support of disaster risk reduction and/or management are evolving in Nepal but none of these legal provisions, including Solid Waste Management (SWM) Act 2011 speaks about disaster waste management (DWM). As a result quite often DWM practice involves either no action, in which the waste is left to accumulate and decompose, or improper action in which the waste is removed and dumped in an uncontrolled manner. Therefore, this policy addressing DWM is an attempt to supplement for current and future disaster events keeping in mind the Sustainable Development Goal (SDG) goals and targets 2030.

1.2 DWM and its link to the Sustainable Development Goals

The impact of disaster to the community obstructs the process of the government to achieve the SDG goal and targets by 2030. The aftermath of disaster and the large volume of waste generated are itself a resource if managed correctly and a burden if not addressed sustainably in time. Disaster-generated waste can have negative impact on all three pillars of sustainable development: social, economic and environment. Correct handling of the disaster waste management will positively influence the six essential elements of SDG, dignity, people, prosperity, planet, justice and partnership. The figure below highlights these elements.

A sound management of the disaster waste of a country is directly and indirectly linked with all except one of the Sustainable Development Goal. Out of the 17 SDG, 11 goals are directly linked to SDG and five indirectly linked to sustainable

disaster waste management. The details linkages to the sustainable goals are stated in the Table # 2 below

Six essential element of SDG (a) dignity: to end poverty and fight inequality; (b) people: to ensure healthy lives, knowledge and the inclusion of women and children; (c) prosperity: to grow a strong, inclusive and transformative economy; (d) planet: to protect our ecosystems for all societies and our children; (e) justice: to promote safe and peaceful societies and strong institutions; and (f) partnership: to catalyze global solidarity for sustainable development.

Figure 1: Six essential elements for delivering the sustainable development goal (UN2014)

Table 2: Linkages between Sustainable Development Goal and Disaster Waste Management

SDG Goal	Linkage status	Linkage details
#1. End poverty in all its forms everywhere	Direct	Exposure from the hazardous disaster waste will be avoided to the poor and vulnerable communities - Income generation opportunities can be created using disaster waste
#2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	Direct	Hazardous disaster waste will be safely disposed avoiding agricultural land and produce organic waste from the organic disaster waste Construction bricks can be produce using disaster waste avoiding use of the fertile soil
#3.Ensure healthy lives and promote well-being for all at all ages	Direct	People, community and natural resources will not exposed to the hazardous waste
#4 Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	Indirect	Sustainable waste management education during and post disaster to be incorporation in the national curriculum can contribute to life long learning opportunity
#5 Achieve gender equality and empower all women and girls	Indirect	Avoid women and girls exposing to the hazardous waste Women and girls are engaged in income generation activities by recycling of disaster waste hygienically
#6 Ensure availability and sustainable management of water and sanitation for all	Direct	Safe disposal of hazardous wastes avoiding contamination of the surface and ground water including sanitation in the community
#7 Ensure access to affordable, reliable, sustainable, and modern energy for all	Direct	Safe disposal and generation of energy from the organic waste finally touching waste to energy
#8 Promote sustained, inclusive and sustainable economic growth, full	Direct	Disaster waste resources 3 R will create employment and decent work to the

and productive employment and decent work for all		community
#9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Direct	Disaster waste resource recycling industry will be developed to produce the construction materials contributing to building resilient infrastructures
#10 Reduce inequality within and among countries	Indirect	A inclusive approach will be adopted during the empowerment and job placement in disaster waste recycling related activities
#11 Make cities and human settlements inclusive, safe, resilient and sustainable	Direct	Awareness of disaster waste management and recycling of waste for making products contribute in resilient and sustainable cities
#12 Ensure sustainable consumption and production patterns	Direct	Recycle of disaster waste for producing useful sustainable products for the community and society use will address sustainable production and consumption
#13 Take urgent action to combat climate change and its impacts	Direct	Safe disposal of disaster waste and reuse of organic waste to energy will contribute to combating climate change
#14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Not applicable	N/A
#15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Direct	Hazardous disaster waste will be safely disposed by not degrading terrestrial ecosystem services capacity
#16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Indirect	Safe disposal of the harmful waste will contribute to a peaceful community ensuring the right to health, right to life and clean and healthy environment. The community and the government at all levels will be empowered to understand and manage disaster waste making them take ownership and become accountable.
#17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Direct	Global partnership in implementation of 3R waste principle in the disaster waste management will enhance the economy and contribute to sustainable development

1.3 Present Waste Management Situation

Solid Waste Management Act 2011 has been effective from 15 June 2011 with the objective of maintaining a clean and healthy environment by minimizing the adverse effects of solid waste on public health and the environment. The SWN Act also does not address the disaster waste management including, construction and demolition waste, e-waste etc.

Local bodies basically municipality and VDC are responsible for day to day handling of all types of waste. Due to limited financial resources, insufficient equipment and untrained human resources they are not capable in handling the huge amount of disaster waste generated within short interval of time. After the recent earthquake of 25, April 2015 followed by several aftermaths, the municipality was not in a position to manage waste accumulated in the street for several weeks. It was observed that there were no institutional, plan and policy to handle the waste generated in the temporary shelters as well as disaster waste in general. The accumulated waste comprised of mixture of several hazardous constituents like paints, heavy metals etc, thus contaminating water sources, adding to dust and air pollution, and soil contamination. As a result severely affecting the health and biodiversity that we live in.

The study of 2012 by SWMTC found that most of the wastes generated at municipal level are degradable which can be converted to manure and biogas (Please see figure 2 for general waste composition). The remaining wastes are recyclable but due to lack of institutional capacity and awareness of segregation these waste are mostly disposed in the landfill site. This called for larger landfill site each year further the lack of proper planning, insufficient equipment, unskilled human resources, technical know how and the limited budget hinder the process of material recovering from municipal waste. The municipalities spend an average of 10% of their total budget on solid waste management, of which about 60%–70% is used for street sweeping and collection, 20%–30% for transport, and the rest for final disposal. Many of these technically and financially constrained municipalities are still practicing roadside waste pickup from open piles and open dumping sites, creating major health risks.

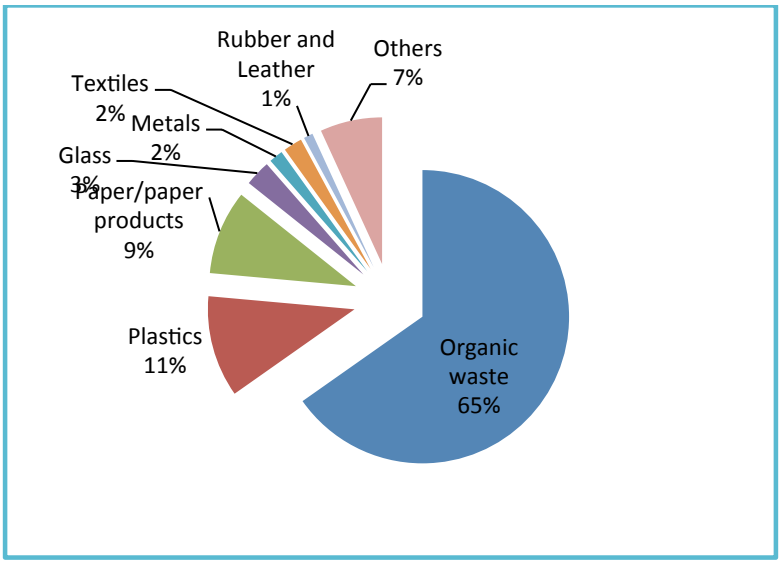

Figure 2: General waste composition of 58 Municipalities in Nepal (SWMTC 2012)

1.4 Legal Gaps related to Disaster Waste Management & Recommendation:

The Constitution of Nepal 2015 has given clear mandate to form national policy to protect, promote and maintain natural resources in order to minimize environmental deterioration due to industrial and physical development. It also gives clear mandate to form environmental sustainable development policy and law and the implementation of policy related to pre-information, preparedness, relief, and rehabilitation to reduce risk caused by natural disaster. There was no clear conceptual plan of waste management till the Seventh National Plan, 1991. In the Eight National Plan 1991 waste management was mainstreamed with environmental management and continued till 13 National Plan 2016.

The Government of Nepal prepared Solid Waste Management Act of 2011 that empowered local bodies in solid waste management from source separation to final disposal. The Act has authorized local bodies imposing service fee and prescribing punishment to offenders. The Draft National Solid Waste Management Policy 1996 was developed emphasizing waste as a resource as well as concept of waste minimization with involvement of private sector and public participation. However, these policies did not clearly mentioned concerning disaster waste management.

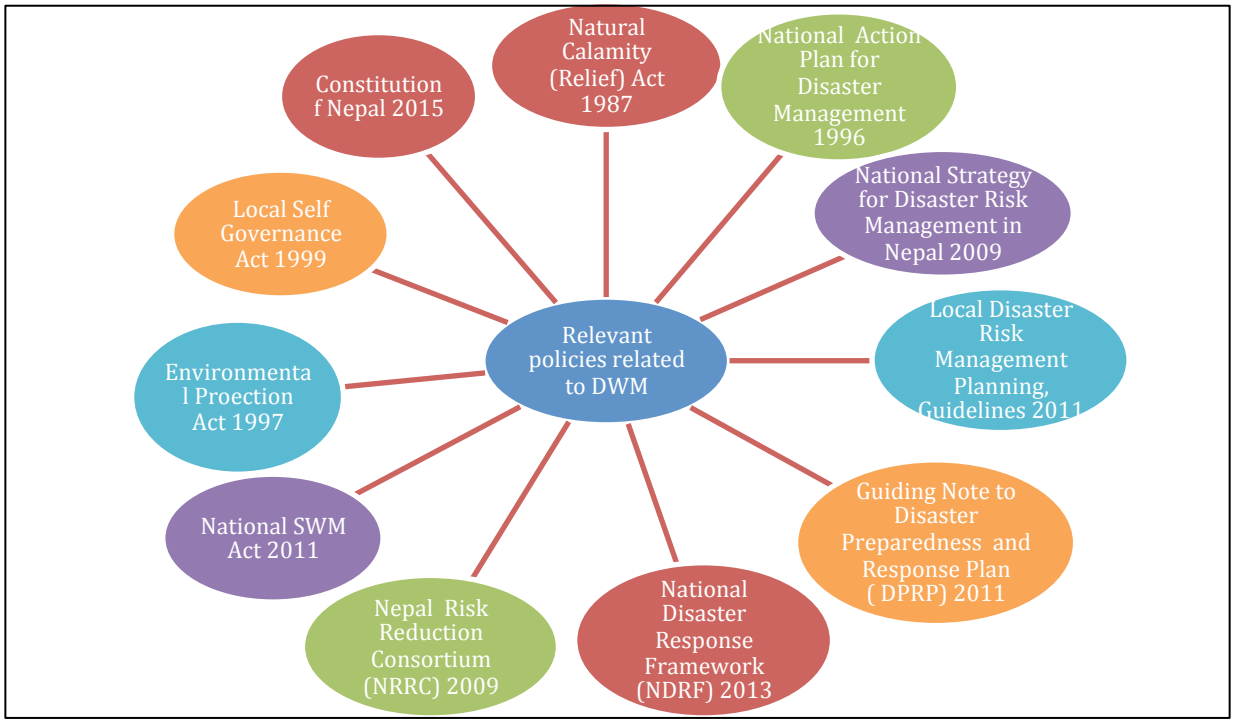

Figure 3: Relevant policies to DWM

During the 2015 earthquake the Government of Nepal initiated rapid emergency rescue based on Natural Calamity (Relief) Act 1982. The Act authorized the formation of a Natural Calamity (Relief) Committee at the central, regional, district and local level. Subsequently the Earthquake damaged buildings structure Demolition (removal) Guidelines 2015 was formulated but the guidelines lack proper management of disaster waste generated from demolition of buildings. Similarly National Disaster Response Framework (NDRF) 2013 was prepared base on the Natural Calamity (Relief) Act for effective coordination and implementation of disaster preparedness and response activities that clarifies the role and responsibilities of various stakeholders involved in disaster risk management in Nepal. The framework has given clear role of debris management and animal carcasses management for local bodies. However, role and responsibilities of other stakeholders for DWM were not clearly mentioned in the framework.

National Action Plan for Disaster Management 1996 mentioned clear responsibility of SWMTSC for hazard flow mapping of debris flow during hydrological, metrological Hazards and water induced disaster prevention but

the plan is silence on mapping of debris flow generated by other disasters. It has a number of action plans on disaster reduction but does not have specific action plan for disaster waste management.

National Strategy for Disaster Risk management in Nepal, 2009 was prepared to reduce disaster risk to an acceptable level for safeguarding their lives, properties, development, investments, and cultural heritage as well as to mitigate the adverse impact to the environment from natural hazard. It has identified 7 major disaster risks however does not mention anything on disaster waste management. However it does emphasized on forming a National Disaster Management Authority as well as regional, district and local disaster management committee but again does not mentioned of task and responsibilities of this committee on disaster waste management.

Disaster Preparedness and Response Plan (DPRP) in 2011 was prepared for District level disaster management. It contains necessary risk analysis, cluster meetings, resource mapping, designation of role and responsibilities of agency need assessment and gap identification and disaster preparedness and response plan. However, there is lack of clear designation of role of agency for disaster waste management and lack of preparedness plan and prevention and removal of disaster waste management.

The government of Nepal has prepared National Adaptation Programme of Action (NAPA) in 2010 as strategic tool to assess climatic vulnerability, and systematically response to climate change adaptation issues by developing adaptation measures. It has shown climate change vulnerability mapping of districts of Nepal. 50% of most affected districts of recent earthquake lies in very high and high vulnerability ranking such as Kathmandu, Bhaktapur, Gorkha, Dhading, Ramechap etc. Recent earthquake will induced to more vulnerability risk in these districts in terms of climate change. NAPA has adopted action plan for community based disaster management and GLOF monitoring and disaster risk reduction which is positive part. However, NAPA has not address climate

change impact and adaptation measures due to huge pile of disaster waste generated due to natural calamities.

