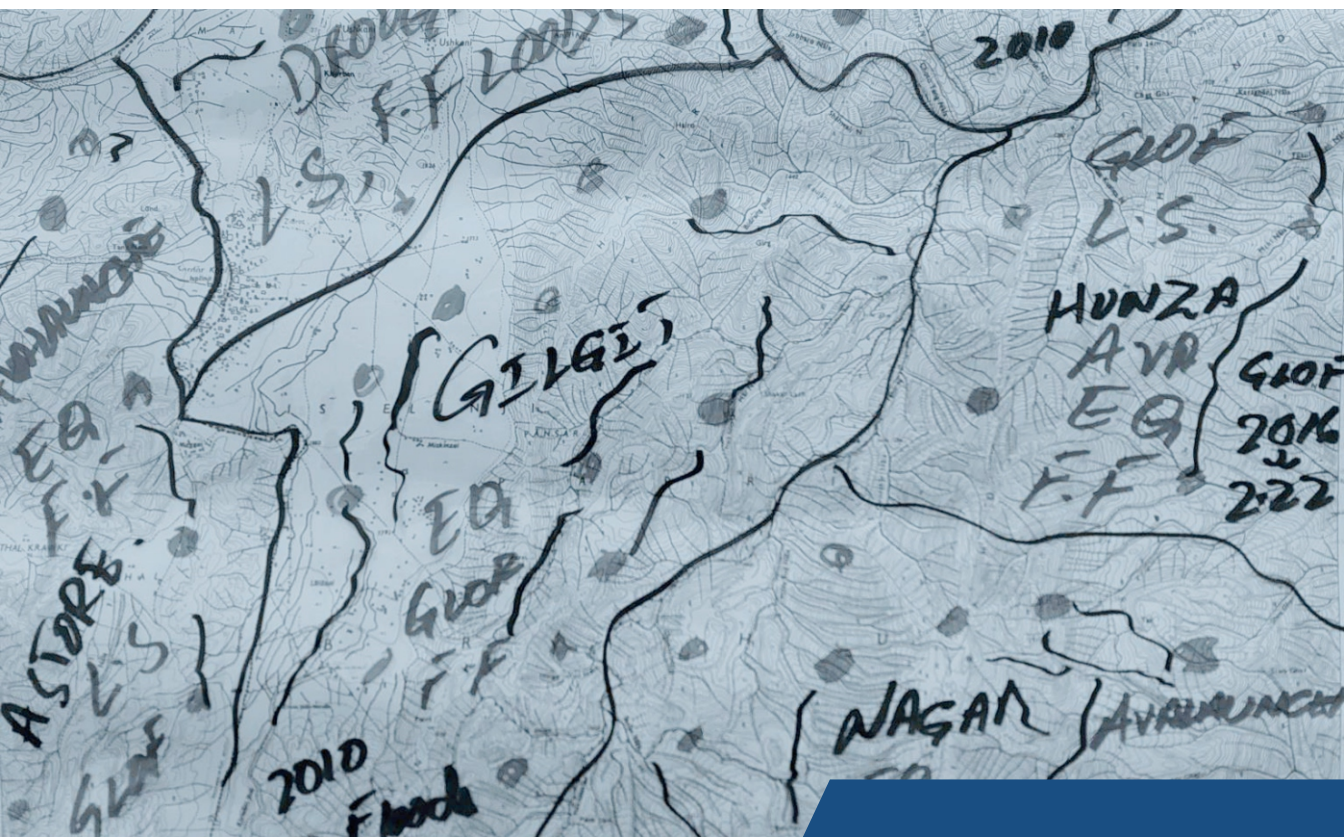




Guideline for Mainstreaming Hazard and Disaster Risk Information in Spatial Planning Processes in Pakistan

Policy Guideline Islamabad, July 2024



Topic: Mainstreaming Hazard and Disaster Risk Information in Spatial Planning Processes

Policy Guideline developed through a consultative multi-stakeholder process

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Chairman's Message



Lt. Gen. Inam Haider Malik, HI (M)
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Risk Sensitive Spatial Planning Guidelines, a significant milestone in our collective journey towards building a resilient Pakistan. In a world increasingly vulnerable to natural and man-made hazards, proactive measures are essential to safeguard our communities and minimize the devastating impact on lives and properties.

These guidelines represent a comprehensive framework meticulously crafted by the National Disaster Management Authority (NDMA) in collaboration with Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) Federal Republic of Germany, aimed at integrating risk-sensitive approaches into spatial planning processes. At the heart of this endeavor lies a fundamental principle, the active involvement of communities. Recognizing that resilience is not merely a product of top-down initiatives but a collaborative effort, these guidelines emphasize the critical role of local stakeholders in shaping their own destinies.

As we navigate the complexities of an ever-changing landscape, the importance of foresight and preparedness cannot be overstated. By adopting proactive strategies rooted in risk sensitivity, we empower ourselves to mitigate the potential losses inflicted by disasters. Moreover, we pave the way for sustainable development that withstands the test of time and adversity.

I commend the dedication and expertise of all those who contributed to the development of these guidelines. Their commitment reflects our shared determination to forge a path towards a safer, more resilient future for Pakistan. Let us embrace these guidelines not merely as a document, but as a catalyst for transformative change.

Together, let us build a resilient Pakistan, one where communities thrive in the face of adversity, where lives are protected, and where the legacy we leave for future generations is one of strength, unity, and resilience.

The top half of the page features a background of a topographic map with contour lines in a light blue color. The word "Vision" is written in a bold, dark blue font in the lower-left corner of this section.

Vision

**Develop a resilient Pakistan against hazards
to minimize life and property losses and
to reduce the impacts of climate change
through active involvement of communities and stakeholders**

Executive Summary

Pakistan is a nation gifted with diverse geographical features and a rich cultural heritage. It is also a country that faces significant challenges from natural hazards and disasters. The higher frequency and severity of recent events have underscored the urgent need for holistic disaster risk management strategies. “More and more people are recognizing disasters as failures of development or as the result of unsustainable development. This implies that we ourselves are creating the social, economic and political conditions that lead to disasters” (ADPC, 2010). As a result there is a need to focus on long term measures to mitigate and prevent disaster and build resilient communities. Sustainable development needs to be based on effective spatial planning, which integrates hazard and disaster risk information.

This guideline was developed to provide a framework for mainstreaming hazard and disaster risk information into spatial planning and development processes in Pakistan. It offers policy recommendations to establish a multi-stakeholder process based on existing spatial planning practices and Multi Hazard Vulnerability and Risk Assessments. The guideline aims to help planners and policy makers to take steps toward a risk sensitive spatial planning practice in Pakistan. By embedding disaster risk considerations into the core of spatial planning, we can increase resilience, reduce vulnerabilities, safeguard lives and livelihoods, and promote resilient development pathways.

The development of this guideline was part of the bilateral project “Promoting Resilience against Impacts of Natural Disaster in Pakistan” (NADIR) jointly implemented between the National Disaster Management Authority (NDMA) of the Islamic Republic of Pakistan and the Federal Institute for Geosciences and Natural Resources (BGR) of the Federal Republic of Germany. A series of participatory and consultative workshops and dialogues laid the groundwork for the development of the guideline. The result is a testament to multiple stakeholders’ collaborative and participatory efforts, including national, state, and provincial Disaster Management Authorities, Planning and Development Departments, Ministries, technical departments, and academic institutions. Their combined expertise and dedication have been instrumental in creating an informative and actionable resource. We hope this guideline will serve as a valuable resource for all those involved in spatial planning, development planning and disaster risk management in Pakistan. By integrating these critical considerations, we can make significant strides toward a safer, more resilient future for our communities.

This guideline is based on NDMA’s mandate specified in the NDMA Act, 2010. The Act includes the specification of measures for the prevention of disaster and the mitigation of their effects in the content of the National Plan. Similarly, this is extended at the provincial level, where also the integration of mitigation measures in the development plans is specified as task for PDMA’s (Government of Pakistan, 2010a).

The focus of this guideline is on risk sensitive spatial planning as a measure to mitigate the impacts of hazards and to prevent disaster. Recommendations for a comprehensive spatial planning framework for Pakistan are outside the scope of this guideline. However, many recommendations hint towards a holistic, multi-stakeholder and participatory spatial planning practice.

This guideline emphasizes the importance of involving diverse stakeholders in the spatial and development planning process. Following the outlined participatory and consultative methods and approaches ensures that the voices of local communities, experts, and relevant authorities are heard and integrated. This approach enhances the quality, acceptance and implementability of spatial plans and fosters a collaborative environment for disaster risk management.

This guideline is envisioned as a living document and is primarily a first resource for risk sensitive spatial planning. Recommended is a wide distribution at all levels of government, especially local governing bodies, directly in contact with communities and grass root level organisations as a first step towards risk sensitive spatial planning in Pakistan.

The guideline also considers Planning Commission processes and the Disaster Risk Reduction (DRR) checklist of the Ministry of Planning, Development, and Special Initiatives.

How to use this guideline

This guideline is intended to serve as a resource for integrating hazard and disaster risk information developed among others through multi hazard vulnerability and risk assessments (MHVRA) into spatial planning and development processes. The recommendations are based on many participatory and consultative meetings and discussions. The list of these meetings and additional resources can be found in *Appendix A*.

Chapter 1 – Introduction, Chapter 2 – Commitments and Chapter 3– Guiding Principles set the frame for risk sensitive spatial planning and give guidance on general considerations that are important for risk sensitive spatial planning and beyond. Chapter 4 is a resource of information on spatial planning, development planning, risk sensitive spatial planning and multi hazard vulnerability and risk assessments. Chapter 5, as the most important part of the guideline, consists of the recommendations and necessary steps to implement risk sensitive spatial planning in Pakistan. Chapter 5 is divided into different topics and serves as a reference.

Users of this guideline are encouraged to adapt the recommendations to their specific contexts and needs, considering local conditions and existing regulatory frameworks. It may require adjustments based on situational demands and stakeholder dynamics. On a local level, the first step in implementing this policy is tackling concrete problems. This is also a means to create trust between the different actors during the planning process (Albrechts, 2010).

The implementation of the recommendations remains flexible, allowing for stepwise implementation or the development of new guidelines specific to provinces or even down to divisional levels. Envisioned is also a regular update of the recommendations and an inclusion of best practices for the Pakistani context.

Disclaimer

The "Guideline for Mainstreaming Hazard and Disaster Risk Information in Spatial Planning Processes in Pakistan" has been developed through a participatory and consultative process based on various themed workshops within the "Promoting Resilience against Natural Disaster Impacts (NADIR)" project. The NADIR project, implemented from January 2021 to September 2024, is a collaborative effort between the National Disaster Management Authority (NDMA) of the Islamic Republic of Pakistan and the Federal Institute for Geosciences and Natural Resources (BGR) of the Federal Republic of Germany. The project was funded by the Federal Ministry for Economic Cooperation and Development (BMZ), Germany, under the core topic "Responsibility for our planet - climate and energy" within the field of action "Climate protection and adaptation to climate change".

The views and opinions expressed in this guideline do not necessarily reflect the views of the Institute for Geosciences and Natural Resources or the Federal Ministry for Economic Cooperation and Development.

Acknowledgement

The NADIR project was conceptualised by Dr. Dirk Balzer, who started discussions on Risk Sensitive Spatial Planning between BGR and NDMA in 2018. His continuous efforts resulted in the realization and funding of the NADIR Project. This document is dedicated to the late Dr Balzer, in memory of his dedication, expertise, merits and expert contributions.

The activities in the NADIR project were carried out in close cooperation between the National Disaster Management Authority (NDMA) of the Islamic Republic of Pakistan and the Federal Institute for Geosciences and Natural Resources (BGR), Federal Republic of Germany. We acknowledge the great support and facilitation by NDMA and BGR staff, which proved to be crucial for achieving the implementation of the project. In addition, we highly appreciate the cooperation and support from Provincial and State Disaster Management Authorities (GBDMA, SDMA, PDMAs) and Planning and Development (P&D) Departments of the provinces especially during provincial-level workshops. We want to thank all representative for their continued efforts and collaboration. The editors furthermore wish to thank everyone else who participated in the different consultative workshops and discussions and contributed to the success of this guideline.

Abbreviations

Abbreviation	Meaning
4RF	Resilient recovery, rehabilitation and reconstruction framework
ADPC	Asian Disaster Preparedness Centre
AJK	Azad Jammu and Kashmir
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources)
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (Federal Ministry for Economic Cooperation and Development)
C&W	Communication and Works
CAREC	Central Asia Regional Economic Cooperation
CBDRM	Community-based Disaster Risk Management
CCA	Climate Change Adaptation
CCPA	Climate Change Policy and Adaptation
CDPR	Consortium for Development Policy Research
CERT	Community Emergency Response Training
COP	Conference of the Parties
DDMA	District Disaster Management Authority
DMO	Disaster Management Officer
DRF	Disaster Risk Financing
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EbA	Ecosystem-Based Adaptation
Eco-DRR	Ecosystem based Disaster Risk Reduction
EIA	Environmental Impact Assessment

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EKN	Embassy of the Kingdom of the Netherlands
EPA	Environmental Protection Agency
ESMP	Environmental and Social Management Plan
EWS	Early Warning System
FFC	Federal Flood Commission
FFD	Federal Forecasting Division
FWO	Frontier Works Organization
G2G	Government to Government
GB	Gilgit Baltistan
GBDMA	Gilgit Baltistan Disaster Management Authority
GCISC	Global Climate-Change Impact Studies Centre
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
GLOF	Glacial Lake Outburst Flood
GSDI	Global Spatial Data Infrastructure
GSP	Geological Survey of Pakistan
HIES	Household Integrated Economic Survey
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JICA	Japan International Corporation Authority
KP	Khyber Pakhtunkhwa
LIDAR	Light Detection and Ranging
M&E	Monitoring and Evaluation

MHVRA	Multi Hazard Vulnerability and Risk Assessment
MNA	Member of National Assembly
MoCC	Ministry of Climate Change (Pakistan)
MoPD&SI	Ministry of Planning, Development and Special Initiatives (Pakistan)
MPA	Member of Provincial Assembly
MSS	Minimum Service Standards
NADIR	Project: Promoting Resilience against Impacts of Natural Disaster in Pakistan
NatCat Model	Natural Catastrophe Model
NbS	Nature-based Solutions
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NDRMF	National Disaster Risk Management Fund
NGO	Non-governmental Organisation
NHA	National Highway Authority
NIAP	National Impact Assessment Program
NIDM	National Institute of Disaster Management
NSDI	National Spatial Data Infrastructure
P&D	Planning and Development
PaktTES	Pakistan Technology Evaluation Satellite
PBS	Pakistan Bureau of Statistics
PC	Planning Commission
PCRWR	Pakistan Council of Research in Water Resources
PDMA	Provincial Disaster Management Authority

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PMD	Pakistan Metrological Department
PRSS	Pakistan Remote Sensing Satellite
PSLM	Pakistan Social & Living Standards Measurement Survey
PSS	Punjab Spatial Strategy
REA	Risk Exposure Assessment
RID	Risk Informed Development
RSSP	Risk Sensitive Spatial Planning
SDG	Sustainable Development Goals
SDMA	State Disaster Management Authority
SFDRR	Sendai Framework for Disaster Risk Reduction
SME	Small and Medium sized Enterprises
SOP	Standard Operating Procedures
SoP	Survey of Pakistan
SPAP	Spatial Planning Authority of Punjab
SPCP	Spatial Planning Council of Punjab
SUPARCO	Space & Upper Atmosphere Research Commission
TMC	Tehsil Municipal Corporations
UC	Union Council
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations agency for urbanization and human settlements
UNSD	United Nation Statistics Division
USD	United States Dollar

WAPDA Water and Power Development Authority

WASA Water and Sanitation Agency

WCDR World Conference on Disaster Reduction

WS Workshop

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1 Background

1.1 Introduction

Pakistan regularly faces disasters triggered by natural hazards like avalanches, cyclones and storms, droughts, floods, glacial lake outburst floods (GLOF), earthquakes, landslides and tsunamis (NDMA Pakistan, 2013). Additionally, Pakistan's high susceptibility to impacts of climate change such as extreme weather events increases the effects. In addition to natural hazards, several man-made hazards are present in Pakistan, which can negatively impact the economy and well-being of society. These include industrial hazards, transport hazards, urban hazards, water table depletion due to uncontrolled water extraction and encroachment of the natural pathways of rivers and nullahs within cities.

Various disasters of a national scale have occurred in recent years in Pakistan. So, the 2005 Kashmir earthquake had severe direct impacts and triggered thousands of landslides. A prominent example is the Hattian Bala landslide that blocked the two streams of the Karli outlet of the Jhelum River (Konagai and Sattar, 2012). The 2010 and 2022 floods in Pakistan, although different in origin, were immense and unprecedented. Additionally to direct losses of life of more than 3,500 people, each event affected more than 33 million people and caused economic losses of more than USD 30 Billion through damages to infrastructure, housing, agriculture and livestock, and other assets (World Bank, 2022; Finance Division, 2023).

Climate change is a long-term change in the average weather patterns and is an increasingly important factor in the increased likelihood of the occurrence and intensity of extreme weather events. Climate change, a global phenomenon, affects the individual countries differently due to different patterns of change and differences in vulnerabilities and coping capacities. Countries of the Global South are hit hardest because they are more vulnerable to the damaging effects of hazards but have a lower coping capacity.

The Global Climate Risk Index 2000 - 2019, based on the most reliable data sets available on the impacts of extreme weather events and associated socio-economic data, placed Pakistan on 8th position of the countries most affected. The authors attributed this to the recurrence of severe events, especially since Pakistan is regularly placed among the ten most affected countries. This should be seen as a warning sign of increased risk of either frequent events or rare but extraordinary catastrophes (Eckstein, Kunzel and Schäfer, 2021).

Risk Sensitive Spatial Planning (RSSP) is an approach to prevent and mitigate the impacts of natural and anthropogenic hazards and climate change, that has gained attention recently. It involves the identification of hazards, vulnerabilities and potential risks in an area, the development of strategies to reduce the likelihood and consequences of disasters, and the integration of these strategies into land use and spatial planning and development (Cutter *et al.*, 2008).

Spatial planning is the process of negotiating and organizing land use and the allocation of resources to meet various social, economic, and environmental needs of a region or community (United Nations, 2020). Spatial planning responds to the need to plan the efficient use of land and assets as finite resources, while also promoting social equity and environmental sustainability (UNSD, 1992). It involves the development of policies and strategies to guide the physical and spatial development of a region or community, taking into account the social, economic, and environmental needs of the people living in that area. This includes the need to plan for adequate housing, infrastructure, and services, as well as the protection of the environment and natural and cultural heritage sites. The primary objective of spatial planning is to create sustainable, resilient, safe and liveable communities that can meet the needs of current and future generations.

Considering natural hazards within spatial planning is of paramount importance. By doing so, RSSP can reduce the impacts of and vulnerabilities to natural hazards. Additionally, the consideration of hazards in spatial planning helps avoiding exacerbating these hazards or even worse, creating new ones.

To summarize, RSSP is an essential for promoting sustainable and resilient development in the face of a changing climate and increasing hazards. By integrating risk considerations into spatial planning, communities can reduce their vulnerability to natural hazards and human-induced risks, protect natural resources and cultural heritage, and promote more equitable and sustainable development.

1.2 Context of the guideline

This guideline is based on NDMA's mandate specified in the NDMA Act, 2010. Under Chapter II, Article 9 (b) the Act specifies the preparation of the National Plan under the powers and functions of the National Disaster Management Authority. Article 10 (3) identifies the content of the National Plan that should include (a) measures to be taken for the prevention of disasters or the mitigation of their effects, b) measures to be taken for the integration of mitigation measures in the development plans, and (d) roles and responsibilities of different Ministries or Divisions of the Federal Government in respect of measures specified in clauses (a), (b) and (c). Similarly, Chapter III covers the functions and tasks of the Provincial Commission and the Provincial Disaster Management Authorities, that includes in 14 (2) (f) and (g) mitigation and prevention measures in development plans and the implementation thereof. Article 17 (3) specifies the content of the provincial plan that shall include (b) the measures to be adopted for prevention and mitigation of disasters; and (c) the manner in which the mitigation measures shall be integrated with the development plans and projects (Government of Pakistan, 2010a).

Disaster Risk Reduction (DRR) and DRR measures start right after a disaster. During reconstruction and rehabilitation, the mitigation and prevention of future hazards and disasters are of immense importance in increasing the resilience and safety of communities. This means that RSSP, which is mainly part of the pre-disaster sector (Fig. 1) with long-term solutions and interventions, needs to be extended towards the reconstruction phase (Balzer, Jäger and Kuhn, 2010). Incorporating hazard information in the broader spatial planning processes aims at mitigation and prevention. It involves the reduction of negative effects of both natural and human-induced hazards on individuals, infrastructure, and the environment. In this regard, the recommendations in this guideline complement the recommendations in the resilient recovery, rehabilitation and reconstruction framework (4RF Manual) published by the Ministry of

Planning, Development and Spatial Initiatives and support especially the fourth strategic recovery objective of Restore and improve basic services and physical infrastructure in a resilient and sustainable manner. This guideline on RSSP also contributes towards mitigating the identified underlying institutional and systemic challenge of weak urban planning and extends this towards a comprehensive risk sensitive land use planning (Ministry of Planning, Development and Special Initiatives, 2022).

Prevention includes identifying potential risks and hazards to eliminate them, whereas mitigation deals with reducing the severity of their impact. Spatial planning can play a vital part in both aspects, as it can help identify areas most susceptible to hazards and direct the development of infrastructure and land use in a risk-reducing manner.



