

MHVRA

INFORMED DISASTER MANAGEMENT PLAN

2023-2032

DISTRICT SHIKARPUR



[HTTPS://COMMUNITY.WINDY.COM/TOPIC/13372/THIS-STORMING-RAIN-24-8-2020-EVENING-AT-SHIKARPUR-DISTRICT-SHIKARPUR-CIRCULAR-ROAD-BUDWAN-MARI-GHRI-YASEEN-ROAD](https://community.windy.com/topic/13372/this-storming-rain-24-8-2020-evening-at-shikarpur-district-shikarpur-circular-road-budwan-mari-ghri-yaseen-road)

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PREFACE

Multi-Hazard Vulnerability Risk Assessment (MHVRA) and resultant database are the foundation for evidence-based disaster management plan. Such databases are also an integral part of the implementation of disaster risk reduction and disaster risk management strategies. The MHVRA study of the Shikarpur district has been conducted successfully using high-resolution satellite imagery and its products like digital elevation models, historical disaster datasets, hydro-meteorological data, pertinent socio-economic data, and various other essential datasets. The hazard, vulnerability, and risk maps at Union Council (UC) level have been prepared and compiled as atlases. Using disaster risk information obtained through MHVRA, the disaster management plan of district Shikarpur is prepared and being presented to disaster management practitioners, executors, and prominent stakeholders. Before the MHVRA study, the district-level disaster and contingency plans were prepared using conventional methods and human knowledge. In contrast, the MHVRA based disaster management plans are realistic, based on modern techniques and multiple data sources, therefore, are more authentic and reliable for planning and management of disasters in the district.

The disaster management plans are based on MHVRA study carried out to understand the hazard vulnerability and risk at UC levels. The multi-criteria approach used in this disaster management plan offers comprehensive understanding of vulnerable communities at UC levels, while offering concerned authorities with viable and best practices to minimize the hazard impacts to the communities. Also, cost-benefit analysis for recommended mitigation efforts provides clear actionable insights for relevant authorities to take necessary measures.

District-wise disaster management plans will be revised after 10 years on updation of the MHVRA study. The disaster management plan of Shikarpur is comprehensive and covers guidelines on the complete spectrum of disaster management and standard operating procedures to efficiently cope with disasters and emergencies in the district.

The disaster management plan is duly approved by Provincial Disaster Management Board and demands its proactive implementation in true letter and spirit. The proactive implementation of the plan will ensure reduced disaster losses and damages in the district.

ACKNOWLEDGEMENTS

Multi-Hazard Vulnerability Risk Assessment (MHVRA) based Informed Disaster Management Plan (IDMP) for Sindh Province will help to strengthen the institutional and community level capacity to plan and implement natural hazard risk preparedness, recovery, and reduction in the province through capacity building, public education, and awareness by undertaking steps to reinforce physical, environmental and economic elements, as well as psychosocial wellbeing of communities.

SUPARCO appreciates and acknowledges the efforts of the project officials and professionals' team in preparing this comprehensive IDMP. We would also like to extend special thanks to the Project Director and Project Coordinator, Sindh Resilience Project (SRP), for their valuable inputs and necessary support required during the execution of different project activities.

- - Disclaimer - -

The Informed Disaster Management Plan (IDMP), the product of “Multi-Hazard Vulnerability Risk Assessment (MHVRA) Study” developed for Provincial Disaster Management Authority (PDMA) Sindh under Sindh Resilience Project (PDMA Component) by Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) is based on results of MHVRA 2022 study, satellite imagery, data and information obtained from concerned departments and verifiable online sources. Every effort has been made to make this plan practical and free of errors, however, PDMA Sindh or SUPARCO are not liable for any discrepancy in data obtained from various departments. The Informed Disaster Management Plan or any part of it is not to be used for legal or litigation matters and commercial use. However, the information contained in the IDMP or any part of the IDMP can be used without prior permission of PDMA Sindh with proper citation and acknowledgements.

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INTRODUCTION TO DISASTER MANAGEMENT PLAN OF DISTRICT SHIKARPUR

INTRODUCTION

As per the declaration of National Disaster Management Act 2010, the districts are required to develop disaster management plans to effectively cope with disasters and emergencies at district level. The objective of district wise disaster management plan is to adopt a proactive approach in managing disaster risk by building capacity and strengthening institutional mechanisms. The plan is aimed to provide direction and guidelines to district governments and other stakeholders, in a paradigm shift from reactive to a proactive approach, and to layout the standard operating procedures to be followed in the complete cycle of disaster management.

Multi-Hazard Vulnerability and Risk Assessment (MHVRA) is integral for proactive risk management, hence under Sindh Resilience Project (PDMA Component), MHVRA has been conducted at the Provincial level. MHVRA is a multi-disciplinary process involving the quantification of the frequency and intensity of possible hazard(s), the assessment of the elements that can be destroyed or damaged from possible disasters, and the degree of the damage each element can sustain when affected by certain disasters of various intensities. The assessment of hazard, exposure, vulnerability and capacity leads to the risk assessment, which indicates the anticipated damages in case of a possible disaster. Disaster risk assessment is normally the first step in planning for disaster management activities. It provides an evidence-based estimation of the risk so that effective risk reduction measures can be employed appropriately and cost-effectively.

The development of MHVRA informed disaster management plan is based on diversified information sources including satellite remote sensing, Digital Elevation Model (DEM), and pertinent information collected from concerned departments. The outcomes for MHVRA study are depicted in atlas including; landuse / landcover, critical infrastructure, hazard, exposure, vulnerability, and risk maps of cyclone and storm surge, drought, earthquake, flood, heatwave, and tsunami at UC level.

The MHVRA Informed Disaster Management Plan is a significant step towards disaster resilient Sindh because the foundation of disaster management plan is laid on realistic disaster risk identification and efficient need-based disaster preparedness and response measures. UC-level multi-disaster risk identification will not only enable active and effective disaster preparedness but also help in disaster risk reduction at the grass-root level. In addition, the plan is intended to strengthen the district disaster management system and provide guidance on pre-disaster preparedness, coordinated response and recovery through implementable agenda.

VISION

Vision of MHVRA Informed Disaster Management Plan is;

- To identify underlying UC level multi-disaster risks in administrative districts of Sindh province.
- To develop realistic Disaster Management Plan for proactive disaster management.
- To ensure prioritization of disaster risk reduction measures at UC level.
- To enforce better coordination for disaster response.
- To improve rehabilitation plans for restoration of livelihood, and organizational capacities of affected communities.

OBJECTIVES

The plan is intended to meet following objectives in 10 years;

1. Building disaster resilience capacity at UC level to minimize the loss of lives, livelihood, assets and environment.
2. Improved understanding of disaster risk, hazard and vulnerabilities to strengthen disaster governance from local level to provincial level.
3. Enhanced preparedness to improve disaster response at grass-root level.
4. Promote and facilitate Disaster Risk Reduction (DRR) in planning and implementation of development projects to increase resilience.
5. Provide clarity on roles and responsibilities of various departments and stakeholders involved in different aspects of disaster management.
6. Promote "Build Back Better" principle in recovery, rehabilitation and reconstruction.
7. Promote social inclusion and communities as partners to reduce and manage disaster risk.
8. Promote disaster prevention and mitigation culture at local level.

REVIEW OF MHVRA INFORMED DISASTER MANAGEMENT PLAN

The MHVRA Informed Disaster Management Plan is planned to be effective for 10 years starting from January 2023 to December 2032 and requires review before completion of 10 years. Periodic review is essential because of following reasons;

1. During 10 years, there will be likely chances of new development in the district hence, vulnerability, exposure, and risk assessment will require updation.