Recommendation:

- Waste Management Act 2011 articles 50 has provision to formulate necessary rules and by-laws and enforce it in order to fulfill the objective of the act. Therefor based on the Waste Management Act 2011 one can develop policy on disaster waste management at national level as a supplement to the existing policy's and legislations relevant to disaster waste management.
- The strategy and action plan to define clear role and responsibilities within the government wing based on sectorial activities on disaster waste management
- Strategic management authorities should have legislated mandate to enable decision-making

1.5 Institutional arrangement on Disaster and post DWM

Institutional Arrangement for Disaster Management:

National Planning Commission:

National Planning Commission (NPC) is the advisory body for formulating development plans and policies of the country under the directives of the National Development Council (NDC). It explores and allocates resources for economic development and works as a central agency for monitoring and evaluation of development plans, policies and programmes. Besides, it facilitates the implementation of development policies and programmes. Getting approval of implementation plans from NPC, line ministries and local bodies implemented programmes. This is apex body, which can be instrumental in incorporating the disaster waste management concept in its disaster and post-disaster related policy and plan in effective way.

Ministry of Home Affairs (MOHA):

The Ministry of Home Affairs (MOHA) is the main responsible authority acts as the national focal agency on all DRM issues It is also the lead agency responsible

for implementation of the Natural Calamity (Relief) Act (1982). It is also responsible for rescue and relief work, data collection and dissemination, as well as collection and distribution of funds and resources. Ministry has established a National Emergency Operation Center (NEOC) at national level in December 2010 (Koirala, 2014). MOHA has major role immediate after the disaster event where the policy makers and responsible authority could put their attention on the managing the huge disaster waste generated. So far disaster waste management issue does not come on mainstream activities of the ministry's disaster event handling. The timely attention on disaster waste during the relief and rescue operation, it will greatly help in sustainably managing the waste after the disaster event

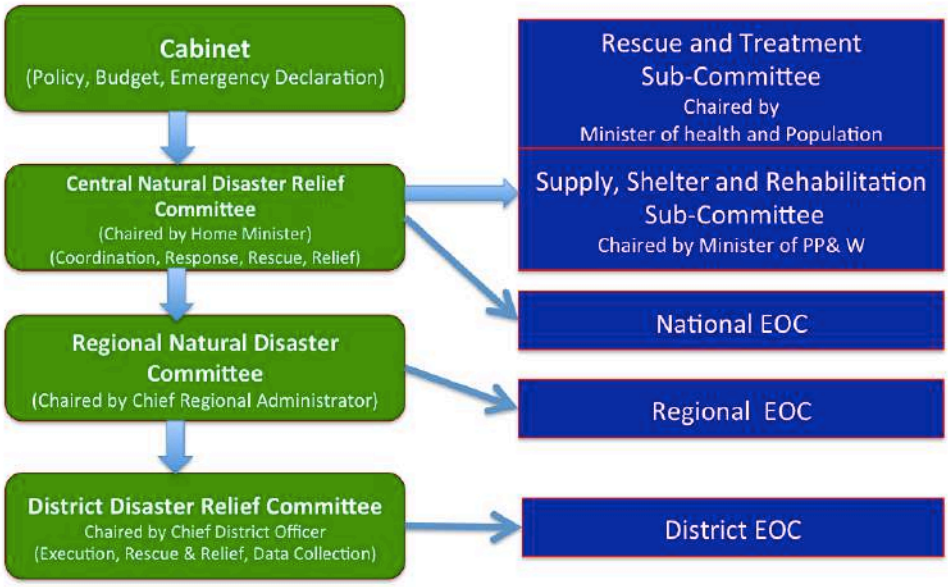

Figure 4: Flowchart of Institutional Framework (in line with 1982 Act)

Central Natural Disaster Relief Committee (CDRC)

The National Calamity Relief Act 1982 is the existing legislation, which has defined the institutional mechanism to address the disaster risk management. This Act has a provision of forming four tiers of relief committees. It includes: Central Natural Disaster Relief Committee (CDRC) chaired by minister level with Rescue and Treatment and Supply, Shelter and Rehabilitation Sub-committee; Regional Disaster Relief Committee (RDRC); District Disaster Relief Committee (DDRC); and Local Disaster Relief Committee (LDRC). (Figure 4).

Existing Disaster Frameworks Institutional Recommendations:

National Strategy for Disaster Risk Management (NSDRM):

The National Strategy for Disaster Risk Management (approved 11 Oct 2009; MOHA, 2009) has proposed the formation of three important institutional entities, which includes: National Council for Disaster Management (NCDM); Three Committees at Ministerial Level; and National Disaster Management Authority (NDMA).

NSDRM has also proposed three-column structure with committees chaired by respective ministers: These committee include: Preparedness Management Committee chaired by the Minister for Local Development; Rescue and Relief Management Committee chaired by the Minister for Home Affairs; Rehabilitation and Reconstruction Committee chaired by the Minister for Physical Planning and Construction. The possibility has been shown to continue the three-column structure of these committees at district and local levels.

From the disaster waste management point, the preparedness and reconstruction committee at the central, district and local level will be useful in implementing the disaster waste management strategy and action plan in building the capacity of the institution at all levels.

The National Disaster Response (NDR) Framework 2013:

The government has prepared the NDR Framework in 2013 for the effective coordination and implementation of disaster preparedness and response. The scope of this framework is limited to preparedness and emergency response at national, regional, district and VDC/local level. The NDR Plan that clarifies the roles and responsibilities of government and non-governmental agencies involved in disaster risk management in Nepal (GoN 2013). (Figure 5)

The framework will come into effect immediately after the approval of the Government of Nepal. So far the disaster waste management work itself is very

significant during and after disaster event. Therefore, the frame work can include the task of addressing disaster waste under its coordination mechanism under the disaster preparedness and response framework at national, regional, district and VDC/local level.

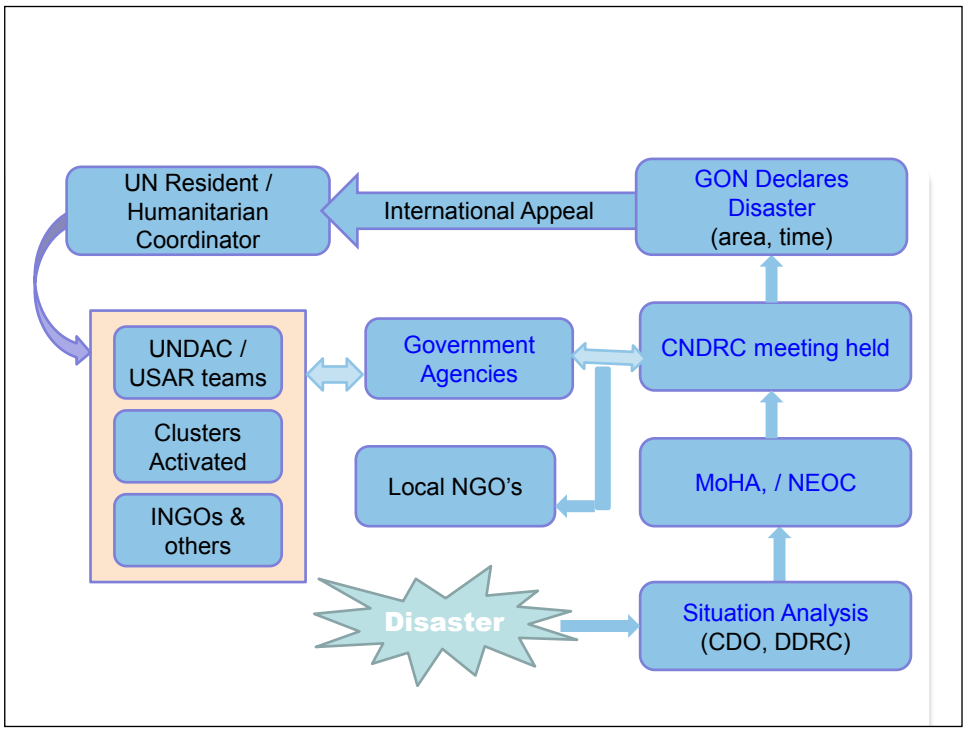

Figure 5: Flow chart showing National Emergency Response Mechanism (GoN)

Waste Management Institutional Mechanism

At present, Government of Nepal is functioning under New Constitution 2015. National Planning Commission (NPC) is the advisory body for formulating development plans and policies of the country under the directives of the National Development Council (NDC). It explores and allocates resources for economic development and works as a central agency for monitoring and evaluation of development plans, policies and programmes. Besides, it facilitates the implementation of development policies and programmes. Getting approval of implementation plans from NPC, line ministries and local bodies implemented programmes. In the same line Institutional arrangement for SWM is presented in following flow chart (Figure 6).

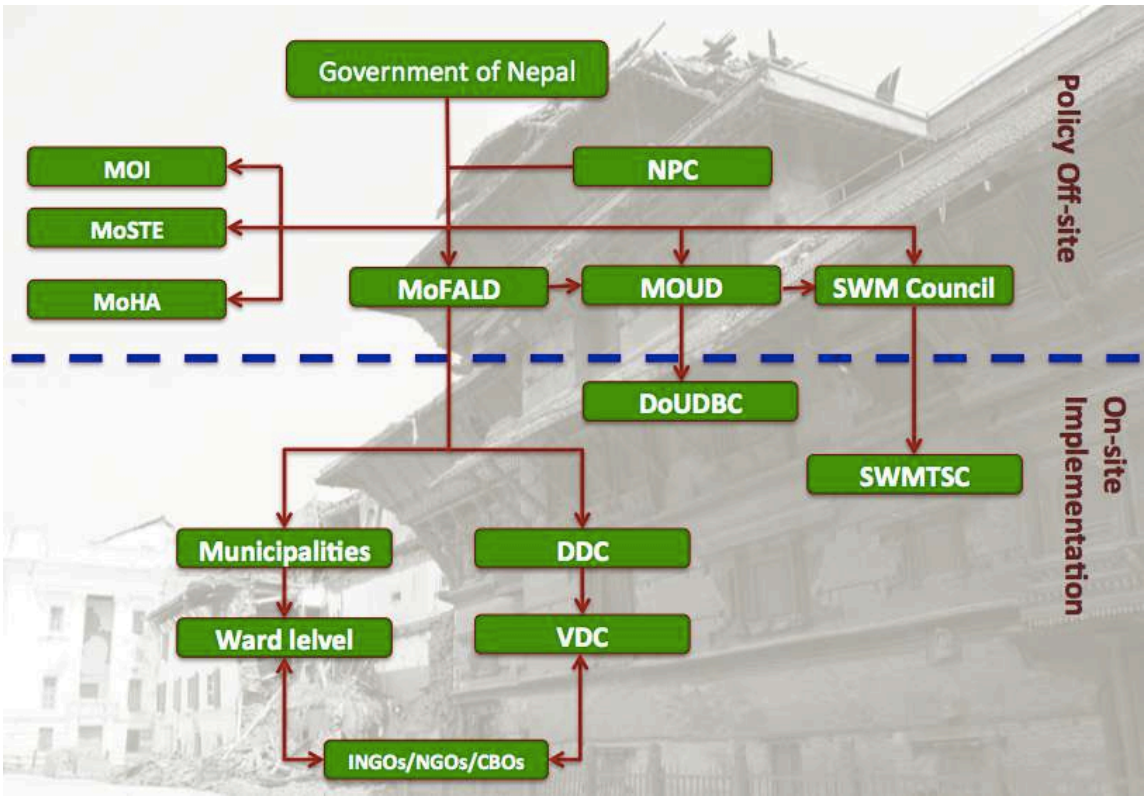

Figure 6: Flow chart of Institutional Arrangement for SWM

Ministry of Science, Technology and Environment (MoSTE):

MoEST is authoritative institution ensuring the incorporation of environmental conservation dimension in the development activities in the country. While Department of Environment under MoSTE will be responsible for developing various environmental standards and also EIA/IEE mechanism or process related to SWM project. Alternative Energy and promotion centre under MoSTE is also planning to support municipalities in generating energy from waste. Waste management in one of the key concern of the ministry in ensuring environmental health of the country and its environment. Ministry has been conducting EIA of several landfill sites in the country. The ministry has approved Banchare Danda landfill site in Kathmandu valley after EIA process. MoEST has been instrumental in banning plastics, developed and implemented the standard of lead and mercury in paints and CFL bulb respectively. So far this ministry has not addressed the disaster waste management issues. Considering the disaster prone country, there is a need for the ministry on developing policies, guidelines,

standards and mentoring through its Department of Environment the compliance to the disaster waste management standards and guidelines.

Ministry of Urban Development (MOUD):

MOUD has been active in water supply and sanitation field. Minister is the Chair of the Solid Waste Management (SWM) Council. Solid Waste Management Technical Support Centre is the secretariat of the council, which gathers the knowledge base on solid waste issue and provides technical support to the government institutions dealing with the waste management.

Department of Urban Development and Building Construction under this ministry has crucial role in addressing the waste management issues. This institution is responsible for developing code for building and construction materials. Disaster waste composition consist large volume of construction materials. Department of Urban Development and Building Construction (DoUDBC) of MoUD is also supporting various municipalities in infrastructure development of Solid Waste Management. So MOUD & DoUBBC is crucial agency in addressing disaster waste management in which the ministry and department can be instrumental in designing the building code and construction material standard. This initiative will help in reduce and reuse of the construction waste consist in disaster waste efficiently in environment friendly way. Ministry can be instrumental in providing guideline for the construction material prepared by the use of disaster waste.

