



Assessing Institutional Capacities for Climate-Change-Driven Disaster Risk Reduction (DRR) in Skardu, the Karakoram and Himalayan Regions of Pakistan

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Abstract

The increasing frequency of natural disasters due to climate change has heightened the vulnerability of mountainous regions, including Skardu in Gilgit-Baltistan. Effective disaster risk reduction (DRR) relies on strong institutional frameworks, yet gaps in implementation persist. This study evaluates the effectiveness of Skardu's current institutional framework in managing DRR measures. Primary data was collected through key informant interviews with government agencies, non-governmental organizations, and academia. Thematic analysis revealed critical inefficiencies, including inadequate risk and vulnerability assessments, non-functional early warning systems, weak inter-agency coordination, and insufficient disaster preparedness planning. Additionally, socioeconomic barriers such as resource constraints, political pressures, Skardu's landlocked geography, and bureaucratic delays further hinder DRR implementation. To enhance disaster resilience, Gilgit-Baltistan must prioritize early warning systems, smart communication, community engagement, planned urbanization, and efficient resource allocation.

Keywords: Disaster Risk Reduction, Gilgit-Baltistan, Disaster, Climate Change, Institutions, Implementation, Effectiveness.

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1. Introduction

Climate change has become a global challenge. Due to climate change, the global occurrence of natural hazards and disasters has increased. According to the report of CRED (2024), the average number of disaster events occurring from 2003 to 2022 was 369, while only in 2023, a total of 399 catastrophic events were recorded [1].

Despite less contribution to global carbon emissions, Pakistan is facing a serious problem of climate change and different disaster events. Disasters like flash floods, glacial lake outburst floods (GLOF), landslides, cyclones, and droughts have become common in Pakistan [2]. In the last two decades, Pakistan has faced 152 extreme weather events, with estimated economic losses due to these disasters of USD 3.79 billion [3].

Like other vulnerable areas, Gilgit-Baltistan (GB) (a heaven on earth) is in northern Pakistan and is highly vulnerable to climate change due to its position in the Himalayan, Karakoram, and Hindu Kush (HKH) mountain ranges. The average temperature in these regions has risen by 0.10°C per decade from 1901 to 2014 [4]. The melting rate of glaciers also increased with the increase in average temperature. In Himalayan regions, more than 67% of glaciers are melting at an exponential rate [5]. Due to the high frequency of glaciers melting, the frequencies and consequences of natural disaster events have been intensified in GB [6]. The United Nations Development Program confirmed thirty-three lakes in the northern part of Pakistan, which are highly vulnerable sites for GLOF [7]. The International Centre for Integrated Mountain Development (ICIMD) surveyed 250 villages in GB and concluded that 46% of villages are facing different types of natural hazard events, and the most frequent and dominant natural hazardous events are landslides, earthquakes, flash floods, soil erosion, rockfall, and glacial outburst floods [8].

Considering the “Hyogo Framework for Risk Actions (HFA) 2005-2015” and the “Sendai Framework for Disaster Risk Reduction 2015-2030,” the government of Pakistan introduced various measures for better management of disasters and risks. In 2006, the government of Pakistan introduced the National Disaster Management Ordinance 2006 [9] and in 2010, the ordinance was converted into the National Disaster Management Act 2010 [10]. After this act, the institutional framework of disaster management was restructured and devolved disaster-related policy formulation and implementation power to the provincial and district levels [11].

Following the National Disaster Management Act 2010, the Gilgit-Baltistan government introduced the Gilgit-Baltistan Disaster Management Act 2017, establishing the Gilgit-Baltistan Disaster Management Authority (GBDMA), which now operates at both provincial and district levels, with offices in all ten districts [6]. GBDMA laid a new institutional framework in Gilgit Baltistan to strengthen disaster risk management and disaster risk reduction measures and initiatives [12]. However, the consequences and damages from disaster events are not reduced significantly. According to Dawn News (2022) in Gilgit Baltistan, more than 47 flash flood events were reported, in which 60 bridges, 75 irrigation channels, more than 700 houses were damaged, and 7 casualties [13]. The estimated internally

displaced people were 50,000, and the economic losses were Rs 10 billion [14]. These damages and losses from the 2022 flood raise serious questions about the current institutional framework of disaster management in Gilgit-Baltistan.