1 Disaster Risk Management (DRM) Cycle

Disaster Risk Reduction (DRR) mainstreaming refers to incorporating disaster risk reduction factors into policies and plans across all sectors, ranging from education to health and extending to infrastructure development. This entails taking a proactive approach towards DRR by factoring potential hazards and vulnerabilities into all decision-making processes rather than simply responding to disasters after they occur. “More and more people are recognizing disasters as failures of development or as the result of unsustainable development. This implies that we ourselves are creating the social, economic and political conditions that lead to disasters” (ADPC, 2010). In order to integrate disaster mitigation and climate

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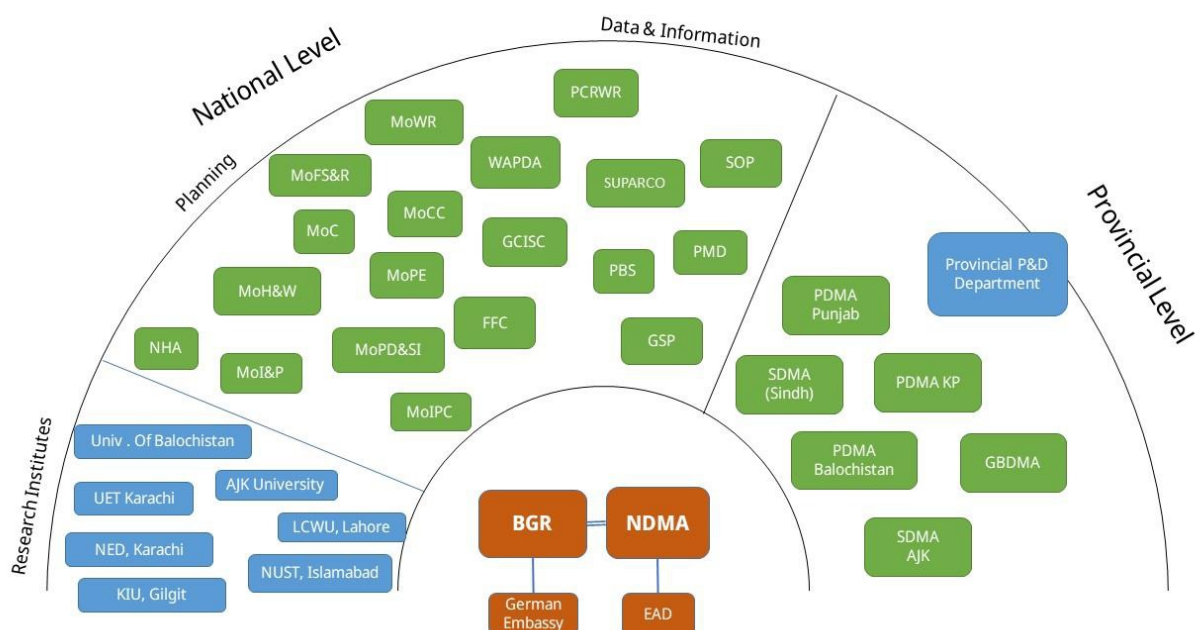
change adaptation into spatial planning processes, this guideline aims explicitly to demonstrating possible ways forward in mainstreaming DRR Programming into different spatial planning and development processes at different tiers of government in Pakistan.

There are several aspects/levels of mainstreaming DRR in policies and plans. One approach is to complement the planning process with DRR measures to address specific sectoral DRR requirements. However, the more appropriate approach is to integrate DRR measures at every phase of the developmental processes and institutionalize the DRR component in the entire process cycle from policy making to project closure. This will ensure that development is risk sensitive to improve the safety of people and critical facilities, protect the national and built environment, and create resilient livelihoods and economies. This approach is a multi-stakeholder task, and governments have an exemplary role as risk avoiders in providing public goods and services by refraining from actions that generate risks (UNDRR, 2019).

1.3 Development of this guideline

The NADIR project aimed at mainstreaming DRR through developing country specific robust RSSP tools, processes, and practices. The project was conceptualized in May 2019 and later agreed on during the G2G negotiations between Pakistan and Germany in September 2019. The project was then jointly implemented by the BGR and NDMA with the project timeline spanning between 2021 and 2024. A project steering committee was formed for the smooth manoeuvring of various contours of project implementation (*Appendix B*).

Relevant stakeholder for the project on risk-sensitive spatial planning - NADIR



2 NADIR Stakeholder Map

Among the outputs under the NADIR project is this guideline, titled "Guideline for Mainstreaming Hazard and Disaster Risk Information in Spatial planning processes in Pakistan", which emphasizes developing implementable practices that reduce risks through RSSP at all tiers of government. The guideline in hand is the product of an inclusive consultative process among the national, provincial, and local stakeholders in disaster management, and planning & development sectors. The project identified potential

stakeholders through stakeholder mapping during the inception phase. In a first engagement, the project team initiated one to one meetings with the stakeholders to introduce the project scope and expected deliverables (Fig. 2).

Throughout the project, a consultative process was adopted to maintain a dialogue between identified stakeholders on all levels to create awareness of the need to mainstream DRR and incorporate their valuable inputs and insights in developing this guideline. This was achieved by organising a series of consultative workshops at national and provincial level, that brought together practitioners, experts, and stakeholders with a mandate in disaster risk management (DRM) or spatial and development planning. The post-workshop reports have been compiled and shared with the participants and are available from NDMA. The rundown/list of the conducted workshops is given in *Table 1*.

Table 1 Consultative Workshops within NADIR Project

No	Workshop	Title	Date
1.	Consultative Workshop I	Multi Hazard Vulnerability and Risk Assessment (MHVRA)	28. July, 2022
2.	Consultative Workshop II	Project Planning and Mainstreaming of Disaster Risk Reduction (DRR)	5. Oct 2022
3.	Consultative Workshop III	Spatial and Non-Spatial Data Needs and Availability	21. Nov 2022
4.	Consultative Workshop IV	Including Multi Hazard Vulnerability and Risk Assessment (MHVRA) and Hazard/Risk Information into Spatial Planning	22. Nov 2022
5.	Follow up Meeting on Workshop I	Multi Hazard Vulnerability and Risk Assessment (MHVRA), Incorporation of Risk Assessment in the Planning Process in Pakistan	23. Nov 2022
6.	Consultative Workshop V	Including Hazard Information in Spatial Planning Processes	6. - 7. March 2023
7.	Consultative Workshop VI	Risk sensitive spatial planning in practice	20. June 2023
8.	Consultative Workshop VII (AJK)	Provincial workshop on Risk sensitive spatial planning in practice in AJK	23. - 24. August 2023
9.	Consultative Workshop VII (KP)	Provincial workshop on Risk sensitive spatial planning in practice in KP	18.-19. Oct 2023
10.	Consultative Workshop VII (Punjab)	Provincial workshop on Risk sensitive spatial planning in practice in Punjab	5. - 6. Dec 2023
11.	Consultative Workshop VII (Balochistan)	Provincial workshop on Risk sensitive spatial planning in practice in Balochistan	30. - 31. Jan 2024
12.	Consultative Workshop VII (Sindh)	Provincial workshop on Risk sensitive spatial planning in practice in Sindh	27. - 28. Feb 2024
13.	Consultative Workshop VII (GB)	Provincial workshop on Risk sensitive spatial planning in practice in GB	5. - 6. March 2024
14.	Workshop VIII	Validation Workshop	29. May 2024

1.4 Vision Development

A vision is an idealistic reality, a broader target or dream statement, that describes a broad development goal, and spatial planning activities aim to reach these objectives. RSSP is based on a common vision that determines the basic intention of reducing disaster risks by mitigating or preventing disasters through a participatory planning process.

Possible vision statements were developed in a national workshop in March 2023 and discussed in all subsequent workshops. Additionally, participants voted for the preferred vision. Results of vision voting (see *Table 2*) show a clear preference for the following vision:

Develop resilient Pakistan against hazards to minimize life and property losses through active involvement of communities.

Table 2 Results of Vision Voting done in the different workshops (WS)

Vision Statement	WS V	WS VI	WS VII (AJK)	WS VII (KP)	WS VII (Punj)	WS VII (Bal) Day 1	WS VII (Bal) Day 2	WS VII (Sin)	WS VII (GB)	Total votes
A disaster resilient community for sustainable development in Pakistan.	17	1	10	15	Rank 3	31	9	20	17	120
Develop resilient Pakistan against hazards to minimize life and property losses through active involvement of communities.	16	16	33	30	Rank 1	40	31	23	17	206
In order to cater for disaster resilient Pakistan through risk sensitive and inclusive sustainable development of Pakistan by 2050.	15	20	22	11	Rank 2	20	31	18	14	133

Alternative visions were suggested:

- Be a part of Disaster Resilient Pakistan by 2035.
- Develop resilient Pakistan against hazards to minimize life and property losses through risk sensitive and inclusive development planning in Pakistan by 2050.
- To develop an (anthropogenic/natural) resilient community & infrastructure for sustainable development and addressing climate change in Pakistan

Additionally, stakeholders suggested the inclusion of the following phrases or terms:

- Climate change impacts
- Communities and stakeholder
- Timeline: by 2035

In the validation workshop in May 2024, the vision was discussed and participants agreed on the final vision for RSSP in Pakistan:

Develop a resilient Pakistan against hazards to minimize life and property losses and to reduce the impacts of climate change through active involvement of communities and stakeholders.

1.5 Overarching Objectives

Spatial Planning is increasingly regarded as critical instrument for DRR. Its attractiveness lies in its ability to regulate the long-term use of space, that governs the utilization of land resources in an organized manner. Spatial planning uses the locality to link hazards and elements at risk, like people, infrastructure, or the environment, as a basis for sustainable development. Through appropriate land use allocation and instruments like building regulations, exposures to natural hazards in current and future situations can be minimized or even prevented. Multi-hazard approaches are required since a location may receive threats from numerous types of natural hazards. (Sutanta, Bishop and Rajabifard, 2010; Chigudu and Chirisa, 2020; Esmail *et al.*, 2022)

In RSSP, the main challenge is framed by three realities: a growing population, the scarcity of suitable space and other limited resources and the increase in frequency and intensity of natural disasters. The overall objective of this guideline is to provide organizational and technical guidelines for the incorporation of DRR and mitigation strategies in spatial planning and development processes. (Sutanta, Bishop and Rajabifard, 2010)

- To understand concepts and techniques of participatory risk sensitive land use management;
- To introduce the use of multi-hazard, vulnerability, and risk assessment tools into spatial planning;
- To develop land use planning interventions that reduce and mitigate disaster risk;
- To constitute tools or methods such as policy guidelines, legal guidelines and institutional provisions for RSSP and DRM;
- To enforce or implement disaster risk reduction into the local spatial planning and development process;
- To ensure that planners and other professionals working in urban and regional planning, development and management have knowledge of disaster risk reduction;

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- To include specific knowledge of which types of planning and land use actions can contribute to reducing risks and increasing urban and rural resilience;
- To ensure that the planning process is guided by a participatory approach that includes stakeholders at all levels, including people and communities;

2 Compliance with and contribution to National, Regional, and International Commitments

Risk Sensitive Spatial Planning (RSSP) in Pakistan aligns with various international and national commitments aimed at Disaster Risk Reduction (DRR), climate change adaptation (CCA), and sustainable development. A summary list is available in *Appendix D*.

RSSP is linked with the Sendai Framework for Disaster Risk Reduction (SFDRR) by promoting collaboration to integrate disaster risk into management practices, encouraging the establishment of mechanisms to ensure compliance with safety provisions, and fostering regional cooperation for disaster risk reduction. It emphasizes mainstreaming disaster risk assessments into land use and rural development planning, as well as promoting the incorporation of disaster risk management into post-disaster recovery processes under various interventions and priority pillars such as 7, 27(d), 28(a), 28(d), 30(g), 30(f), 33(j), and 33(k).

Moreover, RSSP is aligned with the New Urban Agenda, emphasizing sustainable and inclusive urban development and housing policies. It promotes resilient urban planning, equitable access to infrastructure, and the protection of cultural and natural heritage in cities and human settlements.

RSSP supports the goals of the Paris Agreement on Climate Change by emphasizing the intrinsic relationship between climate change actions and sustainable development. It advocates for sustainable urban development, renewable energy integration, emission reduction strategies, and climate resilience and adaptation measures.

RSSP contributes to the achievement of Sustainable Development Goals (SDGs) by addressing poverty eradication under Goal 1 Targets 1.4 and 1.5, building resilient infrastructure under Goal 9 Targets 9.1, 9.2, 9.3 and 9.4, promoting inclusive industrialization, and making cities and human settlements inclusive, safe, resilient, and sustainable under Goal 11 Targets 1-7, taking urgent climate action under Goal 13 Targets 13.1, 13.2, 13.3 and 13.a and integrate biodiversity conservation into land use decisions, ensuring sustainable management of forests, combating desertification, and halting biodiversity loss under goal 15.

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It underscores the imperative of aligning spatial planning with commitments outlined in the United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Parties (COP) meetings, emphasizing precautionary measures, sustainable development, and cooperative efforts for climate action. It also links with initiatives by organizations like the Global Facility for Disaster Reduction and Recovery (GFDRR), advocating for inclusive design, building resilience in infrastructure, and climate integration across all activities.

Moreover, Pakistan's national policies on climate change adaptation and disaster risk management stress the need for pro-poor, gender-sensitive approaches and the integration of DRR into development planning. The vision outlined in Pakistan Vision 2025 underscores the transformation of urban areas into sustainable, safe and smart cities through improved governance, infrastructure, and community participation.

RSSP is closely linked with interventions from the National Disaster Management Plan 2012-22 and the National Disaster Risk Reduction Policy 2013, focusing on awareness programs, mainstreaming DRR into development policies, and enhancing technical capacity. Overall, RSSP underscores the critical importance of aligning spatial planning efforts with these commitments to strengthen resilience and sustainability in Pakistan.

The National Adaptation Plan (NAP) of Pakistan focuses under the topic of spatial planning on integrating climate resilience into urban development, protecting ecosystems, and ensuring sustainable land use. It emphasizes the importance of climate-informed zoning, disaster risk reduction, and the preservation of natural resources to mitigate the impacts of climate change and enhance the adaptive capacity of communities and infrastructure. NAP Objective 2 promotes enhancing land regulation and land use planning to strengthen resilient service provision. This involves ensuring that land records and maps are unified, accurate, and digitized, forming the foundation for better land allocation, risk-sensitive spatial planning, and asset management strategies to support resilience (MoCC, 2023).

3 Guiding Principles

This chapter presents a set of guiding principles aimed at facilitating the mainstreaming of hazard and risk information in spatial planning processes. These principles are essential for effective integration, transparency, gender equity, sustainable development, and the recognition and respect of traditional knowledge. These principles form the basis of any type of planning and development. Adhering to these principles enables spatial planners, developers, and practitioners to ensure that hazard and risk considerations are systematically incorporated into planning decisions, leading to more resilient and sustainable development.

3.1 Integration

The principle of integration emphasizes the need to incorporate hazard and risk information into all stages of the spatial planning process. This includes collecting, analysing, and disseminating data related to hazards, vulnerabilities, and exposures. Integrating this information allows planners to identify areas prone to natural hazards and assess the potential impacts on human settlements, infrastructure, land use, and the environment. By integrating hazard and risk considerations into spatial planning, decision-makers can develop strategies that minimize vulnerabilities and enhance community resilience.

3.2 Transparency

Transparency is crucial for effectively mainstreaming hazard and risk information in spatial planning processes. It entails ensuring the availability, accessibility, and comprehensibility of data, methodologies, and decision-making processes to all stakeholders. This includes availability and accessibility for the citizens. Transparent communication fosters trust, enhances collaboration, and enables the meaningful participation of communities, experts, and policymakers in the planning process. By providing accessible and understandable hazard and risk information, spatial planners empower stakeholders and communities to make informed decisions and contribute to the developing resilient spatial plans.

3.3 Social Inclusion and Gender Equity

The social inclusion and equity principle underscores the need to consider marginalized and vulnerable groups in hazard and risk mainstreaming efforts. Spatial planners must address the specific challenges faced by disadvantaged communities, including women, low-income groups, ethnic minorities, and

people with disabilities. By incorporating social inclusion and equity into spatial planning, planners promote fair distribution of resources, access to services, and participation in decision-making, ensuring that no groups are disproportionately affected by hazards and risks.

The principle of gender equity highlights the importance of considering gender-specific vulnerabilities, needs, and capacities when mainstreaming hazard and risk information in spatial planning. Women and men often experience disasters differently due to gender roles, socio-cultural norms, and different access to resources. Spatial planners must ensure that hazard and risk assessments account for these differences and promote gender-responsive planning. Engaging women in decision-making processes and empowering them as active agents of change can contribute to more effective risk-reduction strategies and resilient spatial planning outcomes.

3.4 Respecting Traditional Knowledge

Respecting traditional knowledge is a fundamental principle in mainstreaming hazard and risk information in spatial planning processes. Traditional knowledge accumulated over generations and held by indigenous peoples and local communities often includes valuable insights into hazards, vulnerabilities, and coping mechanisms. Planners must engage with these knowledge holders, recognize their expertise, and integrate traditional knowledge systems into hazard and risk assessments and planning scenarios. By valuing and incorporating traditional knowledge, spatial planners can enrich their understanding of hazards, improve risk management strategies, and promote cultural diversity and inclusivity.

3.5 Multi-scale Approach

The principle of a multi-scale approach emphasizes the need to consider hazards and risks at various spatial scales, from local to regional and national levels. Spatial planners should not only focus on individual sites or specific regions but also analyse the interconnectedness and potential cascading effects of hazards across different scales. By adopting a multi-scale approach, planners can identify cross-boundary risks, coordinate responses, and implement holistic strategies that address the diverse challenges communities face in different locations.

3.6 Adaptive Management

The principle of adaptive management recognizes the dynamic nature of hazards and risks. Spatial planners should embrace an adaptive management approach, which involves continuously monitoring, evaluating, and adjusting planning strategies based on new information, changing conditions, and evolving knowledge. By adopting adaptive management practices, planners can improve the effectiveness and resilience of spatial plans over time, ensuring that they remain relevant and responsive to emerging hazards and uncertainties.

3.7 Public Awareness and Education

Public awareness and education principles are crucial in mainstreaming hazard and risk information in spatial planning processes. Planners should prioritize educating and informing the public about hazards, risks, and appropriate response measures. This includes disseminating accessible and accurate information through various communication channels, conducting public awareness campaigns, and facilitating community-based training programs. By enhancing public understanding and awareness, spatial planners can foster a culture of preparedness, empower individuals and communities to take proactive measures and encourage active participation in the planning process.

3.8 Collaboration and Partnerships

Collaboration and partnerships are vital for effectively mainstreaming hazard and risk information in spatial planning processes. Planners need to actively engage with diverse stakeholders, including government agencies, local communities, non-governmental organizations, academia, and private sector entities. Collaborative efforts can facilitate data sharing, joint problem-solving and the co-creation of innovative solutions. By fostering partnerships, spatial planners can leverage stakeholders' collective expertise, resources, and perspectives to develop inclusive and context-specific spatial plans that address the complex challenges posed by hazards and risks.

3.9 Continuous Improvement

The principle of continuous improvement highlights the importance of learning from past experiences and incorporating lessons learned into future planning processes. Planners should promote a culture of continuous learning, evaluation, and feedback, ensuring that best practices, innovations, and successes are documented, shared, and integrated into planning frameworks. By embracing a culture of continuous improvement, spatial planners can enhance the effectiveness, efficiency, and resilience of spatial planning processes and contribute to ongoing advancements in hazard and risk management.

3.10 Data Accessibility and Standardization

The principle of data accessibility and standardization emphasizes the importance of making hazard and risk data easily accessible, standardized, and interoperable. Spatial planners should strive to establish data sharing mechanisms, standard data formats, and standardized methodologies for hazard and risk assessment. This ensures that stakeholders can access and utilize reliable and consistent data, facilitating informed decision-making and enhancing the comparability and compatibility of information across different spatial planning processes.

3.11 Long-term Resilience

The principle of long-term resilience focuses integrating hazard and risk information to promote resilience beyond immediate response and recovery. Spatial planners should adopt a forward-looking perspective and consider the long-term impacts of hazards and risks on spatial development and the long-term impacts of spatial development on hazards and risks. This involves incorporating climate change projections, scenarios of future land, and infrastructure planning into spatial plans. By emphasizing the long-term resilience of communities, planners can enhance adaptive capacity, minimize future vulnerabilities, and facilitate sustainable development in the face of evolving hazards and risks.

3.12 Governance and Policy Integration

The good governance and policy integration principle highlights the importance of aligning hazard and risk mainstreaming with existing governance structures and policy frameworks. Spatial planners should coordinate with relevant government departments and agencies responsible for disaster risk reduction, environmental management, and urban planning. By integrating hazard and risk information into existing policies, plans, and regulations, planners can ensure consistency, coherence, and effective implementation of risk reduction measures.

3.13 Financial Sustainability

The financial sustainability principle emphasizes the need for adequate and sustainable funding mechanisms to support hazard and risk mainstreaming efforts in spatial planning. Spatial planners should explore innovative financing options, such as public-private partnerships, risk-based insurance schemes, and climate finance mechanisms. By securing sufficient financial resources, planners can invest in capacity building, data collection, infrastructure development, and community resilience initiatives, ensuring the long-term viability of hazard and risk mainstreaming in spatial planning processes.

3.14 Sustainable Development

Balancing human development with the capacity of natural systems is crucial for sustainable spatial planning. This principle emphasizes the need to manage resources to meet present needs without compromising the ability of future generations to meet their own needs. By recognizing the dependence of society and the economy on natural resources and ecosystem services, spatial planning can ensure their long-term availability and promote sustainable development.

The principle of sustainable development underscores the necessity of integrating hazard and risk information into spatial planning to promote long-term sustainability. Planners should balance socio-economic development and environmental conservation, considering the potential risks associated with various development activities. By incorporating hazard and risk considerations into land use planning, infrastructure development, and natural resource management, spatial planners can foster sustainable and resilient communities that are better prepared for future hazards.

3.15 Ecosystem-Based Adaptation

Eco-DRR is to maintain, restore and sustainably manage ecosystems and ecosystem services, to use them as buffer zones and buffers for dangerous natural phenomena, and to provide humans and local communities with functions such as food and water supply. Eco-DRR is closely related to Ecosystem-based Adaptation (EbA) and approaches to adapt to climate change. They all involve the restoration and management of ecosystems and their services to reduce the vulnerability of human communities to the impacts of climate change.

By considering the interconnectedness and interdependencies within ecosystems, spatial planning can enhance the resilience and sustainability of natural systems. Emphasizing ecosystem-based management recognises the important role and services of natural systems. It promotes the wise use of resources while safeguarding biodiversity and ecosystem services. EbA is closely linked to sustainable development.

3.16 Precautionary Principle

The precautionary principle guides planning and decision-making in the face of potential threats of serious or irreversible damage. Poor understanding or lack of complete scientific certainty should not be used to postpone cost-effective measures to prevent environmental degradation. This principle highlights the importance of proactive measures, prevention, and preparedness in spatial planning. Adopting a precautionary approach can address emerging issues effectively, minimizing risks and protecting natural resources (UN General Assembly, 1992)

3.17 Multi-sectoral Collaboration

Collaboration among various sectors is essential for effective spatial planning based on a comprehensive system. This principle highlights the need for coordinated efforts and partnerships across government departments, civil society organizations, private sector entities, and local communities. Spatial planning can leverage diverse expertise, resources, and perspectives by fostering multi-sectoral collaboration. This collaboration can lead to more comprehensive and integrated approaches to resource management, facilitating the achievement of sustainable development goals and forming the basis for a coordinated effort and implementation of mainstreaming DRR.