1. Planning is a dynamic process, therefore, disaster management plan must be reviewed periodically to incorporate changes according to the emergence of new eminent disasters and situations.
2. Climate is a dynamic driver of changing hazard risks, therefore, it is important to review disaster management plan in changing disaster scenarios.

Additionally, it is also recommended to review the plan after the occurrence of each disaster event to measure its effectiveness. Necessary adjustment may be carried out in the plan accordingly.

Foregoing in view, it is recommended to formulate a committee to review the disaster management plan. A review of the plan shall be carried out by the concerned DDMA under the supervisory role of PDMA Sindh. Recommended composition of the plan review committee is as follows;

Table 1: Recommended Committee for Reviewing Disaster Management Plan

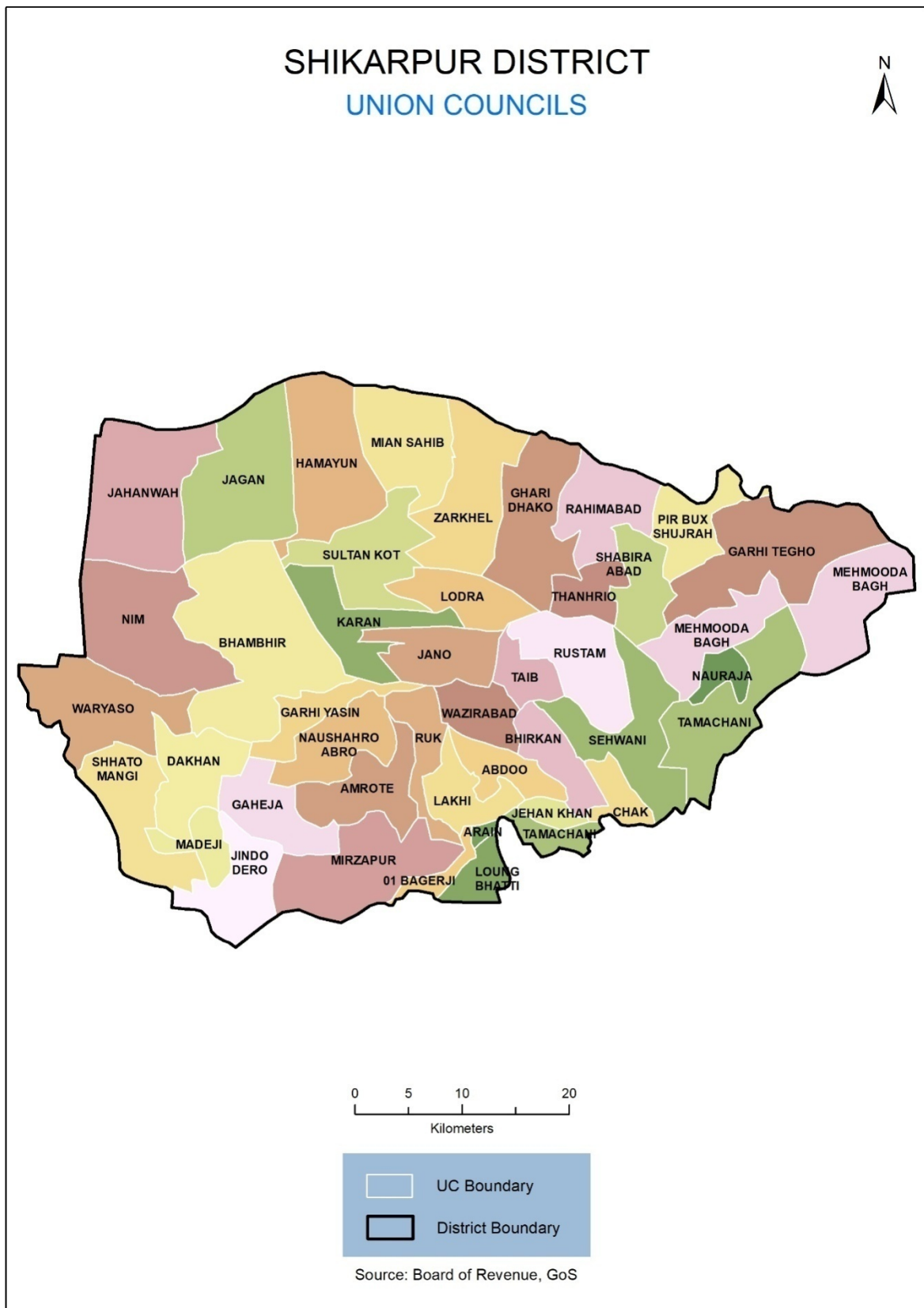
Committee Representative	Role
DG, PDMA Sindh / Dir Ops PDMA	Chairman
Concerned DC or representative officer	Member
Concerned officer from local government	Member
Elected representative of the concerned district	Member
Representatives from disaster affected communities	Member (s)
Representative from SUPARCO	Member
Representative from research / academia experienced in disaster management field	Member (s)
Representative from UN Organization on disaster related domains in Pakistan, especially in Sindh	Member
Representative from reputed NGO working on disaster related domains especially in Sindh	Member

MODES OF REVIEW

Preferred modes of review of plan are;

- a. For a post-disaster review of the plan, PDMA shall conduct a questionnaire-based survey covering pertinent questions to identify gaps or issues in the plan. A questionnaire-based survey can be conducted through online survey services or organizing online meetings. Once issues have been identified by the committee, necessary changes be incorporated in the plan and the revised plan be approved by review committee.
- b. For review before the expiry of the validity of the plan, necessary updation in baseline mapping i.e., hazard, exposure, vulnerability, and risk assessment be carried out to incorporate new developments and disaster situations. Once, baseline mapping is updated, plan is to be updated accordingly. The review committee shall vet the updation of the plan in the light of experience and recommendations. Upon approval from the review committee, the plan shall be effective for next 10-years.

DISASTER RISK PROFILE OF DISTRICT SHIKARPUR



District area in Sq. Km	2,802	
Coordinates	Longitude 68° 19' 42" to 68° 56' 14" East Latitude 27° 49' 19" to 28° 7' 32" North	
Surrounding Districts	Jacobabad in the North Khairpur in the South Sukkur in the East Larkana in the West Kashmorein North East	
Climate Conditions	Hot and Arid	
Coldest Month	January	
Hottest Month	June	
Seasonal Temperatures	Max Mean (°C)	Min Mean (°C)
Spring (March and April)	37.59	20.43
Dry Summer (May and June)	45.53	29.72
Wet Summer (July to September)	42.65	29.54
Autumn (October to November)	35.12	18.94
Winter (December to February)	26.08	10.33
Average Rainfall	83.34 mm/year	
Physiographic Features	River Indus flows through Eastern and Southern boundary of Shikarpur District	