Skardu, one of the most disaster-prone districts in Gilgit-Baltistan, faces frequent natural hazards, raising concerns about the effectiveness of existing Disaster Risk Reduction (DRR) frameworks. Despite the presence of policies and institutional mechanisms, their implementation and overall efficiency remain uncertain. Assessing institutional performance in DRR is crucial to identifying gaps, addressing challenges, and enhancing resilience. This study aims to evaluate the effectiveness of institutional frameworks in disaster management and the key challenges encountered during implementation. This study explores the following research questions:

- How effectively is the current institutional framework implementing Disaster Risk Reduction measures in Skardu?
- What key barriers do institutions face during the implementation of Disaster Risk Reduction measures in Skardu?

2. Literature Review

In response to the growing threat of climate change and disaster events, international communities have developed a comprehensive framework for managing disaster risks. The most notable frameworks are the “Hyogo Framework for Action (HFA) 2005-2015” and the “Sendai Framework for Disaster Risk Reduction 2015-2030” In 2005 the World Conference on Disaster Risk Reduction was held in Hyogo Japan and developed the “Hyogo Framework for Action (HFA) 2005-2015”. In this framework, five priorities for action were identified. The priority was “Ensure that disaster risk reduction (DRR) is a national and a local priority with a strong institutional basis for implementation” [15]. The HFA was endorsed by 162 countries [16]. The third International Conference on Disaster Risk Reduction was held in Sendai, Japan, from March 14th to 18th, 2015, and developed the “Sendai Framework for Risk Reduction”. This framework consists of four key priority areas, and the second key priority area is “Strengthening disaster risk governance to manage disaster risk” [17]. As a result of these two frameworks, countries restructured their institutional framework for disaster risk reduction.

They have decentralized the institutional structure to facilitate the effective implementation of DRR measures.

The restructured and decentralized institutional structure of disaster management improves the implementation of DRR in Bangladesh. In the coastal communities of Bangladesh, disaster risk and vulnerability maps have been prepared for all union levels after the restructured disaster management institutions [18]. Similarly, in Sri Lanka, disaster hazard and vulnerability maps have also been prepared for districts [19]. Along with mapping disaster risk and vulnerability, Early Warning Systems (EWS) and community-based rehabilitation activities also significantly increased [20]. With the help of community-based rehabilitation activities, response activities such as timely assistance to the victims, along with an increased number of mock drills, have been observed in Talisay, Philippines [21].

The restructured institutional structure of disaster management can improve human capacity level by arranging different awareness sessions and mock drills [22]. In Rampur, after establishing the District Disaster Management Authority (DDMA), the implementation of building codes, land-use policy, and rescue mechanisms has improved [23]. Furthermore, DRR education has become an integral part of educational curricula in Indonesia [24]. In Nepal, before the Disaster Risk Reduction and Management Act 2017, disaster policies were focused only on post-disaster activities. After this act, disaster management authorities are established at the provincial and district levels. Now, disaster policies in Nepal are according to the geography of the province, district, and type of disaster. Moreover, policies are also focused on mitigation and preparedness for disasters [25].

In the literature, scholars also highlighted numerous barriers and challenges in the effective implementation of DRR, after the restructuring of the institutional framework of disaster management authorities [21, 26, 27, 28]. Lack of accountability, political interference, and exclusion of local communities in the decision-making process are the main factors for the effective implementation of DRR [26]. Municipalities face numerous challenges, such as a lack of technical expertise, skilled human resources, financial constraints, and a lower priority of disaster activities and plans in their planning. Such factors lead to ineffective implementation of DRR [29].

In Sri Lanka, after the 2004 Indian Ocean tsunami, the Disaster Management Act 2005 was approved and restructured their disaster management authorities. Now they are highly decentralized and working at the district level [30]. In DRR, public awareness and training sessions are essential components, but in Sri Lanka, training and awareness sessions are not conducted properly after the act [31]. The lack of proper coordination, unclear mention of implementing actors, and insufficient financial resources are the main factors behind the ineffectiveness of the implementation of DRR. Djalante and Thomalla (2012), pointed out factors behind the ineffectiveness in the implementation of DRR by district and municipal disaster management authorities [32]. The factors included a lack of financial resources, skilled labor, and ineffective communication with the federal/state. In addition to this, the lack of a proper mechanism for information sharing between the district administration with the federal and local communities also produces negative impacts during the implementation of DRR [21]. The lack of political willingness, low priority of DRR in disaster management, lack of modern machinery, and inactive participation of local communities also contribute [27]. Similar observations are also observed by Jurilla (2016) in the different municipalities in the Philippines [28]. Furthermore, Tanwattana in 2021 added the top-down approach in government departments during policy formulation, the lack of proper institutional channels for engaging local communities in DRR and overlapping of disaster policies are also barriers to effective implementation of DRR at the regional and district levels [33].