4 Mainstreaming DRR in Planning and Development

4.1 Risk Sensitive Spatial Planning

The United Nations defines spatial planning as the process of negotiating and organizing land use and the allocation of resources to meet various social, economic, and environmental needs of a region or community (United Nations, 2020). Spatial planning responds to the need to plan the efficient use of land and related assets as finite resources while promoting social equity and environmental sustainability (UNSD, 1992). It involves the development of policies and strategies to guide the physical and spatial development of a region or community, taking into account the social, economic, and environmental realities and the needs of the people living in that area. This includes the need to plan for adequate housing, infrastructure, and services, and the protection of the environment and natural and cultural heritage sites. The primary objective of spatial planning is to create sustainable, resilient, safe, and liveable communities that can meet the needs of current and future generations.

Spatial planning is also the umbrella term for different sectoral planning aspects. Ideally, it combines different aspects of sectoral spatial planning efforts and focuses on the interdisciplinary aspect of incorporating sectoral planning into one comprehensive plan. Spatial planning can be considered a weighing process of different interests, balancing short-term economic benefits with mid- or long-term social and environmental benefits (Pahl-Weber and Henckel, 2008). In this sense, spatial planning is a tool used by governments to coordinate, control, protect and direct the use of space to facilitate sustainable and just development within a country or society. Spatial planning involves planning processes of social, economic, and environmental change to bring about certain ends, together with drawing up plans, maps, or diagrams that indicate where spatial activities should take place (Kobayashi, 2020). Spatial planning consists not only of the plan, including a spatial map itself, but also considers other aspects like mandate, legal frameworks, coordination and planning procedures, public participation, implementation, and monitoring and evaluation of the plan (Fig. 3).

Land use planning focuses on the demarcation of different land use zones, including a definition of areas with allowed and restricted uses. Land use planning can be defined as “the systematic assessment of land and water potential, alternatives for land use, and economic and social conditions to select and adopt the best land use options” (Metternicht, 2017).

Urban planning focuses on the organisation and management of urban areas and the specific needs of urban communities and the urban environment. Urban planning is sometimes termed town planning or

city planning and is concerned with the specific challenges of urban areas, including infrastructure and the built environment.

Urban planning as a specific part of spatial planning is of growing importance. It is estimated that by 2050, approximately two-thirds of the world's population will be living in urban areas (International Monetary Fund 2014). A rapid urbanization rate and the accompanied growing vulnerability to climate change challenge cities and urban areas in Pakistan. The rise of spatial inequalities and the growing pressure of migration and conflict pose an additional distinct set of challenges. UN-Habitat emphasizes the paradigm shift towards a people-centred approach in urban planning with the central aim of improving the quality of life in existing and new urban settlements (Mwamati, 2012).

Risk sensitive spatial planning (RSSP) is mainstreaming Disaster risk reduction (DRR) in spatial planning by incorporating its key principles into any spatial planning and at any stage of the spatial planning process, including the development of goals, governance arrangements, policies, and practices.

Disaster Risk Reduction (DRR) is defined as the “concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events” (ADPC, 2010) (NDMA, 2016).

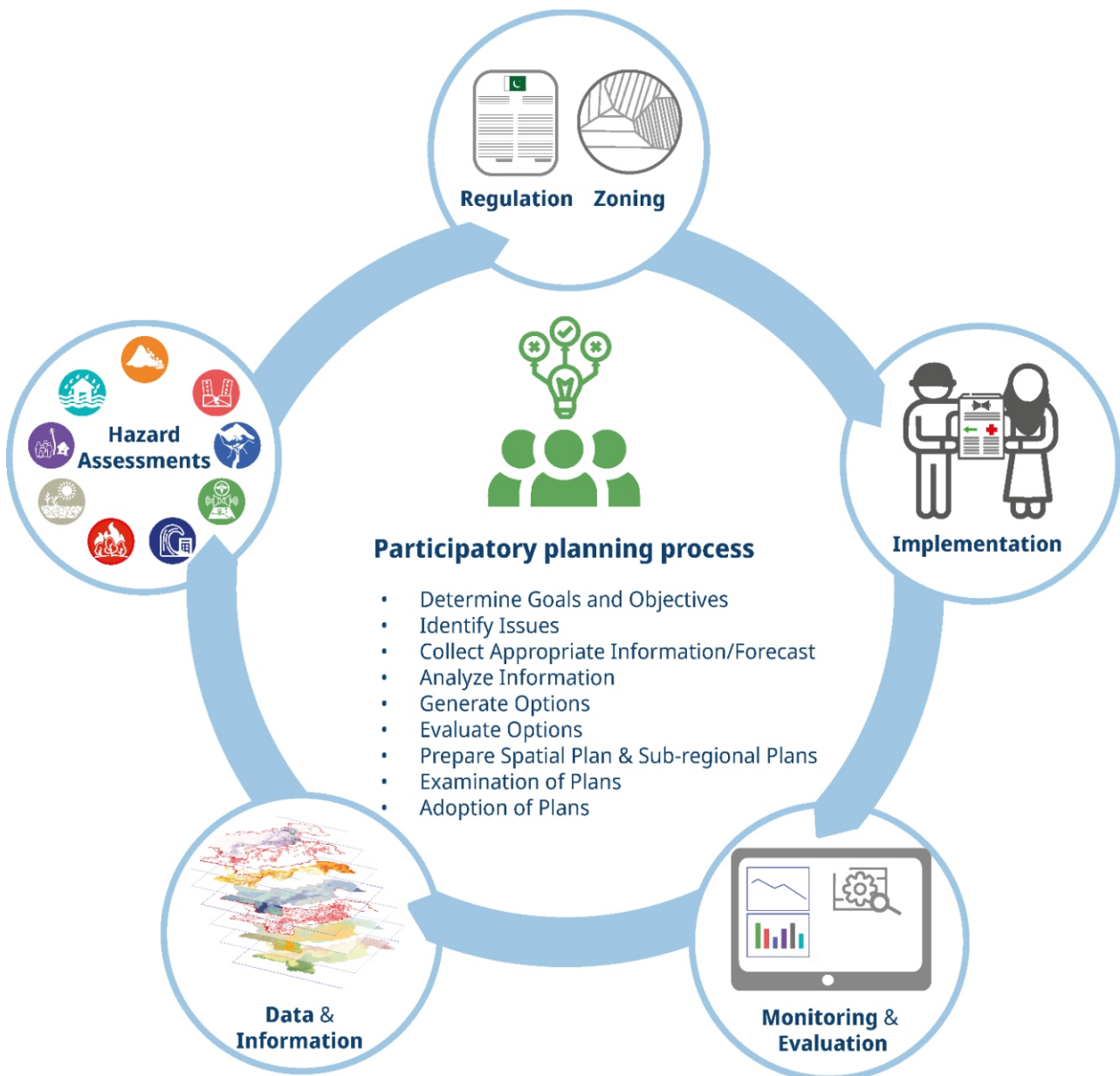
More people recognise disasters as failures of development or as the result of unsustainable development. This implies that we ourselves are creating the social, economic, and political conditions that lead to disasters (ADPC, 2010). Considering natural hazards within spatial planning is, therefore, of paramount importance in DRR. In this way, RSSP can be used to reduce the impacts of and vulnerabilities to natural hazards. Failure to consider hazards in spatial planning might exacerbate the impacts of hazards or - even worse - create new hazards. “Disaster by Choice” authored by Ilan Kelman explains this in great detail, adding that all disasters are human-induced, implying that our policies turn hazards into disasters (Kelman, 2020). There's another notion that disasters lead to development and development leads to disasters, if not properly planned and executed.

RSSP is an important interdisciplinary, strategic, and participatory approach to achieve overarching policy objectives like resilience or sustainability in a changing climate and increasing hazards (Dandoulaki *et al.*, 2023). By integrating risk considerations into spatial planning, communities can reduce their vulnerability to natural and human-induced hazards and risks, protect natural resources and cultural heritage, and promote more equitable and sustainable development.

RSSP goes hand in hand with Risk Informed Development (RID), which considers disaster risks in development planning, budgeting and implementation. RID is an interdisciplinary, strategic, and flexible decision-making principle that addresses the interconnected nature of risks. RID focuses on the integration of disaster risk reduction into any policy, legal instruments, and development strategies and projects. It recognizes that risk and development are influencing each other and that decisions on development can on the one hand contribute to the creation of risk but, on the other hand, also entail opportunities and co-benefits due to reduced risks and safer communities. (UNDP, 2022)

Ecosystems play an important role in DRR. Additional to recognising, that everyone in the world depends on nature and ecosystem services to provide the conditions for a decent, healthy, and secure life, the regulating services provided by ecosystems are of growing importance in a long-term and sustainable disaster risk reduction (Millennium Ecosystem Assessment Board, 2005). In risk sensitive spatial planning this calls for a close collaboration between environmental protection and DRR organisations and practitioners. In contrast to conventional structural disaster management, eco-DRR embraces an

ecosystem-based approach that focuses on nature, ecosystem services and human practices (Wickramasinghe, 2021).



3 Spatial Planning Process based on Participatory Approach and Hazard Information

4.2 Background of MHVRA intervention

The National Disaster Management Authority (NDMA), with the support of Japan International Cooperation Agency (JICA), finalized the National Disaster Management Plan (NDMP) (2012 – 2022) in 2012 in line with the provision of the National Disaster Management Act (Chapter II, Section 10). The NDMP aims to enhance Pakistan’s capacity to prepare for and respond to disasters by defining the measures necessary for disaster management and risk reduction (Government of Pakistan, 2012).

The NDMP includes a macro level hazard and risk assessment resulting in district-wise Risk Indexing. Based on this risk indexing, the districts of Pakistan were prioritized and the baseline for micro level Multi

Hazard Vulnerability and Risk Assessment (MHVRA) was set. The MHVRA procedure, developed by NDMA, is a uniform and information-driven approach for efficient and sustainable disaster management and has a pronounced bearing especially on DRM, credibility and usefulness of developed datasets. MHVRA aims to provide datasets and tools as the basis for a risk information management system for informed decision-making (Government of Pakistan, 2012).

The implementation roadmap of the NDMP covers 15 years (2016-2030) and governs the implementation of NDMP. In this roadmap, the 157 districts of Pakistan are assigned to 3 phases for conducting MHVRA and implementing Community-based Disaster Risk Management (CBDRM), where these activities have to be completed for the entire country by 2030. The priority given to districts for MHVRA depends upon risk indexing, input from PDMA, historical hazard profiles, prevalent hazards, vulnerabilities, and general conditions.

The process of conducting MHVRA studies is explained in the NDMA "Policy For Conduct of Multi Hazard Vulnerability and Risk Assessment", starting with the selection of area, the process of proposal and firm selection, conducting the assessments with a stage-wise monitoring mechanism by the NDMA, followed by the approval of the project/analysis results by the steering committee. The final step is the publication and advocacy of the MHVRA products and tools to be carried out at the concerned provincial and district levels.

The MHVRA Policy Guidelines mention that only government-endorsed datasets are credible data sources. The prescribed models in the guidelines under standardized mechanisms to maintain unanimity in the national risk picture with uniform risk profiles and models. Therefore, it is essential that the process is compatible with the national policy guidelines and that hazard models are based on what is indicated in the policy so that the output is uniform hazard layers and maps. The datasets can only be incorporated within the central database if they align with the nationally prescribed structures.

In addition MHVRA, the NDMP Implementation Roadmap (2016-2030) focuses on other interventions as well, such as Community-Based Disaster Risk Management (CBDRM) aimed at awareness and advocacy, skills and knowledge sharing, and development of an understanding of structural and non-structural development measures to protect livelihoods from natural disasters in civil society, government, and non-government agencies.

4.3 MHVRA, Hazard and Risk Information

MHVRA aims to quantify multi-hazard risks at the lowest administrative unit based on the four factors hazard, exposure, vulnerability, and coping and adaptive capacity. The procedure starts with identifying prevailing hazards in the selected area, such as hydrological, meteorological, climatological, social, economic, geophysical, and geological hazards. Scientific hazard assessments provide information on the location, intensity, frequency (return period), and probability of the identified prevailing hazards (NDMA, 2016).

Exposure assessment is defined as elements at risk directly proportionate to hazard and is based on an overlay analysis, superimposing elements at risk on one hazard. The exposure element include, among others, demography, infrastructure, and essential facilities.

Vulnerability is the degree to which a community, structure, or economy is unable to cope with and increase the susceptibility to the impacts of hazards. Vulnerability is divided into physical and social vulnerability, where physical vulnerability assesses structural measures, e.g., engineered vs non-engineered and social vulnerability characterizes social, economic, demographic, and housing factors that define a community's capability to cope with and adapt to hazards.

Capacity is “the combination of all the strengths, attributes and resources available within a community, society or organization” (NDMA, 2016) to manage adverse conditions and even prevent disaster. As introduced above, capacity assessment within MHVRA includes coping and adaptive capacity. The coping capacity includes measures to prepare communities and administration for emergencies, or disaster response. In contrast, adaptive capacity is the ability of a system or individual to adapt to climate change (or a disaster).

Finally, risks are calculated by assessing the potential impact of each specific hazard individually following the formula:

$$Risk = \frac{(Hazard \times Exposure \times Vulnerability)}{Capacity}$$

resulting in an overall quantification of risk at Union Council (UC) level.

4.4 Mainstreaming Hazard and Risk Information in Spatial Planning Processes

It is globally recognised, that mainstreaming hazard and risk information is a key part of disaster risk management (DRM). The primary purpose of conducting MHVRA is to quantify disaster risks for natural hazards. However, the MHVRA policy guideline includes in Chapter 16ff recommendations for risk treatment and DRR Programming. Recommendations include mainstreaming DRR into development activities and implementing structural measures to increase the resilience to impending disaster. This includes the consideration of hazards in spatial planning at the different levels, making spatial planning risk sensitive.

Advocacy and capacity building on the use of MHVRA is mentioned in the MHVRA Policy Guideline as an integral part. Highlighted are the training needs in utilizing MHVRA tools and results, their role in effective long-term land use planning, their integration into development processes, and their role as a tool for new site selection.

However, risk information is not conclusive for spatial planning processes but is only a first step to support risk sensitive spatial planning. More detailed information as covered in primarily hazard assessments, but also in exposure, vulnerability and capacity assessments together with additional spatial information is needed for risk-sensitive spatial planning. It is essential to think about the use of hazard information not only within MHVRA but also for other processes like RSSP, which is already in the hazard assessment stage.

ADPC highlighted in their guidelines on mainstreaming DRR key elements of making land use planning risk sensitive (ADPC, 2010):

- Conducting thorough hazard assessments that consider both natural and human-induced hazards is crucial. This involves analysing historical data, conducting risk modelling, and engaging experts to understand the potential hazards and their impacts on the area of interest (UNDRR, 2019).
- Develop hazard-specific guidelines and regulations that provide clear instructions for development activities in hazard-prone areas. These guidelines can include building codes, infrastructure design standards, evacuation plans, shelters, and critical facilities tailored to specific hazards.

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- Incorporate hazard information into land use planning processes to ensure that development activities are carried out in areas with lower hazard risks. This can involve zoning regulations, setback requirements, and other land use measures that consider hazard exposure. It will also help to maintain and update land inventory with their level of vulnerability.
- Promote public awareness about hazards and their potential impacts through educational campaigns and community engagement. Encourage community members to understand their vulnerability to hazards, participate in planning processes and identify the risks that a community agrees to take.
- Creating and maintaining affordable housing opportunities is critical to planning processes to ensure equitable and inclusive communities.
- Identify low-lying areas using existing floodplain maps and historical events to protect the natural environment for functioning as a natural retention area.
- Low-lying areas along rivers, streams, or wetlands often have natural flood retention capacity. Incorporate flood retention areas into land use planning and zoning regulations. Designate these areas as protected zones where reclamation or development is restricted or prohibited. This helps ensure their long-term preservation for flood management purposes.

MHVRA and hazard and exposure assessments are only the first step in mainstreaming DRR. Likewise, RSSP is an additional tool in sustainable DRM. A success story of RSSP is the implementation of a nature-based solution to address water-related hazards in urban areas in the Benjakitti Forest Park project in Bangkok, Thailand, illustrating its transformation from an industrial area into a sponge city. This park has over 100 floating islands across a total area of 102 acres. Four lakes within the park play a crucial role in purifying 1600 m³ of water daily, supported by a large storage facility with a capacity of 128,000 m³ (FuturArc, 2023). It contributes to the city by providing fresh water, offering recreational opportunities, mitigating urban flooding, acting as an ecosystem source, and addressing environmental challenges by reducing air temperature (Kongjian Yu, 2022).

Spatial planning is responsible for decisions on the long-term utilization of land. Although not directly responsible for disaster risk reduction, spatial planning can play a fundamental role in disaster risk reduction through its ability to reduce the impacts of disasters. (Greiving, Fleischhauer and Wanczura, 2006) identify four possible roles of spatial planning in disaster risk reduction (Sutanta, Bishop and Rajabifard, 2010):

- i. Prohibiting future development in certain areas. Development should be prohibited in highly prone areas, especially with a history of disaster occurrences. Areas required for emergency response and retention need to be kept free.
- ii. Classify different land use settings for disaster prone areas. Every disaster has its own acceptable risk on different land use classes. For example, steep slopes are highly susceptible to landslides and should not be used for residential or commercial areas. However, they may still be suitable for plantation.
- iii. Regulating land use or zoning plans with legally binding and enforced status. In an area vulnerable to earthquakes, regulation of building density is essential to reduce the impact of building collapse.

- iv. Hazard modification. Spatial planning can play a role in promoting soft engineering methods to reduce the probability and impact of hazards. For example, in flood hazard reduction, retarding basins, which are designed to hold back and contain flood water, should be kept free of development to maintain their function.

In recent years, the focus has shifted from single hazard exposure assessment towards an assessment of systemic risks. Systemic risks consider the interconnectedness of systems in a globalised society that transmits risks across geographies. Resulting are risks that threaten entire systems like health care, transportation, energy or food security (Mitra and Shaw, 2023). The increased complexity calls for systematic multi-stakeholder approaches like RSSP that focuses on systems instead of single elements at risk.

Another relatively recent development is the increased focus on ecosystem and ecosystem services in DRR. Degraded environments that disrupt the balance between human activity and nature are an important driver of risks. Ecosystem-based DRR and ecosystem-based adaptation are not only efficient, cost-effective, flexible and low-regret approaches to reducing disaster risk and the impacts of climate change but also have multiple social, economic and environmental co-benefits (UNDRR, 2020). RSSP, through its geographic focus allows for establishing a holistic and coordinated approach that incorporates the different types of systems. Spatial connections in ecosystems and across systems can be addressed in coordination with multiple stakeholders opening the opportunity to discover complementary uses and co-benefits.

4.5 Existing Spatial Planning in Pakistan

In 2010, Pakistan underwent a major devolution process through the 18th Amendment to the Constitution. This amendment decentralized powers to the provinces, empowering them to make decisions on a wide range of subjects. Among these powers is the mandate to perform spatial planning and regulate land use (Government of Pakistan, 2010b). While provinces have the authority to develop spatial plans including spatial planning procedures, the federal government plays a role in coordinating and providing guidelines through national policies and frameworks. Provinces often align with overarching national development goals and strategies.

At the provincial level, spatial planning, in general, aims to address various development challenges and promote sustainable growth. Provinces have laid the groundwork for spatial planning with the formulation of rules and regulations for spatial planning to guide land use, infrastructure development, and economic growth over specific timeframes (see *Table 3*). In practice, the main focus is on master plans and outlined development plans, structure plans, peri-urban plans and land use reclassification plans. While rapid urbanization prompted provinces to focus on major cities and urban centres, only 16% of urban centres in Pakistan had a valid urban plan in 2019. Additionally, studies show, that the planning process itself has loopholes and is often unable to produce an implementable and achievable plan (Anjum, 2008; Hussnain, 2013).

Existing plans at the national, provincial, and local levels address various aspects of DRR. At the national level, the Pakistan Vision 2025 describes challenges that Pakistan is facing due to disasters and mainly because of climate change. A few national, provincial, and local-level spatial planning documents in Pakistan only considered the Environmental Impact Assessment (EIA), which also has limited implications for DRR. While there are existing spatial planning documents in Pakistan, there is a general need to prioritize hazard mapping, incorporate climate change adaptation measures, and adopt a comprehensive approach to DRR in spatial planning practices.

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Another aspect of DRR in spatial planning is the importance of increasing awareness and building capacity among communities to understand their risks better and work together to develop effective mitigation and adaptation measures. By integrating DRR into existing spatial planning documents, communities can better prepare for and respond to disasters, reducing these events' potential damage, loss of life, and economic impacts.

The focus of this guideline is on RSSP. Recommendations for a comprehensive spatial planning framework for Pakistan is outside the scope of this guideline. However, many recommendations hint towards a holistic, multi-stakeholder and participatory spatial planning practice.

In this regard, existing spatial planning documents should be reviewed and adjusted to incorporate DRR strategies. This might include identifying high-risk areas and implementing measures to reduce exposure, such as zoning certain areas for non-residential or non-essential uses, or enhancing building codes and standards to improve the resilience of structures.

Table 3 Examples of existing Spatial Planning Documents

S. No.	Name of Publication	Author/Organization
1	Punjab Spatial Strategy 2047 "A framework for integrated spatial planning and sustainable development."	Government of Punjab, the Urban Unit with collaboration of the World Bank
2	The Sindh Master Plan Authority Act - 2020	Planning & Development Department, Government of Sindh
3	A Framework for Development of Balochistan Spatial Strategy	Government of Balochistan with collaboration Consortium for Development Policy Research (CDPR)
4	The Khyber Pakhtunkhwa Urban Areas Development Authority Ordinance, 2020	Government of Khyber Pakhtunkhwa with collaboration UN-Habitat
5	Greater Peshawar Regional Development Plan	
6	Swat Regional Development Plan	
7	Strategic Environmental Assessment of the Master Plan for Gilgit City	National Impact Assessment Program (NIAP), a joint initiative of the Government of Pakistan and IUCN Pakistan, with the financial support of the Embassy of the Kingdom of the Netherlands (EKN)
8	Zoning for Urbanized Area in Muzaffarabad City and Adjacent Areas	Government of the AJK and the Japan International Cooperation Agency (JICA)

4.6 Example of Existing Spatial Planning Processes in Pakistan

4.6.1 The Punjab Spatial Strategy

The Punjab Spatial Strategy (PSS) is a comprehensive planning framework designed to guide the sustainable development and spatial management of the Punjab province in Pakistan. It provides a vision, objectives, and strategies to ensure efficient land use, infrastructure development, and environmental conservation. The vision for the spatial development of Punjab focuses on sustainable economic growth, social development, and environmental sustainability. It sets out objectives and targets to guide decision-making and resource allocation.