Ministry of Federal Affairs and Local Development (MoFALD):

MoFALD, which have, develop Environmental Friendly Local Governance Framework 2013 for local bodies especially Municipalities, DDC and VDCs which mentioned various indicators related to SWM that need to be achieved. Municipalities, DDC and VDCs are functioned as Local Self Governance Act 1999 that has given clear mandate for local bodies for solid waste management at local level. This agency and its offices play a crucial role for implementation disaster waste management strategy and action plan. As these offices under this ministry are located up to the village level the disaster waste management activities can

be implemented efficiently with the existing institutional mechanism and resources

Ministry of Industry:

Ministry of Industry is responsible for developing necessary policy, standards and management of industrial waste management. Establishment of any industry requires complying with the standard and management of industrial waste in the country. It has complied with the policy of polluters pay principle in which the polluting industry is mandated to pay the tax for handling the waste generated from the industry. Ministry has its department, which monitors the implementation of safe disposal of industrial effluent and solid waste. Waste as resource and input for several industries, MOI can play a crucial role in minimizing the waste generated by the disaster event. These waste consist of several industrial produce materials, which is hazardous in nature. The industry has to be provided incentive to take back the material it produced which became the part of disaster waste. The industry should promote take back system for material recovery, which will greatly help in addressing disaster waste management.

Ministry of Health and Population:

Ministry of Health and Population is accountable in preparing necessary policy and guidelines related to health care waste management. Ministry has its hospitals and health post offices distributed in entire country where the medical and infectious waste generated are safely disposed following the guideline. In the post disaster situation, it is evident that the medical and infectious waste amount increases drastically due to the treatment of injured. So there is a need to address the medical and infectious waste in the disaster situation in which the Ministry is crucial in safe handling and disposal during and after disaster situation.

Solid Waste Management Technical Support Centre (SWMTSC):

Solid waste management technical support center (SWMTSC) is accountable to SWM council formed under SWM Act 2011 in which Minister of MoUD is

chairperson of council. The council approves plan and policies of SWMTSC. SWMTSC is providing technical support to municipalities and VDCs in terms of developing policy and planning, research and infrastructure development on SWM. This center can be a knowledge resource center for the disaster waste management related technical know how in building the capacity of the national institutions dealing with the waster and disaster.

Institutional Recommendation:

All relevant institutions are dealing with waste and disaster waste separately. Disaster related institutions so far did not foresee the gravity of the disaster waste, which has been generated within a short time frame. The disaster waste generated by Earthquake of 2015 is an experience for the Government about the disaster waste problem, which the present institutions at the central and local level are not capable in addressing due to insufficient knowledge, trained human resources, unavailability of technology and equipment. So based on the existing intuitional mechanism dealing with disaster waste management, the following recommendation on institutional arrangement are:

- Coordination among all stakeholders at national and local level
- Strategic management in addressing human health and risk posed by the disaster waste
- Operational strategic management: build local level institutions capacity and empower the local institutional mechanism to manage disaster waste by utilizing the recyclable materials and safe disposal of the hazardous materials.

1.6 Financial Arrangement:

National Planning Commission has to approve financial budget and programs of fiscal year before Ministry of Finance releases the budget for implementation of respected activities. The budget of local bodies will be distributed through Ministry of Federal Affairs and Local Administration (MoFALD) for implementation of SWM activities. (Figure 7). Private sector finance/ investment should be encouraged in recycling process.

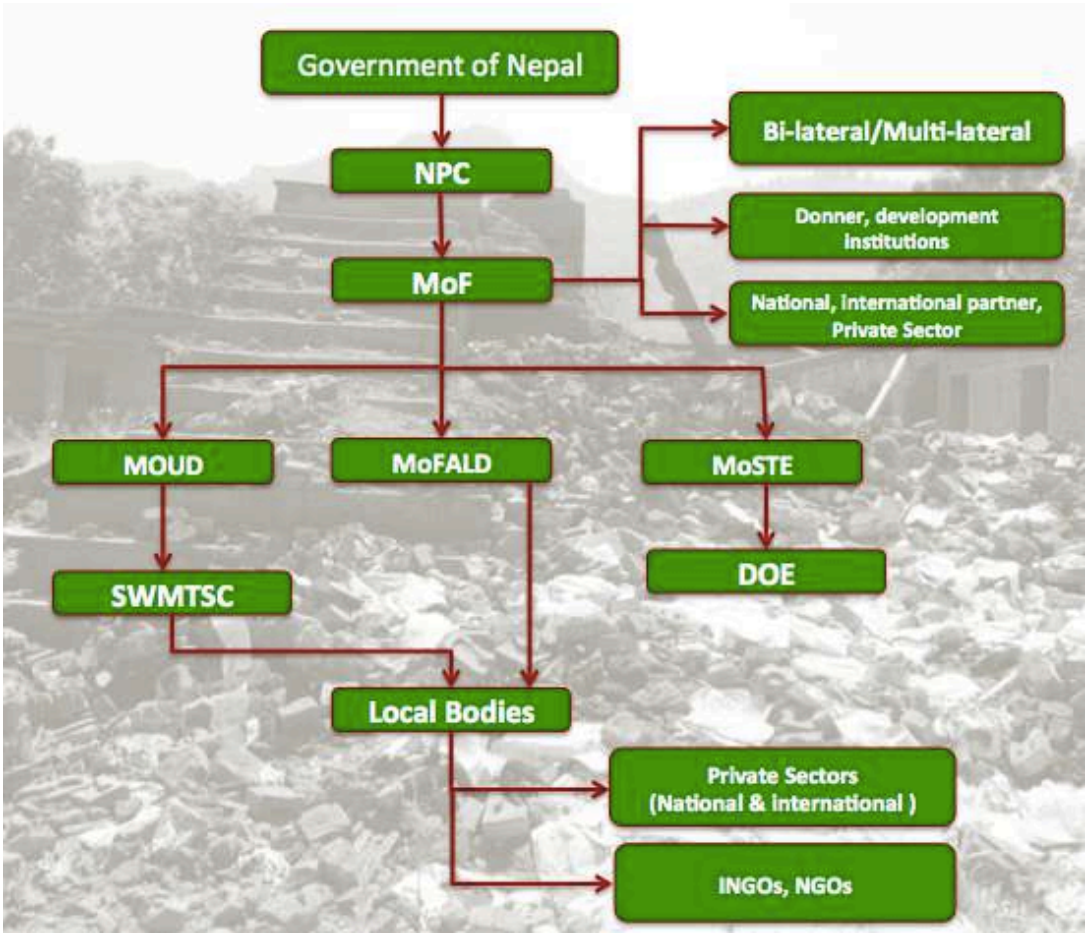

Figure 7: Flow Chart of Financial Arrangement for Solid Waste Management (SWM)

Besides that, local bodies have their own internal financial resources such tariff and revenue generated from local governance tax for implementation of SWM activities. Ministry of Urban development (MoUD) provides financial resources to SWMTSC that used in providing technical support for local bodies on SWM. Private sectors (national and international) can also be involved for recycling and reusing the disaster waste. The funding mechanism can facilitate directly and indirectly for technology promotion, human resource and infrastructure development in the field of waste management.

1.7 Technology and Infrastructure

Nepal is still far behind in technology transfer and infrastructure development in terms of SWM in compare to other developing countries. Nepal has adopted modern technology and infrastructure development for SWM in 1979 when GIZ and SWM Board of Ministry of Physical Planning and Building Construction initiated solid waste management project for Kathmandu Valley. Under the

project, Composting technology was introduced in Kathmandu Valley and controlled dumping site in Gokarna was established where all waste generated from Kathmandu valley is managed and dumped. Then, SWM Act 1987 was enforced in Nepal under which solid waste management council and board was formed and solid waste management and Resource mobilization support center was established. Then, SWMRMC developed national SWM policy and implemented capacity building and awareness raising program on SWM, established Teku transfer station, various composting plants in Kathmandu as well as developed door to door waste collection system, tariff collection system and recyclable waste management. After SWM Act 2011, SWMRMC modified into SWMTSC and has been providing various technical supports in technology transfer and infrastructure development on SWM in local bodies.

There are five sanitary landfill sites currently functioning in Kathmandu, Pokhara, Gorahi, Tansen and Dhankuta and other three sites are in the process of development in Nepalgunj, Butwal and Sidharnagar. There were various composting plants functioning at household, community and commercial level. Material Recovery Facility (MRF) system is started to develop in various municipalities. Waste to energy recovery through establishment of biogas plant is also started in Bhimeshwor, Tulsipur, Tikapur and Kathmandu municipalities. Alternative Energy Promotion Centre (AEPC) is also planning to support in establishing 30 biogas plants in various municipalities in this fiscal year.

Health care institutes in Nepal managed infectious and hazardous waste management themselves and rest its general waste to municipality but it is not effective and efficient. There are also plastic and paper recycling industries in Nepal. However, there is no technology established for hazardous waste management in Nepal. After the earthquake need of engineering expertise and technological solutions to demolish the damaged buildings, transfer disaster waste, sort and shred the waste, and recycle it back into construction materials was felt necessary. There were no heavy equipment to repair and demolish high rising towers and heavy structures. Availability of Concrete cutters, crushers, shredder sand waste haulers in sufficient numbers would have made recovery

process more effective. Lack of Technology and knowhow on recycling and reusing of debris waste in road construction, reconstruction, block making and brick making unit, etc. are also lacking.

1.8 Stakeholder Role

Local bodies i.e. municipalities and VDCs are key stakeholders for implementing SWM activities. SWMTSC is main responsible bodies in providing technical support for local bodies in SWM activities in Nepal. MoFALD provides facilitation for local bodies in SWM activities as well as also support in finding technical and financial support from international organizations.

Department of Urban Development and Building Construction (DoUDBC) under MoUD is also initiated in providing technical support and infrastructure development on SWM for municipalities. Department of Industries under Ministry of Industries also play key role in monitoring and evaluation of pollution control of industries. Department of Public Health under Ministry of health and Population is also responsible for monitoring and evaluation, preparing proper policy and regulation for Health care waste management. Department of Environment under Ministry of Science, Technology and Environment is also responsible for preparing Environmental standards, Guidelines and EIA/IEE process of SWM activities

Section Two: Policy

2.1 Problems and Challenges

The government was not prepared to deal with the large volume of waste that was created by the earthquake. While the country was still working on how to manage the day-to-day waste, the waste created after the earthquake added to their already existing challenges:

The challenges observed in DWM are:

- Large quantities of mixed waste produced within a very short time frame;
- Lack of DWM friendly Legislation;
- Lack of knowledge of practical technology required for a large size plant or a small-scale plant;
- Lack of technical experts in this field;
- Coordination is another challenge at all level of the hierarchy within the government and amongst other stakeholders involved in waste management;
- The state does not have a contingency plan which is important to bridge the gap between response, recovery and longer-term development and is an important investment;
- Lack of active community mobilization scheme;
- The 3R practice is uncoordinated and week in application;
- The policy and strategy is more reactive than proactive;
- Finance mechanism not adequate to meet the challenges of DWM.
- Limited Funding to handle post disaster situation
- Limited Funding for capacity building (within government and for civil societies)

2.2 Vision

To achieve a cleaner, greener and safer nation by protecting and managing the environment by resource recovery and safe final disposal in line with the SDG targets.

2.3 Mission/Goal

With wide range participation of concern stakeholder, establishment of sustainable disaster waste management system including reduce, reuse, recycle,

treatment and safe disposal of disaster waste and strengthen the coordination among government agencies, private sector, civil society and other stakeholders.

2.4 Objectives:

- Establish integrated disaster waste management system into holistic waste management system maintaining health and the ecology balance
- Strengthen and establish appropriate institutional setup with coordination mechanism between all concern stakeholders including National Reconstruction Authority for disaster waste management
- Promote resource recovery of disaster waste using innovative and sustainable technology through public private partnership model,
- Develop infrastructure for final disposal of risky waste.

2.5 Policy Recommendations

The policy recommendations are made with the collective input from the field visit, discussion meetings and workshops. Among the alternatives of the waste management measures, the widely accepted hierarchical preference namely the waste minimization from the source and awareness creation will be given top priority followed by recycling and safe disposal of the disaster waste. The following specific policies shall be undertaken for the accomplishment of the aforesaid objectives:

Prevention and preparedness (3R principle, Reduce)

- Prepare standards of the disaster waste emissions and effluents with special emphasis on the hazardous waste and its contribution in the contamination and degradation of the environmental resources.
- Prepare disaster waste management strategy and action plan in national and city level in line with the SDG targets.
- Interlink DWM principals into the existing legislation and international instruments related to waste management, health and environment
- Disaster preparedness/contingency plans waste management system is to be designed to withstand disaster

Empowerment/community mobilization

- Recognize and empower women in effective leadership role in reducing disaster waste, building community resilience
- Promote awareness and dissemination of knowledge on the disaster wastes, their effects and impacts amongst the government and the general public
- Empower government and community on 3R principals
- Empowerment/strengthen landfill operation and maintenance
- Reducing of waste from the source on site and off site
- Involve community to develop registration practices of all disaster wastes transporter, recycler, treatment and disposal units.
- Awareness on business modalities and income generating activities
- To provide guidance and support to communities and local businesses to make best use of recovered debris and to reduce its long term impacts on public health and environment.
- Promote environment friendly reconstruction and renovation methods

Response and Removal (3R principle, Reuse)

- Waste management plans for cities with a special focus on disaster waste preparedness of waste management system for quick removal of Debris.
- Resume the municipality waste management
- Established disaster waste management cell with appropriate technical, and trained human resources responsible to remove quickly debris.
- Design and implement integrated disaster waste management system in city and rural areas
- Removal of debris and other waste management as high priority considering its adverse impacts on relief operations and public health.
- Waste treatment and disposal sites for hazardous waste to be located away from dense populated area with sufficient capacity.
- Include women in effective leadership role and livelihood development by involving them on 3 R principals and its business components

- Develop infrastructure including, transfer stations, resource recovery center and safe final disposal sites.

Reuse

- Develop criteria for temporary disposal sites, storage of debris
- Develop criteria for safety measures during segregation of waste on site and off site
- Develop criteria for handling hazardous waste
- Create guidelines on sustainable architecture by using what is available on site for example mud or disaster debris

Recovery (3R principle, Recycle)

- Maximize recycling process to reduce the final disposal to the landfill
- Provide national authorities and international relief expert with sound and practical advice to manage waste.
- Bring global experience in disaster response and recovery
- Guidance and support to communities and local business
- Make best use of recovered debris and to reduce its long term impacts on public health and environment

Funding mechanisms:

- Funding deliverance mechanism to be established at the central government level, local government level, private sector level and donor level.
- Need for fund facilitation option either directly, indirectly or in a lump sum manner or in kind.