DEMOGRAPHY

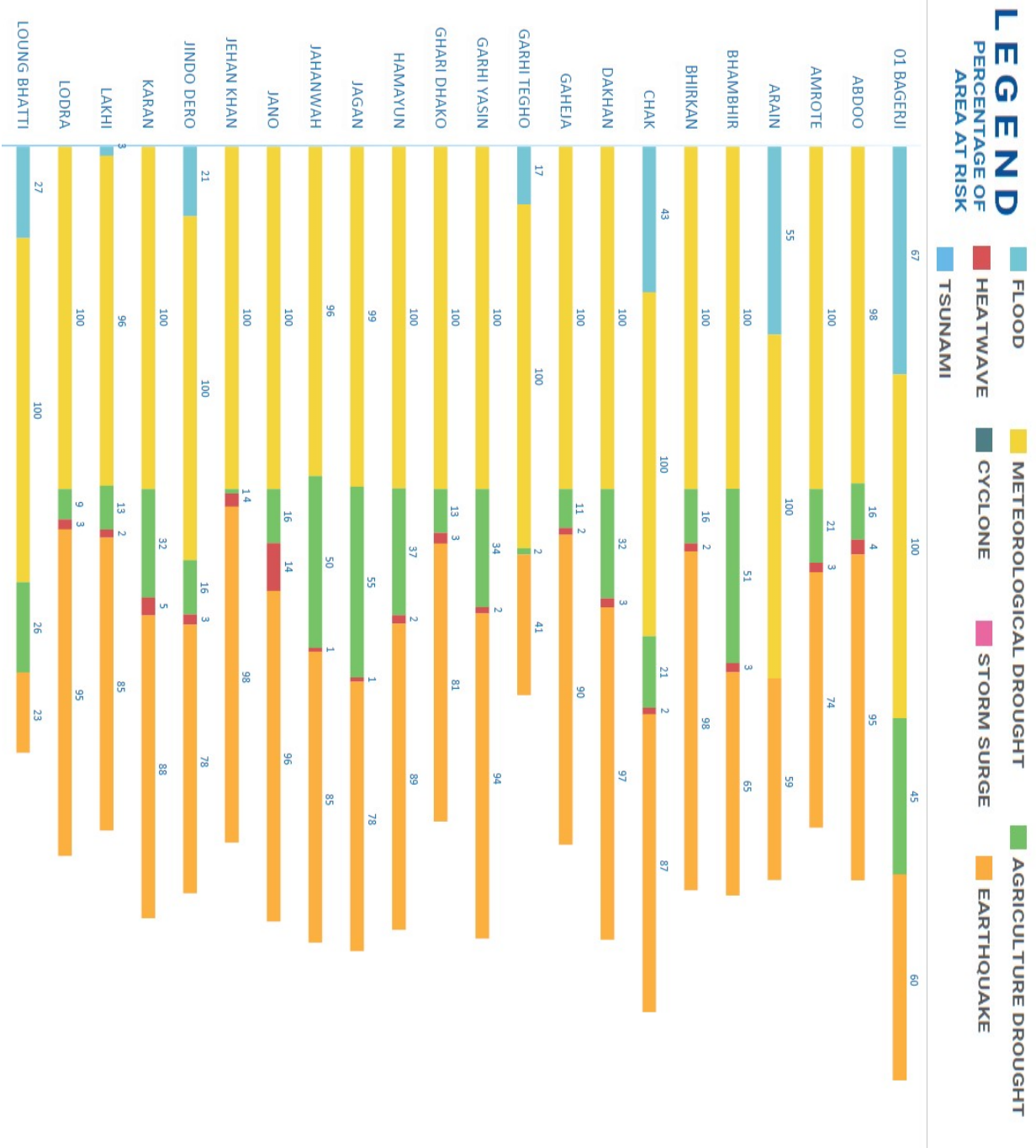
	Year-1998	Year-2017
Population	880,438	1,233,760
Urban	211,979	304,441
Rural	668,459	929,319
No. of Household	-	207,555
Average Annual Growth Rate 1998-2017	1.79 %	

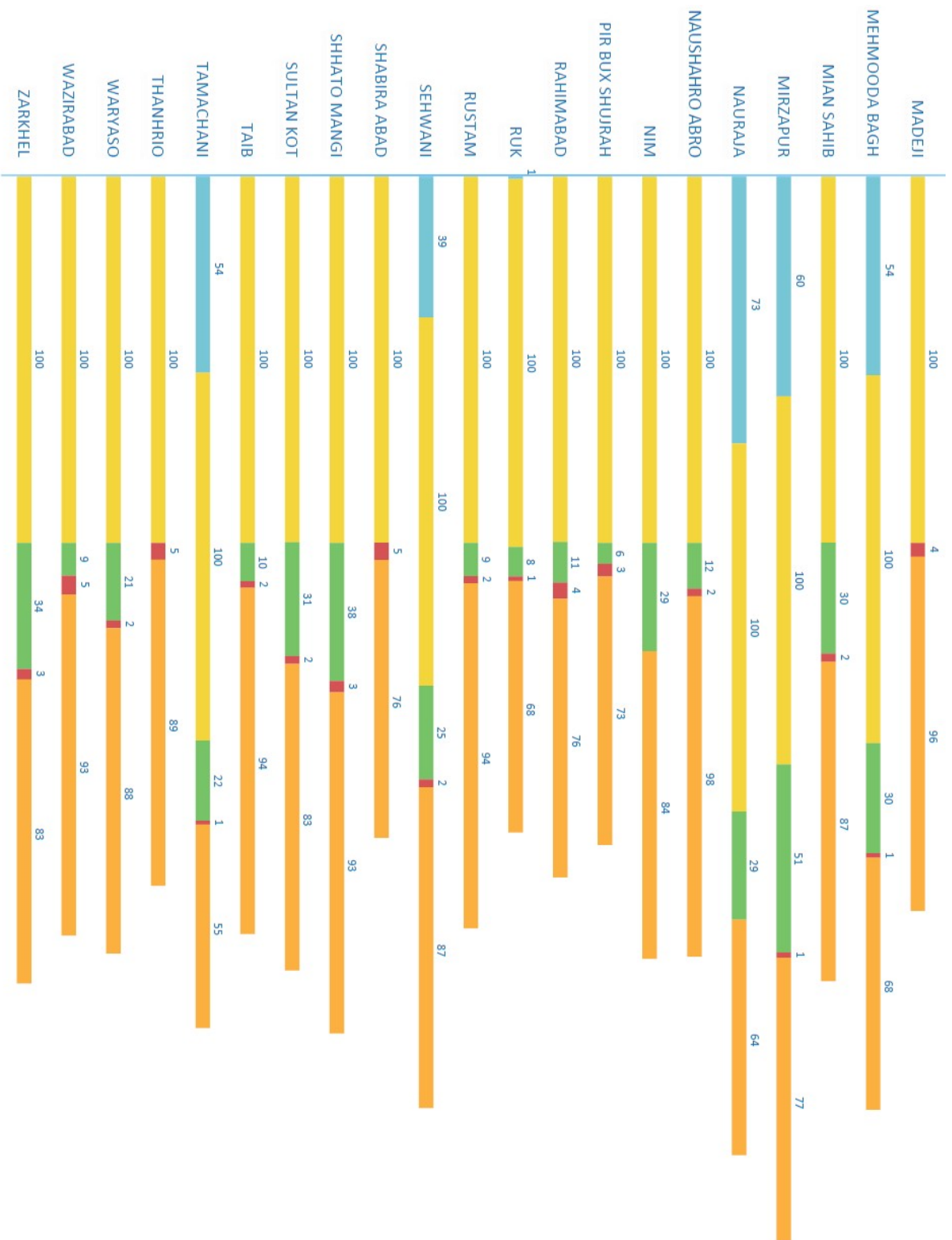
ECONOMY

Industries	Mainly based on Agriculture
Agriculture	Production in M.tons as per (2016-17)
Major Crops	
Wheat	106,303
Sugarcane	14,530
Rice	353,224
Minor Crops	
Gram	1,465
Maize	11
Barley	44
Rapeseed and Mustard	1,090
Sesame	20

TALUKA NAMES	UC NAMES
<ol style="list-style-type: none"> 1. Garhi Yaseen Taluka 2. Khanpur Taluka 3. Lakhi Taluka 4. Shikarpur Taluka 	<ol style="list-style-type: none"> 1. Bagerji 2. Abdoo 3. Amrote 4. Arain 5. Bhambhir 6. Bhirkan 7. Chak 8. Dakhan 9. Gaheja 10. Garhi Tegho 11. Garhi Yasin 12. Ghari Dhako 13. Hamayun 14. Jagan 15. Jahanwah 16. Jano 17. Jehan Khan 18. Jindo Dero 19. Karan 20. Lakhi 21. Lodra 22. Loung Bhatti 23. Madeji 24. Mehmooda Bagh 25. Mian Sahib 26. Mirzapur 27. Nauraja 28. Naushahro Abro 29. Nim 30. Pir Bux Shujrah 31. Rahimabad 32. Ruk 33. Rustam 34. Sehwani 35. Shabira Abad 36. Shhato Mangi 37. Sultan Kot 38. Taib 39. Tamachani 40. Thanhrio 41. Waryaso 42. Wazirabad 43. Zarkhel