The PSS provides land use planning and allocation guidelines, ensuring efficient use of land resources and promoting compact, mixed-use development. It identifies areas for urban expansion, industrial zones, agricultural land, recreational areas, and environmentally sensitive zones. The strategy emphasizes the importance of infrastructure development, including transportation networks, utilities, and social infrastructure such as schools and healthcare facilities. It highlights the need for integrated infrastructure planning to support sustainable urban and rural development.

The PSS recognizes the significance of environmental conservation and natural resource management. It emphasizes the protection of ecologically sensitive areas, the promotion of green spaces, and the integration of environmental considerations into development projects. The strategy aims to stimulate economic growth and attract investment by identifying strategic economic zones, promoting industrial development, and facilitating the establishment of business clusters. It focuses on creating an enabling environment for entrepreneurship and job creation.

The PSS emphasizes the importance of stakeholder engagement and participation in the planning process. It encourages collaboration among government departments, local communities, private sector entities, and civil society organizations to ensure a collective and inclusive approach to spatial development.

The PSS is an evolving document that undergoes periodic updates and revisions to align with changing development priorities and emerging challenges. Its implementation is coordinated by the relevant provincial authorities responsible for spatial planning and development management. The Punjab Spatial Planning Act enacted the Spatial Planning Council of Punjab (SPCP – the Council) at the approval level and a Spatial Planning Authority of Punjab (SPAP – the Authority) for policy, regulatory and execution purposes.

The PSS currently lacks a comprehensive linkage to incorporate DRR. The challenges of spatial planning without considering DRR and impacts of climate change can have significant implications for the sustainability, resilience, and overall well-being of communities and regions. Spatial planning may lead to infrastructure development, settlements, and land use patterns in high-risk areas or may increase risks in areas. This increases vulnerability to natural hazards putting lives, property, and ecosystems at greater risk. Spatial planning that ignores DRR and climate change may prioritize short-term economic gains over long-term sustainability. This can result in the unchecked conversion of natural areas, loss of biodiversity, and degradation of ecosystems. Unsustainable development practices can aggravate environmental issues, including water scarcity, pollution, and habitat destruction.

4.6.2 The Natural Catastrophe (NatCat) model

Catastrophe modelling provides a comprehensive assessment of disasters originating from natural hazards. Modelling is based on analysing historical data, demographic information and geographic

features to provide insights into the likelihood, severity and impact of natural hazards. Central Asia Regional Economic Cooperation (CAREC) provides catastrophe modelling for South Asia at regional and global scales. At the national scale, SUPARCO, with the support of the National Disaster Risk Management Fund (NDRMF), developed the Natural Catastrophe (NatCat) model for Pakistan. It focused on supporting disaster risk reduction (natural hazards), risk financing and spatial planning. SUPARCO utilizes satellite data and GIS technologies to develop models that assist in various aspects of disaster management. Currently the NatCat model covers probabilistic hazard assessment of floods, droughts, earthquake and cyclone hazards, population exposure data, critical facilities and different land uses. In development are the different vulnerability assessments. Based on these data and information layers, three interfaces for different purposes and users are in development (SUPARCO & NDRMF, 2024).

The Risk calculator interface focuses on understanding the extent of hazards and elements exposed to the hazards through overlay. The interface for the planning commission aims to assist the Planning Commission and Provincial Planning & Development Departments in identifying and managing multi-hazard risks for purposes of strategic planning and infrastructure development. The interface developed for the Federal Flood Commission (FFC) focuses on flood hazard mapping, exposure, vulnerability, and risk identification (SUPARCO & NDRMF, 2024).

4.7 Development Project Planning Process (MoPD&SI)

The Ministry of Planning, Development and Special Initiatives (MoPD&SI) is the main government body at the federal level responsible for planning and development. The Ministry places the collective priority needs of the citizens at the centre of their work with a focus on improvement of quality of life in the area of social sector development, infrastructure connectivity, economic competitiveness and climate change (Planning Commission, 2021).

The Public Finance Management Act of 2019 stipulates specific provisions for “Development Projects and Maintenance and Use of Public Assets” in chapter III. Development projects are defined as “(a) core projects in national infrastructure requiring complex planning, design and implementation procedures (...) and (b) sectoral projects (...) required to enhance the development of that sector” (Government of Pakistan, Finance Division, 2020). The Act tasks the Planning Commission under the Ministry of Planning, Development and Special Initiatives with developing and implementing procedures and processes necessary to prepare development projects. This covers not only the financial aspect of projects, but also technical, environmental and social aspects. The Planning Commission (PC) developed a five stage procedure (PCI-PCV) for the development, approval and implementation process.

In 2011, MoPD&SI and the NDMA reacted to the need to consider hazards and DRR interventions/ measures for development projects to avoid hazards that could lead to disaster. On 23 November 2010, MoPD&SI approved a Circular on “Integration of Disaster Risk Reduction (DRR) into Development Process” (No. 5(7) Misc./PP&H/PD/10) laying down that all development projects have to consider prevalent hazards and to incorporate DRR considerations and procedures in different stages of development projects (design, planning and implementation). In practice, this is primarily implemented through the “Checklist for Disaster Risk Reduction” as a compulsory part of Pakistan’s PC-I & PC-II processes (Infrastructure Sector). The checklist was developed with the support of NDMA keeping in view the country’s vulnerability to a varying number of hazards. The DRR checklist consists of several questions and assessments related to disaster risks, including integrating mitigation measures as a guideline for project sponsors (financing agencies) to include DRR measures in the planning process and implementation.

The MoPD&SI supports the sponsoring agencies in ensuring compliance with the DRR Checklist and Environmental Impact Assessment (EIA), and efforts are being made to establish a DRR section within the Planning Commission for monitoring and evaluation purposes. Technical agencies like Pakistan Space & Upper Atmosphere Research Commission (SUPARCO) and Water and Power Development Agency (WAPDA) also provide hazard related information and location-based assessment for PC-I projects (*Appendix C*).

Some of the provincial Planning and Development (P&D) Departments adopted a similar approach to the PC process often copying the national-level procedure directly. The recommendations mentioned in this policy guideline can be equally valid for the provincial level.

5 Policy Recommendations

5.1 Mandate – laws, rules, regulations, responsibilities

Spatial planning and land use planning are mandates of local governments. Spatial planning, general planning, construction of infrastructure, and provisions thereof are covered in the Khyber Pakhtunkhwa Local Government Act 2013, the Punjab Local Government Ordinance 2021, the Sindh Local Government Ordinance 2001 and the Balochistan Local Government Act 2010.

- These Acts and Ordinances empower local government institutions, such as district councils and tehsil councils, to undertake spatial planning. This involves the formulation of comprehensive plans for land use, zoning and development within their respective jurisdictions.
- The Acts mandate local government bodies to plan and oversee infrastructure construction within their areas of jurisdiction. This includes roads, bridges, water supply systems, sewerage networks, solid waste management facilities, water treatment plants, and other essential infrastructure.
- The Acts provide mechanisms for regulating development activities to ensure compliance with approved plans and standards. Local government authorities are tasked with enforcing building codes, zoning regulations, and other land use controls to maintain order, safety, and environmental sustainability in urban and rural areas.
- The Acts encourage stakeholders in the planning and construction of infrastructure projects. Local government bodies are required to consult with communities, stakeholders, and experts during the decision-making process, soliciting feedback and incorporating local preferences and priorities into development plans.

These mandates clearly show that including climate change, DRR, and considering hazards at the district level is of immense importance, promising to deliver the best results in mitigating the impacts of hazards and preventing disasters.

However, providing or developing hazard and risk information is not the mandate of the local governments. Mitigation and prevention of disasters and implementing measures for prevention and mitigation are the mandates of NDMA (NDMA Act, Chapter 10) and PDMA. Within this mandate, NDMA

and PDMA's are responsible for information on hazards and risks and the dissemination of these to relevant authorities and stakeholders. Even without an entire spatial planning system in the country, sectoral spatial planning concerning DRR lies within the mandate of NDMA.

The general recommendations for mainstreaming DRR in spatial planning and RSSP are:

- Develop a legal basis for RSSP independent of general spatial planning but with the provision of possible inclusion in a comprehensive spatial planning process.
- Strengthen the District Disaster Management Authorities (DDMA), emphasizing the importance of disaster management with a focus on disaster mitigation and prevention and advocating for its inclusion in all planning processes.
- Assess existing mandates, procedures and legislation and provide clear definitions concerning incorporating DRR principles into planning processes to avoid encroachment, to foster harmonization, and coordinate efforts, especially regarding knowledge sharing and exchange rules and regulations related to Environmental Impact Assessments (EIA).
- Consider different planning levels, ensuring that national-level recommendations give guidance while avoiding overstepping rights and responsibilities at the regional, provincial, and district levels. The aim is to balance sectoral planning and combine efforts rather than replace them.
- Empower local governments at Union Council levels and below and include them in the planning process. A decentralized system should be developed.
- Establish a regulatory framework at the provincial level to facilitate the implementation and updating of DRR frameworks and address property rights and the need to limit/restrict existing property rights as a central topic in spatial planning discussions.
- Ensure that all master plans, development plans, and spatial plans are sensitive to disaster risks and make hazard assessments compulsory for all development processes and projects.
- Develop or update regulatory and policy frameworks:
 - o related to spatial planning in general and RSSP in particular, aligning them with national development goals, environmental regulations, and social equity principles.
 - o related to hazard mitigation, including zoning, building codes, and establishing local-level institutions to support DRR efforts.
 - o Ensure that developing authorities issue building codes including their spatial translation and official maps to guide development processes.
- Improve the institutional framework:
 - o Establish Provincial spatial Planning Offices/cells responsible for spatial aspects in planning & development. These should be replicated at the district and UC levels.
 - o Promote decentralized regional development planning.
 - o Upgrade the judicial system to support planning and governance reforms.
 - o Strengthen self-accountability mechanisms within planning and development authorities.
 - o Empower field revenue and other concerned staff to enforce regulations effectively.

- Promote shared responsibility among governments, public and private entities, and stakeholders in disaster risk reduction efforts.
- Penalties for violations in spatial planning based on existing and future laws are important for ensuring that any development adheres to established regulations and guidelines. Provincial and local governments need to work with law enforcement agencies to design and introduce a penalty system at a basic level to promote safety, sustainability, and efficient land use and zoning. These penalties should include fines, demolition or removal orders, criminal charges, community service, etc.

5.2 Capacity Building within Government Organizations

Spatial planning in general and RSSP in particular, are in their infancy in Pakistan. Despite spatial planning being performed in selected areas (mainly municipal and urban areas), no holistic multi-stakeholder spatial planning process that covers the entire area of jurisdiction has been implemented. Capacity building should focus on spatial planning as a governance tool to guide the overall development at different levels of government. In the context of RSSP in Pakistan, building capacity within government organizations must focus on an independent planning process and the consideration of the results in any spatial and development planning. This is crucial for effective prevention and mitigation in disaster management. By recognizing the pivotal role of DDMA's and similar entities at various administrative levels, it becomes imperative to strengthen their capabilities based on an increased awareness RSSP and its importance in mitigation and prevention. Furthermore, ensuring their inclusion in a holistic spatial planning process is essential for sustainable risk mitigation.

Below are a set of recommendations for the capacity building of relevant government officials in this regard:

- Establishing a structured training curriculum on spatial planning in general and RSSP in particular within public administration institutions: This curriculum should cover topics such as how to use hazard assessment results, the connection between hazard assessment and land use planning, and regulatory frameworks. This also includes the information/translation of different hazard information into a usable format within the local government, communities and the public.
- Empowerment of DDMA's and Disaster Management Officers (DMOs): These entities serve as the primary focal points for disaster management at the district level, requiring enhanced capacity in mitigation and prevention through RSSP. Director Generals of DDMA's need to be empowered because they are at the forefront of full-scale disaster management at the district level and their input in spatial planning and incorporation of risks into the planning process is very important.
- NDMA should take the lead in providing guidance and support for capacity building initiatives at the district level. This entails developing comprehensive training programs and providing technical assistance to enhance the knowledge and skills of DDMA's and DMO's in RSSP.
- NDMA's think tank, the National Institute of Disaster Management (NIDM), can bring on board disaster management practitioners, planners, tech experts, academia and development partners

to contribute to the development of training programs on RSSP and the inclusion of hazard and risk information in general spatial and non-spatial planning processes.

- Investment in capacity building for government officials, planners, and local communities: This investment should focus on providing access to training workshops, seminars, and educational resources tailored to the specific needs of different stakeholders.
- Promoting spatially enabled governance is essential for integrating geographic information systems (GIS) and other technological tools into the planning process. This requires providing technical training and resources to government officials to effectively develop and utilize geospatial data for planning, decision-making, hazard and risk assessment.
- Strengthening the institutional framework for disaster risk reduction and spatial planning is imperative. This involves assigning roles and responsibilities to relevant government agencies as well as to defining and establishing rules and practices for regular collaboration and coordination among them.
- Encouraging interdisciplinary collaboration and knowledge sharing among government agencies, academia, civil society organizations, and the private sector is essential. This can be facilitated through the establishment of forums, working groups, and partnerships focused on addressing common challenges and sharing best practices.
- Ensuring the sustainability of capacity-building efforts through continuous learning and professional development opportunities is key. This includes promoting a culture of lifelong learning, encouraging participation in relevant conferences, and facilitating peer-to-peer exchange programs.

5.3 Awareness and Education

Effective RSSP in Pakistan requires a concerted effort to raise awareness and educate stakeholders about DRR principles, their roles and responsibilities, the practice of hazard information based spatial planning practices and how they can contribute to community resilience. By fostering a culture of awareness and education, individuals and communities can better understand hazards, mitigate risks, and contribute to sustainable development.

5.3.1 Integration of DRR into Curriculum

One of the fundamental steps in promoting awareness and education is the inclusion of DRR and spatial planning topics in educational curricula at all levels. By embedding DRR principles into formal education systems, students can develop a profound understanding of hazards, vulnerabilities, and resilience strategies from an early age. Additionally, strengthening geographic topics in school and university curricula increases the spatial literacy rate and forms the basis for spatial topics. Children and students as future citizens are agents of change. They are amplifying what they learn within society. With NIDM, NDMA has a competent authority that should take the lead in creating awareness and developing respective curricula together with the educational departments.

5.3.2 Advocacy Campaigns

Launching training and advocacy campaigns aimed at mainstreaming DRR and hazard information in any development plan is crucial. These campaigns should target government agencies, educational institutions, civil society organizations, and the general public to promote awareness of the benefits of considering hazards in any planning and development, foster stakeholder collaboration, and encourage participation in risk reduction efforts.

5.3.3 Public Engagement

Educating the public about hazards and mitigation strategies is essential for building resilient communities. Through workshops, seminars, and outreach events, individuals can learn how to identify hazards, assess risks, prepare mitigation plans, and take proactive measures to safeguard their lives and livelihoods. These outreach programs should include the spatial component of risk mitigation and education about spatially related laws, such as the building code, or river protection, and possible spatial solutions (e.g., nature-based solutions, and ecosystem services).

5.3.4 Youth Engagement

Engaging young people in DRR initiatives is key to fostering a culture of resilience. Establishing youth-led programs focusing on hazard identification, risk awareness, mitigation, and their spatial aspects empowers the next generation to become agents of change and advocates for disaster resilience. The age group (12 to 35 years) is more dynamic and has more potential to adapt to different conditions and they ultimately step up in rescuing and mitigation processes.

5.3.5 Media Engagement

Involving the media in disseminating information enhances the transparency and effectiveness of RSSP initiatives. Leveraging various media channels, including television, radio, and social media, can amplify messages about hazard identification, risk assessment, mitigation measures, risk reduction, and sustainable development practices and how these practices are implemented.

5.3.6 Community-Based Disaster Risk Management (CBDRM)

Integrating risk sensitive spatial planning (RSSP) aspects into CBDRM initiatives enhances community resilience. By empowering local communities with knowledge, tools, and resources concerning the impact and use of space and its power in reducing risks, they can actively participate in identifying hazards and risks, prioritizing long-term mitigation interventions, and implementing sustainable solutions.

Additionally, a focus must be placed on the sustainable and risk-sensitive development of community land. This not only increases resilience at the local level but can also function as a good example, as showcase of best practices, presenting possibilities of mitigation and prevention while creating awareness within the local communities.

5.3.7 School-based DRM Programs and CERT Trainings

Including RSSP aspects in school-based DRM programs and community emergency response trainings (CERT) creates awareness and equips individuals with the necessary skills and knowledge to mitigate and prevent disasters sustainably and effectively.

5.3.8 Promotion of Spatial Planning Principles

Building awareness of spatial planning principles and practices is essential for promoting sustainable development and resilience. Educational materials, workshops, and outreach events can empower residents with the knowledge and skills to protect themselves and their communities from hazards.

5.3.9 Collaborative Efforts

Collaboration between the education department and disaster management departments is crucial for mainstreaming DRR through spatial planning into educational curricula and promoting awareness at the grassroots level. These agencies can leverage their resources and expertise to build a more resilient Pakistan by working together.

5.4 Objectives

RSSP endeavours to cut the spatial link between hazards and the exposed assets, reduce the impacts of hazards, and reduce the community's vulnerability. Accordingly, it utilizes different land use planning and building regulation instruments to customize suitable structural and non-structural measures for risk reduction (Esmail *et al.*, 2022). The 2005 World Conference on Disaster Reduction (WCDR) in Kobe, Japan [16], the Sendai Framework for Disaster Risk Reduction 2015–2030, the Rio + 20 World Conference in 2012, and the Intergovernmental Panel on Climate Change (IPCC) have all underlined the importance of considering disaster risk reduction, resilience, and climate risks in urban planning to attain sustainable development at different scales (Esmail *et al.*, 2022).

The main objective of RSSP is to mitigate and prevent disaster risks through holistic spatial planning and development. It puts the locality, and the space as finite resource, as well as the prevailing hazards in this location in the centre. The availability of hazard information enables decision makers to include relevant mitigation measures in any planning and development. As Mr. Scott Kelly the planning and policy team leader of the Landslide Planning Guidance (NZ Planning Institute, 2024; Vilder *et al.*, no date) emphasised, it is about the right information informing the right development in the right place. General objectives for RSSP are:

- Include risk/hazard information while developing master plans, strategies and action plans. Update existing plans based on hazard and risk information (Review existing plans through the DRR lens)
- Establishing zoning regulations based on various hazards, thereby restricting certain activities in specific vulnerable/exposed areas.
- Empowering decision-makers and spatial planners to implement measures to prevent and mitigate disasters tailored to each zone.

- Follow a holistic systemic approach that looks at entire ecosystems as basis for mitigation measures to include the ecosystem services and ensure the consideration of interconnected areas.

5.5 Coordination

Spatial planning is an interdisciplinary and participatory governance tool that involves a large number of stakeholders. Stakeholders are defined as **“people or organisations who have, in one way or another, an interest in and/or are impacted, whether positively or negatively, by the current project.”** (Planning and Development Department Punjab, 2015) Within the context of RSSP, this definition of stakeholders can be broadened to include additional categories such as those with mandates, land ownership, and users of space.

The Sendai Framework for Disaster Risk Reduction (SFDRR) acknowledges the primary responsibility of national governments and local authorities in disaster risk reduction and response. However, it emphasizes that resilience against climate change, emerging hazards, and evolving risks cannot be achieved by governments alone. The framework supports implementing a multi stakeholder approach, designed for execution by various stakeholders across different levels. Successful implementation necessitates the inclusive and active participation of governments at both local and national levels, alongside diverse stakeholders such as civil society, private sector entities, academic and technical institutions, and with the help of regional and international collaborators. All stakeholders have a shared responsibility and play an important role as enablers in supporting government/states.

National, regional, and local governments must engage, build capacity and empower stakeholders in all DRR decision-making processes. They should also ensure that communities/populations at risk, including women, older persons, and persons with disabilities are meaningfully included, as stated on the International Day for Disaster Risk Reduction (DRR) in 2023. It was also emphasised in SFDRR that DRR requires an all-of-society engagement and partnership.

Involving communities and providing for public participation in local, national, and provincial government is a key democratic function. Governments need to encourage the public to participate in municipal processes and consider their opinions.

In RSSP, there are additional important results from community participation: “The more local governments and local communities know about their risks by doing their own risk assessment and evaluation, the more they can learn about what they can do to protect themselves.” (ADPC, 2010). Furthermore, including communities in spatial planning creates awareness and knowledge about imminent hazards, taps into local knowledge, considers the needs of the public, raises acceptance of the plan and therefore makes the plan enforceable.

A multi stakeholder approach in spatial planning counteracts working in silos. Coordination and collaboration between government organisations are essential to comprehensive spatial planning processes. This opens the opportunity to identify complementary uses of space that support two or more functions. A focus needs to be placed on cooperation with departments responsible for the protection of the environment to foster eco-DRR and implement long-term solutions. For DRR important are the

regulating services that affect climate, floods, disease, wastes, and water quality. Examples in RSSP are uses that support DRR and additional benefits ground water recharge, recreation, or tourism.

5.6 Stakeholder inclusion and public participation

The general recommendations for stakeholder inclusion and public participation in spatial planning in general and RSSP in particular are listed in *Table 4*.

5.6.1 Collaboration and Coordination with Technical Organizations and Stakeholders

- Spatial planning is a multi-stakeholder activity and relies heavily on the inclusion, coordination and negotiation between these stakeholders.
- Technical organizations bring specialized knowledge of prevailing hazards, climate induced emerging hazards and data analysis capabilities to assess various aspects of spatial planning, such as land use, infrastructure needs, and environmental impact.
- They offer innovative solutions and best practices for addressing complex spatial challenges including the multi-hazards, such as mainstreaming DRR, sustainable development, transportation networks, and natural resource management.
- Collaboration with and inclusion of technical organizations ensures that spatial planning not only fulfils national/international sustainable development commitments but also aligns with mainstreaming Disaster Risk Reduction (DRR) including gender sensitive approaches, adheres to quality standards, and complies with relevant regulations and guidelines, enhancing the credibility and effectiveness of planning outcomes.
- To enhance spatial planning and DRM, the centralized data hosted on the NatCat model for MoPD&SI and Provincial P&Ds should be shared with other stakeholders who are doing sectoral spatial planning and spatial planning as a whole. The NatCat model contains comprehensive data with various attributes and scales, making it a valuable resource for RSSP and decision-making. It should be shared by establishing different levels of access based on the role and requirements of stakeholders, such as government agencies, spatial & urban planners, researchers, policymakers, international development organisations, and NGOs.

