



## Disaster Resilient Cities in Nepal: Disaster Management Efforts of Biratnagar Metropolitan City

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### Abstract

*Disaster resilient, safe, inclusive and sustainable space is required for all. But Nepal is facing challenges due to inadequate disaster response. The primary objective of this study is to assess the local government's preparedness and efforts in management of human shelters and public occupancy, in addition to prompt response, rescue and rehabilitation mechanisms as well as supply management to any disaster affected population in the city. Taking Biratnagar Metropolitan City of Koshi Province as a case, this study answers the question of what disaster challenges exist in the city and how the local government responded to those situations and why the responses were not adequate. The present research uses both primary and secondary data to make an assessment of the status, preparedness, actions and challenges of the city governance of Biratnagar Metropolitan City in management of disaster safety and people's awareness building on safe city issues which significantly aids in bringing disaster management in the city. The findings indicate that the emphasis on early preparedness and sustainable initiatives on disaster management remained in the marginal reference of the local level disaster planning. The local government's focus is found generally active in rescue and relief during disasters when a paradigm shift through early preparedness has become a core area of concern in disaster management for a sustainable development globally. This paper is believed to draw attention of the policy makers at the local level and lead the discourse further for the academicians.*

**Keywords:** Safe city, disaster vulnerability, social infrastructure, disaster preparedness, local government

### Introduction

Disasters can lead to significant economic loss, property destruction, homelessness and deaths ( Zahari et al.,2023) and disaster resilience is vital for the sustainability of any city (Gharai et al., 2018). A holistic disaster response can be created through preparedness, response, recovery and mitigation of disaster besides the supply of a range of logistical support through the humanitarian agencies (Mohd Zahari et al., 2023). Social infrastructures and preparedness for environment related issues and problems can help development of disaster resilient urban settlements in Nepal.

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Nepal is experiencing a pace of urban development with 37 percent urban inhabitants of the total 26,494,504 people in the country (CBS, 2011). Since 2017, the government of Nepal has endorsed a concept of 'modern towns' with contemporary amenities (The Kathmandu Post, 10 May 2017). Further, with wider concerns, there were political campaigns during the 2017 elections to work on their proposed smart city development plans in the country (Karki & Dahal, 2020). When experts suggested a number of basic requirements for any city to be called a smart city (Adhikari & Bhattarai, 2021), several authors had already asserted that haphazard urban development was the cause of creating hazards and disasters in Nepal (Neupane & Devkota, 2017).

There comes a more critical concern when Nepal is already reported as one of most-disaster-prone country exposed to multiple disasters such as earthquakes, floods, and landslides, fire, storms, thunder, hailstones and cold waves along with draughts and epidemics (Neupane & Devkota, 2017). Nepal was ranked 11<sup>th</sup> as the most earthquake-prone nation and 30<sup>th</sup> in flood hazards globally (Khanal, 2020) and keeping the majority of the country's population in high-risk of death due to two or more than two types of disasters (ICIMOD, 2019).

The earthquake-related fatalities in 2015 were 8,891, which sent an approximate of 58,700 people to displacement sites. 6, 05,176 houses were destroyed by the earthquake and the number of houses damaged by the earthquake were 2, 89,037 (USAID, 2015). Nepal was ill-prepared to respond to the earthquakes in 2015 (Singh, 2018). Floods and flash floods pose a threat to the livelihoods of downstream communities, including Nepal, in the Himalayan region during the monsoon season (Shrestha & Bajracharya, 2013). The serious flood in Nepal's eastern terai destroyed agricultural land and added "great vulnerability" and threatened an increased number of people in Nepal (Candau, 2020). A document from ICIMOD (2019) claimed that floods in small rivers and tributaries can potentially be disastrous if the government and other concerned agencies do not pay due attention.

Gautam et al. (2021) concluded that Nepal's eastern region and the southern part of the country has a higher level of multi-hazards vulnerability due to population concentration and occurrence of many types of natural hazards. NPC (2017) reported that the severe flooding in August, 2017 affected 35 districts of Nepal along the country's southern plains which affected 1,688,474 people (866,994) male and 821,480 female) killed 134 people (90 male and 44 female) and 22 people were injured (13 male and 9 female).

Any catastrophic event, where the general public is to suffer, is a disaster (Bhattarai, 2020). Disaster management requires adoption of appropriate strategies for minimizing casualty and property losses. Haque (2022) claimed that there is a paradigm shift in disaster management from the traditional rescue, relief and rehabilitation approaches to disaster risk reduction, smart and early warning systems, emergency response, quick evacuation, transfer to safe shelter and adoption of pre-disaster and post disaster plans.