So, in the literature, a detailed discussion about the effectiveness and barriers of the restructured disaster management institutional framework in implementing DRR is discussed, such as in Indonesia, India, Nepal, and the Philippines. In the case of Pakistan, several researchers like Ainuddin et al., 2013; Azhar, 2022; and Shah et al., 2020 evaluated the framework of disaster management authorities [11, 34, & 35]. In 2022 Azhar discussed disaster management reforms in Pakistan in detail [35]. She criticized the current institutional framework of disaster management in Pakistan. The current institutional framework is bureaucratic-dependent. Furthermore, the lack of human capacity programs at the local level and the disintegration of Indigenous knowledge in DRR measures also produced negative impacts during the implementation of DRR measures. Even after decentralization, lack of clarity of responsibilities, budget constraints, and bureaucratic delays are major reasons for the

ineffectiveness of the disaster management authority at the provincial and different district levels in KP [11]. In Baluchistan, even after the NDMA Act 2010, the district-level disaster authorities are not empowered, thus DRR measures are not implemented [34]. However, these studies mainly focused on the Khyber Pakhtunkhwa (KP) and Baluchistan provinces of Pakistan. Gilgit Baltistan the north of Pakistan is highly vulnerable for disaster risks. Due to its highly climatic vulnerability and unique geographically and administrative system from other part of Pakistan. It is necessary to investigate the effectiveness of the existing institutional framework in Skardu, Gilgit-Baltistan.

3. Methodology

3.1. Data Collection

This study employed a case study research design to explore disaster management initiatives in Gilgit-Baltistan. Primary data was collected through key informant interviews using semi-structured questionnaires. The fieldwork was conducted over three months, from July 3, 2024, to September 28, 2024.

Before the fieldwork, a pilot survey was carried out with disaster management experts to refine the questionnaire, ensuring its comprehensiveness and accuracy. A total of 23 respondents were interviewed, comprising 11 representatives from government departments, 7 from non-governmental organizations (NGOs), and 5 from academia. Respondents were selected based on their expertise and direct involvement in disaster management. Before conducting the interviews, efforts were made to ensure that all participants fully understood the scope of the study and the questionnaire, allowing them to provide accurate and insightful responses.

Government agencies were chosen following the Gilgit-Baltistan Disaster Management Act 2010, which designates the GBDMA and other relevant government bodies as responsible for disaster-related initiatives in the region. NGOs were selected based on their active engagement in the development sector of Gilgit-Baltistan. A detailed description of the respondents is provided in Table 01

TABLE 01: DESCRIPTION OF THE RESPONDENTS.

Organization	Organization form	No of Respondents
District Skardu Disaster Management Authority	Government	02
Skardu Development Authority	Government	01
District Administration Skardu	Government	01
Department of Local Govt. and Rural Development	Government	01
University of Baltistan Skardu	Academia	03
Karakoram University	Academia	02
Recuse 1122	Government	01
United Nations Development Program	Non-Government	02
Gilgit Baltistan Rural Support Program	Non-Government	01
Aga Khan Agency for Habitat	Non- Government	01
International Fund for Agricultural Development	Non- Government	02
Worldwide Fund for Nature-Pakistan	Non-Government	01
Department of Public Health Engineering	Government	01
Gilgit Baltistan Public Works Department	Government	01
Department of Agriculture	Government	01
Directorate of Planning and Development Baltistan	Government	01
Department of Water Management	Government	01

To ensure the accuracy and reliability of data collection, face-to-face interviews were conducted, and audio recordings were used to capture responses verbatim. This approach

allowed for a more in-depth understanding of disaster management practices and challenges in the region.

3.2. Data Analysis

Thematic analysis, a widely used approach for analyzing qualitative data [36], was employed in this study to systematically interpret the findings for two key reasons. First, it allows themes and sub-themes to emerge inductively from the data rather than being predefined. This ensures a more nuanced and contextually relevant understanding of the research questions and objectives. Second, thematic analysis goes beyond simple data summarization by facilitating an in-depth interpretation of responses and the identification of meaningful patterns.