5.6.2 Involvement of Key Entities

- Involving key entities such as law enforcement agencies, regulatory bodies, implementers, and policymakers is essential for comprehensive spatial planning. They ensure compliance with laws and regulations related to land use, zoning, and building codes, contributing to orderly development and public safety, enforcing planning decisions, preventing unauthorized development and ensuring adherence to approved plans.
- Involvement of regulatory bodies ensures that planning decisions align with legal requirements, contribute to sustainable development, and oversee compliance with planning regulations and standards, issuing permits and approvals for development projects.
- Provincial planning and development departments, local governments, and infrastructure agencies, are responsible for executing spatial plans on the ground. They ensure that plans are

translated into actionable projects, that infrastructure is developed according to plan specifications, and resources are allocated effectively.

5.6.3 Community Engagement and Participation

- Communities possess valuable local knowledge about their neighbourhoods, including historical context, cultural significance, and environmental dynamics. Involving them ensures that this grass-roots insights informs planning decisions.
- Involving local residents in planning discussions, policymakers can better understand community needs, preferences, and concerns. This is leading to more responsive, long-term sustainability and equitable outcomes.
- Engaging communities fosters a sense of ownership and accountability for planning decisions and outcomes, making communities more likely to support and take responsibility for implementing the resulting initiatives.
- Community engagement workshops and meetings provide a platform for addressing conflicts and building consensus around contentious planning issue. As a result, residents can develop skills, knowledge, and confidence to participate actively in decision-making processes.

5.6.4 Notables and Political Leadership

- Political leaders play a crucial role in setting priorities and shaping the vision for the region. Their dedication and commitment to specific goals, related to sustainable development or environmental conservation, serve as guiding principles for spatial development.
- Notable and religious leaders often have significant influence and credibility within their communities. Their involvement can help build trust in the planning process and garner support from community members. These leaders can advocate for the interests of their communities in the planning process and mobilize community members to participate actively and voice their concerns.

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Table 4 List of stakeholders for RSSP

Type of Stakeholder	Department	
Collaboration with Technical Organizations	PMD GSP SUPARCO SoP PBS PDMA NDMA DDMA NHA Ministry of Energy FWO Education Irrigation & Agriculture	Health Livestock Urban Unit FFD/FFC Transport/Communication Department Civil Society SME Development Authority WASA Academia C&W EPA
Sustainable Financial and Technical Coordination	Government (National & Provincial) Local Government Board of Revenue and Finance Department Ministry of Planning and Special Initiative	
Involvement of Key Entities	Enforcement agencies: Ministry of Law Police Rangers Judicial System Media (social and mainstream) Civil Society	
Community Engagement and participation	Community Engagement Local NGOs and welfare organisation The public	
Notables and Political Leadership	National and Provincial Assembly MPA at district and/or local level MNA at district and/or local level Local Government	

5.7 Sustainable Financial and Technical Coordination

- Special funds should be designated during annual development plans specifically for data collection, multi-hazard assessment, analysis, and stakeholder engagement within the financial breakdown of the development project. These funds are established to ensure that these essential aspects receive the necessary attention and support for successful implementation.
- Sustainable financial coordination includes monitoring expenditures, evaluating the effectiveness of spending, and adjusting budgets as needed to optimize resource utilization and achieve desired outcomes.
- Financial and technical coordination facilitates stakeholder engagement by providing the necessary resources and technical support to ensure meaningful participation in planning activities, such as workshops, consultations, and public meetings.

5.8 Implementation, Monitoring and Enforcement

5.8.1 Data

Spatial planning, in general, is used as a tool by governments to coordinate, control, protect and direct the use of space to facilitate a sustainable and just development within a country or society. RSSP, in particular, is based on accurate spatial and non-spatial data, including official baseline data, e.g., official boundaries, existing features, land use data, and information on hazards.

With spatial planning being a government tool, information used should be built on government-endorsed data sets for better credibility and authenticity. This is especially important with data on administrative boundaries and any regulation based on hazard assessment results and spatial planning processes. Additionally, the accessibility of this data and information is a necessity.

The minimum required data sets for RSSP include basic administrative areas, boundaries data, and data on existing features and hazards. The minimum list of spatially relevant datasets comprises:

- Administrative areas and boundaries as general reference layers
- Topographic data
- Infrastructure
- Land cover
- Land use
- Population figures
- Economic statistics
- Hazard data

These data and information are not consolidated but are distributed among different government organisations.

A summary of the datasets available with the different government organisations of November 2022 is displayed in *Table 5*. However, there are considerable constraints regarding coordinating and disseminating data between the different government departments at all levels. Concerning data collection and dissemination, a fragmentation and overlapping of mandates within legislative bodies and

a general lack of accurate real-time data exist. Additionally, transboundary data sharing mechanisms are lacking. The non-availability of the related baseline data impacts all sectors and forms one of the main constraints of spatial planning.

Survey of Pakistan (SoP) is the leading agency in Pakistan in developing the National Spatial Data Infrastructure (NSDI). The above-mentioned realities make the NSDI with the objectives of ensuring a consistent mechanism of maintenance, dissemination, and sharing of geospatial data among all users by reducing duplication in collection and maintenance of data described above and enhancing and improving objective decision making an urgent necessity. During a conference by the Global Spatial Data Infrastructure (GSDI) Association in 1998, SoP was acknowledged as the lead agency in developing an NSDI (Ministry of Defence, 2020). In 2010, SoP started with organisational efforts to establish NSDI. In 2014, the Surveying and Mapping Act, which sets the legal framework for NSDI, was passed by the National Assembly and only in 2020 was a national coordination committee, responsible for making collaborative efforts for the development of the NSDI established. It includes one representative from each government department, private sector organizations and academic institutions (Ali and Imran, 2021). In 2024, SoP submitted a PC-I proposal concerning NSDI to PC that covers all aspects related to legal, and technical frameworks for enabling spatial data sharing in the country.

General recommendations concerning data collection, availability and access are as follows:

- (1) National Spatial Data Inventory (NSDI): Pakistan lacks legal and technical frameworks for spatial data sharing, which poses a significant obstacle to spatial planning in the country. The non-availability of NSDI and basic government endorsed data sets is an additional constraint hampering spatial planning. There is an urgent need to advance the process of developing an NSDI. As the lead agency, SoP and all other government departments involved need to be aware of this urgency. They should expedite the process of developing a comprehensive NSDI.
- (2) Mandate: Revise the mandates within the legislative bodies to resolve the issue of fragmentation and overlapping of existing mandates.
- (3) Coordination between the different data developers and custodians: Establish a continuous in-depth dialogue between different organisations at all levels, including top management and decision makers concerning data development, data needs and data sharing as a basis to build trust and pave the way for a robust data development and sharing practice. The dialogue is also a basis for exchanging data needs of different organisations, and helps in reducing the non-availability of data in the desired format, and creates awareness of the need for geotagged datasets.
- (4) Data development and sharing policy: Develop a comprehensive data development and sharing policy applicable for all government organisations that is also applicable outside of NSDI. This helps reduce redundancies in data collection and development, streamlines the process of data sharing, and supports data security. The policy should include standards on data format to ensure compatibility and data sharing, including the possibility of continuous/automated sharing processes while maintaining a transparent and secure process. This is necessary especially for data that is regularly updated.

- (5) Data repositories: Efforts concerning the establishment of data repositories within and across the different departments and levels of government should be coordinated and streamlined. This aims to increase the comparability and compatibility of data. Suggested is a national data repository with a central data management system hosting information on availability of data and information at the different government departments.
- (6) Quality, accuracy, and credibility of data sets: Each organisation needs to ensure accuracy, and quality and regularly update their respective data sets. They should also define and establish mechanisms to ensure and monitor the quality and accuracy of data. This could include a metadata catalogue using a standard format for metadata.
- (7) Data available at academic institutions: Establish a dialogue with academic institutions as basis for a standard agreement of data exchange and/or accessibility.
- (8) Hazard information: Up-to-date and accurate hazard information needs to be made easily available for planners at all levels of government. NDMA and PDMA, as custodians for hazard information, should ensure the accuracy, update, and accessibility of data and information on hazards for all stakeholders.
- (9) Ecosystem information: environmental protection is a complementary use of space. Information and understanding of ecosystems and their functions are a basis for eco-DRR.
- (10) Gender inclusion: Increase the generation, collection and use of citizen-generated quantitative sex, age, income and disability disaggregated data and gender statistics. This is the basis for resource allocations and planning processes considering the needs of vulnerable groups and women.

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Table 5 Summary of datasets available with the different government organisations (2023)

Organisation	Data/Information
SoP (Survey of Pakistan)	Topography – NSDI Standardized data sets Village boundaries/points Open Series maps General maps Tourist maps
SUPARCO (Space and upper atmosphere research commission) SACRED (Space Application Centre for Response and Emergency)	NATCAT Hazard Vulnerability Risk PRSS-1 PaktTES-1A Spot 6/7 Pleiades 1A/1B UN-Spider Rich archive of satellite data; capable of acquiring high- resolution satellite data in case of emergency; National land cover data for entire Pakistan Crop mask for Rabi and Kharif NATCAT baseline data and as basis for DRF Glacial Lake sources information GLOF inventory (atlas)
GCISC (Global Climate-Change Impact Study Centre)	Climate Change modelling Research papers
PCRWR (Pakistan Council of Research in Water Resources)	Water quality Water table, quantity, quality, sources, recharge for Upper and Indus; Research on water resource management
PBS (Pakistan Bureau of Statistics)	Demographic survey Social statistics Trade statistics Price statistics Census of Manufacturing Industry PSLM HIES Labour force Survey Population and Housing Census

	Mouza census Livestock census Property data
WAPDA (Water and Power Development Authority)	Snout survey Ablation survey Hydrological modelling Snowmelt Runoff Model + Glacier
GSP (Geological Survey of Pakistan)	Geological maps Mineral resources Geochemical map (69 Elements) Landslide hazards Fault lines LIDAR, InSAR data DEM, DSM, DTM
PMD (Pakistan Meteorological Department)	Seismic event catalogue Tsunami hazard modelling data Meteorological data Climate data
FFC (Federal Flood Commission)	Irrigation system Major rivers Hydraulic structures and water inflow outflow/discharge data District level submergence plans Flood plans Risk mapping
BISP (Benazir Income Support Programme)	NSER – National Socio-Economic Register

5.8.2 MHVRA (scientific basis)

MHVRA is the scientific basis for comprehensive DRM at national level with the aim (among others) of developing and providing valuable datasets and tools. The output of MHVRA is a composite risk figure at the UC level as a basis for DRM.

RSSP, however, cannot be based on a composite risk figure. Instead, it needs to be based on the results of single or composite hazard assessments. The more details exist about the different hazards and their spatial locations, the higher the usefulness for spatial planning. This implies that the final results of MHVRA and also the detailed results of the different hazard, vulnerability, and coping capacity assessments prepared within MHVRA should be available to the relevant planning authorities and all stakeholders.

5.8.2.1 Recommendations:

- Include all hazards in MHVRA: Expand the scope of MHVRAs to all hazards prevalent in an area based on a thorough hazard identification.
- Include not only natural but also human-induced hazards in MHVRA.
- Include the impact of hazards on the environment: This includes environmental vulnerability assessments that considers the impact of hazards on ecosystems, natural resources and the environment.
- MHVRA needs to consider the impact of climate change: Climate change impacts the frequency and intensity of natural hazards and also changes the prevalent patterns of hazards.
- Availability of results: Publication and guaranteed availability of the data and information generated during conducting MHVRA in a usable digital and analogue format for planners. This includes the results of all hazard assessments as well as vulnerability, coping capacity, and exposure assessments.
- Translate results in nonprofessional terms and in the local language where appropriate. MHVRAs are based on scientific methodologies and work. To make results usable for practitioners, planners and laypeople, they must be presented in an understandable format and language.

5.8.3 Zoning (restrictions, implementation)

Zoning is a significant instrument of spatial planning that regulates or restricts activities on a given piece of land. It translates rules, regulations, and restrictions into a geographical expression. In RSSP, zoning supports the wise management of land and the environment by reducing exposure to hazards and lessening the vulnerability of people and property.

Zoning for RSSP is based on the interpretation of the geographic location of hazards in combination with land use and acceptable risks. People and communities need to be involved in defining the threshold of acceptable risks to devise strategies and campaigns. While RSSP focuses on the reduction of disaster risks, the inclusion of RSSP into a more comprehensive spatial planning process is recommended for an effective risk informed sustainable development.

Zoning with a legally binding status creates clarity on possible future development for all stakeholders. Together with transparency, it forms the basis for successful implementation.

5.8.3.1 Recommendations / the way forward

- Define a uniform set of hazard specific zones including their inherent rules, regulations, and limitations: Zoning for disaster risk reduction is directly based on the intensity and extent of the different hazards in an area and the definition of thresholds of acceptable risk levels at the local level.
- Consider zones for protected areas and protection of ecosystems with a focus on their value and services in disaster risk reduction.
- Define placement guidelines: Zoning is not arbitrary but based on hazards and conditions in different locations. Placement guidelines help planners at different levels of government to use the predefined zones in their planning processes and guarantee continuity.

- Legally binding status: Zones and their rules and regulations for DRR need to receive a legally binding status independent of but complementary to a comprehensive spatial planning effort.
- Define a uniform symbology/colour scheme for the zones to increase recognition (see also chapter on *1 Mapping/ Cartography*).

5.8.3.2 Zones:

- Priority areas for risk reduction: Define zones/areas where risk reduction is prioritized over any other development. This includes the definition and designation of natural areas and environments and their ecosystem services that support disaster risk reduction in general (e.g., nature-based solutions; recreational areas functioning as reducing urban heat islands effects) and areas suitable for the modification of hazard risks (e.g., retention areas for water).
- Different land uses need to be based on acceptable risk levels in disaster prone areas.
- Prohibit future development in high-risk zones or disaster hotspots.
- Translate building codes in zones with explicit rules (e.g., building density based on earthquake vulnerability)
- Translate hazards in measures as the basis for zoning.
- Zones of infrastructural improvement.
- Zones of controlled vertical development.
- Limited land holding capacity.

5.8.4 Scale and Resolution

Spatial planning has different functions and intentions at the different levels of government. At the national level, only very general recommendations concerning an overall and just development are given for a just and even sustainable development of the country (Table 6 Recommendations of different scales for different level of governance).

At the provincial level, the focus is on the strategic utilization of land with binding specifications and requirements that need to be considered for development, order, and security of space. The plans at the national and the provincial levels have little operational guidelines.

The mandate of detailed spatial planning with actual measures and implementation lies with the local government. At this level, harmonising existing and future plans of different disciplines or sectors is an important task. This links with RSSP's need for necessary details in the respective maps and plans.

The functions at different levels reflect directly on the map scale used for planning in order to incorporate the necessary detail of relevant data (*Table 6* and *Table 7*).

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Table 6 Recommendations of different scales for different level of governance

Level of governance	Scale	Content
National	1:500,00 – 1:1,000,000	Strategic direction of utilization of land concerning an overall and just development
Provincial	1:100,000 – 1:500,000	Binding specifications/requirements and statements to consider for development, order and security of space
District	1:50,000 – 1:100,000	Zoning for disaster risk reduction. Harmonising different sectoral plans (e.g., DRR, water resources, protected areas, infrastructure)
Municipal	1:5,000 – 1:50,000	Communal area, maybe Union Council
Urban level	1:500 – 1:5,000	Infrastructure planning
General spatial plan	1:25,000 to 1:100,000	Addresses issues of pattern and structural spatial usage on residential, transportation and utility
Detailed spatial plan	1:5,00 to 1:10,000	Info on zoning, density, ratio of building and open space and acceptable storey

Table 7 Decision-making based on different levels of scale

Issues/ Purpose	Land use planning at national scale	Land use planning at local scale
Planning aim	<p>Keeping hazard areas clear of development</p> <p>Differentiated decisions on general land use</p> <p>Locating critical infrastructure in appropriate locations</p>	<p>Keeping hazard areas clear of development</p> <p>Differentiated decisions on specific land uses at the parcel level</p> <p>Application of planning and building code to ensure durability to withstand hazards</p> <p>Ensure the provision of infrastructure networks for safe, reliable utility in pre and post disaster situations.</p>

Risk mitigation planning instruments	Priority zones for spatially relevant functions or uses Securing sites and routes for infrastructure	Areas with land use restrictions Sites and routes for critical infrastructure Type of land use
Required river flood hazard information	Extent of flood Frequency of flood	Flood modelling: Extent of flood Frequency of flood Height of flood Speed of water Arrival time Flood duration Expected losses and risk
Required landslide hazard information	Inventory of historical landslides Susceptibility zones for landslides Frequency of landslides and related triggering events	Inventory of historical landslides Hazard zones for landslide initiation Hazard zones for landslide runout Expected losses and risk
Required coastal hazard information	Inventory of past events Extent of hazard zones Type of hazard (storm surge, tsunami) Expected frequency	Storm surge hazard map Tsunami hazard map Flood extent, Flood height, flow velocity for different frequencies Expected losses and risk
Required earthquake hazard information	Expected earthquake intensity Frequency of earthquakes	Earthquake hazard Secondary hazards (liquefaction, tsunami, landslides) Expected losses and risk
Required forest fire hazard information	Extent of historical forest fires	Extent of historical forest fires Forest fire hazard Expected losses and risk

Required volcanic hazard information	Historical and pre-historical extent of volcanic effects Type of volcanic effects (pyroclastic flows, ash-cloud surges, lahars, lateral blasts)	Hazard zones with frequency and intensity per volcanic hazard type Expected losses and risk
Required contents of hazard and risk maps	Scale: 1:25,000 to 1:50,000 Susceptibility zones General frequencies Exposure information per parish, enumeration district or smaller unit.	Scale: 1:1,000 to 1:10,000 Multi-hazard zones Hazard intensities and frequencies for each individual hazard type Expected losses and risk for each individual hazard and for multi-hazards for land parcels.

(CDEMA, 2014)

5.8.5 Mapping/ Cartography

Cartography is defined as the science of graphically representing a geographic area. A map presents geographic information in a comprised but also understandable format. Additionally, to the required basic information of a map, like the title, scale, and legend, cartography also defines how the information is presented.

SoP defined the basic symbology of topographic features. It should be adhered to in all maps published. Concise topographic information forms the basis for meaningful spatial planning at district levels and below. Similar international standards are available for land use maps.

Consequently, standards for hazard mapping should be developed. Standardized hazard maps provide clear guidance for decision-makers, increasing the legibility.

5.8.5.1 Recommendations

- Develop a standard symbology, colour scheme and design for hazard maps: to increase the legibility and the recognition of the content of maps. The same information needs to be presented regularly in the same format.
- Develop hazard maps of single hazards for planning purposes based on MHVRA and other hazard assessments and make them available for planners and local government.
- Make maps available in the local language, e.g., Urdu for the use and information of communities and any stakeholder working in mainstreaming DRR.
- Include map literacy in school and university curricula.

5.8.6 General Implementation

In the pursuit of risk-sensitive spatial planning in Pakistan, the general implementation process serves as the backbone for translating policies, strategies, and plans into tangible actions and outcomes. Below are essential steps and considerations integral to the general planning process, encompassing various facets such as data utilization, infrastructure upgrades, and adaptation strategies.

5.8.6.1 Development of holistic risk sensitive land use plans

- Collaborate with Tehsil Municipal Corporations (TMC) and local government representatives to develop comprehensive risk sensitive land use plans at the tehsil level that consider measures to mitigate disaster.
- Ensure that these plans are time-bound, incorporating short-term objectives and long-term visions to guide sustainable development.

5.8.6.2 Local-Level Focus and Inclusivity

- Emphasize local-level implementation, ensuring inclusion and participation of communities in decision-making processes.

5.8.6.3 Ecosystem Preservation and Infrastructure Upgrades

- Adopt an ecosystem-based approach that considers entire systems. Ecosystems need to be considered in their entirety to incorporate and understand the complex interconnectedness and impacts within the system. Additionally, a functioning ecosystem provides ecosystem services for DRR.
- Preserve and restore natural ecosystems that serve as buffers against hazards, such as wetlands for flood control and forests for landslide risk reduction.
- Upgrade critical infrastructure, including roads, bridges, and utility networks, to withstand hazards through retrofitting existing infrastructure and incorporating resilient designs for new projects.
- Implement nature-based solutions (NbS): NbS broadens the focus on short-term economic gains towards long-term goals. NbS for climate mitigation and disaster control infrastructure help reduce disaster impacts, while reducing the carbon footprint and achieving national climate commitments.

5.8.6.4 Systemic Risk Assessment and Mitigation Planning

- Conduct risk assessments for critical infrastructure like hospitals, schools, and power plants, considering various hazards, and develop and implement mitigation plans to ensure their resilience.
- Extend risk assessment to systems like health care, transportation, water, energy and food for systemic risk management.
- Prioritize gender and social safeguards to demonstrate a commitment to inclusivity and equity in risk reduction efforts, enhancing project transparency and effectiveness.

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5.8.6.5 Adaptation Strategies and DRR Frameworks

- Develop comprehensive disaster risk reduction frameworks tailored to urban areas, integrating adaptation strategies like NbS for long-term resilience.
- Evaluate and prioritize mitigation strategies based on cost-benefit analyses and potential risk reduction, selecting the most effective and feasible options for implementation.
- Incentivize risk reduction measures.

5.8.6.6 Work Planning and Monitoring

- Develop detailed work plans with specific targets and milestones for implementing selected mitigation strategies, ensuring accountability and progress tracking.
- Conduct field surveys and meetings to gather data, monitor progress, and address any issues that arise during implementation, facilitating adaptive management approaches.

5.8.6.7 Specialized Human Resources and Spatial Planning Cycles

- Hire experts to support implementation and monitoring efforts where necessary, augmenting capacity and expertise.
- Recognize spatial planning as a cyclic activity requiring ongoing review, updates, and adjustments to reflect evolving risks and priorities.

5.8.6.8 Minimum Services Standards and Policy Enforcement

- Establish minimum services standards (MSS) or standard operating procedures (SOPs) to guide RSSP and zoning policies, prohibiting construction in high-risk areas.
- Implement and update comprehensive disaster management plans at the local and national levels, ensuring alignment with spatial planning objectives and resilience goals.

5.8.6.9 Localization of Building Codes and Implementation Challenges

- Efforts to localize building codes, such as developing specific codes for areas like Quetta, are commendable but must be accompanied by strict implementation mechanisms to ensure compliance.
- Addressing implementation challenges requires a concerted effort to change existing practices and ensure accountability at all levels of government and project implementation.