The state and its agencies can have an important role in disaster management (Upadhyay, 2022). They can offer rescue, relief and rehabilitation during and after any disaster, and also work for pre-disaster management (Pandey, 2017). There are several provisions at the national, provincial and local level plans, aimed for comprehensive and sustainable development. With a commitment expressed to agenda 2030 and to the international standards and frameworks for disaster risk reduction, the government of Nepal assures several efforts to link between response, recovery and resilience to meet sustainable development goals (NPC, 2017).

Disaster response is a bottom-up approach (Malla et al., 2020). In Nepal, disaster management is a primary responsibility of the local government. As per the District Disaster Risk Management (DDRM) 2019 guidelines, the local government shall keep disaster response equipment, such as fire fighting engines, ready to use (Bhandari, et al., 2020). According to the DRRM Act and Regulation (2019), every local level shall have a set-up of their Local Disaster Management Committee (LDMC) consisting of such members, with a maximum of fifteen, led by the chairperson of the Rural Municipality or mayor of the municipality. The LDMC is required to put the fire brigades including other machinery on standby to use right-away during the time of disaster. Further, the constitution (2015) of Nepal in its schedule 8 provides a list of power and functions for the local governments which clearly states that keeping the people safe from fire and similar other disasters is a primary function of the local government. More importantly, knowledge of disaster management in the steering body of the local level representatives is important (Malla et al. 2020). Such knowledge can aid in minimizing the vulnerability of disaster. Timely responses help to control disasters (Haque, 2022).

As per the official website (2023) of Biratnagar Metropolitan City, the total area of this city is 77 Sq. Km. with a total Population of 2, 42,548 who reside in 45228 houses. This metropolitan city has 19 wards. This city has the experience of the severity of how natural hazards can turn into disasters. The city experienced a big flood in 2017. The Himalayan Post reported on 15 August 2017 that flood in the southern terai of Nepal not only had an impact on the local people but also had trans-border effects. There are also general concerns about the city's preparedness for fire hazards and disasters (Upadhyay, 2022). A question frequently strikes this researcher: How will Biratnagar Metropolitan City manage them? Flooding is a major issue in Nepal's terai and the city of Biratnagar is equally impacted.

In light of the aforementioned scenario, this research aims to explore how the local urban governance in Biratnagar Metropolitan City is prepared for any disaster response and management. This research is believed to be helpful for policy makers, planners, practitioners and others and it can contribute further in the branch of knowledge.

### **Method**

This qualitative research uses a descriptive and analytical framework. For the data, the disaster management mechanism under the Ministry of Internal Affairs in Koshi Province (formerly province 1) is reviewed as a guiding strategy for the local governments within the province. The Local Disasters and Climate Resilience Plans (LDCRP) are reviewed to comprehend the disaster resilience strategy. Besides reviewing the policy documents and disaster resilience plans at the local level, the field data on the status of risk and shock vulnerability is representatively collected from wards 1, 2, 12 and 19 of Biratnagar Metropolitan City. However, of the 13 different types of disasters listed in the Local Disaster and Climate Upliftment Plan (LDCUP) 2019 that affected the city of Biratnagar in the past, this study selected four major types of disasters and their repercussions for in-depth analysis.

### **Result and Discussion**

The Local Disaster and Climate Upliftment Plan 2019 of Biratnagar Metropolitan City has identified and standardized 13 types of disasters and hazards while assessing the state of disaster risk within the city. However, the status of four major types of disasters flood, cold wave, earthquake and fire is studied while analyzing the disaster management capacity in

Biratnagar. As per the data file of the Disaster Management Department of Biratnagar Metropolitan City (2019), in the last 30 years (1988-2018), there were big earthquakes in 1988 and 2015, big floods in 2017, major fire incidence in 1994, 1997, 2003 and in 2018. The severely impacted wards due to fire incidents were ward 18 in the year 2018 and wards 12 and 19 were affected by fire almost every year. Similarly, cold waves occur almost every year, in ward 12 and 19. There were epidemics in the years 2014, 15 and 16. The management of these hazards and disasters remained challenging for the local authority in Biratnagar.