Recycling

- Identify sustainable environmentally sound technology/equipment to the treatment/reuse/ recycle of post disaster waste.
- Empower human resources to operate the technology/equipment
- Allocate budget and financial source (public and private)
- Promote maximize recycling to reduce the final waste volume
-

Monitoring & Evaluation

- Ensure monitoring mechanism are in placed
- Identify the monitoring government wing of different sectors of the DWM
- Identify the evaluation wing of the different sectors of the DWM

Section Three: DWM Strategy

3.1 Disaster Waste Management Strategy

Disaster waste can pose a risk to human health or the local environment and impend disaster relief and recovery process, so it must be considered a potential priority. Huge amount of disaster waste generated in short time span during disaster need to be well expected in advance and take proactive approach before the event in addressing it. Similarly immediate reactive approach is needed to manage the huge amount of the disaster waste generated after the disaster event. Proactive approach will greatly help the institutions to develop knowledge and capacity of the institution, which will be useful during the reactive approach phase (Figure 8). Timely developed strategy and guidelines can play important role in saving life and ensuring sustainable and smooth recovery after disaster. The disaster waste management preparedness could be divided into four phases.

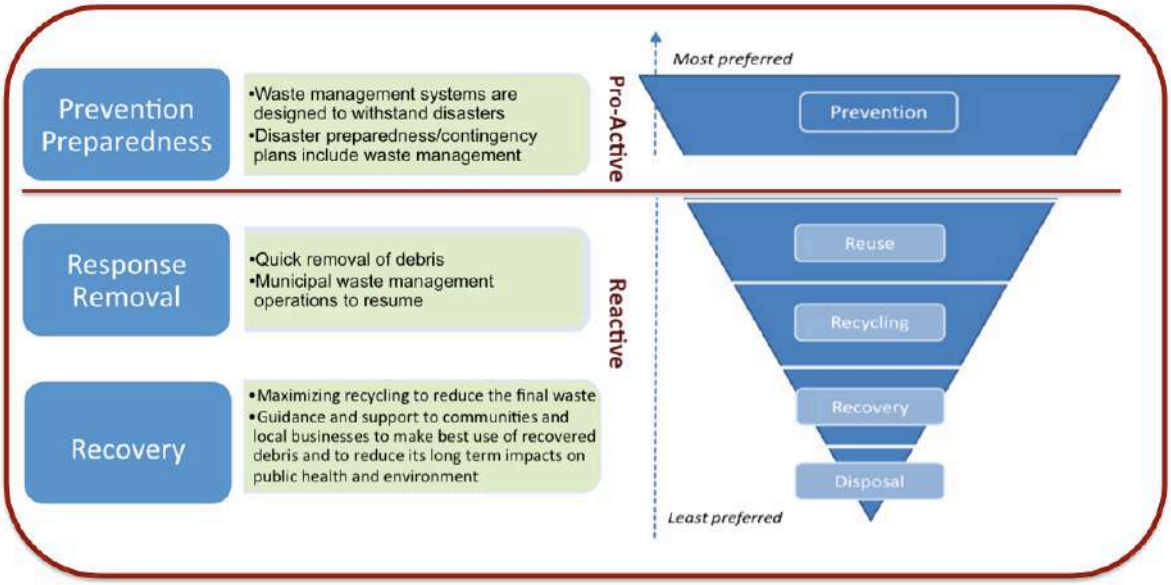

Figure 8: DWM Strategic approach for different stages of disaster

Phase 1 Emergency phase: It addresses the most acute waste issues required to save lives, alleviate suffering and facilitate rescue operations. It should be initiated immediately. Activities at this phase includes

- **Identify waste Issues** through governmental sources, GIS, news, and information gathered from local agencies.

- **Characterize waste**. Quantify, composition and quality of the identified waste streams and dumps/ landfills through site visits and waste sampling/ analysis, even if this is cursory.
- **Map & access waste**. Use above data in a waste map of the affected area. The map will be a valuable tool throughout the process, and can be updated as information becomes available.
- **Prioritize actions.** Each identified waste streams and/or issue is given a 'common sense' ranking.
    - Appropriate disposal sites are to be identified for the disposal of the different types of waste collected in the emergency phase. If an existing disposal site is available, it should be rapidly assessed for environmental compliance before use. Where no existing disposal site is available, a temporary disposal site or engineered dumpsite should be identified and established.
    - Main streets are to be cleared to provide access for search and rescue efforts and relief provisions.
    - All available equipment and stakeholders should be used.
    - If hospital and clinics are affected by the disaster, they should be encouraged to separate infectious and/or healthcare waste, store it separately and transport it to temporary special treatment or disposal sites.

Following Actions should be initiated within days of disaster event:

- If people remain in the disaster area, the collection of their household waste should be carried out where possible.
- DW assessment should be carried out to inform further decision-making. Exact data is not required, but reasonable ideas about the status of waste, the ability of local authorities to handle the situation, and the need for any international assistance should be provided.
- Wastes from IDP camps should be managed in coordination with general solid waste management services, and thus integrated with the local waste collection services.

Phase 2 Early Recovery phase: It lays groundwork for a disaster waste management program to be implemented during the recovery phase. It also continues to address key issues such as the location of a disposal site for the different types of waste, streamlining logistics for waste collection, transportation and reuse/recycling activities. Efforts should be, build on the initial Phase 1 assessment but go into greater depth, with an emphasis on longer-term solutions. Required actions normally include:

- Assessments: Continue to assess the disaster waste (extent of waste generation, locations, types of waste, regulatory understanding, etc.). Assess locations (and upgrade if necessary) for medium term temporary disposal and waste separation sites for unsorted rubble and municipal waste.
- Operations: Establish temporary storage sites for debris and regular waste, Initiate collection and transportation of waste and debris, with the goal of expanding this in the full recovery phase, Prepare practical advice and guidance for local authorities on interim solutions to minimize environmental and health impacts of disaster waste.
- Planning: Implement a communications plan for affected communities with a focus on opportunities (i.e. reuse and recycling), risks (i.e. human health risks) and collection schemes. Develop a plan for healthcare waste. Consult affected communities on issues relating to public health, wastes, livelihoods and the environment.
- Communication and reporting: Communicate rapidly and regularly regarding all findings to the local authorities, concerned governmental Institutions and if necessary to foreign development partners, and other international response mechanisms as appropriate.

Phase 3 Recovery Phase: It includes implementation of disaster waste management projects designed in Phase 2, and continued monitoring and evaluation of the disaster waste situation. The following main actions should be considered:

- Develop and implement a communications plan for the key stakeholders to ensure the disaster waste management program is aligned with community expectations and needs.
- Procure or repair required waste management plant, machinery and equipment and train waste management operators if required.

- Support the implementation of disaster waste management systems by supporting waste management operators/operatives or local authorities.

Phase 4: Contingency Planning: It is not a part of emergency response but it does help bridge the gap between response, recovery, and longer-term development and is therefore an important investment. Contingency planning can be conducted during the recovery phase or as a preparedness measure prior to disaster. The objective is to develop a Disaster Waste Management Contingency Plan (DWMCP) to aid communities in determining appropriate management options in advance of a disaster. A plan identifying cost-effective disaster waste management options and resources can save money, increase control over waste management and improve administrative efficiency. The plan may also serve as a resource document in negotiating technical and financial assistance.

Table 3 :Summary of strategy against key goals/objectives, indicators/targets

Goals / Objectives	Indicators / Targets	Strategy
Minimize waste generation	• Reduce the quantity of waste generated per capita • Eliminate unneeded materials • Systematize solid waste reduction and management practices into standard operating procedures and packaging/product specifications	• Outline the roles and responsibilities of all stakeholders involved with waste management. • Reduce or eliminate materials entering the solid waste system which hinder or limit the opportunities to achieve reuse, recycling, or energy recovery, or that may exacerbate environmental impacts of disposed residuals. • Provide information and education on options to reduce waste. • Evaluate shipping and packaging procedures to identify items, which could be eliminated or reduced.
Maximize reuse, recycling and material recovery	• Use alternate materials which reduce production impacts • Substitute reusable items for disposable items in shipping, handling, storage and operations • Reduction of landfill space used. • Reduction in the quantity of raw material • Job creation in particular.	• Outline the roles and responsibilities of all stakeholders involved with waste management Increase the opportunities for reuse and recycling • Increase the effectiveness of existing recycling programs • Target specific materials for reuse, recycling and material recovery • Utilize non-recyclable material as fuel to provide electricity and district heating from waste-to-energy facilities • Develop reusable containers for shipping. • Reduction in transportation for raw materials and debris. • Possible reduction in waste management costs.
Develop	• Develop waste management	• Create materials and tools to target

waste management practices	plans in consultation with effected community • Include communication links so that people can inform each other when their activities change which have an impact on waste management • Work with regional organizations to minimize duplication of resources and facilities	community members and groups • Hold activity sessions detailing the importance of waste management and what people and staffs can do • Develop communication links between different groups involved in waste management activities. It is essential that all those involved in specific waste activities (such as purchasing, collection, storage, and disposal) know what others are doing. This will avoid both gaps and overlaps.
Ensure waste management is safe and effective	• Develop a combined environmental committee and health and safety committee • Assign responsibility for the regular review of the available technologies for waste storage and disposal	• Document the segregation, containment, storage, collection, and disposal mechanisms for each category of waste, with particular attention paid to harmful categories • Develop accident response strategies for harmful categories of wastes and provide training for those who will be responsible for carrying them out • Provide staff training

Recommendations

Legal and Institutional:

- There is need to adjust and amend the existing legislation which is needed in implementing the strategic approach in addressing disaster waste management.
- Existing institutional mechanism on disaster and waste is operation separately which need to harmonize while addressing disaster waste in a coordinated manner.
- Solid Waste Management act 2011 can play a major role in bringing all stakeholders from disaster and waste management field in a common platform in addressing disaster waste management.

Financial:

- For the implementation of the DWM strategy, institutional funding mechanism to be arranged so as to promote recycling of disaster waste management.
- This arrangement will be help the stakeholder to engage in creating the disaster waste materials recycle market.
- The funds recovered from the recycled material will be the source of income to support employment of human resources in waste management.

Technical:

- Institutional technical capacity has to be increased in addressing the handling of the disaster waste.
- Government to promote green and sustainable reconstruction technology using the disaster waste materials at onsite and offsite.
- Government to promote private sector in utilizing disaster waste materials for composting, construction blocks, biogas and generation energy.
- Material that cannot be reused, and recycle to be safely disposed in the landfill site.

Empowerment/community mobilization:

- Government to emphasis in empowering community and mobilising them in using the disaster waste on the 3R principle.
- Government to mobilise the private sector in collaboration with the community in creating local business opportunity.
- A community based awareness program to be promoted on environment friendly reconstruction; health hazard from the hazardous waste.

Monitoring & Evaluation:

- Institutional and legal framework to monitor and evaluate mechanism to check the implementation of the DWM strategy with its indicators identified.
- Ensure a provision in the policy for reward or punishment for abiding/or not abiding with the rules and regulations on disaster waste management activities.

Section Four: DWM Action Plan

4.1 Disaster Waste Management Action Plan

An action plan has been developed to implement the DWM by the government of Nepal to address the recent earthquake disaster and for future disaster events. Environmental, economic, social and recovery criteria are considered for the strategic intervention for effective disaster waste management. The action plan developed is structured in prevention, preparedness, removal and recovery stages with timeline, resources required and lead agency for each action. The strategy focuses on: framework law, institutional arrangements, financing mechanisms, technology, and infrastructure and stakeholder participation. The brief action plan is presented in the Table 4 below and the detail action plan with time line and budget required is presented in the Annex 1.

Table 4: Summary of DWM Action Plan

Stage	Strategies	Action Plan		Responsible Agencies
		Actions	**Detailed Activities**	
Prevention	Preparation of Disaster waste management policy with participatory approach	Formulation of Disaster waste management policy, strategy and action plan	Assessment of disaster events; Review and draft preparation; Consultation with stakeholders; Approval; Dissemination; Implementation.	MoFALD, SWMTSC, *(MoUD, MoSTE, MoHP, NPC, MoI, MoHA, MoD Municipalities representatives, NGOs representatives, Academician)*
		Revised Building Code	Assessment and review; Draft building code; Stakeholder consultation; Approval; Dissemination; implementation	DUDBC, MoUD *(MoFALD, MoSTE, MoHA, Natural Calamity Relief Committee at regional and local level)*
		Strategy and Action plan at city level	Assessment and review; draft preparation; Consultation with stakeholders; Approval; Dissemination; Implementation.	MoFALD SWMTSC, *(Municipalities,)*
Preparedness	Preparedness of Integrated disaster waste Management	Disaster Waste Assessment	• Assessment of estimation of disaster waste based on possible disasters and its effect of magnitude • Assessment of necessary resources and possible challenges/gaps for disaster waste management in Nepal	SWMTSC, MoUD *(MoFALD, Municipalities, DDC, VDC,)*
		Preparedness of Resources for disaster waste management	• Fund allocation and mobilization for emergency natural disaster; Identification of suitable equipment and technology; Purchase of suitable equipment and technology;	all concerned ministries MoUD • *(natural Relief Calamity Committee at central, regional and local level*