SHIKARPUR DISTRICT MULTI-HAZARD RISK PROFILES





UC WISE RISK PROFILE

Bagerji			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	7.933 sq km
		Natural Vegetation in Wet Areas	0.01 sq km
Meteorological Drought	Medium - Extreme	Agriculture Area	7.944 sq km
		Natural Vegetation in Wet Areas	3.543 sq km
Agricultural Drought	Low - Medium	Agriculture Area	7.486 sq km
		Natural Vegetation in Wet Areas	0.214 sq km
Riverine Flood	Low - Extreme	Agriculture Area	7.897 sq km
		Natural Vegetation in Wet Areas	0.94 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Heatwave	Nil	The UC falls out of vulnerable zone for Heatwave	

Abdoo			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	30.635 sq km
		Forest Area	0.001 sq km
		Pakka Unplanned Area	1.38 sq km
		Range Land	0.003 sq km
		Bridges	1
		Education Facilities	31
		Health Facilities	4
		Mobile Towers	9
		Petrol Pumps	5
		Police Stations	2
		Settlements	20
		Irrigation and Drainage Network	20.67 km
		Railway Line	8.442 km
		Road Network	59.976 km
		Population	38268
Household	6858		

Meteorological Drought	Medium - Extreme	Settlements	20
		Agriculture Area	30.687 sq km
		Forest Area	0.004 sq km
		Range Land	0.041 sq km
		Water Body	0.114 sq km
		Wet Area	0.317 sq km
		Population	30183
		Household	5409
Agricultural Drought	Low	Settlements	3
		Agriculture Area	6.844 sq km
		Forest Area	0.005 sq km
		Range Land	0.05 sq km
		Water Body	0.143 sq km
		Wet Area	0.005 sq km
		Population	394
		Household	69
Heatwave	Medium	Settlements	12
		Population	29762
		Household	5334
		Agriculture Area	0.073 sq km
		Pakka Unplanned Area	1.371 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Amrote			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	42.93 sq km
		Forest Area	0.018 sq km
		Natural Vegetation in Wet Areas	0.073 sq km
		Pakka Unplanned Area	1.546 sq km
		Range Land	0.032 sq km
		Bridges	1
		Education Facilities	32
		Health Facilities	1
		Mobile Towers	1

		Petrol Pumps	1
		Settlements	30
		Irrigation and Drainage Network	52.702 km
		Railway Line	3.122 km
		Road Network	80.469 km
		Population	24152
		Household	4052
Meteorological Drought	Medium - Extreme	Settlements	30
		Agriculture Area	43.143 sq km
		Forest Area	0.396 sq km
		Natural Vegetation in Wet Areas	4.076 sq km
		Range Land	0.598 sq km
		Water Body	10.361 sq km
		Wet Area	0.794 sq km
		Population	19141
		Household	3214
Agricultural Drought	Low	Settlements	1
		Agriculture Area	5.618 sq km
		Forest Area	0.501 sq km
		Natural Vegetation in Wet Areas	1.785 sq km
		Range Land	0.742 sq km
		Water Body	8.073 sq km
		Wet Area	0.017 sq km
		Population	534
		Household	88
Heatwave	Medium	Settlements	24
		Population	18701
		Household	3137
		Agriculture Area	0.134 sq km
		Pakka Unplanned Area	1.529 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Arain			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	2.144 sq km
		Natural Vegetation in Wet Areas	0.014 sq km
		Irrigation and Drainage Network	1.068 km
		Road Network	1.945 km
Meteorological Drought	Medium - Extreme	Agriculture Area	2.151 sq km
		Natural Vegetation in Wet Areas	1.152 sq km
Riverine Flood	Low - High	Agriculture Area	2.01 sq km
		Natural Vegetation in Wet Areas	0.014 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Heatwave	Nil	The UC falls out of vulnerable zone for Heatwave	
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

Bhambhir			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	109.016 sq km
		Kachcha Area	1.649 sq km
		Natural Vegetation in Wet Areas	0.44 sq km
		Pakka Planned Area	0.378 sq km
		Pakka Unplanned Area	2.449 sq km
		Range Land	0.215 sq km
		Bridges	4
		Education Facilities	64
		Grid Stations	1
		Health Facilities	5
		Mobile Towers	8
		Petrol Pumps	5
		Police Stations	1
		Post Offices	1
Settlements	78		
Irrigation and Drainage Network	62.997 km		