5.8.7 Monitoring

Monitoring is an essential component of the implementation process of any project in general and of RSSP as a cyclic activity, particularly in Pakistan. It ensures laws and regulations are enforced, development activities adhere to prescribed standards, and environmental sustainability maintained. It also monitors if the actions taken and implemented have the intended results and allows for continuous guidance and adjustments to the plan. This section outlines the essential aspects and mechanisms involved in monitoring efforts, including conflict resolution, and strengthening of environmental laws.

5.8.7.1 Monitoring and Evaluation Mechanisms

- Develop a comprehensive mechanism for monitoring and evaluation (M&E) based on developed processes and regulations to track the implementation of RSSP initiatives.
- NDMA, PDMA, PMD, and P&D departments should take a lead role in coordinating monitoring efforts and ensuring compliance with regulations concerning RSSP and development.
- Evaluate the spatial plan regularly. Spatial planning is a cycling activity. Evaluation informs the implementer on the performance of the implemented measures. The evaluation also gives guidance and recommendations for the recurring planning process and the update of spatial plans.

5.8.7.2 Conflict Resolution

- Establish mechanisms for conflict resolution to address disputes arising from development activities, land use conflicts, and encroachments.
- Facilitate dialogue and mediation processes involving relevant stakeholders to resolve conflicts and ensure equitable outcomes.

5.8.7.3 Strengthening Environmental Laws

- Strengthen monitoring, evaluation and enforcement mechanisms for environmental laws, including the Environmental Protection Act, to ensure compliance with environmental regulations.
- Increase penalties for violations and enhance monitoring and enforcement capabilities of environmental agencies to safeguard natural resources, ecosystems and their functions.

5.8.7.4 Monitoring of Land Use Regulations

- Monitor land use regulations and zoning ordinances to prevent unauthorized construction and encroachments in flood-prone areas, including floodplains and riparian zones.
- Conduct regular inspections and surveys to identify violations and take appropriate enforcement actions to mitigate risks and ensure public safety.

5.8.7.5 Capacity Building and Training

- Invest in capacity building and training programs for enforcement agencies, government officials, and relevant stakeholders to enhance their understanding of laws, regulations, and enforcement procedures.
- Provide technical support and resources to build the capacity of monitoring and enforcement agencies, enabling them to effectively carry out their responsibilities.

5.8.7.6 Public Awareness and Participation

- Raise public awareness about the importance of compliance with laws and regulations through educational campaigns, outreach activities, and community engagement.

- Encourage public participation in monitoring efforts by providing avenues for reporting violations, providing feedback, and contributing to decision-making processes.

5.8.8 Enforcement

Effective enforcement mechanisms are essential for ensuring compliance with laws and regulations related to spatial planning and development in Pakistan. This section discusses the importance of enforcement, tools, and strategies for enforcement, and the role of key agencies in enforcement efforts.

5.8.8.1 Importance of Enforcement

- Strict enforcement mechanisms are necessary to uphold laws and regulations governing urban development, environmental protection, and land use planning.
- Enforcement ensures that development activities adhere to approved plans, zoning regulations, and building codes, reducing the risk of disasters and safeguarding public safety and welfare.

5.8.8.2 Strict Enforcement Mechanisms

- Implement and rigorously enforce existing laws and regulations, including urban development laws and land use regulations, to ensure compliance with prescribed standards and regulations.
- Enforce the application of the different building codes of Pakistan. Utilize tools such as penalties, fines, and directives from the District Coordination Officers to deter violations and enforce adherence to regulations.

5.8.8.3 Tools and Strategies for Enforcement

- Imposing penalties and fines for violations of laws and regulations serves as a deterrent against non-compliance. Penalties should be commensurate with the severity of the violation and enforced consistently.
- Development Control Officers can be crucial in enforcing urban development laws and regulations. They monitor construction activities, issue permits, and ensure compliance with building codes and zoning ordinances.
- Establishing mechanisms for conflict resolution helps address disputes related to land use, development projects, and environmental concerns. Mediation and arbitration can help resolve conflicts in a timely and impartial manner.

5.8.8.4 Role of Key Agencies

- NDMA and PDMA: These agencies play a vital role in enforcing DRR measures and ensuring compliance with RSSP regulations. They should collaborate with relevant stakeholders to strengthen enforcement mechanisms and enhance disaster resilience.
- Environmental Agencies: Strengthening enforcement mechanisms for environmental laws, including the Environmental Protection Act, as this is crucial for protecting natural resources and mitigating environmental risks. Environmental agencies should increase penalties for violations and enhance monitoring and enforcement capabilities.

- **Planning and Development Departments:** Planning and Development departments at the federal and provincial levels are responsible for enforcing land use regulations and zoning ordinances. They should enforce strict land use regulations to prevent unauthorized construction and encroachments in flood-prone areas, including floodplains and riparian zones.

5.8.8.5 Recommendations for Enhanced Enforcement

- Develop comprehensive enforcement strategies that address gaps in existing mechanisms and prioritize risk-sensitive spatial planning.
- Increase public awareness of spatial planning laws and regulations to foster compliance and community engagement in enforcement efforts.
- Strengthen coordination among relevant agencies, including law enforcement authorities, to streamline enforcement processes and ensure accountability.
- Enhance capacity-building initiatives for enforcement officers to equip them with the necessary skills and knowledge to enforce spatial planning regulations effectively.
- Implement innovative approaches such as technology-driven monitoring systems and community-based monitoring to improve enforcement outcomes.

5.8.9 Measures per Hazard

Developing and implementing targeted measures for specific hazards is one practical part of RSSP and supports resilience and mitigation of risks. The following are examples of measures tailored to the different hazards. The list hints at possible pathways but is by no means conclusive. Implementation possibilities depend on thorough hazard assessments and a comprehensive RSSP process. Additionally, these measures must be part of the systemic approach complementing holistic DRM that focus on long-term solutions.

5.8.9.1 Floods

- Mandatory inclusion of green belts in all infrastructure projects, allocating a minimum of 2% of project budgets for their creation and maintenance.
- Preserve and restore natural drainage systems such as wetlands and riparian buffers to enhance flood attenuation and water quality.
- Construct small-scale reservoirs and detention basins to capture excess runoff and reduce downstream flooding.
- Develop floodplain management plans as a basis for land use regulation to minimize exposure to flood hazards.
- Prohibit construction in wetlands near flood zones and on embankments, and prevent encroachments of streams and rivers.
- Develop mechanisms to remove stream debris and construct check dams in upper catchment areas and floodplains for water storage and flood control.
- Construct and maintain levees, dams, and other flood control structures to manage water flow during heavy rainfall.

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- Promote nature-based solutions such as reforestation, wetland restoration, and riverbank stabilization to enhance flood resilience and ecosystem services.
- Implement land acquisition and resettlement programs to relocate communities from high-risk areas to safer locations.

5.8.9.2 Earthquakes

- Establish and enforce stringent building codes considering specific earthquake risks and promoting resilient construction materials and techniques.
- Retrofit existing buildings, including critical infrastructure such as schools, hospitals, and government buildings, to withstand seismic forces and promote open space preservation.

5.8.9.3 Landslides

- Conduct afforestation activities to mitigate landslides and increase plantation in landslide-prone areas, involving communities and raising awareness.
- Construct protection walls, tunnels, and bioengineering structures, and ensure proper drainage of infrastructure to control erosion and debris flow.
- Conduct slope stability assessments and mapping to identify areas susceptible to landslides and implement zoning regulations to restrict development in high-risk areas.
- Promote slope stabilization measures such as terracing, revegetation, and retaining walls to reduce landslide risk.
- Develop community-based disaster risk reduction plans.

5.8.9.4 Urban Hazards

- Implement redesigning of water systems and green building practices, including green roofs and urban tree plantation.
- Develop maintenance schedules for drainage systems.
- Demarcation of nullahs to define actual pathways.
- Implement green infrastructure projects such as green roofs, permeable pavements, and rain gardens to manage stormwater runoff and reduce urban flooding.
- Introduce urban heat island mitigation strategies such as increasing vegetation cover, enhancing natural ventilation, and using reflective materials in urban design.
- Incorporate climate-resilient design principles into urban planning and development, including setback requirements, building orientation, and passive cooling techniques.
- Demarcate and implement buffer zones between development and areas and natural areas.
- Create protection zones (forests) around urban areas to sustain ecosystem services and reduce the impacts of hazards like landslides and flash floods.

5.8.9.5 Avalanches

- Install avalanche barriers and snow fences in high-risk areas to mitigate the impact of avalanches on infrastructure and communities.

5.8.9.6 *Forest Fires*

- Increase plantation and develop strategies for climate change adaptation.
- Implement controlled burning and prescribed fire programs to reduce fuel buildup and decrease the likelihood of intense wildfires.
- Establish firebreaks and fuel breaks in forested areas to create barriers that can help contain wildfires and protect communities.
- Invest in firefighting infrastructure and equipment, including fire stations, water sources, and aerial firefighting resources.
- Conduct public education campaigns on fire prevention and safety measures, including the responsible use of fire in forested areas and promptly reporting wildfires.

5.8.9.7 *Smog*

- Develop strategies for public transportation, enforce strict emission standards, promote cleaner technologies and renewable energy sources, and enforce pollution control measures.
- Implement vehicular emissions testing and vehicle inspection programs to control automobile pollution and ensure compliance with emission standards.
- Promote alternative transportation options such as public transit, cycling, and walking to reduce reliance on private vehicles and mitigate air pollution.
- Enforce regulations on industrial emissions and enforce penalties for non-compliance with air quality standards.
- Plant native trees and vegetation in urban areas to improve air quality and provide natural air filtration.
- Develop a carbon footprint strategy for smog mitigation to reduce emissions of greenhouse gases and pollutants that contribute to smog.

5.8.9.8 *Glacial Lake Outburst Floods (GLOFs)*

- Implement small-scale engineering structures, monitoring stations, and reforestation programs.
- Conduct hazard mapping and risk assessments to identify glacial lakes at risk of outburst floods and prioritize mitigation measures.
- Implement early warning systems to alert downstream communities to potential GLOF events and facilitate timely evacuation.
- Invest in engineering interventions such as siphoning, lake lowering, and embankment construction to reduce the risk of GLOFs.
- Promote community-based adaptation strategies such as livelihood diversification and climate-resilient agriculture to enhance the resilience of vulnerable populations.

5.8.9.9 *Droughts*

- Regulate groundwater extraction and promote rainwater harvesting and drainage plans for wastewater recycling.
- Implement drought monitoring and early warning systems to track meteorological indicators and forecast drought conditions.

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- Promote water conservation practices such as rainwater harvesting, greywater recycling, and drip irrigation to reduce water demand and enhance drought resilience.
- Develop drought contingency plans that outline measures for water rationing, crop diversification, and emergency relief for affected communities.
- Invest in infrastructure projects such as reservoirs, groundwater recharge facilities/areas, and desalination plants to increase water supply resilience and mitigate drought impacts.

5.8.10 PC Process

The Planning Commission (PC) process of PC1 – PC V, which oversees the planning and implementation of large development projects in the country, provides a critical opportunity to integrate disaster risk reduction (DRR) considerations into the planning and implementation of projects. The DRR checklist (part of PCI and II) for the development process typically includes key steps and considerations to integrate DRR principles into planning and implementation. While specific checklists may vary depending on the context and objectives, the main aspects include risk assessment, incorporating risk reduction measures, adaptation to climate change, learning and knowledge sharing, community engagement, capacity building, institutional framework, financial planning, and monitoring and evaluation. Although this is a standardized procedure for every large-scale development project, it should be mandatory for development projects of all scales. The PC process also takes place at the provincial level, therefore, DRR considerations must be mandatory at the provincial level as well.

This chapter explores the strengthening of existing and integration of additional DRR principles into the PC process, emphasizing the need for technical input, institutional mechanisms, community engagement, and continuous monitoring and evaluation.

5.8.10.1 Incorporating Technical Input

- Recognizing the importance of technical expertise in addressing disaster risks, there is a need to establish a dedicated DRR Unit within the Ministry of Planning, Development & Special Initiatives (MoPD&SI). This unit would provide technical guidance and support in incorporating DRR considerations into the PC process.
- Close Coordination between DRR and environmental protection to release and increase the co-benefits of eco-DRR.
- Periodic updates of the DRR checklist should be conducted, incorporating lessons learned from previous projects and including climate change scenarios/projections to ensure resilience to future risks. Incorporate technical expertise from NDMA and DRR practitioners for these updates.
- The PC-1 document, which outlines the project proposal, should include a mandatory Multi-Hazard Assessment that should inform project design and implementation.

5.8.10.2 Inclusion of Environmental and Social Impact / Management Plan

- Development projects impact the social and environmental aspects of communities and areas. Detailed information on these impacts is necessary within the decision-making process. Additionally, they directly impact the vulnerability and risk. Within the multi-sectoral approach, it is important to assess these impacts and connect them with other sectors like DRR to reduce

impacts and include mitigation measures for disaster. Comprehensive environmental and social management plans (ESMP) should be included as a mandatory part of the PC process.

5.8.10.3 Mainstreaming MHVRA-driven DRR

- Funds for DRR should be included in the PC-1 budget to ensure adequate resources for risk mitigation measures.
- Mainstreaming MHVRA-driven DRR into development projects involves institutionalizing a geographic approach focusing on locality instead of individual projects. This approach ensures that projects are designed and implemented with a thorough understanding of local hazards and vulnerabilities.

5.8.10.4 Institutional Mechanisms and Community Engagement

- Instead of seeking expertise externally, (NDMA) and (PDMAs) should provide this expertise and create hazard maps and sectoral spatial plans in general and on request, making their input compulsory within the planning process.
- The PC process should institutionalize public participation procedures, ensuring that local communities are engaged in the planning and decision-making. Engaging Union Council Disaster Management Committees and conducting awareness and training programs at the grassroots level, including Community-Based Disaster Risk Management (CBDRM), is essential for empowering marginalized groups and ensuring inclusive planning.

5.8.10.5 Continuous Monitoring and Evaluation

- Establishing a continuous monitoring and evaluation system, including the finances and human resources, is vital for tracking project progress, identifying areas for improvement and guiding the implementation.

Glossary

Term	Definition
Acceptable Risk	The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical, and environmental conditions (UNISDR, 2009)
Adaptive Capacity	The ability to anticipate and transform structures, functions, or organizations to better survive any hazards or climate change (Raza <i>et al.</i> , 2020)
Base line study	An analysis describing the situation prior to a development intervention against which progress can be assessed or comparison can be made
Building Code	A set of ordinances or regulations and associated standards intended to control aspects of design, construction, materials, alterations and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage
Capacity	The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience (UNISDR, 2009)
Capacity Building	Efforts aimed to develop human skills or societal infrastructure within a community or organization needed to reduce the level of risk. In extended understanding, capacity building also includes development of institutional, financial, political and other resources, at different levels of the society (Schuermann, 2019)
Capacity Development	The process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through the improvement of knowledge, skills, systems and institutions
Cartography	The science of graphically representing a geographic area
Climate Change	A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer (IPCC, 2022)
Climate Proofing	Ensuring development is as resilient as possible and affordable to conceivable climate change scenarios to avoid maladaptation
Coping Capacity	The ability of people, institutions, organizations, and systems, using available skills, values, beliefs, resources, and opportunities, to address, manage, and overcome adverse conditions in the short to medium term (IPCC, 2022)

**Guideline for Mainstreaming Hazard and Disaster Risk Information
in Spatial Planning Processes in Pakistan**

Critical infrastructure	The physical structures, facilities, networks, and other assets which provide services that are essential to the social and economic functioning of a community or society (UNDRR, no date b)
Cyclone	A low/depression area of closed, circular fluid motion rotating in the same direction as the Earth beyond certain intensification.
Debris Flow	Very rapid to extremely rapid surging flow of saturated debris in a steep channel. Strong entrainment of material and water from the flow path (Hunggr, Leroueil and Picarelli, 2014)
Disaster	A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts (UNISDR, 2009)
Disaster Management	Managing the complete disaster spectrum, including preparedness, response, recovery and rehabilitation, and reconstruction (Government of Pakistan, 2010a; NDMA, 2016)
Disaster Risk	The likelihood of loss of life, injury or destruction and damage from a disaster in a given period of time (UNDRR, no date b)
Disaster Risk Management	Application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses (UNISDR, 2009)
Disaster Risk Reduction	The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development (UNISDR, 2009)
Drought	An extended period of weeks, months, or years when a region/province notes a deficiency in its water supply
Early Warning	The provision of timely and effective information, through identified institutions, to communities and individuals so that they could take action to reduce their risks and prepare for effective response (UNISDR, 2009)
Early Warning System	An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events (UNISDR, 2009)

Earthquake	A shaking and vibration at the surface of the earth resulting from underground movement along a fault plane from volcanic activity or due to movement of plate boundaries of the earth
Eco-DRR	The sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development
Ecosystem	Dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit (Millennium Ecosystem Assessment, 2005)
Ecosystem-based adaptation	The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change
Ecosystem services	Benefits the people and communities obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (Millennium Ecosystem Assessment, 2005).
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance
Efficiency	A measure of how economic resources/inputs (such as funds, expertise, or time) are converted into results
Elements at risk	All tangible (e.g., population, essential and critical infrastructure, buildings, crops) and intangible elements (monetary values) that are at risk of any potential damage during extreme events
Environmental Impact Assessment	Studies undertaken in order to assess the effect on a specified environment of the introduction of any new factor, which may upset the current ecological balance (UNISDR, 2009)
Environmental Degradation	The reduction of the capacity of the environment to meet social and ecological objectives and needs (Schuermann, 2019)
Evaluation	The systematic and objective assessment of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact and sustainability.
Exposure	People, property, systems, or other elements present in hazard zones that are subject to potential losses
Flood	A phenomenon of inundation by water coming from a river, drainage or other water bodies, such as lakes or seas due to overflowing from the ordinary boundary between land and water or water surging

**Guideline for Mainstreaming Hazard and Disaster Risk Information
in Spatial Planning Processes in Pakistan**

Forecast	Estimate of the occurrence of a future event
Gender Equity	Provision of fairness and justice in the distribution of benefits and responsibilities between women, men, and all genders (European Institute for Gender Equality)
Geological Hazard	Geological process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihood and services, social and economic disruption, or environmental damage (Schuermann, 2019)
Glacial Lake Outburst Flood	A flood that occurs when water in a glacier lake suddenly discharges due to a breach of a moraine dam (glacier lake)
Hazard	A process, phenomenon, or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be natural, anthropogenic, or socio-natural in origin. (UNDRR Terminology 2017)
Hydro meteorological hazard	Process or phenomenon of atmospheric, hydrological, or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (Schuermann, 2019)
Impact	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended
Indigenous knowledge	Indigenous peoples' understanding of disaster risk that taps into a wealth of traditional knowledge and folklore reaching back many generations (UNDRR, no date b)
Initial environmental examination	A preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment
Landslide	A gravitational movement of massive rock, debris, or earth down a slope (Cruden, 1991)
Land use planning	<p>(a) The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including considerations of long term economic, social and environmental objectives for the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted and acceptable uses (NDMA, 2016).</p> <p>(b) Iterative process based on dialogue amongst all stakeholders aiming at the negotiation and decision for a sustainable form of land use in rural areas as well as initiating and monitoring its implementation</p>

(c) The systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land use options (Metternicht, 2017)

Map	Graphic representation, drawn to scale and usually on a flat surface, of features—for example, geographical, geological, or geopolitical—of an area of the earth
Mitigation	The lessening or minimizing of the adverse impacts of a hazardous event (UNISDR, 2009)
Monitoring and Evaluation	A continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds
Multi-hazards	Hazards evolved from multiple sources, either inter-related or independent phenomena, and are subject to joint probability theory and analysis (NDMA, 2016)
Multi-Hazard-Vulnerability and Risk Assessment	A comprehensive study which intends to evaluate the expected vulnerabilities, risks and losses due to different hazardous events; both natural and human-induced
Natural Hazard	Natural processes or phenomena occurring in the biosphere that may constitute a damaging event (UNISDR, 2009)
Nature-based Solution	Actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g., climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits (IUCN, 2016)
Non-structural measures	Policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts (NDMA, 2016)
Preparedness	Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations (UNISDR, 2009)
Prevention	Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters (UNISDR, 2009)

Recovery	The restoration and improvement, where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors (Schuermann, 2019)
Relief	The provision of assistance during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration (UNISDR, 2009)
Residual risk	The disaster risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained (UNISDR, 2009)
Resilience	(a) The capacities to live and develop with change and uncertainty (Rockström <i>et al.</i> , 2023) (b) The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions
Response	Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected (UNISDR, 2009)
Risk	The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions (UNISDR, 2009)
Risk Assessment	A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend (NDMA, 2016)
Risk Exposure Assessment	Quantification of all endangered elements (elements at risk) within a certain area, e.g., population, infrastructure, facilities, or all kinds of lifelines that are exposed to hazard and are thereby subject to potential losses
Risk Management	The systematic approach and practice of managing uncertainty to minimize potential harm and loss (Schuermann, 2019)
Scale	The relationship between the real world size of a geographic feature and its representative feature on a map (Schuermann, 2019)
Smog	A specific type of air pollution consisting of a combination of harmful pollutants (often appearing relatively low to the ground as a yellow-brown haze) introduced into the atmosphere by natural and human induced processes (University of Calgary, 2002).

Spatial Planning	A scientific discipline, an administrative technique, and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy. Spatial planning gives geographical expression to the economic, social, cultural, and ecological policies of society
Stakeholder	People or organisations who have, in one way or another, an interest in and/or are impacted, whether positively or negatively, by the current project
Stakeholder dialogue	A method for managing change processes through cooperation. Their distinguishing feature is that they involve the stakeholders relevant to implementing a measure. Stakeholder dialogues bring different perspectives together, and enable the stakeholders to seek solutions jointly. (UN Global Compact, 2011)
Storm Surge	A phenomena of sea level rise associated with a low-pressure weather system, typically a tropical cyclone
Structural measures	Any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and the construction of hazard-resistant and protective structures and infrastructure (NDMA, 2016)
Sustainability	The ability to maintain or support a process over time without depleting natural or physical resources
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given, and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (United Nations World Commission on Environment and Development, 1987)
Technical Committee	A committee of all relevant actors concerned with disaster risk reduction and/or spatial planning in Pakistan that discusses the technical outputs and operations of the project
Technical Working Group	A group of technical experts for relevant actors responsible for the technical implementation of the project, e.g., through the formulation of documents, and the organisation of events etc.
Tsunami	A series of waves that are generated by sudden deformation of the sea floor, which can be caused by earthquakes, landslides and volcanic activities
Urban Flood	Flood and inundation phenomena occurring in the city or built-up areas
Vision	An inspirational statement of an idealistic emotional future of a company, group, or society that serves as a foundation for a broader strategic plan

Vulnerability

(a) The human dimension of disasters as a result of the range of economic, social, cultural, institutional, political and psychological factors that shape people's lives and the environment that they live in (UNDRR, no date a).