Following the semi-structured interviews, all responses were transcribed verbatim to ensure accuracy and completeness. The transcribed data was then manually coded, with unique codes assigned to key concepts and ideas. These codes were systematically categorized into broader themes and sub-themes, allowing for a structured analysis of the findings.

The analysis identified six major themes related to the effectiveness of the current institutional framework, while five key themes emerged as barriers to its effectiveness. A detailed breakdown of these themes is provided in Table 02. This rigorous approach to data analysis ensured that insights were derived directly from the participants' responses, capturing the complexity of disaster management practices in Gilgit-Baltistan.

TABLE 02: CODES OF THEMATIC ANALYSIS.

1. Effectiveness of Current Institutional Framework in the Implementation of DRR		
ID	Code for Theme	Codes for sub-themes
1.1	Conventional Disaster Risk and Vulnerability Assessment Methods	1.1.1 Based on historical data 1.1.2 Lack of scientific and systematic risk assessment
1.2	Absence of Disaster Preparedness Plan	1.2.1 Limited to Contingency Plan 1.2.2 Lack of comprehensive
1.3	Unfunctional Early Warning System	1.3.1 Installed

1.4	Weak Local Community Engagement	1.4.1 Awareness sessions 1.4.2 Lack of consultation
1.5	Shortfalls of Human Resources	1.5.1 Lack of Technical Staff 1.5.2 Dual Responsibilities 1.5.3 lack of refresh courses
1.6	Limited Coordination and Collaboration	1.6.1 GBDMA with federal agencies 1.6.2 Normal time moderate with other district departments 1.6.3 Emergency time better than normal times
2. Barriers to Implementation of DRR		
2.1	Lack of Resources	2.1.1 lack of sufficient Human Resources 2.1.2 Lack of sufficient and modern Capitals 2.1.3 Financial Constraints
2.2	Locked Geography	2.2.1 lack of accessible road infrastructures
2.3	Government procedure	2.3.1 Top-bottom approach 2.3.2 slow response rate
2.4	Pressure Group	2.4.1 Community Pressure 2.4.2 Political Forces and Interests
2.5	Orthodox Beliefs	2.5.1 Local Religious Elites Resistance 2.5.2 lack of acceptance of NGOs 2.5.3 politicization of disasters activities

3.3. Study Area

Gilgit-Baltistan is in the northern part of Pakistan and consists of three divisions, Baltistan, Gilgit, and Diamer. District Skardu is the headquarters of the Baltistan division and

is located at the latitude of 35° 18' 21" N and 75° 36' 51" E longitude. The total area of district Skardu is 10168 sq. km, and the population is 0.26 million. Geographically, District Ghanche is located to the east of District Skardu. District Kharmang lies to the south, District Astore is to the west, the north is the District Shigar, and the north-west is bounded by District Gilgit, as shown in Figure 01.