A summary status sheet on the four types of hazards and disaster risk selected for this study out of the 13 types listed in the Local Disaster and Climate Upliftment Plan (LDCUP) 2019, Biratnagar is adopted as presented below:

Hazards & Risk Type	Main Causes	Internal Factors	Causes & Effects	Remedial measures to address vulnerability
Flood and river bank cutting	Human settlements are on the riverbanks, there is lack of river tanning, there is a population pressure, people's awareness level is low, and there is poverty.	There are landless people, the soil is fragile, heavy rainfall, and an indifferent response of the government on the issue.	Damage of settlements & property almost every year, displacement of people, and health hazards	River tanning is required, shifting of settlements, effective early warning system, and provision for emergency rescue system and equipments
Cold Wave	Industrialization and air pollution, lack of sufficient rags, dwelling in tents and huts, lack of suitable housing, lack of firewood and extreme cold during the winter.	Perhaps it is an impact of climate change, and the community is struggling with poverty.	Tough life of people, it leads to death, planted crops are damaged, there is famine or food scarcity, and creates challenges in their day to day lives.	Increase greenery; attempt reducing the greenhouse gas emissions, provision of warm clothes, and construction of safe houses for settlers in winter.
Earthquake	Weaknesses in construction of houses and buildings, ignorance of earthquake prevention measures, absence of planning for disaster response, lack of technical expertise, poverty in the community, unmanageable non-structural objects, lack of early preparedness	Lack of consciousness among people, economic hardship, Nepal's vulnerability to earthquakes, and governmental apathy in disaster preparation	People die, get injured, terror is spread, resources and property are destroyed and poverty levels rise. Social life turns unsettled and triggers a financial crisis.	Preparation for work to do, establishment of contingency fund, creating a disaster management plan at the village and community levels, materials to arrange in the community and even at home. Frequent discussion and interaction.

Fire	Dwelling in straw and bamboo huts, lack of public awareness, messy electrical wiring, carelessness with fire, use of open space for cooking, discarding burnt bundles, not extinguishing the sweltering fire, keeping the incense burning, living in a densely populated area, and lack of enough infrastructure.	Poverty in the community, lack of fire fighting knowledge and expertise, inadequate infrastructure	Loss of wealth, damage to physical structures, air and environment pollution	Monitoring and maintaining the condition of electric wires and poles at sensitive times, practicing fire-related artificial events, discussing fire risks at school, youth group and community level and conveying early warning messages, organizing fire control training, fire extinguishers to keep in readiness in schools, homes and public offices, to establish an emergency fund to be used in emergency, storing for ready- to- use tripal, utensils etc.
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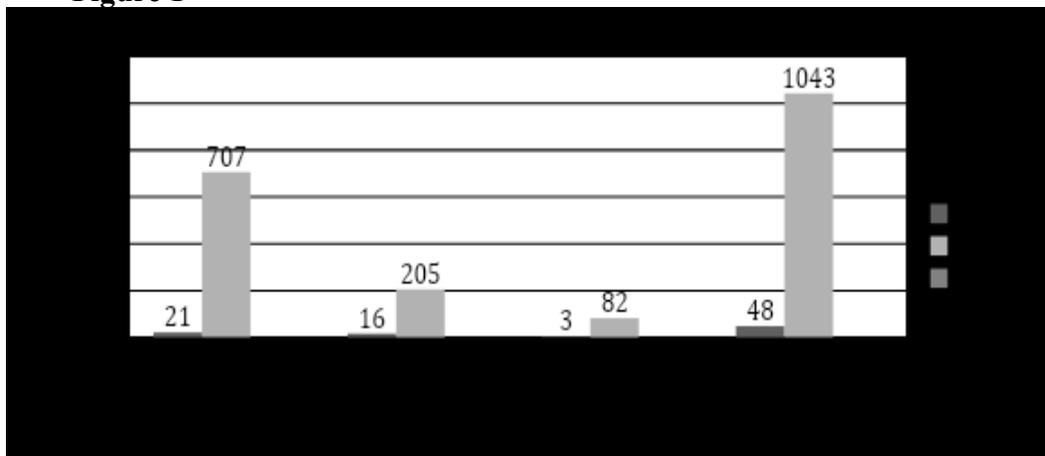
Adapted from: LDCUP, 2019, Biratnagar (Pp: 20-22)

In an interview with the official in the disaster management division of Biratnagar Metropolitan City in January 2023, an officer expressed that due to the lack of coordination between the three levels of government during development work, disaster management has also become difficult.

*“It is our understanding that there has been an error in the construction of the infrastructure. The budget was directly provided by the federal government. The people were pleased that the canal and the pitch roads would be built. However, the height of the houses and the road did not coincide. It is also not decided where to get the water outlet. There is no coordination with the metropolis”,* claimed an officer.

The disaster management section said that eight clusters have been formed to monitor and address the disaster management issue. This is a city-wide inter-agency mechanism in the city.