(b) The characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of a hazard (NDMA, 2016)

References

- ADPC (2010) *Urban governance and community resilience guides - Mainstreaming disaster risk reduction*. Edited by Gabrielle Iglesias.
- Albrechts, L. (2010) 'How to Enhance Creativity, Diversity and Sustainability in Spatial Planning: Strategic Planning Revisited', in M. Cerreta, G. Concilio, and V. Monno (eds) *Making Strategies in Spatial Planning: Knowledge and Values*. Dordrecht: Springer Netherlands, pp. 3–25. Available at: https://doi.org/10.1007/978-90-481-3106-8_1.
- Ali, A. and Imran, M. (2021) 'The Evolution of National Spatial Data Infrastructure in Pakistan - Implementation Challenges and the Way Forward', *International Journal of Spatial Data Infrastructures Research*, (15), pp. 110–142. Available at: <https://doi.org/10.2902/1725-0463.15.art5>.
- Anjum, G.A. (2008) 'Assessment of Urban Land Development and Management practices in five cities of Punjab'.
- Balzer, D., Jäger, S. and Kuhn, D. (2010) *The guidebook for assessing risk exposure to natural hazards in Central America*.
- CDEMA (2014) *7.1 Spatial Planning, virtual library*. Available at: <https://www.cdema.org/virtuallibrary/index.php/charim-hbook/methodology/7-land-use-planning/7-1-spatial-planning#:~:text=Spatial%20planning%20can%20play%20a%20significant> (Accessed: 27 February 2023).
- Chigudu, A. and Chirisa, I. (2020) 'The quest for a sustainable spatial planning framework in Zimbabwe and Zambia', *Land Use Policy*, 92, p. 104442. Available at: <https://doi.org/10.1016/j.landusepol.2019.104442>.
- Cruden, D.M. (1991) 'A simple definition of a landslide', *Bulletin of the International Association of Engineering Geology*, 43(1), pp. 27–29. Available at: <https://doi.org/10.1007/BF02590167>.
- Cutter, S.L. *et al.* (2008) 'A place-based model for understanding community resilience to natural disasters', *Global Environmental Change*, 18(4), pp. 598–606. Available at: <https://doi.org/10.1016/j.gloenvcha.2008.07.013>.

Dandoulaki, M. *et al.* (2023) 'Disaster Risk Management and Spatial Planning: Evidence from the Fire-Stricken Area of Mati, Greece', *Sustainability*, 15(12), p. 9776. Available at: <https://doi.org/10.3390/su15129776>.

Eckstein, D., Künzel, V. and Schäfer, L. (2021) *Global Climate Risk Index 2021, Who suffers Most from Extreme Weather Events? Weather-related Loss Events in 2019 and 2000 to 2019*. Germanwatch e.V. Available at: https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf.

Esmail, A. *et al.* (2022) 'Integration of flood risk assessment and spatial planning for disaster management in Egypt', *Progress in Disaster Science*, 15, p. 100245. Available at: <https://doi.org/10.1016/j.pdisas.2022.100245>.

Finance Division (2023) 'Pakistan Floods 2022 Impact Assessment'. Available at: https://www.finance.gov.pk/survey/chapters_23/Annex_III_Pakistan_Floods_2022.pdf.

FuturArc (2023) 'Benjakitti Forest Park'. Available at: <https://www.futurarc.com/project/benjakitti-forest-park/>.

Government of Pakistan (2010a) 'National Disaster Management Act'. Government of Pakistan. Available at: https://www.preventionweb.net/files/32317_ordinance.pdf.

Government of Pakistan (2010b) 'The Constitution (Eighteenth Amendment) Act, 2010'. Available at: https://na.gov.pk/uploads/documents/1302138356_934.pdf.

Government of Pakistan (2012) 'National Disaster Management Plan'. Government of Pakistan. Available at: <https://cms.ndma.gov.pk/storage/app/public/plans/October2020/eUvDKZR0Qa0f2eA966um.pdf>.

Greiving, S., Fleischhauer, M. and Wanczura, S. (2006) 'Management of natural hazards in Europe: The role of spatial planning in selected EU member states', *Journal of Environmental Planning and Management*, 49(5), pp. 739–757. Available at: <https://doi.org/10.1080/09640560600850044>.

Hungr, O., Leroueil, S. and Picarelli, L. (2014) 'The Varnes classification of landslide types, an update', *Landslides*, 11(2), pp. 167–194. Available at: <https://doi.org/10.1007/s10346-013-0436-y>.

Hussnain, M.Q.U. (2013) 'A study on the utilization of information and communication technology in preparation and implementation of development plans: A case study of Rawalpindi'. University of Engineering and Technology (UET) Lahore.

International Monetary Fund (2014) 'Finance & Development, December 2014', *Finance & Development*, 51(4), p. i. Available at: <https://doi.org/10.5089/9781484315422.022>.

IPCC (2022) *Annex to IPCC Special Report on Impacts of Global Warming of 1.5°C above Pre-industrial Levels in Context of Strengthening Response to Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. 1st edn. Edited by J.B.R. Matthews. Cambridge University Press. Available at: <https://doi.org/10.1017/9781009157940>.

IUCN (2016) *Nature-based Solutions to address global societal challenges*. IUCN, Gland, Switzerland. Available at: <http://dx.doi.org/10.2305/IUCN.CH.2016.13.en> (Accessed: 12 June 2024).

- Kelman, I. (2020) *Disaster by Choice: How Our Actions Turn Natural Hazards Into Catastrophes*. Oxford University Press.
- Kobayashi, A.L. (ed.) (2020) *Encyclopedia of human geography*. Second Edition. Amsterdam, Netherlands ; Cambridge, MA: Elsevier.
- Konagai, K. and Sattar, A. (2012) 'Partial breaching of Hattian Bala Landslide Dam formed in the 8th October 2005 Kashmir Earthquake, Pakistan', *Landslides*, 9(1), pp. 1–11. Available at: <https://doi.org/10.1007/s10346-011-0280-x>.
- Kongjian Yu, T. (2022) 'Benjakitti Forest Park: Transforming a Brownfield into an Urban Ecological Sanctuary'. Available at: <https://landscape.coac.net/en/node/7517>.
- Metternicht, G. (2017) 'Land Use Planning - Global Land Outlook Working Paper'. UNCCD. Available at: https://knowledge.unccd.int/sites/default/files/2018-06/6.%20Land%2BUse%2BPlanning%2B__G_Metternicht.pdf (Accessed: 21 November 2023).
- Millennium Ecosystem Assessment (2005) *Ecosystem and Human Well-Being: Synthesis*. Washington, D.C.: World Resource Institute. Available at: <https://www.millenniumassessment.org/documents/document.356.aspx.pdf>.
- Millennium Ecosystem Assessment Board (2005) *Living Beyond our Means - Natural Assets and Human Well-Being*. UNDP.
- Ministry of Defence (2020) *National Spatial Data Infrastructure*. Available at: <https://nsdi.gov.pk/Detail/NzIzNDQ0ODctYmFkYy00NjE0LTkwNGMtODMwZDY4MWQwZDYz> (Accessed: 5 June 2024).
- Ministry of Planning, Development and Special Initiatives (2022) *Resilient recovery, rehabilitation and reconstruction framework Pakistan (4RF)*. Manual and Guideline. Government of Pakistan.
- Mitra, A. and Shaw, R. (2023) 'Systemic risk from a disaster management perspective: A review of current research', *Environmental Science & Policy*, 140, pp. 122–133. Available at: <https://doi.org/10.1016/j.envsci.2022.11.022>.
- MoCC, unfccc (2023) *The National Adaptation Plan of Pakistan by UNFCCC and Minister for Climate Change & Environmental Coordination*.
- Mwamati, D. (2012) *The International Guidelines on Urban Territorial Planning 2018 -2020*. 057/20. Nairobi: UN-Habitat. Available at: https://unhabitat.org/sites/default/files/2021/11/1-ig-utp_reporting_2018-2020.pdf (Accessed: 21 November 2023).
- NDMA (2016) 'NDMA Policy guidelines for conduct of Multi Hazard Vulnerability and Risk Assessment (MHVRA)'. National Disaster Management Authority Pakistan. Available at: <http://cms.ndma.gov.pk/storage/app/public/publications/October2020/G0wGoQX2IvEqb4Om54kG.pdf>.
- NDMA Pakistan, M. (2013) *National Disaster Risk Reduction Policy 2013*. Ministry of Climate Change, National Disaster Management Authority.
- NZ Planning Institute (2024) '2024 The New Zealand Planning Institute (NZPI) Award Winner', *2024 NZPI Award Winner*. Available at: <https://www.youtube.com/watch?v=lq47OHlYr7E>.

Pahl-Weber, E. and Henckel, D. (2008) *The Planning System and Planning Terms in Germany*. Germany: The German Academy for Spatial Research and Regional Planning (ARL), Germany.

Planning and Development Department Punjab (2015) 'Punjab Planning Manual'. Government of Punjab. Available at: https://pnd.punjab.gov.pk/system/files/Planning_Manual_Punjab.pdf (Accessed: 21 November 2023).

Planning Commission, G. of P. (2021) 'Manual for Development Projects'. Ministry of Planning, development and special Initiatives. Available at: <https://www.pc.gov.pk/uploads/archives/Manual-Projects-2021.pdf> (Accessed: 20 February 2023).

Raza, T. *et al.* (2020) 'Extreme weather disasters challenges for sustainable development: Innovating a science and policy framework for disaster-resilient and sustainable Quezon City, Philippines', *Progress in Disaster Science*, 5, p. 100066. Available at: <https://doi.org/10.1016/j.pdisas.2020.100066>.

Rockström, J. *et al.* (2023) 'Shaping a resilient future in response to COVID-19', *Nature Sustainability* [Preprint]. Available at: <https://doi.org/10.1038/s41893-023-01105-9>.

Schuermann, E. (2019) *RISK EXPOSURE ASSESSMENT – UTILIZING REA RESULTS FOR DISASTER RISK REDUCTION*. Hannover, Germany: BGR, p. 82.

SUPARCO & NDRMF (2024) *The Natural Catastrophic (NatCat) model*. Available at: <https://ndrmf.pk/nat-cat-model/>.

Sutanta, H., Bishop, I.D.B. and Rajabifard, A.R. (2010) 'Integrating Spatial Planning and Disaster Risk Redcution at Local level in the Context of Spatially Enabled Government', in A.R. Rajabifard et al. (eds) *Spatially Enabling Society Research, Emerging Trends and Critical Assessment*. Leuven University Press.

UN General Asembly (1992) *Rio Declaration on Environment and Development - Report of the United Nations Conference on Environment and Development*. Rios de Janeiro.

UN Global Compact (2011) *CEO Water Mandate Library*. Available at: <https://ceowatermandate.org/resources/stakeholder-dialogues-manual-2011/> (Accessed: 21 May 2024).

UNDP (2022) 'The UNDP Approach to Risk- Informed Development'. United Nations Development Program.

UNDRR (2019) *Global Assessment Report on Disaster Risk Reduction*. Geneva, Switzerland: United Nations Office for Disaster Risk Reduction, p. 472. Available at: https://gar.undrr.org/sites/default/files/reports/2019-05/full_gar_report.pdf.

UNDRR (2020) *Ecosystem-Based Disaster Risk Reduction: Implementing Nature-based Solutions for Resilience*. Bangkok, Thailand: United Nations Office for Disaster Risk Reduction - Regional Office for Asia and the Pacific. Available at: <https://www.undrr.org/media/48333/download?startDownload=20240606>.

UNDRR (no date a) *Understanding disaster risk - vulnerability, UNDRR Prevention Web*. Available at: <https://www.preventionweb.net/understanding-disaster-risk/component-risk/vulnerability> (Accessed: 20 February 2023).

UNDRR (no date b) *Understanding Disaster risk: foundational concepts and principles*, *UNDRR Prevention Web*. Available at: <https://www.preventionweb.net/understanding-disaster-risk> (Accessed: 21 May 2024).

UNISDR (2009) 'UNISDR Terminology on disaster Risk Reduction'.

United Nations, F. (2020) *Strengthening civic spaces in spatial planning processes*. FAO. Available at: <https://doi.org/10.4060/cb0422en>.

United Nations World Commission on Environment and Development (1987) *Our Common Future*. Available at: https://en.wikisource.org/wiki/Brundtland_Report.

University of Calgary (2002) *Smog, Energy Education*. Available at: https://energyeducation.ca/encyclopedia/Smog#cite_ref-primer_2-0.

UNSD (1992) *United Nations Conference on Environment & Development, Rio de Janeiro, Brazil, 3 to 14 June 1992*. Brazil. Available at: <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>.

Vilder, S. de et al. (no date) *Landslide Planning Guidance: Reducing Landslide Risk through Land-Use Planning*. 2024th edn. GNS Science (144). Available at: <https://doi.org/10.21420/R2X8-FJ49>.

Wickramasinghe, D. (2021) 'Ecosystem-Based Disaster Risk Reduction', in Wickramasinghe, D., *Oxford Research Encyclopedia of Natural Hazard Science*. Oxford University Press. Available at: <https://doi.org/10.1093/acrefore/9780199389407.013.360>.

World Bank (2022) 'Flood Damages and Economic Losses Over USD 30 billion and Reconstruction Needs Over USD 16 billion - New Assessment'. Available at: <https://www.worldbank.org/en/news/press-release/2022/10/28/pakistan-flood-damages-and-economic-losses-over-usd-30-billion-and-reconstruction-needs-over-usd-16-billion-new-assessme>.

Appendix A List of workshop reports and resources

All reports are available with NDMA.

No	Date	Title	Type
1	31.03.2022	Inauguration Workshop Report	Workshop Report
2	28.07.2022	Workshop I - MHVRA	Workshop Report
3	25.08.2022	Project Stakeholders - Mandates and Relevant Laws	Summary Report
4	27.09.2022	Summary of the Existing and/or Proposed Urban/Spatial/Land Use Plans Available at National, Provincial and District Level in Pakistan	Summary Report
5	05.10.2022	Workshop II - Project Planning and Mainstreaming of Disaster Risk Reduction (DRR)	Workshop Report
6	21.11.2022	Workshop III - Spatial and Non-Spatial Data Needs and Availability	Workshop Report
7	22.11.2022	Workshop IV - Including Multi Hazard Vulnerability and Risk Assessment (MHVRA) and Hazard/Risk Information into Spatial Planning	Workshop Report
8	23.11.2022	Follow up Meeting on Workshop I: Multi Hazard Vulnerability and Risk Assessment (MHVRA), Incorporation of Risk Assessment in the Planning Process in Pakistan	Workshop Report
9	07.03.2023	Workshop V - Including Hazard Information in Spatial Planning Processes	Workshop Report
10	20.06.2023	Workshop VI - Risk informed spatial planning in practice	Workshop Report
11	01.07.2023	Spatial Planning in Germany - A summary	Summary Report
12	24.08.2023	AJK - Workshop VII: Consultative Workshop on Risk Sensitive Spatial Planning	Workshop Report
13	19.10.2023	KP - Workshop VII: Consultative Workshop on Risk Sensitive Spatial Planning	Workshop Report
14	06.12.2023	Punjab - Workshop VII: Consultative Workshop on Risk Sensitive Spatial Planning	Workshop Report
15	31.01.2024	Balochistan - Workshop VII: Consultative Workshop on Risk Sensitive Spatial Planning	Workshop Report
16	28.02.2024	Sindh - Workshop VII: Consultative Workshop on Risk Sensitive Spatial Planning	Workshop Report
17	06.03.2024	GB - Workshop VII: Consultative Workshop on Risk Sensitive Spatial Planning	Workshop Report
18	29.05.2024	Validation Workshop	Workshop Report

Appendix B Steering Committee Nominations for NADIR Project

NDMA/Coord/NDMA-2019
No. 3(11)/DRR-APM/Coord/NDMA-2019
Government of Pakistan
Prime Minister's Office
National Disaster Management Authority
Islamabad

Member DRR
Ph: 051-9215412

PAKISTAN
NDMA

Islamabad, the June 24th, 2021

Subject: **STEERING COMMITTEE FOR "PROMOTING RESILIENCE AGAINST NATURAL DISASTER IMPACT IN PAKISTAN" PROJECT**

National Disaster Management Authority (NDMA) is implementing a project on "Promoting Resilience Against Natural Disaster Impact in Pakistan" with BGR (Bundesanstalt für Geowissenschaften und Rohstoffe). In this project BGR will support NDMA to develop guidelines for use of spatial risk sensitive planning for disaster risk reduction. Economic Affairs Division, Pakistan and Government of Germany signed Technical Cooperation Agreement on 23rd December 2020, which includes constitution of a Project Steering Committee to provide overall guidance during Implementation of the said project.

2. Therefore, Steering Committee for the subject project consisting of the representatives from following departments / organizations has been constituted:

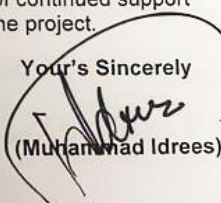
i. Chairman, NDMA	Chairman
ii. Member (DRR), NDMA	Member
iii. Director (Implementation), NDMA	-- do --
iv. Representative, Ministry of Economic Affairs	-- do --
v. Representative, Ministry of Planning, Development & Special Initiative	-- do --
vi. Representative, German Embassy in Islamabad	-- do --
vii. Representative of respective PDMA's	-- do --
viii. AD (Projects), NDMA	Secretary
ix. Technical Expert, PMU, NDMA	Member
x. Representative, BGR	-- do --
xi. Any Co-opted Member, as deemed appropriate by the Committee	

3. The Steering Committee shall:

- Provide strategic / technical guidance and support in the project activities
- Meet at least every six-month. All proceeding of the meeting will be documented in minutes that shall be circulated to all concerned stakeholders.
- Discuss and resolve other issues, as may be deemed appropriate and raised by any member of the Steering Committee.

4. In the above context you are requested to kindly nominate an appropriate officer from your respective department to act as a Focal Person for the project as well as member of the Steering Committee.

5. NDMA would like to take this opportunity to express its appreciation of continued support from your Ministry/office and looks forward to successful implementation of the project.

Your's Sincerely

(Muhammad Idrees)

To:

- Secretary, Economic Affairs Division, Islamabad.
- Secretary, Planning, Development & Special Initiative, Islamabad.
- Director General's, PDMA's/ Regional DMA's
- German Embassy in Islamabad, Islamabad.
- Technical Expert, BGR, Islamabad.

Copy to:
P.S. to Chairman, NDMA

Appendix C Integration of DRR into Development Process Circular and DRR Checklist

FROM : ABC

FAX NO. :

Nov. 24 2010 03:11PM P1

IMMEDIATE

GOVERNMENT OF PAKISTAN
PLANNING COMMISSION
PLANNING AND DEVELOPMENT DIVISION
(Public Investment Authorization Section)

No. 5(7)Misc./PP&H/PD/10

Islamabad, the 23rd November, 2010

C I R C U L A R

Subject: INTEGRATION OF DISASTER RISK REDUCTION INTO DEVELOPMENT PROCESS

It has been decided that in future all development projects requiring approval of Government should give due consideration to vulnerability from natural and human induced disasters and incorporate measures of disaster risk reduction at the project design, planning and implementation stages. Accordingly Checklist (Infrastructure, Production and Social Sectors) are enclosed which may be made part of PC-I & PC-II for consideration of competent forum (i.e. DDWP, CDWP, PDWP, ECNEC).

2. This issues with the approval of the Deputy Chairman, Planning Commission.

Encl: Check List


(Zulfikar Ali Kayhar)
Research Officer
Tel/9093621

All Federal Secretaries / Addl. Secretaries (Incharge of Ministries / Divisions)
All Chief Secretaries / Chairman P&D / ACS (Dev.) Provincial Governments /
Departments, Govt. of AJK, Govt. of Gilgit Baltistan and ACS(FATA).

Copy to:-
(1) Members, Planning Commission, Islamabad.
(2) Additional Secretary (Admn.) P&D Division Islamabad
(3) Chiefs/ Heads of Technical Sections, P&D Division, Islamabad.
(4) Chief, PIA, P&D Division, Islamabad.
(5) Project Director (MPPF), Projects Wing, Chughtai Plaza, Islamabad.
(6) NPD (DERA)
(8) All Project Directors, P&D Division, Islamabad.

C.C to:-

(1) PS to Deputy Chairman, Planning Commission, Islamabad.
(2) PS to Secretary, Planning & Development Division, Islamabad.

Appendix D Detailed Summary of International, Regional and National Commitments

RSSP is in line with the DRM landscape in Pakistan and brings together DRR policy, CC policy, EPA regulation, Hazard Waste Management Policy etc. Below is a summary list of the different documents with the relevant chapters.