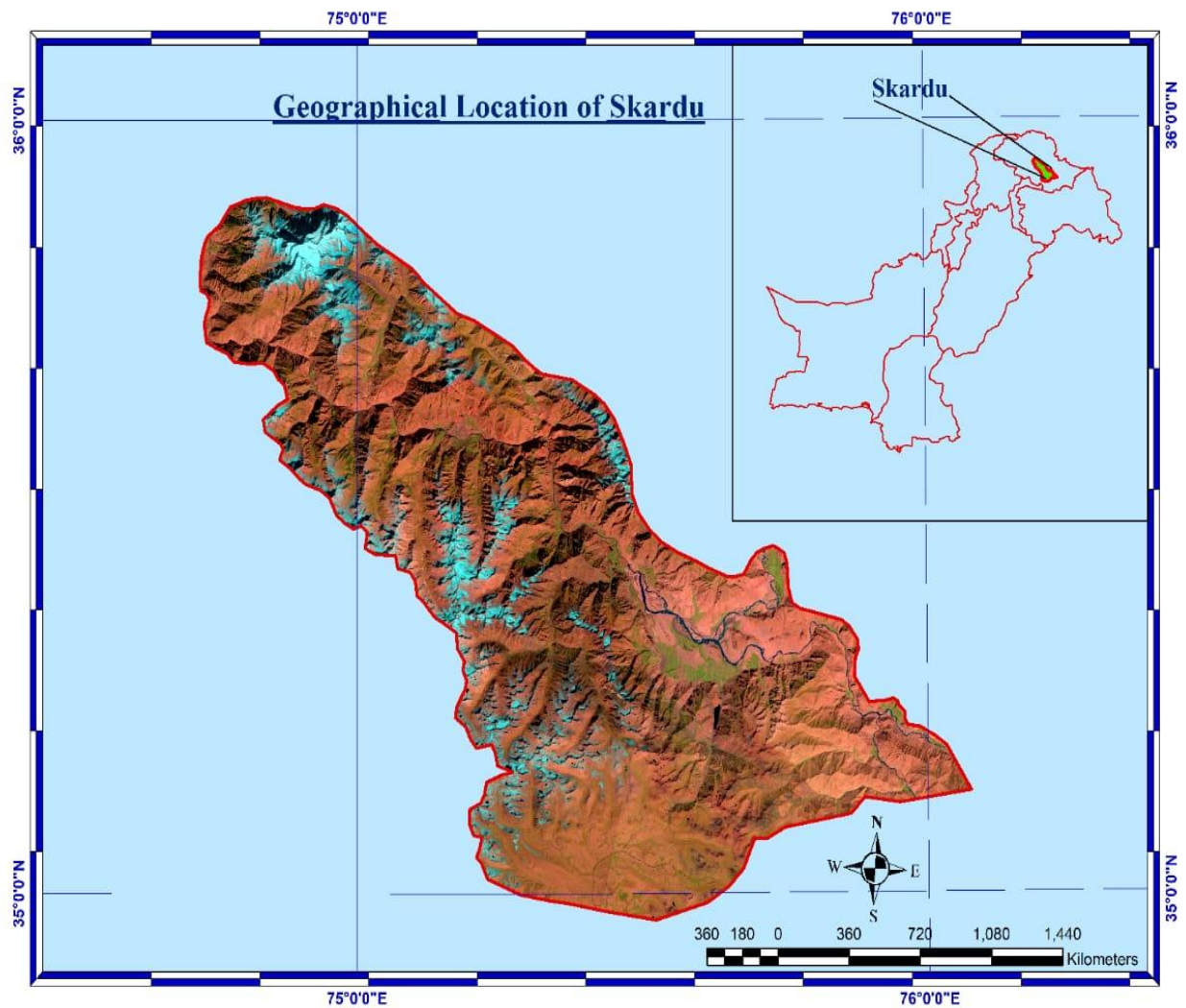


Figure 01. Map of study area.

4. Results and Discussion

After semi-structured interviews with the respondents, six themes emerged regarding the effectiveness of the DDMA of district Skardu in implementing DRR. Furthermore, respondents also highlighted barriers to the effective implementation of DRR in the district. Figure 02 shows themes for thematic analysis.