**Figure 1**



Adopted from: The Multi-hazards Vulnerability and Capacity Profile 2022(P: 43) of Biratnagar Metropolitan City

The Multi-hazards Vulnerability and Capacity Profile 2022 of Biratnagar Metropolitan City further contested the official records of the Ministry of Home Affairs (MoHA) which showed 4 deaths and 30 injuries, damage of 34 houses, taking away 13 animals and property damage of worth Rs. 6 crore 59 lakh 56 thousand during the period (2011-21) while the ward level survey data collected for preparing the profile revealed 232 deaths and 3119 people were injured. And this also indicates that official records differ with the ground level experience.

The Local Disaster and Climate Resilience Plan, 2019 reveals that 13 out of the 19 wards in Biratnagar were affected by flood in the past. As previously mentioned, in this study the status of four different types of disaster categories is analysed selecting four different wards, as samples, out of the 19 wards in Biratnagar. The Singhia river is devoid of embankments and spars. The river has narrowed as a result of rise in unorganized settlements. In 2017, 65 houses were swept away due to river bank erosion, and this problem recurs every rainy season. People have constructed houses on the bank of the river. Due to the lack of cleaning of the river, bamboo, wood, trees and trash got lodged in the bridge and the water flowed-out more than it did the year before. Due to the fact that there are no drains in all parts of the city and there is no proper drainage of water, if it rains, there will be a flash flood around. Ward 1 also has a fire issue. There are lots of thatched, bamboo, and wooden dwellings here..

Flood in Biratnagar is primarily caused due its location between two rivers, the Singhiya and the Keshaliaya. As mentioned in the Local Disaster and Climate Upliftment Plan 2019 of Biratnagar, altogether 13 wards out of the 19 were collectively severely impacted by flooding in these two rivers in the past. The Sighiya inundated seven different wards (wards 1, 2,7,8,14,16 and 19) and the Keshalia submerged six different wards (wards 4,5,6,11,12 and 16). However, in 2018, Biratnagar experienced flooding in the month of October as a result of incessant rain when almost every ward of the city was affected leading to displacement of more than one thousand population. Similarly, 36 families were completely impacted only at Bijaypur Tole of ward no.1 in Biratnagar in the flood in 2017. Majority of the thatched houses with walls made of mud were damaged; the handful with bricked walls were full of water. It took 4 days for the family of Shrestha to clean the mud from inside the house and he fell sick. Two case studies showed that:

Bablu Kamat's wife had Rs. 10000 inside her clothes. She not only lost the household's food and clothing but also the money she kept.

*"Some visitors brought some food and basic utensils. The ward office provided 15 kg of rice, beaten rice, puffed rice, daal and salt as relief supplies",* said Bablu (40 years) during an interview a month after the flood.

Rajesh Choudhury purchases pulses from village farmers and sells them in the local markets. He had stored pulses and Masala worth Rs 1 lakh 50 thousand which was swept away by the flood.

### **Efforts and Preparedness for Disaster Management in Biratnagar Metropolitan City**

According to the Disaster Risk Reduction and Management Act, 2074, there is a national council for disaster risk reduction and management under the chairmanship of the Prime Minister (GoN, 2017). This act was introduced with the aim of disaster risk reduction and management and to protect the lives of common people and the public, private and personal property along with the natural and cultural heritage and the physical structures from natural and non-natural disasters by coordinating and effectively managing all disaster management activities in the

country. The council shall work to formulate national policies and plans related to disaster management. Again, a National Disaster Risk Reduction and Management Authority (NDRRMA) has been established under the chairmanship of the Minister of Home Affairs (MoHA) in accordance with the provisions under section 10 of the aforementioned Act. In the same way, Chapter 6 of the Act specifies that at the provincial level, there will be a state disaster management committee under the chairmanship of the Chief Minister, which will formulate policies and plans related to disaster management in the province in accordance with the national policy and plan approved by the council.

According to Chapter 7 of the same law, there is a District Disaster Management Committee (DDMC) with the Chief District Officer serving as the coordinator in each district, while there is a provision for the formation of a local disaster management committee under the chairmanship of the chairman/chief of the village/town executive. According to the model law issued by the Ministry of Federal Affairs and General Administration to the local levels, the local level should draft and enact laws.

Thus, the local governments had scopes to create their own laws for disaster risk reduction and management. However, as the officials at the disaster management department in Biratnagar Metropolitan City reported, the provincial government ought to have created the law at the local level before the city could make it. . Formulation of laws such as local disaster fund operation procedure, village/municipality emergency operation procedure should also be passed.