			Human resources development through various capacity buildings programmes; Development of capacity building training materials	• *MoHA, MoD, MoFALD, Municipalities, DDC MoHA, NoD, Municipalities, SWMTSC, national and international NGOs)*
		Capacity Building Programs	• Capacity building at central, regional and local level on • Demolition of buildings • capacity building on disaster waste management	MoUD *(MoHA, NoD, Municipalities, SWMTSC, national and international NGOs)*
Removal	Mobilization of all concerned stakeholder and resources for disaster waste removal in coordinated and participatory approach	Assessment of damaged due to natural disaster	• Assessment of casualties, destroyed building and monuments based on geographical location • Assessment of estimation of total disaster waste generation and types of rubbles, disaster waste composition, and calculation of hazardous waste generated from debris, issues/challenges/gaps, impacts, necessary resources mobilized for disaster waste management after post disaster.	Natural Calamity Relief Committee at Central Level *(NCRC at regional and local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters)*
		Safe removal of disaster waste	• Demolition of buildings safely following proper guidelines and manual • waste minimization through waste segregation at source • Effective disaster waste collection and transportation • Temporary site management for disaster waste collection • Final Disposal site management for disaster waste • Removal of waste from emergency camps and its management	
		Resource mobilization Stakeholder engagement	• Mobilization of fund with proper fund management planning • Mobilization of trained human resources in affected area • Private Sector promotion in removal of destroyed buildings • Monitoring of disaster waste management and documentation	
		Resource mobilization Stakeholder engagement	• Stakeholders engaged for various activities as designated roles and responsibilities in disaster waste management • Develop good coordination and communication mechanism in between stakeholders	

Recovery	recovery of raw materials with 3R approach	Promotion of 3R activities	• Awareness raising and capacity buildings on recovery of resources from disaster waste • Recovery of resources at sources for rebuilding materials • Promotion of interested entrepreneurs in recovery business • Establishment of recovery plants and production of buildings materials based on local demands	MoUD *(NCRC at local level, affected Municipalities/VDCs, SWMTSC, Technical Advisory Committee, national and international organization cluster, FNCCI,)*

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Annexes

Annex I : Action Plan to Implement the Strategy

1. Strategies and Action Plan at Prevention Stage (Immediate and Short Term)

Strategies	Action Plan		Target/ Performance indicators	Responsible Agencies	Supporting Agencies	Budget (NRs)	Time Frame
	Actions	Detailed Activities					
Preparation of Disaster waste management policy, with participatory approach	Formulation of Disaster waste management policy, strategy and action plan	• Assessment of disaster events • Review and draft preparation • Consultation with stakeholders • Approval • Dissemination • Implementation	100% implementation	MoFALD, SWMTSC, MoE DoE	MoUD, MoSTE, MoHP, NPC, MoI, MoHA, MoD Municipalities representatives, NGOs representatives, Academician	2,000,000	Short Term; It is continuous improving process.
	Revised Building Code	• Assessment and review • Draft building code • Stakeholder consultation • Approval • Dissemination • Implementation	100% application of Building code	DUDBC, MoUD	MoFALD, MoSTE, MoHA, Natural Calamity Relief Committee at regional and local level, VDC Municipality	3,00,000	Short to Medium Term (Will take more time for implementation) 1-5 yrs
	Strategy and Action plan at city level	• Assessment and review • Draft preparation • Consultation with stakeholders • Approval • Dissemination • Implementation	80% of city will have strategy and action plan on SWM	MoUD MoFALD	Municipalities, SWMTSC DDC/VDC Community	50,000,000	Medium to Long Term

Short Term: 0-2 Years; Medium Term: 1-5 Years; Long Term: 5-10 Years

2. Action Plan at Preparedness Stage

Strategies	Action Plan		Target/ Performance indicators	Responsible Agencies	Supporting Agencies	Budget (NRs)	Time Frame
	Actions	**Detailed Activities**					
Preparedness of Integrated disaster waste Management	Disaster Waste Assessment	• Assessment of estimation of disaster waste based on possible disasters and its effect of magnitude • Assessment of necessary resources and possible challenges/gaps for disaster waste management in Nepal	6 Month	SWMTSC, MoUD	MoFALD, Municipalities, DDC, VDC Local Govt	5,000,000	Short-Medium Term
	Preparedness of Resources for disaster waste management	• Fund allocation and mobilization for emergency natural disaster • Identification of suitable equipment and technology • Purchase of suitable equipment and technology • Human resources development through various capacity buildings programs • Development of capacity building training materials • Donor/Private Sector/National/International Development Partner	100% implementation of fund mobilization, 100% preparedness of equipment and technology and 100% preparedness of HRD	All concerned ministries	• Natural Calamity Relief Committee at central, regional and local level • MoHA, MoD, MoFALD, Municipalities, DDC • MoHA, MoD, Municipalities, SWMTSC, national and international NGOs	May go up to 1,000,000,000	Medium-Long Term 5ys -10yrs
	Capacity Building Programs	• Capacity building at central, regional and local level on DWM • Demolition of buildings • Capacity building on disaster waste management	100% preparedness of capacity building	Municipalities, SWMTSC, national and international donors, NGOs	MoHA, NoD, MoUD MoFALD	May go beyond 1,000,000,000	Medium, Long Term Short to mid

	Coordination and Cooperation between concerned stakeholders	• Monthly meeting of Natural Relief Calamity Committee at Central, Regional and Local level • Monthly meeting of technical advisory committee • Monthly meeting national and international Non-government organizations cluster for disaster management	Regular coordination and cooperation between stakeholders and documentation	MoUD All concern ministry	All concerned stakeholders community/local govt	May go beyond 1,000,000,000	Short, Medium, Long Term
	Safe removal of disaster waste	• Demolition of buildings safely following proper guidelines and manual • waste minimization through waste segregation at source • Effective disaster waste collection and transportation • Temporary site management for disaster waste collection • Final Disposal site management for disaster waste • Removal of waste from emergency camps and its management	100% safe disposal	Natural Calamity Relief Committee at Central Level	NCRC at regional and local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters		

	Resource mobilization Stakeholder engagement	• Mobilization of fund with proper fund management planning/direct/indirect • Mobilization of trained human resources in affected area • Private Sector promotion in removal of destroyed buildings • Monitoring of disaster waste management and documentation	100% mobilization 100% coordination and communication among stakeholders	Natural Calamity Relief Committee at Central Level	NCRC at regional and local level, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters	Up to 1000,000,000	Short-Medium Term
	Resource mobilization Stakeholder engagement	• stakeholders engaged for various activities as designated roles and responsibilities in disaster waste management • Develop good coordination and communication mechanism in between stakeholders	communication among stakeholders	Natural Calamity Relief Committee at Central Level	NCRC at regional and local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters	500,000,000	Short-Medium Term

Short Term: 0-2 years; Medium Term: 1-5 Years; Long Term: 5-10 years

3. Action Plan at Removal Stage

Strategies	Action Plan		Target/ Performance indicators	Responsible Agencies	Supporting Agencies	Budget (NRs)	Time Frame
	Actions	Detailed Activities					
Mobilization of all concerned stakeholder and resources for disaster waste removal in coordinated and participatory approach	assessment of damaged due to natural disaster	• Assessment of casualties, destroyed building and monuments based on geographical location	100% database management	Natural Calamity Relief Committee at Central Level	NCRC at regional and local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee	5,000,000	Short, Medium Term
		• Assessment of estimation of total disaster waste generation and types of rubbles, disaster waste composition, calculation of hazardous waste generated from debris, issues/challenges/gaps, impacts, necessary resources mobilized for disaster waste management after post disaster					

	Safe removal of disaster waste	• Demolition of buildings safely following proper guidelines and manual • waste minimization through waste segregation at source • Effective disaster waste collection and transportation • Temporary site management for disaster waste collection • Final Disposal site management for disaster waste • Removal of waste from emergency camps and its management	100% safe disposal	Natural Calamity Relief Committee at Central Level	NCRC at regional and local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters	Up to 1000,000,000	Short, Medium Term
	Resource mobilization	• Mobilization of fund with proper fund management planning • Mobilization of trained human resources in affected area • Private Sector promotion in removal of destroyed buildings • Monitoring of disaster waste management and documentation	100% mobilization	Natural Calamity Relief Committee at Central Level	NCRC at regional and local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters	Upto 1000,000,000	Short, Medium Term

	Stakeholder engagement	stakeholders engaged for various activities as designated roles and responsibilities in disaster waste management Develop good coordination and communication mechanism in between stakeholders	100% coordination and communication among stakeholders	Natural Calamity Relief Committee at Regional Level	NCRC at local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters		Short, Medium , Long Term
	Information dissemination	Information desk establishment and sharing of updated information dissemination of various IEC materials on Disaster waste management and best use of communication media	100% information dissemination	Natural Calamity Relief Committee at Regional Level	NCRC at local level, SWMTSC, MoUD, MoHA, MoFALD, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters	100,000,000	Short, Medium Term
	Social Mobilization	social mobilization for support in resource mobilization and implementation of Disaster waste management	100% social mobilization	Natural Calamity Relief Committee at Local Level	SWMTSC, Departments, local NGOs, Municipalities and VDCs, technical advisory committee, national and international organization clusters	50000K	Short, Medium Term

Short Term: 0-2 years; Medium Term: 1-5 Years; Long Term: 5-10 years

4. Action Plan at Recovery

Strategies	Action Plan		Target/ Performance indicators	Responsible Agencies	Supporting Agencies	Budget (NRs)	Time Frame
	Actions	Detailed Activities					
Recovery of raw materials with 3R approach	Promotion of 3R activities	• Awareness raising and capacity buildings on recovery of resources from disaster waste • Recovery of resources at sources for rebuilding materials • Promotion of interested entrepreneurs in recovery business • Establishment of recovery plants and production of buildings materials based on local demands	80% recovery of disaster waste	MoUD	NCRC at local level, affected Municipalities/VDCs, SWMTSC, Technical Advisory Committee, national and international organization cluster, FNCCI,	1,000,000,000 or more	Short, Long Term

Short Term: 0-2 years; Medium Term: 1-5 Years; Long Term: 5-10 years

ANNEX II

Field Report
Disaster Waste Management
Earthquake Affected Areas

July – August 2015
LEAD Nepal
Kathmandu, Nepal

Field Visit Report
Disaster Waste Management Policy, Strategy Action Plan

The team of experts visited the earthquake-affected district in Kathmandu, Lalitpur and Bhaktapur. The findings of the field visit are stated below.

Objective:

The Objective of the field visit was:

- Observe and collect available data and information related to earthquake generated disaster waste;
- Identify the disaster waste management challenges;
- Get clear vision about the exact waste generated, composition and management system at the earthquake affected settlements.

Methodology:

- The team of experts did a literature review related to waste and environment and identified the gaps. Also secondary data were collected from the government and donors on the effects of the recent earthquake and the current situation.
- During the field visit group discussion was conducted with the local community, municipality and aid workers with an inclusive approach.
- Photographs and Video were taken to record disaster of the earthquake
- Data was collected and analysis of the situation of the ground was observed

Field Visit Recommendations

1. Establish proper institutional setup to strengthen the coordination mechanism between Department of Archeology and other authorities with Municipality to manage disaster waste from damaged historical monuments
2. To transfer adequate authority to the municipalities in decision making and to mobilize disaster related activities and responsibilities instead of the only CDO having the full authority
3. To build capacity of municipalities on Disaster Preparedness and SWM on safety and health prevention measures during handling and demolishing period and dumping site
4. To empower civil societies and municipalities on demolishing earth quake damaged houses and providing the necessary equipment's
5. Allocate government land to dispose of hazardous disaster waste so as not to contaminate water and sanitation and protect agriculture land
6. Practical vehicles and equipment's required to access the narrow lanes across the settlements for extraction and transportation of the disaster waste

7. Provide awareness training on 3 R principles to minimize, reuse and reduce waste.
8. To implement relevant policy on proper health care during the post disaster period and trainings to health post and communities on addressing emergency health care.
9. To incorporate waste management concept addressing segregation, recycle and reuse in the educational curriculum from primary level to higher level.
10. To engage media to disseminate information on disaster waste management and 3 R principals
11. Disseminate information on DWM and its impact by picture posters and pamphlets

Karyabinayak Municipality (visited places Khokana and Bungmati)

General Information

- Total Population: 38036Total Household: 8989
- RCC. Buildings : 5319
- CGI roof building - 2572
- Tiles/ slate building - 635
- Others - 463

(Source: CBS, 2011)

Pre-disaster Municipal Waste Management

No proper waste management practices before earthquake. Organic waste are used for animal husbandary or thrown in the agricultural land to decompose. The non bio-degradable waste are openly burned includes plastic products, medical waste , textiles etc.Municipality has given authority to the NGOs for waste collection but not worked out efficiently in all households due to the unwillingness of paying fees by all the households.

Key Actors involved :Nepal Pollution Control and Environment Management Center (NEPSEMAC) ,Krisak Bahudesya Sahakari Sanstha etc

Scenario of Post – Disaster Municipal Waste Management :

Fully destroyed houses:3330 (36.71%) of total household	Partially destroyed houses1300 (14.46%)of total household	People died26	Casualties100-150 (not fully reported
Fully destroyed and major repair needed temples:2	Fully destroyed builings:3,300(36.71%of total HHs)	Partially destroyed buildings:14.46% of total HH are inhabitable	

Collection of waste has been stopped for 4 to 5 days after the earthquake due to the frequent after shocks. These waste are widely spread in the streets and open spaces blocking the narrow lane. Burning plastic products, papers, textiles, in the debris waste has been observed High demand of demolished waste to fill the low land in free of cost was reported. During this time the private sectors where involved waste collection in Saibu, Bungamati, Khokana area so far but they have plan to expand other areas also. Locals proactively started removing debris from building collapsed site to pile up in the common place (bus park) as transit location to move to the requested place where people are interested to fill their low lands at Bhaisepati Monteswori School, roadside housing plots and

riversides. Collection from NGOs are done two times a week taking charge of Rs. 150 to 300 from the locals but at present all the locals are not ready to pay.
The waste has been disposed at Karyabinayak Chetra, Pachatol, Khalbu Tole for filling the low land near brick factory. Camps waste are not managed properly.After request only municipality provide tractor to remove the debris.Debris is mixed up of all kinds of waste including health waste and industrial waste.Health care waste are not properly managed

Suggestions and Action need to be taken for post disaster

- Narrow lane houses given support system to the houses was not easy accessible to enter the available vehicles so need to provide appropriate vehicles for demolition and removal of debris. In this condition need to provide adequate wheel barriers to expedite the collection and removal process.