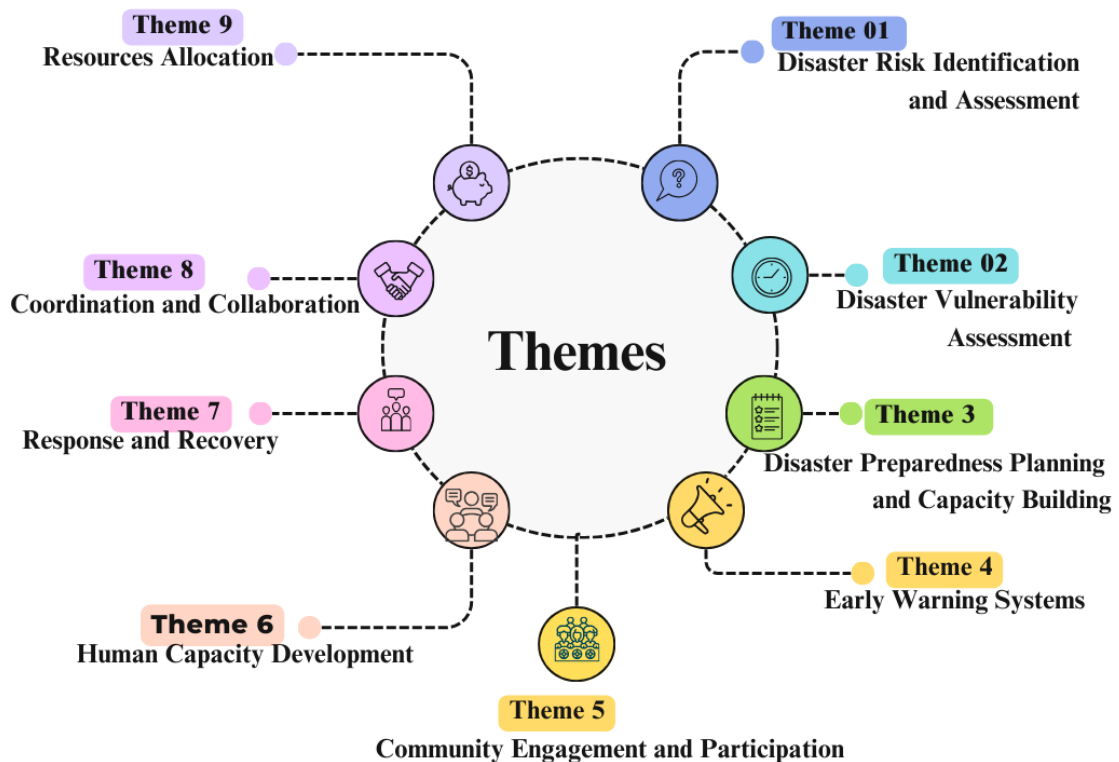


Figure 02. Major Themes for thematic analysis.

4.1. Effectiveness of Current Institutional Framework

The following are the main themes about the effectiveness of the current institutional framework of District Skardu in implementing DRR.

4.1.1. Conventional Disaster Risk and Vulnerability Assessment Methods

Currently, the district Skardu is facing various types of natural disasters such as flash floods, earthquakes, soil erosion, and landslides. However, in direct Skardu disaster risk and vulnerability assessment are not according to international standards and scientific standards. Historical and past data and trends are used for disaster risk and vulnerability assessment.

“Currently, we have no proper mechanism for disaster risk assessment and identification. We assess disaster risk based on historical data and district administration field information”.

Every region needs a proper risk assessment and identification framework according to the disaster events, topography, and local setting of the region [37]. Furthermore, in the

National Disaster Risk Reduction Policy 2013, it is mentioned that provincial and district management authorities are responsible for proper and systematic disaster risk and vulnerability assessment [38]. However, after seven years of the GBDMA Act, the lack of systematic and research-based disaster risk and vulnerability assessment in the district Skardu clearly shows the ineffectiveness of the DDMA of the district Skardu in the implementation of DRR measures in the district Skardu and makes it more vulnerable to natural disasters.

4.1.2. Absence of Disaster Preparedness Plan

The DDMA is responsible for the formulation of a disaster plan preparedness for the respective district according to the guidelines of the National Disaster Management Authority (NDMA) of Pakistan and the Provincial Disaster Management Authorities (PDMA) [9, & 38]. In the case of the district, Skardu disaster preparedness plan was limited to two contingency plans: the Monsoon Contingency Plan and the Winter Contingency Plan. This region is highly vulnerable to climate change, and the contingency plans have limited scope. The Monsoon Contingency plan is limited to heavy rainfalls and flash floods that occur from July to August. The Winter Contingency plan is only for the winter season (December to February). This region is facing different types of disasters. So, a proper disaster preparedness plan is required according to the type of disaster and the geography of different parts of Skardu. But no such steps have been taken by the DDMA in the district Skardu. Like the lack of systemic disaster risk and vulnerability assessment techniques, the lack of comprehensive disaster preparedness plans shows inefficiencies in the current institutional framework of disaster management.

More interestingly, some of the respondents criticized the contingency plans. According to them, contingency plans are a government formality, and no one is serious about them.

“Contingency plans are annually revised, but only the date and signature of people are changed”.

4.1.3. Unfunctional Early Warning System

According to the Hyogo Framework, the Early Warning System (EWS) is an important element of DRR [15]. EWS reduces disaster risks and vulnerabilities for individuals and nations while strengthening climate-resilient communities [39]. Recently, in district Skardu,

the first EWS was installed in Basho Valley, but it is still dysfunctional. According to the GBDMA Act 2017, district disaster management authorities are responsible for installing, maintaining, and upgrading EWS [40]. Limited and nonfunctional EWS in the district Skardu makes this region more vulnerable to extreme weather events. Thus, it also highlights an ineffective institutional framework for disaster management in the district Skardu.