The research responses and the review of the policy documents reveal that the local governments can use the issues of local level disaster management as an opportunity to demonstrate their capabilities. The local levels are free to make decisions, in line with the federal and provincial laws, on how to respond to those disasters that may occur in regions of their jurisdiction. The policies and plans approved by their assembly, the local government can play an important role in reducing the effects of disasters within their municipalities by making integrated and regional programs linked to disaster risk reduction, response, and recovery. In the same way, there are areas of core intervention such as preparing the necessary budget for disaster management, providing training to all the stakeholders, making and implementing special plans and programs with an eye towards the classes and communities most at risk of disasters. Adherence to approved standards while constructing physical building structures, and undertaking disaster risk assessment is equally important.

Similarly, in terms of disaster management, it is vital to assign responsibility to public institutions and commercial establishments responsible for disaster management by collaborating and coordinating with Nepal government, provincial government, ministries, departments and other agencies. Proper management and distribution of relief and rehabilitation supplies received from various organizations and individuals during disasters is also a matter of priority at the local level. By making the local community aware of disasters, disaster preparedness and response committees have been formed up to the ward level and with their help, mock drills for disaster response can be conducted. However, the key respondents at the Tole Level Committees (TLCs) were critical while voicing “the issue of disaster does not seem to be a priority of the municipality”.

A well-equipped disaster preparedness that can easily operate during an emergency can help justify the disaster management capacity of the local government. The research respondents, more or less, agreed that if the local levels can establish an emergency operation center at the

local level and develop a disaster early warning system, as per their capacity, there won't be any loss of human resources during the disaster. In Biratnagar, the Local Government Emergency Operation Centre (LGEOC) was established on 18 March 2021. There was already a fire management department and fire station with four fire engines and 12 firefighters (Upadhyay, 2022). Further important is that the local level should be able to identify areas that are vulnerable to disasters such as river erosion, floods, inundation, fire, cold waves, and earthquakes and any other hazards and disasters in their jurisdiction and take necessary initiatives for that. Also, searching for a suitable location to relocate the community living in the area to a safe place and conducting an awareness program for their safety helps to reduce the potential risks.

Community preparedness and public support for disaster management can be equally beneficial. There is some support at the community level from humanitarian organizations like the Nepal Red Cross Society (NRCS, 2018) for disaster management at the local level and the national levels as well. . Nepal police and Armed Police Force are two responding agencies in disaster management in Nepal (Malla et al. 2020). Community preparedness, however, is more significant for disaster management. The chief of the disaster management division emphasized that community awareness; support and readiness are always significant in disaster management. Community participation is needed to help in road expansion so that fire engines can maneuver easily. People shall obey road governance and uphold road discipline. The local community can also support resource management for disaster response. Though the civil society engagement and community participation on the planning and policy implementation at the local level have slowed down after the local bodies have been formed with people's elected representatives (Upadhyay, 2018), community contribution and saving through disaster management funds and their labour donation for construction and operation of the disaster resilient infrastructure can be of support.

### **Conclusion**

Disaster management is a major responsibility of the local government in Nepal. Flood, cold wave, earthquake and fire highly affect the population in Biratnagar Metropolitan City. The efforts toward safe and sustainable development are getting some sort of priority in the city. However, the risk assessment capacity of the urban planners is just as crucial. The urban settlement, as in Biratnagar, requires an efficient disaster response mechanism including smart and early warning systems, safe shelter provisions and adoption of pre-disaster and post disaster action plans. There is the Local Disaster and Climate Resilience Plan (LDCRP) which can be an integral part of the "modern and safe city" plans. Pre-disaster and post-disaster actions were less frequently reported in the field. At some points, the local government reports & the reality as per their plans and actions revealed discrepancies. The intergovernmental and inter-palika collaboration, public-private partnerships and the national, regional and global agencies active support can have more room to work together for disaster management at the local level. Specific understanding of disaster can aid in management and control of disaster. The unplanned settlements in riverbanks increase the risk of disaster, threats to life and vulnerability. There is a sizable portion of the population deprived from metropolitan amenities and services in Biratnagar. Safe building construction is equally important to combat earthquake challenges. The need for construction of immediate response centers and emergency centers is highly realized. Community level resilience capacity is equally significant. Capacity enhancement of the municipal workforce is immediately required. The city government can plan and contribute to open space maintenance and development. Emergency response plans can be prepared and

implemented. Formal urban settlement policy can be implemented. Similarly, the thatch huts in the city were more prone to fire disaster. Fire resilient roof construction support from the government can help the local community. Capacity building and enhancement of the vulnerable population can support the disaster management efforts of the city government. Additionally, as mentioned in the LDCRP, community level consultations on disaster could be extended in all the wards so that the community would be well- aware of the disaster preparedness policies of the municipal executive office in the metropolitan city.

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