Present Disaster Waste Management

Demolition and disposal

- Immediately after earthquake, Army,Armed Police Force including local representative and political parties participated in demolition and cleaning of buildings. Rescue Army from Foreign countries did participate in demolition of buildings for rescuing life as well as finding corpse from damaged buildings. Debris are collected at bus park collection point and monuments' artifacts were preserved in safe place. People started piling the debris on the road sides, lowland, private land and river side.Elderly men and women are both involved in demolishing the house. According to the request the debris has been disposed at Karyabinayak Chetra, Pachatol, Khalbu Tole for filling the low land near brick factory. On request only municipality provide tractor to remove the debris.
- **Suggestions and Action plan needed**

Need to provide proper institutional set up with proper coordination with respective authorities, equip with knowledge base people, staffs, resources, manpower, efficient and appropriate equipments and prompt decision making power to handle the emergency situation, appropriate awareness training on Earthquake. Disaster Preparedness training according to the country;s situation, safety health prevention measures during handling and demolishing peirod, capacity building training to equip the manpower on demolishing the particular type of house in particular settlements. Aware

about waste segregation and reusing the recyclable materials. Awareness training need for safe disposal of medical waste and industrial waste and about and contamination due to filling the low land. Awareness program to the locals to get profits out of reusable and recycable materials such as wood, brick, mud, cement mix brick etc which are collected from the collapsed or demolished buildings. Since debris are mixed up of all kinds of waste including health waste and industrial waste so need make aware of health impact if not properly handled and managed properly.
Source: *Municipality chief, ward chief, hospital staffs, local people from Bungmati and Khokana 2015*

Bhaktapur Municipality

General Information

Total Household: 17,639	Male Population: 41,081
Mud bonded brick stone-8320	Female Population: 40,667
Total Population: 81,748	Cement bonded brick/stone - 8923
Others - 396	

(***Source: CBS, 2011)***

- According to the Municipality, 5950 (33.62% of total HH) fully destroyed and 2092 (12% of total Hh) buildings were partially destroyed but risk to stay. Number of monuments detroyed was 116.Most affected wards of Municipality - ward 1- Suryamati, ward 2- Jela, Ward 3, Ward 6 Inacho, Ward 7 -Golmodi, Ward 10-Byasi, Ward no. 11- Khala

Pre Disaster Municipal Waste Management

- Total waste generation per day 30 tons. Total waste collection 28 tons per day. Average numbers of staffs 147 (driver 11, admin 5) Average number of collection vehicle 11. Landfill waste 26 tons per day.
- The municipality has started waste segregation system in ward no. 3, 14 ,15, 17, and 13 but in these wards segregation practice is not regular. Municipality has routine wise collection system.
- At ward No. 11 Bhelukhel, composting plant was established in Bhaktapur with capacity of production of compost 500 tons per year in between 1984 and 1985 with support of German project but during 2005/06, the plant was closed. Since 2004/05, JICA had supported in household composting in ward no.14, 15, 17. At present, one community level composting plant is running Nikosera , Sallaghari, ward no. 17. The segregated waste collected from ward 3, 14,15,17 and 13 brought here in the site for composting.
- Bhaktapur Municipality has open dumping site in the bank of Hunmante River. The area is roughly about 200 m^2. They dig the area 3-5 m and dump the waste in it.

Post-disaster Municipal Waste Management

Total waste generation at post disaster i high about 38 tons per day. Though 70% of the municipality staff's buildings were destroyed still the waste collection was regular except the day when earthquake occurred. From healthcare only general waste are collected but healthcare the

respective institutes manage waste. Scrap entrepreneurs played active role in collecting recyclable or reusable materials

Present Disaster waste management

Demolition and disposal of debris

Immediately after earthquake, Army, Armed Police Force and including local representative participated in demolition of buildings. Rescue Army from Foreign countries did participate in demolition of buildings for rescuing life as well as finding corpse from damaged buildings. Damaged and destroyed monuments and its artifacts were preserved in safe place. Later local committee was formed which helped to demolish 2000 buildings but still 4000-5000 building were left to demolish. Municipality has provided appropriate wheel barrows to transfer the debris to the main road because available dozer cannot access to the narrow road. Lack of proper vehicles to the existing settlements debris started accumulated for many days dumped in the road. This has produced negative impacts to the environment due to foul odor and dust and had made health impact to the people because the debris are mixed up with municipal waste. The municipality has provided 100 litres fuel for dozer and 30 litres fuel for tipper hired by the committee for collecting debris from road. Monuments which were maintained were less damaged and protected during this earthquake but those monuments which were not maintained regularly were found damaged. According to Municipality, there is high demand of debris from local and adjoining VDCs to fill their low land areas. The neighboring municipality, Mahamanjushree has requested Bhaktapur municipality to dump debris in low land for road construction. One who demanded debris for low land filling pay NRs.300 per tipper which is used to pay driver and workers.

Suggestions from the municipality and Action need to be taken

Need to provide appropriate, enough and well maintained equipment, vehicles which should be settlement friendly or should be according to the housing pattern, awareness training for demolishing, using protective measures, waste management

specially on waste segregation**.** There is lack of coordination between Department of Archaeology and other authorities with Municipality for regular maintenance and repair of monuments. Should train how to access and use emergency preparedness materials from the stored place during emergency period .Strong decision making power should be provided to the municipality to tackle the situation during disaster period. Proper health care guidelines and relevant policy should be implemented and awareness training regarding different kinds of waste and health should be provided.

Lalitpur Municipality

General Information

Total Household:54,581	CGI roof building:8320	Tiles/state state builing: 1,138	Male population:130556
RCC building:42,411	Others:2986	Total Population254308	Female Population: 123752

(Source: CBS, 2011)

Fully destroyed buildings 2368 (4.33% of total HHS	Fully destroyed buildings 2368 (4.33% of total HHS	Partially destroyed buildings 2444(4.48% of total HH):uninhabitable	Uninhabitable:2679 (4.91%)

Pre-disaster Municipal Waste Management

Average number of primary collection vehicles 14 and secondary vehicles (from transfer station to Sisdol landfill site) 4. Landfill waste 60 tons per day (only by municipality office).	Total waste gen. collected per day;25 tons by private sector(outer ring road area and 65 tons/day by municipalities(inner ring road area)	Among total waste collected by municipality office, only 5 tons/day is reuse and resale for recycle.

- The municipality started waste segregation program (under European funding project) in 3500 households targeting 10000 household. They provided segregation trainings by distributing bins. Lack of awareness on segregation and monitoring the practice was not running properly eg. Ward no 22 has been segregation practice in almost all households i.e 2500 however is not smoothly running.
- Among total waste collected by municipality office, only 5 tons/day is reuse and resale for recycle and rest is dumped to Sisdol landfill site.

Among collected waste by private sector about 2.2 % is used for composting, 72% is transported to sisdol landfill site and rest is used for recycling. The final disposal landfill site is Sisdol landfill site, which is about 36 km from lalitpur transfer station.

Post – Disaster Municipal Waste Management

- Solid waste management has been halted for 4 to 5 days after the earthquake. The collection route has changed after earthquake due to the accumulated debris along the narrow lane and also due to the support system provided to the houses. The collection efficiency decreased due to which the municipality could collect only up to 45-50 tons/day including the waste from 13 camps as well (per camp about 1.5 tons/day). Also the final disposal efficiency has decreased due to which more than 60 tons waste was piled up in the transfer station. Scrap entrepreneurs played very active role collecting recyclable and reuse materials. Municipality collects only general waste from the health care centers as health care waste are managed by the institutes by itself. Since people are staying in camps so during this time period mostly the waste are collected daily from camps but not segregated.

Present Disaster waste management

Demolition and Disposal of debris work:

- Immediately after earthquake, Army, Armed Police Force and including local representative and political parties participated in demolition and cleaning of buildings. Rescue Army from Foreign countries did participate in demolition of buildings for rescuing life as well as finding corpse from damaged buildings.
- Damaged and destroyed monuments and its artifacts were preserved in safe place.
- Disaster management committee is formed under leadership of ward secretory and political representative in all 30 wards. 15 engineers to mobilized for data collection so that one engineer could look after 2 wards.
- Every Saturday cleaning campaign is organized by municipality office for about 4/5 weeks. 7-8 trucks along with dozer were provided. Some private vehicles were also provided in the cleaning campaign but now it is stopped and service is only provided based on local people request.

However the available dozer is bigger in size and could not give service in narrow road; local volunteers brought debris in the main road. Since lack of dozer, debris even remains for many days in road. This situation has created huge problem for surrounding environment giving adverse health impacts due to air pollution from foul odor and dust pollution.

- Most of the damaged houses are mud mortared. Locals stated demolishing their houses by themelves with the help of local communities and started dumping in the road areas and also dumped in lowland and private land.
- According to the Municipality, those monuments which were maintained regularly by municipality were less damaged and protected.
- According to Municipality, there is high demand of debris from local and adjoining wards to fill low land areas. House owner segregate wood, bricks and tiles and disposed remaining rubble in the road side. Then locals and adjoining wards people collect the rubble to fill their low private land. Also in some areas locals' communities are using these rubbles to fill lowland areas around sunakoti areas and chapagaun areas. Also some contractors collect the rubble and sell people who need this materials to fill their lowland.

Suggestions and actions need to be taken

- Proper institutional set up is essential with good coordination between respective authorities. Municipality should be given full authority in decision-making power to mobilize all activities and resources where as only CDO office are given responsible for this. Municipality should be trained for appropriate post disaster waste management training and planning in which they should learn how to use the stored emergency preparedness materials for emergency use., giving awareness training on demolishing houses and buildings in narrow lanes, awareness training for using health protective measures etc. The municipality should also be provided sufficient, maintained vehicles, human resources and knowledgeable people who can handle during disaster. Training on waste management should be given to minimize, reuse and reduce the waste.

Mahalaxmi Municipality (visited place lubu)

General Information

- Total Household: 14930
- RCC. Buildings :10339
- CGI roof building - 2315
- Tiles/ slate building - 1510
- Others – 766+
- Total Population: 62172

(Source: CBS, 2011)

Fully destroyed	Partially destroyed	Simple Damaged	Most Affected Wards
4481 (30.01% of total HHs)	844 (5.65% of total HH)	1580 (10.58%)	1, 2,3,4,5,6,7,8 and 14 (lamatar, lubhu and siddipur area).

.

Pre-disaster Municipal Waste Management

- Total waste generation per day 26.60 tons. City area in Lubhu, waste collection system are provided by private sectors (Srijanshil Nepal ,Nepal Biaksh Avian, Matribhui Nepal). They collect waste twice a week and provide awareness programs to the locals. These organizations are working with agreement from Lubhu ward office. However in rural and other areas of Mahalaxmi municipality people dump their waste either in the open space or in the river side or burn the waste.

Post – Disaster Municipal Waste Management

- Solid waste management has been halted almost for 15 days after the earthquake. This resulted in accumulation of waste in the streets and open spaces The collection efficiency has decreased due to the lack of sufficient vehicles, narrow lanes and lack of management system. The municipality collects only municipal waste from the health care and health care waste are taken responsible by the health centres by themselves.
- It is not possible to provide waste collection services in the inner core area of city due to debris dumped in the main street. Though most of the people are living in the various camps but there was no waste collection system provided in the camp area. They either burn or throw their waste in the street and open spaces.

Present Disaster waste management and demolition work:

Demolition work:

- Immediately after earthquake, Army, Armed Police Force including local representative and political parties participated in demolition and clearing of buildings. Rescue Army from Foreign countries did participate in demolition of buildings for rescuing life as well as finding corpse from damaged buildings. Damaged and destroyed monuments and its artifacts were preserved in safe place. Local development committee was formed for disaster waste management but there is no planning for clearing and final disposal of the debris. They get a dozer from Mahalaxmi Group only sometimes but not sufficient to clear the debris. At least they required it for a week to clear current deposited debris from the road. The local expects to get dozer for three days more but the size of the dozer is big enough to access the narrow road so the local volunteers carried the debris up to the road.Thus this has created environmental pollution as the debris is mixed up of all kinds of waste and more dust and specially during monsoon it gives out more foul odor. As municipality is newly formed, it lacks both human and equipment resources Since most of the damaged houses are, mud mortared. Locals have stated demolishing their houses by own themselves with the help of local communities, stated piled in the road areas, and piled in lowland and private land. Some contractors are involving in clearing debris. They collect debris from roads and from some house and sell to local and outsiders to fill their lowland and in construction.According to Municipality, there is high demand of debris from local and adjoining wards to fill low land areas. House owner segregate wood, bricks and tiles and disposed remaining rubble in the road side. Then locals and adjoining wards people collect the rubble to fill their low private land. In addition, some contractors collect the rubble and sell.

Cross cutting issue:

- Various organizations (Red Cross, Fulbari, Enhpho, Oxfam) have been providing, temporary houses, tent, hygine kit, lunch and dinner in various camps. Fulbari organization constructed 300 temporary houses for the displaced people. ENPHO and Donbosco College also prepared temporary houses and distributed CGI sheets to locals. Similarly, Red Cross constructed toilets in the camp area and alsp provided sanitation awareness programs. They also provided hygiene kit to 700 fully displaced houses people staying at camp areas and planning to provide to more 500 displaced houses. Oxfam was also involved in constructing temporary houses and toilets.
- According to representatives of Municipality, they felt that it has made people more lazy and steady in demolition work. If these unemployed victims can be used for demolition of building then it would have support income generation and livelihood.

Suggestions and Action Plan needed

Need proper institutional set up for Post Disaster Waste Management and Planning. Need to give awareness training for demolishing the building, using health protective measures during demolishing, waste management specially focussing on waste segregation etc. Need human resources, skilled knowledgable staffs to handle the situation.Need good coordination between authorities, decision making should be fully authorised to the municipality to tackle the situation.Sufficient and appropriate equipments and vehicles should be provided.