4.1.4. Weak Local Community Engagement

In the last few decades, local community engagement in DRR has become a central part of the implementation and management of DRR [41]. Nowadays, the community-based DRR approach is a crucial pillar in implementing DRR measures effectively [42, & 43].

In District Skardu, engagement with local communities is limited only to arranging awareness sessions about DRR. During policy formulation stages, the engagement of local communities is very rare. In rare cases, the inputs and concerns of the local communities are considered. Most of the decisions are made by top government officials. As the local communities are important stakeholders in DRR, the lack of participation of local communities in the policy cycle produces negative impacts on the effectiveness of DDMA in the implementation of DRR in the district Skardu.

“During emergencies, all concerned governmental departments participate in emergency response meetings, but in such meetings, local communities are called to participate”.

4.1.5. Shortfalls of Human Resource

Without adequate and efficient human resources in government departments, DRR could not be implemented effectively [44]. Currently, the DDMA of District Skardu is working with two allied staff under the Assistant Director, who is also in charge of the District Shigar DDMA. The DDMA of District Skardu has not advertised and recruited sufficient and well-trained staff. Even after recruitment, the lack of refresher courses and job orientation diminishes the people's skills and capacity.

“Now GB is highly prone to natural and human-made disasters, but human resources are not trained about them. In GB, after induction in government departments, there is no concept of staff capacity building and job orientation”.

4.1.6. Limited Coordination and Collaboration

In Pakistan, disaster management authorities are highly decentralized; now, authorities are working at the district level. Without proper coordination and collaboration with federal agencies, provincial agencies, and local communities, DDMA cannot work in silos.

The DDMA of District Skardu has no direct coordination and collaboration mechanism with federal-level agencies such as NDMA and the Federal Flood Commission. However, these federal agencies are coordinating and collaborating with GBDMA.

In the case of provincial agencies, district administration, and NGOs, the DDMA of District Skardu has better coordination and collaboration mechanisms. During emergencies, all provincial and district departments coordinate and collaborate effectively with the DDMA of District Skardu for the implementation of DRR measures, while in normal situations, there are numerous socio-economic factors contributing to ineffective coordination and collaboration that produce negative effects on the implementation of DRR.

The above six themes clearly highlight that the current institutional framework of disaster management in the district Skardu is not effective and efficient in the implementation of DRR.

4.2. Barriers to Implementation of DRR

The following are the institutional inefficiencies of the current DRR framework.

4.2.1. Lack of Resources

Efficient resources such as human, machinery, and finance are prerequisite conditions for the implementation of DRR. The current institutional setup of disaster management in Skardu is facing a serious issue of a lack of efficient resources. The DDMA of District Skardu is currently working without a proper office setup. They have limited human resources, and the Assistant Director of DDMA of the District Skardu has additional responsibilities for the District Shigar. In the case of machinery, they have only two Wheel Dozers, four Road Rollers, two excavators, and five Tractors for the whole District Skardu. Furthermore, these are not according to the international standards for highly disaster-prone regions. For the financial constraint of the DDMA of District Skardu, one of the respondents added.

“We have a limited amount of financial budget. We need to care about their spending because if we use them for mitigation, then in case of any disaster, we face serious financial issues for recovery and rehabilitation activities”.

4.2.2. Locked Geography

Like other parts of Gilgit-Baltistan, residents of District Skardu are living in far-flung and mountainous regions. In these parts, the lack of road infrastructure has become a barrier to the implementation of DRR. Because it is producing negative impacts on the installation of EWS, response, and recovery activities, training sessions, and mock drills. A similar result was obtained by Shah & Rana in 2023 for Gilgit of Gilgit-Baltistan [6].

4.2.3. Government Procedure

Most of the respondents highlighted that top-down approaches in different government departments and agencies led to failure in implementing DRR in the district Skardu.

“For a small sharing of information, first we need to coordinate and seek approval from the secretary of the concerned department, and then from the concerned person.”

In addition to the top-down approach, slow governmental procedure, slow response rate, and red tape in governmental departments are further intensifying the failure of the current institutional framework in Skardu.

4.2.4. Pressure Group

In District Skardu, the DDMA is facing unnecessary pressure from different pressure groups during the implementation of DRR. When any protective/precautionary measures are started in any region, the nearby communities start pressuring DDMA to change the measures. Even elected members of the Gilgit-Baltistan Legislative Assembly started to interfere in the process for their own benefit.