Commitments	Title	Year/ Period	Intervention/ Priority/ Pillar (text)	Intervention/ Priority/ Pillar
International	The Sendai Framework for Disaster Risk Reduction (SFDRR)	2015-2030	<ul style="list-style-type: none"> - 7, Collaboration to integrate disaster risk into their management practices - 27(d), To encourage the establishment of necessary mechanisms and incentives to ensure high levels of compliance with the existing safety-enhancing provisions of sectoral laws and regulations, including those addressing land use and urban planning, building codes, environmental and resource management and health and safety standards, and update them, where needed, to ensure an adequate focus on disaster risk management; - 28(a), To guide action at the regional level through agreed regional and subregional strategies and mechanisms for cooperation for disaster risk reduction, as appropriate, in the light of the present Framework, in order to foster more efficient planning, create common information systems and exchange good practices and programs for cooperation and capacity development, in particular to address common and transboundary disaster risks; - 28(d), To promote transboundary cooperation to enable policy and planning for the implementation of ecosystem-based approaches with regard to shared resources, such as within river basins and along coastlines, to build resilience and reduce disaster risk, including epidemic and displacement risk; - 30(f) To promote the mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes; 	7, 27(d), 28(a), 28(d), 30(g), 30(f), 33(j), 33(k)

		<p>30(g), To promote the mainstreaming of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, rivers, coastal floodplain areas, drylands, wetlands and all other areas prone to droughts and flooding, including through the identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help to reduce risks;</p> <p>30(h), To encourage the revision of existing or the development of new building codes and standards and rehabilitation and reconstruction practices at the national or local levels, as appropriate, with the aim of making them more applicable within the local context, particularly in informal and marginal human settlements, and reinforce the capacity to implement, survey and enforce such codes through an appropriate approach, with a view to fostering disaster-resistant structures;</p> <p>30(j), To promote the incorporation of disaster risk management into post-disaster recovery and rehabilitation processes, facilitate the link between relief, rehabilitation and development, use opportunities during the recovery phase to develop capacities that reduce disaster risk in the short, medium and long term, including through the development of measures such as land-use planning, structural standards improvement and the sharing of expertise, knowledge, post-disaster reviews and lessons learned and integrate post-disaster reconstruction into the economic and social sustainable development of affected areas. This should also apply to temporary settlements for persons displaced by disasters;</p> <p>To develop guidance for preparedness for disaster reconstruction, such as on land-use planning and structural standards improvement, including by learning from the recovery and reconstruction programs over the decade since the adoption of the Hyogo Framework for Action, and exchanging experiences, knowledge and lessons learned;</p>
<p>A reference to the midterm review report of Pakistan (SFDRR)</p>	<p>2023</p>	<p>RSSP is very much in line with SFDRR: Achieve SDGs "Through implementation of inclusive and integrated social, economic, institutional, technological, educational and political actions and measures"</p> <p>Challenge: Inadequate attention to DRR at local level results in limited community participation and ownership of DRR programs and initiatives</p>

		<p>Midterm review report mentions that CCA and sustainable disaster management are cross-cutting issues that require a more comprehensive approach.</p> <p>Environmental degradation is mentioned as the root cause of Disaster risks. -> RSSP can be used as a tool to combat that.</p> <p>Measures mentioned in the midterm review of SFDRR that support or are similar to our recommendations:</p> <p>DRR education and Training; include communities</p> <p>improved infrastructure planning</p> <p>Eco-DRR: restoring degraded ecosystems, implement NbS (nature-based solutions)</p> <p>Resilient urban planning: green infrastructure, smart buildings, improved zoning and land use regulations</p> <p>Eco-DRR is mentioned in the Pakistan National Biodiversity Strategy and Action</p>	
New Urban Agenda	2016	<p>15. We commit ourselves to working towards an urban paradigm shift for a New Urban Agenda that will:</p> <p>(c) Adopt sustainable, people-centered, age- and gender-responsive and integrated approaches to urban and territorial development by implementing policies, strategies, capacity development and actions at all levels, based on fundamental drivers of change, including:</p> <p>(iii) Reinvigorating long-term and integrated urban and territorial planning and design in order to optimize the spatial dimension of the urban form and deliver the positive outcomes of urbanization;</p> <p>32. We commit ourselves to promoting the development of integrated and age- and gender responsive housing policies and approaches across all sectors, in particular the employment, education, health-care and social integration sectors, and at all levels of government — policies and approaches that incorporate the provision of adequate, affordable, accessible, resource efficient, safe, resilient, well-connected and well-housing, with special attention to the proximity factor and the strengthening of the spatial relationship with the rest of the urban fabric and the surrounding functional areas.</p>	15c(iii), 32, 34,

		<p>34. We commit ourselves to promoting equitable and affordable access to sustainable basic physical and social infrastructure for all, without discrimination, including affordable serviced land, housing, modern and renewable energy, safe drinking water and sanitation, safe, nutritious and adequate food, waste disposal, sustainable mobility, health care and family planning, education, culture, and New Urban Agenda 13 information and communications technologies. We further commit ourselves to ensure that these services are responsive to the rights and needs of women, children and youth, older persons and persons with disabilities, migrants, indigenous peoples and local communities, as appropriate, and to those of others in vulnerable situations. In this regard, we encourage the elimination of legal, institutional, socioeconomic and physical barriers.</p>
<p>Paris Agreement and Climate Change Mitigation</p>	<p>2015</p>	<p>The Paris Agreement and Climate Change Mitigation efforts provide significant support and guidance for spatial, land use, and urban planning to address climate change more effectively Sustainable Urban Development, Renewable Energy Integration, Emission Reduction Strategies, Conservation and Land Use Management, Climate Resilience and Adaptation. Main points from the agreement:</p> <ol style="list-style-type: none"> 1. Emphasizing the intrinsic relationship that climate change actions, responses and impacts have with equitable access to sustainable development and eradication of poverty, 2. Recognizing the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change, 3. Affirming the importance of education, training, public awareness, public participation, public access to information and cooperation at all levels on the matters addressed in this Agreement, 4. Recognizing the importance of the engagements of all levels of government and various actors, in accordance with respective national legislations of Parties, in addressing climate change, 5. Also recognizing that sustainable lifestyles and sustainable patterns of consumption and production, with developed country Parties taking the lead, play an important role in addressing climate change,

Sustainable Development Goals (SDGs)	2016-2030	Sustainable Development Goals (SDGs): SDGs: 1, 9, 11, 13 and 15
		<p>Goal 1. End poverty in all its forms everywhere</p> <p>Target 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance</p> <p>Target 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters</p> <p>Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> <p>Target 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human wellbeing, with a focus on affordable and equitable access for all</p> <p>Target 9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries</p> <p>Target 9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets</p> <p>Target 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities</p> <p>Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>Target 11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums</p>

Target 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Target 11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

Target 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage

Target 11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

Target 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

Target 11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities

Goal 13. Take urgent action to combat climate change and its impacts

Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Target 13.2 Integrate climate change measures into national policies, strategies and planning

Target 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Target 13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly

		<p>\$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible</p> <p>Target 13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities</p> <p>Goal 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</p> <p>Target 15.1: ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.</p> <p>Target 15.2: promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.</p> <p>Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation neutral world.</p> <p>Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.</p> <p>Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.</p> <p>Target 15.6: Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed.</p>
United Nations Framework	1992	<p>Article 3: Principal 3: The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where</p>
		Article 3 (Principal 3,4)

	<p>Convention on Climate Change (UNFCCC) & Conference of the Parties (COP) Meetings</p>	<p>Yearly (1995 - till)</p>	<p>Article 4: Commitment 1. b, c, e, f, g & i</p> <p>there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties.</p> <p>Principal 4: The Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programs, taking into account that economic development is essential for adopting measures to address climate change.</p> <p>Article 4: Commitment 1.b: Formulate, implement, publish and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change;</p> <p>Commitment 1.c: Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;</p> <p>Commitment 1.e: Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods;</p> <p>Commitment 1.f: Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate +methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and</p>
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			<p>on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change;</p> <p>Commitment 1.g: Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies;</p> <p>Commitment 1.i: Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations;</p> <p>Disaster Risk Management is a Development Challenge: The most efficient tools to make communities more resilient and help them prepare for, cope with, and recover from disasters are the same tools that are central to poverty reduction. These tools however must be adapted to account for increasing hazardous events, changing climate, and other risks. For example, risk sensitive urbanization and land-use planning policies create economic opportunities without putting people unnecessarily at risk. Similarly, universal access to infrastructure and basic services such as energy, water, and sanitation builds human capital and lessens exposure to environmental shocks. Stronger social protection systems, better managed public finances, and universal access to education and financial services are all essential tools people need not only to manage risks, but also to invest and innovate. “Cities are engines of socioeconomic growth and smart land-use and urbanization planning should be priorities for rapid and balanced development. If such planning integrates measures to manage and account for disaster and climate risks—for instance, by steering urban development toward safe areas and away from flood prone areas—they can also be critical risk-reduction instruments.⁴ However, rapid urbanization can also be the main driver in the increase of risk and disaster losses if these risks are disregarded in the development planning process⁵ or if such planning is largely absent in the face of poor governance and uncontrolled migration.</p>
Global Facility for Disaster Reduction and Recovery (GFDRR)	2018–2021		

			<p>Focusing on inclusive design and participation: Resilient development will not be achieved unless all stakeholders are involved in the planning and implementation of disaster risk management interventions.</p> <p>Jointly addressing disaster and climate risk: Building on its current work in this area, GFDRR integrates resilience to climate change into all its activities by:</p> <ol style="list-style-type: none"> i. improving identification and understanding of risk under future climate scenarios; ii. avoiding the creation of new risks and reducing existing risks; and iii. supporting design and implementation of investment policies so that they include climate resilience measures. <p>Promoting resilient infrastructure: Publicly funded infrastructure such as transport, health care, drinking water, sanitation, telecommunications, and electricity, must be designed as resilient, so that basic services are maintained during disaster and infrastructure users are not put at risk by sub-standard structures. Furthermore, infrastructure development attracts population and investment, and its localization should be such that it steers development toward safer areas. GFDRR provides technical assistance to governments to improve the design, operations and maintenance, and contingency planning of new and rehabilitated infrastructure.</p> <p>Scaling up the resilience of cities: Unless urban planning practices radically change, urbanization will remain one of the major drivers of the increase in risk in the next decades.</p>
National	National Adaptation Plan of Pakistan (NAP)	2023	<p>Vision: A climate-resilient Pakistan made up of communities with socioeconomic and environmental adaptive capacities—collaborating to pursue prosperity, promote personal and national wellbeing, and protect their ecosystems through inclusive sustainable approaches.</p> <p>Goals: Enhance the sustainable development of vulnerable communities by fostering social, economic, and environmental resilience. This can be achieved through a progressive empowerment process that ensures equitable resource utilization, building on gender-responsive, participatory, transparent, and socially inclusive approaches</p> <p>Key Objectives and Initiatives for the Agriculture-Water Nexus:</p> <p>Priority Adaptation Areas and Initiatives:</p> <p>4.1 The Agriculture-Water Nexus</p> <p>4.2 Natural Capital (Land, Water, and Air)</p> <p>4.3 Urban Resilience</p> <p>Human Capital</p>

	4.5 Disaster Management	4.6 Gender, Youth, and Social Inclusion	Risk
<p>Objective 1: Incentivizing farmers to transition to climate smart water and land management practices</p> <p>Objective 2: Modernizing surface and groundwater irrigation services to support the transition to CSA</p> <p>Objective 3: Developing long-term agriculture growth strategy with a focus on productivity improvement, climate resilience, and physical expansion.</p> <p>Objective 4: Developing a plan for managing projected river flow and rainfall variability under different climate scenarios</p> <p>Key Objectives and Initiatives for Natural Capital:</p> <p>Objective 1: Mainstreaming sustainable land management into ecosystem services</p> <p>Objective 2: Promoting integrated watershed management</p> <p>Objective 3: Improving water quality through better wastewater management</p> <p>Objective 4: Investing in coastal and marine resources protection</p> <p>Objective 5: Investing in air pollution-climate change nexus</p> <p>Key Objectives and Initiatives for Urban Resilience:</p> <p>Objective 1: Mainstream climate adaptation in urban planning across federal, provincial, and local governments</p> <p>Objective 2: Improving land regulation and land-use planning to bolster resilient service provision</p> <p>Objective 3: Bolstering climate-smart municipal services</p> <p>Objective 4: Leveraging Nature based solutions (NbSS) to manage climate risks</p> <p>Objective 5: Developing financing instruments to ensure sustainable revenue streams for green and resilient urbanization</p> <p>Key Objectives and Initiatives for Human Capital:</p> <p>Objective 1 : Mainstream Climate Adaptation in Health and Education Policies</p>			

			<p>Objective 3: Build Workforce Capacities to Address Climate Risks</p> <p>Objective 3: Build Workforce Capacities to Address Climate Risks</p> <p>Key Objectives and Initiatives for DRM:</p> <p>Objective 1: Understanding climate and disaster risk by investing in state-of-the-art hydro-met, climate and early-warning systems</p> <p>Objective 2: Strengthening disaster risk governance</p> <p>Objective 3: Investing in disaster risk reduction to bolster the resilience of communities and critical infrastructure</p> <p>Objective 4: Enhancing disaster preparedness for effective response and to “Build Back Better” by incorporating risk-informed approaches into recovery and reconstruction efforts</p> <p>Key Objectives and Initiatives for the Gender, Youth, and Social Inclusion:</p> <p>Objective 1: Support Vulnerable Groups in Strengthening Their Capacity for DRM</p> <p>Objective 2: Empower Vulnerable Groups through Fostering Climate-Resilient Livelihoods</p> <p>Objective 3: Promote Inclusive Participation of Vulnerable Groups in Climate-Related Policy and Development Planning</p>	
<p>Climate Change Policy and Adaptation (CCPA)</p>	<p>2021</p>		<ul style="list-style-type: none"> - To focus on pro-poor gender sensitive adaptation while also promoting mitigation to the extent possible in a cost-effective manner; - To build climate-resilient infrastructure; - To track impact of climate change on water, food and energy security of the country, and to implement remedial plans to support water, energy and food policies; - To minimize the risks arising from the potential increase in frequency and intensity of extreme weather events such as floods, droughts and tropical storms; - To develop climate-resilient agriculture and food systems for all agroecological zones in the country; - To foster the development of appropriate economic incentives to encourage public and private sector investment in adaptation and mitigation measures; - To enhance the awareness, skill and institutional capacity of relevant stakeholders; 	

			<ul style="list-style-type: none"> - To promote tree plantation, conservation of natural resources, nature-based solutions and long-term sustainability. - Develop and enforce rules under which climate change assessment is mandatory for all development project's approval, where federal funding is involved; - Take necessary measures to redesign administrative structures and procedures of Federal and Provincial EPAs and Planning and Development Division to integrate climate change concerns into Initial Environmental Impact Assessment (EIA) processes; - Ensure that IEE/EIA and other mechanisms are strictly observed in all development projects, particularly infrastructure projects, by the concerned agencies;
National DRR Policy	2013		<p>Preamble: Climate Change threatens to alter monsoon and rainfall patterns further and is predicted to lead to more severe and less predictable flooding and drought episodes. Rapid urbanization with little attention to spatial planning and construction norms exposes higher numbers of people to highly damaging events such as cyclones and earthquakes.</p> <p>1.3.2 Development not "risk conscious" and DRR not yet effectively Integrated: The integration of DRR into development is at its initial stage. This applies to all levels of development planning i.e. a) national development plans and poverty reduction strategy papers; b) development programs and sector-specific projects and c) the application of building codes for construction and land-use and zoning regulations for settlement planning. This can be attributed to a mix of both technical and institutional factors; namely the need to raise awareness and commitment at policy- and decision-making levels; the need to build dedicated capacity and resources; a lack of institutional and legal mechanisms to promote enforcement; and a lack of monitoring, evaluation and accountability. As a consequence, development currently exacerbates rather than reduces disaster risks.</p> <p>2.2 DRR Approach: The DRR approach promotes risk reduction as part and parcel of development. Risk reduction strategies need to be mainstreamed to increase Pakistan's resilience to natural hazards and to ensure that development efforts do not increase vulnerability. It is imperative that the reduction of vulnerability and risks is viewed as a continuous set of activities across social, economic, governmental and professional sectors. Activities within these sectors need to be integrated into planning and</p>

development strategies that facilitate widespread exchange of information. A shared awareness, commitment and responsibility need to be created at all levels of Pakistani society to reduce risk in disaster-prone areas and communities.

2.4 Policy Objectives:

2.4.4 Promoting development planning that considers and addresses disaster risks alongside environmental and climate change concerns;

2.4.5 Strengthening the structural and non-structural resilience of key infrastructure and lifelines in Pakistan;

2.4.6 Strengthening capacity at national and provincial levels to facilitate and provide support to the implementation of DRR policies, plans and programs across sectors and in high-risk areas

2.4.7 Strengthening Local Level Risk Reduction capacity focusing upon communities, and supportive linkages with Union Councils, tehsils and districts

2.4.8 Ensuring DRR is systematically integrated into recovery and reconstruction programming, “building better, safer and stronger” and informing DRR mainstreaming in general

3.2.2 Promoting “risk conscious” and resilient development

a. Integrate DRR into development planning (macro-level: national level plans and strategies; mega-projects)

The relationship between disasters and development is twofold: disasters have the potential to offset development gains while development can increase exposure and vulnerability to hazards. For the poor this often means that disasters feed into a vicious cycle of worsening vulnerability and ultimately destitution. DRR therefore needs to be treated as an integral component of major strategic frameworks for development i.e. national level development plans and Poverty Reduction Strategy Papers. DRR focusing on hydro-meteorological hazards by addressing already existing climate change variability should also be promoted as a major component of Climate Change Adaptation Plans. Last but not least DRR needs to inform the design of projects of national significance and be factored into project cycle management.

			<p>b. Put into place adequate regulatory regimes to promote DRR: Against a background of rapid urban growth and potential urban disasters, the promotion of DRR through land-use plans and building codes needs to be given high priority in urban settlements. There is an urgent need to revisit municipal regulations in relation to building by-laws and structural and non-structural safety-features to identify a) major safety issues in relation to major hazards including earthquakes, landslides, fires and flooding and b) proper and realistic measures to strengthen the enforcement regime and compliance mechanisms.</p> <p>There is a need to address the issue of land-use planning and zoning in sprawling urban areas taking into account anticipated future growth. Master plans need to be reviewed against findings from risk and vulnerability assessments and current land-use patterns. Where master plans do not exist, they need to be developed to promote sustainable and risk conscious strategies for urban development.</p> <p>c. Integrate DRR into development planning (micro-level projects): At the project level efforts have been completed to develop a DRR checklist for basic development project formats PC 1 & 2 at national, provincial and district levels. Future efforts should concentrate on building capacity within national, provincial and district Planning and Development departments to manage and monitor the proper use of these checklists while ensuring proper technical support from NDMA and PDMA. This includes capacity to analyse development alternatives against their potential impact on risk. In addition, integration of DRR into development needs to be gradually expanded to cover all stages of the project management cycle including monitoring and evaluation with clear criteria and guidelines. This also requires sector-specific guidelines for a number of priority sectors. Ultimately checks performed during the project appraisal phase must be able to flag projects that require more in-depth assessments to a) identify risks, b) formulate recommendations to address these risks. Risk Assessment elements may be incorporated into Environmental and Social Impact Analysis.</p>	
	Linkages to the Pakistan Vision	2025	<p>Pillar II: d. Urban Development and Smart Cities</p> <p>There is excess demand for office, apartment, retail, warehouse, education as well as community space in all major cities of Pakistan. This problem has been exacerbated by outdated zoning laws which fail to accommodate the growing demand for commercial space. For example, 55% of Islamabad's land was designated for residential purposes,</p>	

whereas only 5% was designated for commercial activity⁸. This has led to unplanned and haphazard urbanization. Businesses are forced to move to residential areas as they are faced with high commercialization fees and cumbersome procedures. In addition, large cities have witnessed an increase in slums or katchi abadis (slums) where sometimes even basic sewerage facilities are not available. Because of such urban sprawl, respective city administrations struggle in providing adequate public services to their citizens. Such a scenario is not sustainable and will hamper growth.

Pakistan Vision 2025 aims at transforming our urban areas into creative, eco-friendly sustainable cities through improved city governance, effective urban planning, efficient local mobility infrastructure (mass transit systems) and better security to make urbanization an important driver of growth. Zoning laws will be revised to cater to the growing demand for commercial and parking space in large urban centres. This will involve the use of 'mixed use' areas - residential and commercial.

To cut down usage of private transport in urban centres, public transport including mass transit systems will be carefully devised and implemented. In addition, cities will be made pedestrian friendly. These measures will not only reduce demand for oil and fuels, but will also lead to cleaner and more eco-friendly cities.

Community based participation will be promoted to transform our cities into 'creative' cities where local and innovative solutions are found to local problems through community organization in collaboration with city governments. The aim is to allow for the free exchange of ideas and organize citizens and city officials so that they can work together in formulating and implementing strategies to combat local issues and problems.

These improvements will be the first step in developing 'smart cities' - cities that are capable of adapting to increasing complexity and demand for knowledge communication given urban expansion. To be able to cope adequately to increasing populations and city size with respect to providing public services, real-time updates on city traffic patterns, pollution, crime, parking spaces, water and power will be required. Therefore, for our cities to become 'smart', they must be equipped to transfer such vast amounts of data instantaneously. Vision 2025 seeks to ensure that Pakistan's cities are digitally connected, equipped with wireless network sensors and there is e-connectivity in all parts where the

			<p>free flow of information is possible, thereby laying the foundations for the cities of Pakistan to be smart and creative.</p> <ul style="list-style-type: none"> - Explicit recognition of the relevant risks (and associated economic and social costs and implementation of well-defined mitigation and adaptation strategies / measures, - To promote long term sustainability, conservation and protection of natural resources. 	
	National Disaster Management Plan	2012-2022	<p>4.6 Intervention-6: Strengthen awareness program on disaster risk reduction at local level:</p> <ol style="list-style-type: none"> i. Enhance knowledge on disasters management in the general public ii. Establish safe evacuation places in the case of disaster situation Implement and disseminate CBDRM activities iii. Disseminate self-help and mutual help efforts in disaster management 1.0 Establish disaster mitigation measures incorporated with existing development program <p>4.8 Intervention-8: Mainstreaming disaster risk reduction into development:</p> <ol style="list-style-type: none"> i. Establish disaster risk reduction policies in National Development Plan and National Poverty Reduction Strategy ii. Set up sectoral guidelines on mainstreaming disaster risk reduction Establish criteria to assess development projects from a risk reduction perspective iii. Improve technical capacity of federal <p>Intervention-6: Strengthen awareness Program on disaster risk reduction at local level</p> <p>6.5. Establish disaster mitigation measures incorporated with the existing development Program</p> <ol style="list-style-type: none"> i. Planning small scale mitigation measures during CBDRM activities ii. Mitigation measures for community DRM are incorporated in the local government development Program <p>Intervention-8: Mainstreaming disaster risk reduction into development</p>	

<p>8.1. Establish disaster risk reduction policies in National Development Plan and National Poverty Reduction Strategy</p>	<ul style="list-style-type: none"> i. Collect lessons learnt from pilot projects on mainstreaming DRM ii. The National Development Plan and National Poverty Reduction Strategy should include disaster risk reduction as a national policy iii. Disaster risk reduction is put into practice as pilot projects iv. 8.2 Set up sectoral guidelines on mainstreaming disaster risk reduction v. Undertake case studies on previous experiences of line ministries on mainstreaming DRR
<p>8. 3. Establish criteria to assess developed projects from a risk reduction perspective</p>	<p>Conduct cost-benefit analysis of integrated risk reduction into development sectors</p>
<ul style="list-style-type: none"> i. Establish the evaluation criteria and guidelines for mainstreaming DRM into development projects ii. Disseminate the evaluation criteria to federal and provincial governments through workshops and awareness programs iii. Review the development programs by the criteria set by NDMA 	<p>8. 4. Improve technical capacity of federal and provincial governments to integrate risk reduction into development plans and programs</p> <ul style="list-style-type: none"> - Prepare curriculum of national and provincial workshops on mainstreaming DRM - Hold workshops for sharing lessons learnt and experience



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