Source: Municipality chief, local key stake holders

FINAL REPORT

National Workshop

On

Draft: Disaster Waste Management Policy, Strategy and Action Plan

Organized By:

Ministry of Federal Affairs & Local Development

United Nation Environment Protection

& LEAD Nepal

19 Nov 2015

VENUE: HOTEL HIMALAYA, LALITPUR

Table of Contents

Background

Nepal is one of the most vulnerable countries in the world, in terms of natural disasters. It ranks 4th in terms of climate change, 11th in risk of earthquake and 30th prone to flood respectively. Therefore, vulnerable to multi natural disasters with an average of 900 types of natural disaster annually (MoHA, 2009)

A major earthquake of shallow depth measuring 7.8 richter scale struck central Nepal on 25 April 2015 causing large destruction. The earthquake was followed by repeated aftershock killing nearly 9000 people and 30,000 injured and around nine lakhs buildings were fully or partially destroyed in 30 districts. It is estimated that nearly 9731,557.05 tons of debris waste was generated from 14 earthquake affected districts and 12% increment plastic waste was accumulated in Kathmandu valley during the one-time use of plastic cups and plates in the temporary shelters (PDNA 2015).

Due to lack of proper infrastructure, resources and policies and guidelines on waste management, Nepal is now facing a large problem in dealing with waste management issue. Further, the recent earthquake accumulated about four million tons of disaster waste including chemical waste, which has added to the already grave challenges of waste management. Thus becoming a serious health and environment issues of Nepal.

Taking the about situation into consideration, there is an urgent need to formulate a holistic waste management policy and strategy, new regulations or guidelines amending existing act where necessary with clearly defined roles and responsibilities. There is need for technology to address the waste issues and trained human recourses are vital, followed but sufficient budget while being sensitive to ecological balance. Nepal has to develop a system to map hazardous waste; vulnerability assessment and risk analysis caused by hazardous waste has to be developed.

This programme was developed to draft a holistic waste management policy, strategy and action plan in the hope to address the above issues. A team of experts visited the

earthquake-affected districts to study and analyze the situation of waste and its impact. Group discussions were held with different stakeholders in the field, literature review was looked into and a few existing waste technology plants were visited. Several participatory meetings and consultations in Kathmandu amongst different stakeholders were organized. These includes: (a) round table on “Disaster Waste Management in Nepal”, 5th June 2015;(b) workshop on “Disaster Waste Management in Nepal with International Development Partners and Funding Agencies”, June 12, 2015, 12 June 2015;(c) Sharing workshop on " Field Observation and Findings on Disaster Waste Management, 23 July 2015; (d) Consultation with international experts at UNEP IETC, 26 August 2015; (e) roundtable consultation on the draft Disaster Waste Management policy, strategy and action plan, 19th November 2015.

Objectives

The main objective of the round table discussion group on waste management policy, strategy and action plan is to:

1. Present the draft report on Disaster Waste Management Strategy and Implementation Plan to the Government, donors, private sectors and legal institutes related to waste management.
2. Receive comments and suggestions from all stakeholders on the draft report

Participants

Sixty-three participants’ representing 23 institutes (MoFALD, Kathmandu Metropolitan City, Lalitpur Municipality, Bhaktapur Municipality, SWMTSC, NAST, Tribhuvan University, MOSTE, UNICEF, UNEP, JICA, WWF, UNITN, AITM, ECI, WEG, Nepal Bar Association, Media, NepWaste Pvt. Ltd, IOE, IOM, Captain Outdoors and LEAD Nepal) attended the discussion group. Please see annex 2 for the list of participants.

Program Introduction Summary

MoFALDand LEAD Nepal organized the program, which was supported by UNEP. The chief guest of the programme was Dr. Krishna Chandra Poudel, Secretary of Ministry of Science Technology & Environment and Dr. Sumitra Amatya, Solid Waste Management Expert chaired the discussion. Dr. Amatya welcomed all the participants and presented the objective of the programme followed by an introduction of the participants.

Presentation Summary

Professor Dr.Rejina Maskey Byanju, Tribhuvan University presented the draft report on Disaster Waste Management Policy, Strategy and Action Plan. She mentioned that Nepal lies vulnerable to multi natural disasters like climate change, earthquake, flood etc. with an average of 900 natural disasters every year. The enormity task on waste management lies ahead of Nepal, past, current and future. Further the recent earth quack in Nepal has accumulated disaster waste all over Nepal thus adding to the already existing waste management challenges. Dr. Byanju explained the methodologies used for preparing the draft disaster waste management policy, strategy and action plan. Dr. Byanju presented the strategies linking it to activities, target and indicators, actions required and responsible agency and support agencies with budget requirement and implementing time frame. *(Find copy of presentation slides in annex1)*

The second presentation was by Mr. Pravakar Pradhan, Research Fellow; CCEE (Center for Climate Change, Energy and Environment). Mr. Pradhan presented the technical process of turning waste to energy by using the principle of polymer energy system. This technology is successfully being operated in Rayond municipality, Thailand and compared it with the waste situation and statistics in Kathmandu Valley and found it to be compatible.6 to 8 tons plastic per day would result into 4,500 to 6,000 liter crude oil per day Dr. Pradhan also presented another technology where organic waste is turned into energy known as Aerobic digestive plant. This can be installed in a small scale for a family (biogas plant) or on a larger scale. The cost and benefit aspects of the different technology were presented. He concluded his presentation by emphasizing on the positive aspect of managing waste in terms of health, environment, economy and ecology. *(Find copy of presentation slides in annex2)*

Finally, Mr. Anil Thaman, Chief Executive Officer of Captain Outdoors presented a practical and economical technology addressing the current post earthquack disaster management solutions. The technology included Crushers, Mixers and Interlocking Machine, a practical solution to clear debris, crush them and mix them into brick like structures for reconstruction material. He concluded by stressing on the usefulness and cost effectiveness of this technique. *(Find* copy *of presentation slides in annex3)*

Discussion/Recommendations

Suggestions provided during the dissuasion are:

- To integrate Sustainable Development Goals (SDG) 2015 while preparing Strategy and Action Plan.
- Disaster waste policy need to be integrated or linked into national solid waste management policy.
- Clear roles and responsibility identified and lead ministry indicated
- Emphasize implementation of strategy and action plan from civil societies to institutes linking it up the latter to the Prime Minister.
- Prioritize implementation of demonstration project on innovative technology which environmental friendly and social acceptable for which land will be provided by the government.

- The municipality of KMC, LSMC and Bhaktapur to work jointly urgently in demonstrating pilot project for technology transfer. The team needs clear institutional package with roles and responsibilities specified.
- If necessary, policy can be amended. JICA is hopeful to contribute in disaster waste management as well. JICA is coordinating with all stakeholders as well as Ministry of Environment.
- Major challenge to install technology plant is space and leasing land for long-term service is not recommended hence municipality needs land ownership.
- Provide guidance and support to communities and local businesses to make best use of recovered debris and to reduce its long term impact on public health and environment.
- Establish necessary institutional setup and permanent committees to implement the above policies
- Engage all stakeholders including the general public in building pressure for environmentally sound management of disaster wastes to relevant responsible agencies
- Develop human resources and build their capacity necessary for the implementation of above policies.
- Ensure a proactive police and strategy action plan for disaster waste management
- Develop sound practices of waste management from child hood at home, school and the community to make it part of life.

Closing Remarks

Mr. Chakrapanti Sharma, Under Secretary, MoFALD, thanked the presenters and the participants for their active participant and valuable suggestions. He thanks UNEP and LEAD-Nepal for their support in organizing the workshop. He suggested that the report to be translated in Nepali language as well and emphasized on a proactive policy and strategy action plan where all stakeholders to implement it with dedication.

List of Abbreviations

S.N	Abbreviations	Full Form
1	MOFALD	Ministry Of Federal Affairs And Local Development
2	SWMTSC	Solid Waste Management Technical Support Center
3	NAST	Nepal Academy of Science and Technology
4	MOSTE	Ministry Of Science Technology and Environment
5	UNICEF	United Nations Children's Fund
6	UNEP	United Nations Environment Programme
7	JICA	Japan International Co operation Agency
8	WWF	World Wildlife Fund
9	UNITN	University of Trento
10	AITM	Asian Institute of Technology and Management
11	ECI	Environment Conservation Initiative
12	IOE	Institute of Engineering
13	IOM	International Organization for Migration

List of Participants on National Round Table Disaster Waste Management Policy, Strategy and Action Plan

S.N	First Name	Last Name	Organization Name
A) GOVERNMENT OFFICIAL			
1	K.C	POUDEL	Ministry Of Science Technology & Environment
2	CHAKRA. P	SHARMA	Ministry Of Federal Affairs And Local Development
3	AMARDIP	SUNUWAR	Ministry Of Federal Affairs And Local Development
4	DEPENDRA	OLI	Solid Waste Management Technical Support Center
5	SANTOSH	SHRESTHA	Solid Waste Management Technical Support Center
6	SUMAN	GIRI	Solid Waste Management Technical Support Center
7	Dr. ALKA	SAPKOTA	Solid Waste Management Technical Support Center
8	UDDHAV	RIJAL	Bhaktapur Muncipality
9	PRADEEP	AMATYA	Lalitpur Sub Metropolitian
10	RABIN MAN	SHRESTHA	Kathmandu Metropolitian City
B) ACADEMICIANS			
11	DINESH	BHUJU	Nepal Academy of Science and Technology
12	REJINA	MASKEY	Tribhuvan University
13	KEDAR	RIJAL	Tribhuvan University
C) UNITED NATIONS			
14	KATHLYN	SUMAGH	United Nations Children's Fund
15	PURNA	RAJ BHANDARI	United Nations Environment Programme
16	SURENDRA	SHRESTHA	United Nations Environment Programme
D) NGOs and PRIVATE ENTITY OFFICIALS			
17	YUKIO	TANAKA	Japan International Co operation Agency
18	BIDHYA	POKHREL	Japan International Co operation Agency
19	TAKA	HAYASHIDE	Japan International Co operation Agency
20	PADMA	GAUTAM	World Wildlife Fund
21	FRANCESCO	CAVALIERI	University of Trento
22	LASSE	LAAKSONEN	NepWaste Pvt. Ltd
23	SUMAN	BASNYAT	NepWaste Pvt. Ltd
24	PRAVAKAR	PRADHAN	Asian Institute of Technology and Management
25	PRAMOD	PRADHAN	Asian Institute of Technology and Management
26	D.P	ACHARYA	Environment Conservation Initiative
27	ANJU	SINGH	WEG Nepal
28	PADAM BDR.	SHRESTHA	Advocate
29	TIKARAM	DAHAL	Waste Management Group
30	RIJA	JOSHI	Clean Up Nepal
31	ISWAR MAN	AMATYA	Institute of Engineering
32	PADMA	KHADKA	Institute of Engineering
33	DR. SUMAN	KARNA	International Organization for Migration
34	ARVIND	SHARMA	International Organization for Migration

S.N	First Name	Last Name	Organization Name
35	ASA	GRANATH	International Organization for Migration
36	ANIL	THAMAN	Captain Outdoors
37	RAJIV	KAUSHIK	Captain Outdoors
38	SUMITRA	AMATYA	Amatya and Associates
39	SAMIR	NEWA	The Organic Village Pvt. Ltd
40	RAJANI	RAJ BHANDARI	LEAD – Nepal
41	ANJU	MULMI	LEAD – Nepal
42	SULOCHANA	SHRESTHA	LEAD – Nepal
43	DIPESH	MAHARJAN	LEAD – Nepal
44	AISHA	KHATUN	LEAD – Nepal
45	RONIT	SHAKYA	LEAD – Nepal
E) MEDIA			
46	RAMA	GHIMIRE	INFO NEPAL
47	DINESH	SHILPAKAR	INFO NEPAL
48	ALIZ	SHRESTHA	INFO NEPAL
49	ANAND	GURUNG	ABC TV
50	J.P	SHRESTHA	ABC TV
51	SABIN	SHARMA	Rajdhani Daily
52	JAGDISH	PANDEY	Kantipur Daily
53	PURSHOTTAM	GHIMIRE	NTV
54	DEVI	SAPKOTA	NTV
55	JIBAN	BASNET	Abhiyan Daily
56	DIPESH	NEUPANE	Hamro Kathmandu
57	CHANDRA	BHATTARAI	Hamro Kathmandu
58	RADHA	CHALISE	Gorkhapatra
59	SHARMILA	PATHAK	RSS
60	RAMNATH	GHIMIRE	BFBS Radio
61	PREM	RANA	Mountain TV
62	SUJAN	MAGHAIYA	Mountain TV
63	MR.	RANA	Mountain TV

National Workshop on Disaster Waste Management Policy, Strategy and Action Plan

Organized by: MoFALD and LEAD Nepal/UNEP

Date: 19th November 2015 (Thursday)

Venue: Himalaya Hotel, Kopundole

Time:08:30 – 12:30 hrs

Tentative Agenda

	Program
08:30-09:00	Arrival of Guest , Registration &Breakfast
09:00-09:20	- Welcome and Objective of the Program - by *Mr.Rishi Acharya*, Under Secretary MoFALD, - *Dr. SumitraAmatya,* (Environment & Waste Management Expert)
09:20-09:30	Introduction of Participants
09:30-09:50	Draft Disaster Waste Management Policy, Strategy and Action Plan by Dr. *Prof. RejinaMaskeyByanju, TU*
09:50-10:10	Waste to Energy: - Polymer to Fuel - Organic waste to Energy *by PravakarPradhan,* Asian Institute of Technology Management
10:10- 10:30	Debris Management Technology *by Anil Thaman*, Private Sector
10:30-11:30	Discussion
11:30-12:30	Remarks by: - *SurendraShrestha,* Director, UNEP IETC - DG, DUDBC - Department of Environment - *Dr. Krishna Paudyal*, MOSTE
12:30	Lunch

LEAD NEPAL

Workshop on Disaster Waste Management in Nepal, June 5, 2015

(Brief Proceeding Report)

Introduction:

Nepal has recently faced unexpected natural calamity as massive earthquake in April 25, 2015. Out of 75 districts, 14 districts were severely affected. 9000 people were died and more than 30000 people injured. Thousands of government, non-government and private buildings were fully and partially destroyed (Nepal Disaster Risk Reduction Portal). After massive disaster, Nepal has faced various environmental challenges as debris waste from urban and rural settlements, air pollution from dust of debris waste, landslides, GLOF, surface water contamination etc.