“Politicians are always pressurized to start response and recovery activities according to their own wish and their core constituency”.

4.2.5. Orthodox Belief

Sometimes orthodox beliefs of people become a hindrance to the effective implementation of DRR in the district Skardu. The non-government agencies are facing this issue more than the government agencies. Along with the government of Gilgit Baltistan, a few international organizations are actively involved in DRR measures and activities in Gilgit Baltistan. However, People's minds have been politicized by local religious elites, and as a result, non-government agencies face resistance from the local community during the implementation of DRR.

5. Limitations and a Way Forward

This study has certain limitations. First, this study has geographical constraints as this study only focuses on the district of Skardu, Gilgit-Baltistan. Secondly, only the government, non-government officials, and academic researchers are interviewed. In the future, this study can be enriched by interviewing local community leaders, youth, and women.

6. Recommendations

Based on the study's findings, the following key recommendations aim to enhance institutional capacity and ensure the effective implementation of DRR in District Skardu:

6.1 Scientific Disaster Risk Assessment: Likewise, Japan's Disaster Prevention Research Institute (DPRI), GBDMA needs to systematically monitor natural disaster mechanisms and critically evaluate anthropogenic activities contributing to climate-related hazards. The department may collect and analyze historical disaster data while leveraging advanced technologies such as Geographic Information Systems (GIS) and remote sensing to enhance forecasting capabilities and improve disaster preparedness.

6.2 Early Warning System: The lack of functional early warning systems significantly highlights in institutional inefficiencies in operating DRR measures. A well-integrated multi-stakeholder approach can address this issue. In this approach, local communities should allocate free-of-cost space for the installation of early warning systems. For technical and financial support, the government should sign multilateral and bilateral

agreements with international organizations such as the UNDP and the Asian Development Bank. The operating telecom companies in Gilgit-Baltistan can be used for timely data and information sharing.

6.3 Smart Communication Mechanism: To enhance inter-departmental coordination and expedite governmental procedures, digital coordination and collaboration should be integrated across all government departments. All risk and warning service information should be disseminated through a mobile application with real-time updates. Furthermore, each department may appoint a focal person for GBDMA and hold regular meetings to align disaster-related activities across departments.

6.4 Community-Based Disaster Risk Reduction: Like Bangladesh, Community-Based Disaster Risk Reduction model, GBDMA can improve community participation by involving experienced and expert community members in policymaking and disaster risk reduction mechanisms. This approach will also facilitate the dissemination of awareness programs, as information conveyed by a local representative will be more easily understood by the community.

6.5 Planned Urbanization: The lack of planned infrastructure is causing barriers to the effective implementation of DRR in Gilgit-Baltistan. The government should introduce an urbanization policy in Gilgit-Baltistan and ensure well-established infrastructure in all far-flung areas in Gilgit-Baltistan.

6.6 Resource Allocation: The government of Gilgit-Baltistan may develop a comprehensive framework to strengthen GBDMA. For human resources, well-structured technical and tactical capacity-building programs can be introduced to ensure a skilled workforce. For financial support, at least 5% to 10% of the provincial budget and the budget for national development schemes can be directly allocated to DRR initiatives in Gilgit-Baltistan. Additionally, targeted investments may focus on modernizing GBDMA with capital machinery such as excavators, road rollers, dozers, and tractors, as well as essential equipment like life jackets, helmets, climbing ropes,

dragon lights, safety nets, hand tool sets, water gel blankets, descenders, and ascenders to enhance disaster response and recovery efforts.

7. Conclusion

Climate change and human activities have inflated the occurrence of hybrid disaster events, many of which can be mitigated through proactive measures by government agencies and NGOs. Gilgit-Baltistan, particularly Skardu, is highly vulnerable to such disasters, making the assessment of institutional gaps in Disaster Risk Reduction crucial. This study identifies key inefficiencies, including inadequate disaster risk and vulnerability assessments, a non-functional early warning system, insufficient resources, and weak inter-agency coordination. Additionally, socio-economic barriers further hinder the effective implementation of DRR measures. To enhance disaster resilience, the government must prioritize risk reduction strategies and reinforce the institutional framework to ensure a more coordinated and resource-efficient response.

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Wajhullah Fahim conceptualized the idea. collected data and processed it in the presentable format, Dr. Muhammad Raza supported, guided during the whole process and brought the article in the publishable format and Mohammad Armughan supervised the process written literature review and methodology.

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