		Road Network	175.961 km
		Population	68946
		Household	11655
Meteorological Drought	Medium - Extreme	Settlements	78
		Agriculture Area	109.748 sq km
		Bare Area with sparse Natural Vegetation	10.158 sq km
		Natural Vegetation in Wet Areas	10.509 sq km
		Range Land	5.503 sq km
		Water Body	16.561 sq km
		Wet Area	19.587 sq km
		Population	54533
		Household	9212
Agricultural Drought	Low - High	Settlements	33
		Agriculture Area	70.483 sq km
		Bare Area with sparse Natural Vegetation	9.23 sq km
		Natural Vegetation in Wet Areas	4.612 sq km
		Range Land	6.145 sq km
		Water Body	10.365 sq km
		Wet Area	12.578 sq km
		Population	15668
		Household	2637
Heatwave	Low - Medium	Settlements	52
		Population	53560
		Household	9049
		Agriculture Area	0.229 sq km
		Kachcha Area	1.645 sq km
		Pakka Planned Area	0.377 sq km
		Pakka Unplanned Area	2.429 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood
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Bhirkan			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	37.139 sq km
		Pakka Unplanned Area	0.854 sq km
		Range Land	0.005 sq km
		Education Facilities	32
		Health Facilities	2
		Settlements	24
		Irrigation and Drainage Network	20.476 km
		Road Network	69.289 km
		Population	18619
		Household	3206
Meteorological Drought	Medium - Extreme	Settlements	24
		Agriculture Area	37.168 sq km
		Range Land	0.182 sq km
		Water Body	0.082 sq km
		Wet Area	0.225 sq km
		Population	14727
		Household	2535
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	7.534 sq km
		Range Land	0.158 sq km
		Population	1503
		Household	255
Heatwave	Medium	Settlements	15
		Population	14353
		Household	2470
		Agriculture Area	0.091 sq km
		Pakka Unplanned Area	0.841 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Chak			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	19.026 sq km
		Pakka Unplanned Area	0.386 sq km
		Range Land	0.011 sq km
		Education Facilities	18
		Health Facilities	2
		Settlements	8
		Irrigation and Drainage Network	9.659 km
		Road Network	21.455 km
		Population	8410
		Household	1448
Meteorological Drought	Medium - Extreme	Settlements	8
		Agriculture Area	19.116 sq km
		Range Land	0.335 sq km
		Water Body	2.153 sq km
		Population	6649
Agricultural Drought	Low - Medium	Agriculture Area	5.984 sq km
		Population	101
		Household	16
Heatwave	Low – Medium	Settlements	5
		Population	6519
		Household	1122
		Agriculture Area	0.037 sq km
		Pakka Unplanned Area	0.382 sq km
Riverine Flood	Low - Extreme	Agriculture Area	9.599 sq km
		Education Facilities	3
		Irrigation and Drainage Network	0.757 km
		Road Network	1.597 km
		Settlements	2
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Dakhan			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	56.207 sq km
		Pakka Unplanned Area	1.469 sq km
		Bridges	3
		Education Facilities	57
		Health Facilities	4
		Mobile Towers	3
		Petrol Pumps	3
		Police Stations	1
		Post Offices	1
		Settlements	35
		Irrigation and Drainage Network	49.087 km
		Road Network	65.361 km
		Population	22963
		Household	3854
Meteorological Drought	Medium - Extreme	Settlements	35
		Agriculture Area	56.32 sq km
		Water Body	0.704 sq km
		Wet Area	1.376 sq km
		Population	18149
		Household	3047
Agricultural Drought	Low - Medium	Settlements	8
		Agriculture Area	22.389 sq km
		Water Body	0.881 sq km
		Wet Area	0.615 sq km
		Population	4278
		Household	717
Heatwave	Medium	Settlements	29
		Population	17736
		Household	2976
		Agriculture Area	0.14 sq km
		Pakka Unplanned Area	1.45 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Gaheja			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	46.934 sq km
		Natural Vegetation in Wet Areas	0.033 sq km
		Pakka Unplanned Area	0.979 sq km
		Bridges	1
		Education Facilities	29
		Health Facilities	1
		Settlements	20
		Irrigation and Drainage Network	43.791 km
		Railway Line	3.285 km
		Road Network	84.372 km
		Population	15292
		Household	2568
Meteorological Drought	Medium - Extreme	Settlements	20
		Agriculture Area	47.064 sq km
		Natural Vegetation in Wet Areas	1.117 sq km
		Water Body	1.526 sq km
		Wet Area	2.8 sq km
		Population	12066
		Household	2025
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	4.502 sq km
		Natural Vegetation in Wet Areas	1.346 sq km
		Water Body	1.632 sq km
		Wet Area	0.167 sq km
		Population	989
		Household	164
Heatwave	Medium	Settlements	17
		Population	11835
		Household	1987
		Agriculture Area	0.089 sq km
		Pakka Unplanned Area	0.967 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone
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Garhi Tegho			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	49.974 sq km
		Forest Area	0.061 sq km
		Kachcha Area	0.689 sq km
		Natural Vegetation in Wet Areas	0.447 sq km
		Pakka Planned Area	0.113 sq km
		Pakka Unplanned Area	0.191 sq km
		Range Land	0.261 sq km
		Education Facilities	11
		Health Facilities	1
		Police Stations	1
		Settlements	28
		Irrigation and Drainage Network	36.529 km
		Road Network	66.754 km
		Population	18228
Household	2872		
Meteorological Drought	Medium - Extreme	Settlements	28
		Agriculture Area	50.213 sq km
		Forest Area	1.292 sq km
		Natural Vegetation in Wet Areas	33.512 sq km
		Range Land	9.128 sq km
		Water Body	16.891 sq km
		Wet Area	5.884 sq km
		Population	14445
Household	2277		
Agricultural Drought	Low - Medium	Settlements	1
		Agriculture Area	2.025 sq km
		Forest Area	0.062 sq km
		Natural Vegetation in Wet Areas	0.043 sq km
		Range Land	0.739 sq km
		Wet Area	0.007 sq km
		Population	216
Household	35		
Heatwave	Low - Medium	Settlements	20

		Population	14121
		Household	2226
		Agriculture Area	0.04 sq km
		Kachcha Area	0.684 sq km
		Pakka Planned Area	0.112 sq km
		Pakka Unplanned Area	0.19 sq km
Riverine Flood	Low - High	Agriculture Area	19.766 sq km
		Education Facilities	2
		Kachcha Area	0.116 sq km
		Natural Vegetation in Wet Areas	2.064 sq km
		Road Network	1.263 km
		Settlements	7
		Population	2138
		Household	338
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Garhi Yasin			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	32.378 sq km
		Pakka Unplanned Area	0.59 sq km
		Bridges	1
		Education Facilities	17
		Health Facilities	1
		Petrol Pumps	1
		Settlements	18
		Irrigation and Drainage Network	20.813 km
		Road Network	50.093 km
		Population	9723
		Household	1644
Meteorological Drought	Medium - Extreme	Settlements	18
		Agriculture Area	32.447 sq km
		Water Body	1.295 sq km
		Wet Area	0.624 sq km
		Population	7705
		Household	1301

Agricultural Drought	Low - Medium	Settlements	6
		Agriculture Area	13.308 sq km
		Water Body	1.641 sq km
		Wet Area	0.196 sq km
		Population	2263
		Household	381
Heatwave	Medium	Settlements	14
		Population	7490
		Household	1264
		Agriculture Area	0.064 sq km
		Pakka Unplanned Area	0.582 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Ghari Dhako			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	71.122 sq km
		Forest Area	0.006 sq km
		Kachcha Area	0.034 sq km
		Pakka Unplanned Area	2.608 sq km
		Range Land	0.202 sq km
		Bridges	4
		Education Facilities	43
		Health Facilities	2
		Mobile Towers	4
		Petrol Pumps	4
		Settlements	49
		Irrigation and Drainage Network	32.981 km
		Road Network	102.259 km
		Population	58309
Household	9574		
Meteorological Drought	Medium - Extreme	Settlements	49
		Agriculture Area	71.404 sq km
		Forest Area	0.158 sq km

		Range Land	9.293 sq km
		Water Body	0.508 sq km
		Wet Area	7.306 sq km
		Population	45967
		Household	7548
Agricultural Drought	Low	Settlements	1
		Agriculture Area	3.662 sq km
		Forest Area	0.2 sq km
		Range Land	10.782 sq km
		Water Body	0.361 sq km
		Wet Area	0.038 sq km
		Population	615
		Household	96
Heatwave	Medium	Settlements	36
		Population	45281
		Household	7435
		Agriculture Area	0.145 sq km
		Kachcha Area	0.034 sq km
		Pakka Unplanned Area	2.596 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Hamayun			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	90.781 sq km
		Forest Area	0.002 sq km
		Pakka Unplanned Area	2.431 sq km
		Range Land	0.188 sq km
		Bridges	1
		Education Facilities	51
		Grid Stations	1
		Health Facilities	1
		Mobile Towers	7
		Petrol Pumps	3
		Police Stations	1
		Settlements	45
		Irrigation and Drainage	17.463 km

		Network	
		Railway Line	8.272 km
		Road Network	138.091 km
		Population	40110
		Household	7113
Meteorological Drought	Medium - Extreme	Settlements	45
		Agriculture Area	90.972 sq km
		Bare Area with sparse Natural Vegetation	0.513 sq km
		Forest Area	0.046 sq km
		Range Land	6.901 sq km
		Water Body	0.406 sq km
		Wet Area	3.255 sq km
		Population	31550
		Household	5592
Agricultural Drought	Medium - Extreme	Settlements	14
		Agriculture Area	37.176 sq km
		Bare Area with sparse Natural Vegetation	0.658 sq km
		Forest Area	0.059 sq km
		Range Land	8.766 sq km
		Water Body	0.506 sq km
		Wet Area	2.109 sq km
		Population	5035
		Household	891
Heatwave	Medium	Settlements	33
		Population	31017
		Household	5497
		Agriculture Area	0.161 sq km
		Pakka Unplanned Area	2.414 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Jagan			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	92.999 sq km
		Kachcha Area	0.26 sq km
		Pakka Unplanned Area	1.193 sq km
		Range Land	0.338 sq km
		Education Facilities	26
		Health Facilities	1
		Settlements	38
		Irrigation and Drainage Network	32.898 km
		Road Network	122.337 km
		Population	23963
		Household	4246
Meteorological Drought	Medium - Extreme	Settlements	38
		Agriculture Area	93.297 sq km
		Bare Area with sparse Natural Vegetation	7.286 sq km
		Range Land	11.487 sq km
		Water Body	0.582 sq km
		Wet Area	6.433 sq km
		Population	18867
		Household	3341
Agricultural Drought	Low - High	Settlements	19
		Agriculture Area	58.838 sq km
		Bare Area with sparse Natural Vegetation	5.986 sq km
		Range Land	14.624 sq km
		Water Body	0.746 sq km
		Wet Area	5.397 sq km
		Population	7486
		Household	1323
Heatwave	Medium	Settlements	20
		Population	18535
		Household	3283
		Agriculture Area	0.094 sq km
		Kachcha Area	0.259 sq km
		Pakka Unplanned Area	1.185 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood

Jahanwah			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	103.649 sq km
		Forest Area	0.002 sq km
		Kachcha Area	0.232 sq km
		Natural Vegetation in Wet Areas	0.042 sq km
		Pakka Unplanned Area	1.071 sq km
		Range Land	0.087 sq km
		Education Facilities	20
		Settlements	36
		Irrigation and Drainage Network	26.098 km
		Road Network	144.533 km
		Population	21144
		Household	3687
Meteorological Drought	Medium - Extreme	Settlements	36
		Agriculture Area	103.916 sq km
		Bare Area with sparse Natural Vegetation	3.376 sq km
		Forest Area	0.017 sq km
		Natural Vegetation in Wet Areas	2.003 sq km
		Range Land	3.996 sq km
		Water Body	1.156 sq km
		Wet Area	3.945 sq km
		Population	16617
		Household	2898
Agricultural Drought	Low - Medium	Settlements	19
		Agriculture Area	64.365 sq km
		Bare Area with sparse Natural Vegetation	3.023 sq km
		Forest Area	0.021 sq km
		Natural Vegetation in Wet Areas	2.531 sq km
		Range Land	5.087 sq km
		Water Body	1.465 sq km
		Wet Area	1.852 sq km
		Population	13395
Household	2331		

Heatwave	Medium	Settlements	19
		Population	16342
		Household	2851
		Agriculture Area	0.077 sq km
		Kachcha Area	0.231 sq km
		Pakka Unplanned Area	1.061 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Jano			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	45.079 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Planned Area	5.913 sq km
		Pakka Unplanned Area	1.508 sq km
		Ambulance Services	1
		Bridges	12
		Bus Stops	4
		Education Facilities	114
		Grain Mandi	2
		Health Facilities	18
		Mobile Towers	29
		Petrol Pumps	16
		Police Stations	5
		Post Offices	3
		Settlements	65
		Tourist Places	2
		Irrigation and Drainage Network	34.077 km
		Railway Line	5.571 km
		Road Network	114.645 km
		Population	183693
Household	31122		
Meteorological Drought	Medium - Extreme	Settlements	65
		Agriculture Area	45.159 sq km

		Natural Vegetation in Wet Areas	0.021 sq km
		Water Body	0.39 sq km
		Wet Area	0.202 sq km
		Population	144012
		Household	24396
Agricultural Drought	Low - Medium	Settlements	11
		Agriculture Area	10.132 sq km
		Natural Vegetation in Wet Areas	0.025 sq km
		Water Body	0.482 sq km
		Wet Area	0.034 sq km
		Population	4198
		Household	744
Heatwave	Low - Medium	Settlements	54
		Population	143124
		Household	24247
		Agriculture Area	0.165 sq km
		Pakka Planned Area	5.906 sq km
		Pakka Unplanned Area	1.489 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Jehan Khan			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	10.978 sq km
		Pakka Unplanned Area	0.398 sq km
		Education Facilities	21
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	10
		Irrigation and Drainage Network	3.18 km
		Railway Line	1.583 km
		Road Network	14.722 km
		Population	8686
		Household	1495

Meteorological Drought	Medium - Extreme	Settlements	10
		Agriculture Area	10.994 sq km
		Water Body	0.086 sq km
		Wet Area	0.075 sq km
		Population	6893
		Household	1188
Agricultural Drought	Low	Agriculture Area	0.087 sq km
		Water Body	0.106 sq km
		Population	194
		Household	33
Heatwave	Medium	Settlements	8
		Population	6723
		Household	1155
		Agriculture Area	0.033 sq km
		Pakka Unplanned Area	0.394 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Jindo Dero			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	44.469 sq km
		Natural Vegetation in Wet Areas	0.101 sq km
		Pakka Unplanned Area	1.668 sq km
		Range Land	0.083 sq km
		Bridges	5
		Education Facilities	29
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	25
		Irrigation and Drainage Network	35.407 km
		Railway Line	7.385 km
		Road Network	99.169 km

		Population	30838
		Household	5152
Meteorological Drought	Medium - Extreme	Settlements	25
		Agriculture Area	44.698 sq km
		Natural Vegetation in Wet Areas	7.343 sq km
		Range Land	1.184 sq km
		Water Body	1.778 sq km
		Wet Area	1.239 sq km
		Population	24379
		Household	4073
Agricultural Drought	Low	Settlements	3
		Agriculture Area	8.51 sq km
		Natural Vegetation in Wet Areas	2.644 sq km
		Range Land	0.28 sq km
		Water Body	0.534 sq km
		Wet Area	0.01 sq km
		Population	96
		Household	16
Heatwave	Medium	Settlements	22
		Population	23972
		Household	4004
		Agriculture Area	0.114 sq km
		Pakka Unplanned Area	1.653 sq km
Riverine Flood	Low - medium	Agriculture Area	11.675 sq km
		Natural Vegetation in Wet Areas	0.578 sq km
		Pakka Unplanned Area	0.00032 sq km
		Railway Network	4.784 km
		Range Land	0.018 sq km
		Road Network	0.948 km
		Settlements	1
		Population	5
Household	0		
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Karan			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	51.109 sq km
		Kachcha Area	0.015 sq km
		Natural Vegetation in Wet Areas	0.026 sq km
		Pakka Planned Area	1.689 sq km
		Pakka Unplanned Area	1.262 sq km
		Range Land	0.043 sq km
		Bridges	5
		Education Facilities	43
		Grain Mandi	1
		Grid Stations	1
		Health Facilities	2
		Mobile Towers	5
		Petrol Pumps	6
		Settlements	59
		Irrigation and Drainage Network	32.782 km
		Railway Line	1.39 km
		Road Network	100.813 km
Population	60302		
Household	10312		
Meteorological Drought	Medium - Extreme	Settlements	59
		Agriculture Area	51.271 sq km
		Bare Area with sparse Natural Vegetation	1.279 sq km
		Natural Vegetation in Wet Areas	1.214 sq km
		Range Land	0.758 sq km
		Water Body	0.885 sq km
		Wet Area	2.352 sq km
		Population	47558
		Household	8131
Agricultural Drought	Low - Medium	Settlements	12
		Agriculture Area	19.785 sq km
		Bare Area with sparse Natural Vegetation	0.457 sq km
		Natural Vegetation in Wet Areas	1.223 sq km
		Range Land	0.943 sq km
		Water Body	1.113 sq km

		Wet Area	0.983 sq km
		Population	5397
		Household	943
Heatwave	Low - Medium	Settlements	47
		Population	46856
		Household	8005
		Agriculture Area	0.135 sq km
		Kachcha Area	0.015 sq km
		Pakka Planned Area	1.686 sq km
		Pakka Unplanned Area	1.249 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Lakhi			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	31.786 sq km
		Forest Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.073 sq km
		Pakka Unplanned Area	0.843 sq km
		Range Land	0.115 sq km
		Bridges	5
		Education Facilities	40
		Health Facilities	3
		Police Stations	1
		Settlements	31
		Irrigation and Drainage Network	34.959 km
		Railway Line	12.735 km
		Road Network	96.212 km
		Population	18388
Household	3164		
Meteorological Drought	Medium - Extreme	Settlements	31
		Agriculture Area	31.893 sq km
		Forest Area	0.01 sq km
		Natural Vegetation in Wet Areas	0.43 sq km