Currently, major environmental challenge is disaster waste management that needs to be immediately taken into action to protect local environment and public health. Solid Waste Management Technical Support Centre (SWMTSC), a national governing body of Government of Nepal is one of major concerned body to deal with this solid waste issue. Taking priority as one of major environmental issue relevant at this situation, SWMTSC, Ministry of Urban Development organized "**Workshop on Disaster Waste Management in Nepal**" with an objective of highlighting its importance of making policy and plan, and finding possible option of disaster waste management in Nepal on June 5, 2015.

Participants: 85. Representatives from NPC, UNDP, World Bank, UNEP,NSET, SWMTSC, TKMC,LSMC, TU, IoE, WEPCO, WEG, NGOFEC, FODEJ, NGOs and various Media.

Brief Summary of the workshop:

Hon. Prof. Dr. Govinda Nepal, NPC as Chief Guest, Mr. Kishor Thapa, NPC Advisor as Special Guest, Mr. Mahendra Khadka, Joint Secretary, Department of Environment/MoEST and Dr. Sumitra Amatya, Executive Director, SWMTSC/MoUD chaired the workshop session.

Dr. Sumitra Amatya , ED, SWMTSC/MoUD presented Key notes and importance on Disaster waste management. She informed that total weight of debris generated by the current earthquake in the Kathmandu valley is about approx. 3.94 million tons which is equivalent to be generated in 10.79 years (current total waste generation in Kathmandu valley is 1000 tons/day).

Mr. Manoj Aryal, Environmental Inspector, DoEnv/MoEST has presented on Post Disaster Needs Environmental Assessment. He estimated about 1.12 billion of bricks might be required for reconstruction of damaged building which might required huge amount of coal and soil for brick manufacturing. He estimated about 2 million litres of paints used in damaged houses in 31 districts.

Dr. Alka Sapkota / Mr. Gehen Maharjan presented on disaster waste management approach in Nepal. She figured out about

12.5 million cum of volume of debris (i.e. about 3.94 million tons) will be generated. She presented various possible recycling process and methods for debris waste management.

Participants have given various valuable comments and suggestion regarding disaster waste management. Such as assessment of glass waste, recycling of debris waste to reproduce bricks, private sector participation in recycling business of debris waste, importance of policy on disaster waste.

Expert's team from participants nominated to form one group prepared workshop conclusion.

Based on data of numbers of buildings partially and fully destroyed given by NDRRP/MoH on June 3,2015, total disaster waste generated in Kathmandu Valley is 3.94 million tons (12.5 million cum) which is equivalent to 10.79 years of total waste generated in Kathmandu Valley (1000 tons /day) while in other 11 affected districts , it would generated about 8.64 million tons (27.5 million cum) of debris . Since most of buildings in these 11 districts are rural houses, about 90% of Construction and Demolition waste could be recycled and reused. (SWMTSC/MoUD;2015)

Workshop Conclusion:

Expert team has come up with following conclusion:

1. Institution set up for disaster waste management (concerned stakeholders)
2. Detail Status assessment of earthquake affected structure based on nature and composition (e.g. types of building, types of effects, composition of affected structure).
3. Policy, Strategies and Action Plan on disaster waste management & contingency plan
   - Separation of waste (Waste Minimization)
   - Application of using 3R principle
   - Handle with care to special waste such as electrical, electronic, biomedical and other hazardous waste.
   - Need demolition of structured building by mobilizing special contractors with necessary equipment's.
   - Identification of primary on-site storage (nearest possible open space) considering environmental parameters.
   - Collection, transportation and intermediate storage of waste. (Reduce transaction costs by centralizing resources):
   - Standardize recycled products for reuse enhancing public private (PPP) sector capacity and technology.
   - Need separate/ special guidelines for heritage and monuments.
   - Dumping of non-recycling and non-reused waste.

- **Ensure Environmental Sustainability of the UN Millennium Development Goals: Integrate the principles of sustainable development into country policies and programs, and reverse the loss of environmental resources:**

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Introduction:

A recent devastating earthquake in Nepal on April 25, 2015 and its continuous tremors have threaten whole country and its people that has given social, economical, environmental and political impact to the nation. About 9000 people had lost their life and about 900000 buildings were fully and partially destroyed. Out of 75 districts, about 14 districts were severely affected. (Nepal Disaster Risk Reduction Portal/MoH).

Considering environmental impact, one of major environmental challenge facing by Nepal at present is disaster waste management. Policy , strategy and implementation plan on disaster waste management, equipment's and capacity buildings on demolition of destroyed buildings, resource recovery from debris, final disposal system, coordination between concerned stakeholders are major concern issues regarding disaster waste management in Nepal.

Solid Waste Management Technical Support Centre (SWMTSC), a national governing body of Government of Nepal dealing with this issue has made efforts in prioritizing this issue at national level and sensitized and coordinated with concern stakeholders. SWMTSC organized national level workshop on June 5, 2015 and another consultation meeting with development partner on June 12, 2015. Furthermore, SWMTSC has conducted desk study and also did field observation and further planning to preparation of strategy and implementation plan on disaster waste management.

Therefore, SWMTSC / MoUD organized " **Sharing workshop on Disaster waste management: Expert Field observations and findings "** on July 23, 2015 with aim of discussion with concern stakeholders from national and international organizations on present challenges and gap on disaster waste management and on preparation of strategy and implementation plan on disaster waste management in Nepal.

Total Participants: 42 (Representatives from NPC, MoSTE, DoE,MoFALD,MoUD,MoFA, JICA-Nepal, UNDP,UNEP-IETC,TU,LEAD-Nepal,CBS, KMC, LSMC, Bhaktapur Mun,various Journalists)
(detail participants list in annex)

Summary of the workshop:

Dr. Sumitra Amatya, Executive Director chaired session of workshop, Dr.Krishna C Poudel, Secretary of Ministry of Environment as the Chief Guest and Mr. Kishor Thapa, Advisor,

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National Planning Commission, and Mr. Suroj Pokharel, Director General, Department of Environment as special guest were invited as special guest in the workshop.

Mr. Santosh Shrestha, SWM/Environmental Expert, SWMTSC presented first on behalf of SWMTSC generally on compiling desk study and field observation report on disaster waste management. He mentioned total disaster waste generation in Kathmandu is 4.01 million tons (12.5 million m3 volume) equivalent to 10.8 years of total waste generation in Kathmandu Valley (based on calculation by SWMTSC, July 2015). Similarly, 9.7 million tons (31.13 million m3 volume) of disaster waste in 11 districts outside the Kathmandu Valley. He shared present field observation report in various affected cities and efforts of SWMTSC in disaster waste management. He also emphasized on necessary of disaster waste management strategy and action plan at national level for which all concern stakeholders need to keep joint efforts in planning as well as implementation phase.

Mr.Naoki Utsuka, Deputy Director WMD/ Ministry of Environment, Japan shared about earthquake occurred in Great East Japan and shared experience how they deal with disaster waste management. He also shared field observation report in different cities of Kathmandu valley and Sindhupalchowk district and informed disaster waste need to be immediately treated before it was dumped illegally in public land and also emphasized on considering environmental pollution control measures.

Similarly, Early Recovery Cluster of UNDP also shared their knowledge on how they are dealing with demolition of buildings and debris management in 3 VDCs, Karthali,Kunchowk,Irkhu of Sindhupalchowk District. They informed that they have supported community through UN Volunteers in demolition of 1678 building demolition till date and recovered 77K m3 stone, 23K m3 Timber and 27Km2 CGI sheet. During demolition, they have also provided capacity building training and disaster risk reduction knowledge sharing among local engineers.

Finally Mr. Jeff Dorsey, Demolition Specialist, Disaster Waste Recovery- Nepal presented paper on basic principle of disaster waste management and shared remaining challenges observed in DWM in Nepal as well as shared knowledge on various technologies and innovation in DWM.

Summary of Discussion in workshop:

- Need immediate intervention/action in technology for removal of disaster waste to minimize current environmental challenges of improper dumping of disaster waste

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- Need to plan on DWM on holistic waste management approach
- Need to develop coordination mechanism as various stakeholders were working on it in Nepal.
- Necessary of demolition guidelines and manual

Closing Remarks

Mr. Kishor Thapa, Advisor, NPC said DWM is not big issues if it is handle with care at community level. He added hazardous waste which is contaminated with those disaster waste were major concerned things that need to taken into consider for safe disposal of hazardous waste management. In conclusion, He has given importance of 3 things: 1) production of raw material from debris waste 2) environmental consideration adoption 3) recycle and reuse as far as practical.

Similarly, Mr. Krishna C Poudel, Secretary of Ministry of Environment, emphasized better late than never to develop Strategy and action plan on Disaster waste management. He added it is responsibility of all and need coordination among all stakeholders. He appreciated young engineer gaining practical knowledge on demolition of building in Sindhupalchowk. He added waste management has to think holistically and need to give continuity in all kinds of waste management.

Dr. Sumitra Amatya, ED, SWMTSC concluded the workshop with importance of developing strategy and action plan on disaster waste management as immediate need and thanks all stakeholders and INGO representatives for taking concerned on this issues and making the workshop so worthful.

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Annex: Participant List

Attendance of sharing workshop on Disaster Waste management: Expert Finding and Field Observation

S. No.	Name	Designation	Office
1	Dr. Krishna C. Poudel	Secretary	Ministry of Environment
2	Er Kishor Thapa	Advisor/ former Secretary	National Planning Commission
3	Dr. Sumitra Amatya	Executive Director	SWMTSC
4	Mr. Suroj Pokharel	Director General	Department of Environment
5	Mr.Naoki Utsuka	Deputy Director	WMD/ Ministry of Environment , Japan
6	Mr.Akin Morita		Japan Environmental Sanitation Centre
7	Ms. Suddha Subba	Human Resource Manager	Disaster Waste Recovery-Nepal
8	Mr.Jeff Dorsey	Demolition Specialist	Disaster Waste Recovery-Nepal
9	Mr.Mustaq Memon	Senior Program Officer	UNEP-IETC
10	Mr.Amardip Sunuwar		Disaster management section, Ministry of Federal Affair and Local Development
11	Ms.Yngvic Foss		UNEP
12	Mr.Tomas Carlsson	Debris Program Manager	UNDP
13	Mr.Hotrika Joshi	UN Volunteer	UNDP
14	Mr.Mikael Gartner		UNDP
15	Ms.Pragya Bashyal	Programme Analyst	UNDP
16	Ms. Lila Kumari KC		National Planning Commission
17	Dr. Rejina Maskey	Professor	Center division of Environmental Studies, Tribhuwan University
18	Ms. Rajani Amatya	Consultant	LEAD Nepal
19	Mr. Purna CL Rajbhandari	Consultant	UNEP
20	Mr. Ram Krishna Adhikari		Ministry of Health and Population
21	Mr. Rabin Man Shrestha	Senior Engineer	Environmental Division/ Kathmandu Metropolitan City
22	Ms. Bidhya Pokharel	Senior Program Officer	JICA-Nepal
23	Mr. Dilip Kumar Suwal	Chief	Enivronment Section/ Bhaktapur Municipality
24	Mr. Binod Ghimire	Program Officer	Early Recovery Cluster/ UNDP
25	Ms. Rhonda Gossen	Coordinator	Early Recovery Cluster/ UNDP
26	Mr.Sushil Sharma	Director	Central Bureau of Statistics (CBS)
27	Mr.Pradip Kumar Koirala	VS	Ministry of Home Affairs
28	Mr.Tara Bahadur Karki	Chief Executive Officer	Lalitpur Sub Metropolitan City
29	Mr.Santosh Shrestha	SWM / Environmental Expert	SWMTSC

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30	Dr. Alka Sapkota	SWM / Environmental Expert	SWMTSC
31	Mr.Nischal Shrestha	Journalist	News 24 TV
32	Mr.Sudip Bardewa	Journalist	Radio Mirmire
33	Ms.Parbati Khadka	Journalist	Capital FM
34	Amrit Adhikari	Journalist	Nepal bani Network
35	Mr.Bishnu bhakta Maharjan	Journalist	Nepal Television, NTV
36	Mr.Hari Prasad Pant	Journalist	TV today
37	Mr.Bashu Dev Timisina	Journalist	Radio Mirmire
38	Mr.Topa Ram Acharya	Assistant Manager	SWMTSC
39	Mr.Suresh Lal Shrestha	Assistant Manager	SWMTSC
40	Mr.Tandon Singh Chaudhari	Computer Operator	SWMTSC
41	Ms.Kalpana Amgain	Secretary	SWMTSC
42	Ms.Sajana Pokharel	Receptionist	SWMTSC

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Annex: Program Schedule

Venue: SWMTSC meeting hall, Shree Mahal, Pulchowk, Lalitpur.
Time: 14:00 - 17:00 pm
Date: July 23, 2015 (Shrawan 7, 2072)

Time	**Detail Program**
14:00 -14:30 pm	Registration with tea/coffee Introduction Dr. Sumitra Amatya, Executive Director, SWMTSC Dr. Krishna C Poudel, Chief Guest, Secretary of Environment Special Guest Mr. Kishor Thapa, Advisor, NPC
14:30- 14: 45 pm	Disaster waste management: Desk Study and field Observation report Mr. Santosh Shrestha, SWM/Environmental Expert,SWMTSC
14:45 - 15: 00 pm	Field observation and findings on Disaster Waste Management JICA+ MoEJ
15:00 - 15:10 pm	Disaster waste Management : Sindupalchowk District ERC/UNDP
15:10 - 15:20 pm	Disaster waste recovery in context to Nepal Mr. Jeff Dorsey, Demolition Specialist, Disaster waste Recovery-Nepal
15:20 - 16:00 pm	Open Discussion (5 min for each participant)
16:00 -16:15 pm	Closing Remarks Dr. Sumitra Amatya, Executive Director, SWMTSC
16:15 -17:00 pm	Snacks