		Range Land	2.304 sq km
		Water Body	1.17 sq km
		Wet Area	0.376 sq km
		Population	14545
		Household	2505
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	3.163 sq km
		Range Land	2.93 sq km
		Water Body	0.199 sq km
		Wet Area	0.008 sq km
		Population	92
		Household	14
Heatwave	Medium	Settlements	19
		Population	14179
		Household	2439
		Agriculture Area	0.089 sq km
		Pakka Unplanned Area	0.831 sq km
Riverine Flood	Low - Extreme	Agriculture Area	1.186 sq km
		Natural Vegetation in Wet Areas	0.009 sq km
		Pakka Unplanned Area	0.002 sq km
		Road Network	0.177 km
		Population	35
		Household	6
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Lodra			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	42.179 sq km
		Pakka Planned Area	0.067 sq km
		Pakka Unplanned Area	1.185 sq km
		Range Land	0.003 sq km
		Bridges	2
		Bus Stops	1
		Education Facilities	29
		Health Facilities	2

		Industries	3
		Mobile Towers	2
		Petrol Pumps	2
		Power Plants	1
		Settlements	39
		Irrigation and Drainage Network	19.304 km
		Railway Line	4.146 km
		Road Network	76.765 km
		Population	20758
		Household	3654
Meteorological Drought	Medium - Extreme	Settlements	39
		Agriculture Area	42.25 sq km
		Range Land	0.088 sq km
		Water Body	0.124 sq km
		Wet Area	1.77 sq km
		Population	16405
		Household	2890
Agricultural Drought	Low - Medium	Settlements	1
		Agriculture Area	4.361 sq km
		Range Land	0.043 sq km
		Water Body	0.096 sq km
		Wet Area	0.68 sq km
		Population	536
		Household	95
Heatwave	Low - Medium	Settlements	31
		Population	16011
		Household	2822
		Agriculture Area	0.119 sq km
		Pakka Planned Area	0.066 sq km
		Pakka Unplanned Area	1.172 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Loung Bhatti			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	5.435 sq km
		Natural Vegetation in Wet Areas	0.042 sq km
		Road Network	0.486 km
Meteorological Drought	Medium - Extreme	Agriculture Area	5.48 sq km
		Natural Vegetation in Wet Areas	14.799 sq km
Agricultural Drought	Low	Agriculture Area	4.052 sq km
		Natural Vegetation in Wet Areas	3.838 sq km
Riverine Flood	Low - Extreme	Agriculture Area	5.383 sq km
		Natural Vegetation in Wet Areas	0.951 sq km
		Road Network	0.065 km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Heatwave	Nil	The UC falls out of vulnerable zone for Heatwave	

Madeji			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	23.933 sq km
		Pakka Unplanned Area	0.893 sq km
		Bridges	1
		Education Facilities	29
		Police Stations	1
		Settlements	15
		Irrigation and Drainage Network	15.772 km
		Road Network	43.368 km
		Population	16785
		Household	2805
Meteorological Drought	Medium - Extreme	Settlements	15
		Agriculture Area	23.972 sq km
		Water Body	0.522 sq km
		Wet Area	0.421 sq km

		Population	13269
		Household	2217
Agricultural Drought	Low	Settlements	1
		Agriculture Area	0.124 sq km
		Water Body	0.038 sq km
		Wet Area	0.001 sq km
		Population	179
		Household	30
Heatwave	Medium	Settlements	11
		Population	13063
		Household	2182
		Agriculture Area	0.064 sq km
		Pakka Unplanned Area	0.885 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Mehmooda Bagh			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	92.22 sq km
		Kachcha Area	0.762 sq km
		Natural Vegetation in Wet Areas	0.095 sq km
		Pakka Unplanned Area	0.857 sq km
		Range Land	0.068 sq km
		Bridges	1
		Education Facilities	17
		Grid Stations	1
		Health Facilities	1
		Settlements	31
		Irrigation and Drainage Network	8.141 km
		Road Network	45.127 km
		Population	31289
Household	5073		
Meteorological	Medium - Extreme	Settlements	31

Drought		Agriculture Area	92.47 sq km
		Natural Vegetation in Wet Areas	21.645 sq km
		Range Land	1.607 sq km
		Water Body	1.392 sq km
		Wet Area	0.84 sq km
		Population	24711
		Household	4005
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	51.393 sq km
		Natural Vegetation in Wet Areas	0.845 sq km
		Range Land	0.29 sq km
		Water Body	0.035 sq km
		Population	952
		Household	149
Heatwave	Medium	Settlements	27
		Population	24231
		Household	3926
		Agriculture Area	0.138 sq km
		Kachcha Area	0.756 sq km
		Pakka Unplanned Area	0.85 sq km
Riverine Flood	Low - Extreme	Agriculture Area	72.606 sq km
		Education Facilities	5
		Kachcha Area	0.733 sq km
		Natural Vegetation in Wet Areas	1.396 sq km
		Pakka Unplanned Area	0 sq km
		Range Land	0.011 sq km
		Road Network	5.974 km
		Settlements	20
		Population	13465
		Household	2121
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Mian Sahib			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	67.239 sq km
		Forest Area	0.002 sq km
		Kachcha Area	0.029 sq km
		Pakka Unplanned Area	1.676 sq km
		Range Land	0.076 sq km
		Bridges	2
		Education Facilities	32
		Health Facilities	1
		Police Stations	1
		Settlements	40
		Irrigation and Drainage Network	30.581 km
		Railway Line	4.672 km
		Road Network	130.273 km
		Population	29721
Household	4958		
Meteorological Drought	Medium - Extreme	Settlements	40
		Agriculture Area	67.473 sq km
		Forest Area	0.028 sq km
		Range Land	1.876 sq km
		Water Body	0.761 sq km
		Wet Area	7.424 sq km
		Population	23380
		Household	3900
Agricultural Drought	Low - Medium	Settlements	9
		Agriculture Area	23.58 sq km
		Forest Area	0.036 sq km
		Range Land	2.373 sq km
		Water Body	0.958 sq km
		Wet Area	3.368 sq km
		Population	4536
		Household	752
Heatwave	Medium	Settlements	27
		Population	22963
		Household	3832
		Agriculture Area	0.124 sq km
		Kachcha Area	0.029 sq km
		Pakka Unplanned Area	1.663 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood

Mirzapur			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	76.48 sq km
		Forest Area	0.05 sq km
		Kachcha Area	0.339 sq km
		Natural Vegetation in Wet Areas	0.075 sq km
		Pakka Unplanned Area	1.051 sq km
		Range Land	0.019 sq km
		Bridges	1
		Education Facilities	15
		Settlements	17
		Irrigation and Drainage Network	17.387 km
		Railway Line	8.535 km
		Road Network	55.864 km
		Population	21721
Household	3645		
Meteorological Drought	Medium - Extreme	Settlements	17
		Agriculture Area	76.685 sq km
		Forest Area	3.97 sq km
		Natural Vegetation in Wet Areas	7.274 sq km
		Range Land	0.253 sq km
		Water Body	0.901 sq km
		Wet Area	6.786 sq km
		Population	17220
		Household	2889
Agricultural Drought	Low - Medium	Agriculture Area	59.538 sq km
		Forest Area	2.3 sq km
		Natural Vegetation in Wet Areas	2.901 sq km
		Range Land	0.211 sq km
		Water Body	0.86 sq km
		Wet Area	0.051 sq km
		Population	218

		Household	37
Heatwave	Medium	Settlements	14
		Population	16904
		Household	2837
		Agriculture Area	0.084 sq km
		Kachcha Area	0.338 sq km
		Pakka Unplanned Area	1.042 sq km
Riverine Flood	Low - Extreme	Agriculture Area	59.282 sq km
		Education Facilities	2
		Forest Area	0.013 sq km
		Natural Vegetation in Wet Areas	1.451 sq km
		Pakka Unplanned Area	0.079 sq km
		Railway Network	0.685 km
		Range Land	0.011 sq km
		Road Network	5.684 km
		Settlements	2
		Population	1230
		Household	206
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Nauraja			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	11.106 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Range Land	0.001 sq km
		Education Facilities	3
		Settlements	1
Meteorological Drought	Medium - Extreme	Settlements	1
		Agriculture Area	11.122 sq km
		Natural Vegetation in Wet Areas	4.838 sq km
		Range Land	0.023 sq km
Agricultural Drought	Low	Agriculture Area	6.502 sq km
		Range Land	0.029 sq km

Riverine Flood	Low - High	Agriculture Area	11.11 sq km
		Education Facilities	3
		Natural Vegetation in Wet Areas	1.553 sq km
		Range Land	0.001 sq km
		Settlements	1
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Heatwave	Nil	The UC falls out of vulnerable zone for Heatwave	

Naushahro Abro			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	54.316 sq km
		Pakka Unplanned Area	1.071 sq km
		Range Land	0.025 sq km
		Education Facilities	28
		Settlements	32
		Irrigation and Drainage Network	51.152 km
		Road Network	81.011 km
		Population	16730
		Household	2810
Meteorological Drought	Medium - Extreme	Settlements	32
		Agriculture Area	54.372 sq km
		Range Land	0.356 sq km
		Water Body	0.717 sq km
		Wet Area	0.128 sq km
		Population	13239
		Household	2223
Agricultural Drought	Low - Medium	Agriculture Area	7.548 sq km
		Range Land	0.441 sq km
		Water Body	0.903 sq km
		Wet Area	0.107 sq km
		Population	467
		Household	75

Heatwave	Medium	Settlements	25
		Population	12898
		Household	2165
		Agriculture Area	0.121 sq km
		Pakka Unplanned Area	1.055 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Nim			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	97.151 sq km
		Kachcha Area	0.067 sq km
		Natural Vegetation in Wet Areas	0.416 sq km
		Pakka Unplanned Area	0.955 sq km
		Range Land	0.295 sq km
		Education Facilities	33
		Health Facilities	1
		Police Stations	2
		Post Offices	1
		Settlements	49
		Irrigation and Drainage Network	46.28 km
		Road Network	143.692 km
		Population	15973
Household	2680		
Meteorological Drought	Medium - Extreme	Settlements	49
		Agriculture Area	97.522 sq km
		Bare Area with sparse Natural Vegetation	0 sq km
		Natural Vegetation in Wet Areas	7.118 sq km
		Range Land	6.299 sq km
		Water Body	1.62 sq km
		Wet Area	5.206 sq km
		Population	12602
Household	2113		

Agricultural Drought	Low - Medium	Settlements	16
		Agriculture Area	30.183 sq km
		Natural Vegetation in Wet Areas	3.183 sq km
		Range Land	7.75 sq km
		Water Body	2.018 sq km
		Wet Area	1.3 sq km
		Population	4141
		Household	695
Heatwave	Medium	Settlements	18
		Population	12349
		Household	2070
		Agriculture Area	0.086 sq km
		Kachcha Area	0.067 sq km
		Pakka Unplanned Area	0.945 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Pir Bux Shujrah			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	32.483 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.184 sq km
		Natural Vegetation in Wet Areas	0.048 sq km
		Pakka Unplanned Area	1.324 sq km
		Range Land	0.232 sq km
		Bridges	1
		Education Facilities	22
		Mobile Towers	4
		Petrol Pumps	2
		Police Stations	1
		Settlements	34
		Irrigation and Drainage Network	12.183 km
		Road Network	47.848 km
Population	27698		
Household	4362		

Meteorological Drought	Medium - Extreme	Settlements	34
		Agriculture Area	32.659 sq km
		Forest Area	0.036 sq km
		Natural Vegetation in Wet Areas	1.119 sq km
		Range Land	6.889 sq km
		Water Body	3.698 sq km
		Wet Area	1.241 sq km
		Population	21846
		Household	3439
Agricultural Drought	Low	Settlements	1
		Agriculture Area	1.773 sq km
		Forest Area	0.02 sq km
		Natural Vegetation in Wet Areas	0.022 sq km
		Range Land	1.415 sq km
		Water Body	0.2 sq km
		Wet Area	0.002 sq km
		Population	126
		Household	19
Heatwave	Medium	Settlements	31
		Population	21394
		Household	3368
		Agriculture Area	0.112 sq km
		Kachcha Area	0.183 sq km
		Pakka Unplanned Area	1.312 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Rahimabad			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	45.592 sq km
		Forest Area	0.006 sq km
		Pakka Planned Area	0.056 sq km
		Pakka Unplanned Area	2.634 sq km
		Range Land	0.116 sq km

		Bridges	3
		Education Facilities	36
		Health Facilities	1
		Mobile Towers	3
		Petrol Pumps	1
		Power Plants	1
		Settlements	44
		Irrigation and Drainage Network	25.147 km
		Road Network	102.697 km
		Population	48373
		Household	7617
Meteorological Drought	Medium - Extreme	Settlements	44
		Agriculture Area	45.766 sq km
		Forest Area	0.076 sq km
		Range Land	3.174 sq km
		Water Body	5.15 sq km
		Wet Area	7.275 sq km
		Population	38121
		Household	6002
Agricultural Drought	Low - Medium	Settlements	1
		Agriculture Area	7.395 sq km
		Range Land	0.483 sq km
		Water Body	1.21 sq km
		Wet Area	0.018 sq km
		Population	285
		Household	46
Heatwave	Low - Medium	Settlements	38
		Population	37481
		Household	5901
		Agriculture Area	0.149 sq km
		Pakka Planned Area	0.056 sq km
		Pakka Unplanned Area	2.619 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

		Ruk	
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	24.607 sq km
		Forest Area	0.006 sq km
		Natural Vegetation in Wet Areas	0.069 sq km
		Pakka Unplanned Area	0.423 sq km
		Range Land	0.04 sq km
		Bridges	1
		Education Facilities	14
		Settlements	18
		Irrigation and Drainage Network	12.34 km
		Railway Line	0.881 km
		Road Network	47.371 km
		Population	8716
		Household	1499
Meteorological Drought	Medium - Extreme	Settlements	18
		Agriculture Area	24.72 sq km
		Forest Area	0.34 sq km
		Natural Vegetation in Wet Areas	3.853 sq km
		Range Land	1.373 sq km
		Water Body	5.126 sq km
		Wet Area	0.561 sq km
		Population	6894
		Household	1184
Agricultural Drought	Low	Agriculture Area	1.622 sq km
		Natural Vegetation in Wet Areas	0.483 sq km
		Range Land	0.117 sq km
		Water Body	1.586 sq km
		Wet Area	0.003 sq km
		Population	242
		Household	41
Heatwave	Medium	Settlements	12
		Population	6718
		Household	1154
		Agriculture Area	0.054 sq km
		Pakka Unplanned Area	0.417 sq km
Riverine Flood	Low - Extreme	Agriculture Area	0.389 sq km
		Forest Area	0.002 sq km

		Natural Vegetation in Wet Areas	0.014 sq km
		Road Network	0.01 km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Rustam			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	66.054 sq km
		Natural Vegetation in Wet Areas	0.001 sq km
		Pakka Unplanned Area	1.291 sq km
		Range Land	0.134 sq km
		Bridges	3
		Education Facilities	36
		Health Facilities	1
		Mobile Towers	4
		Petrol Pumps	1
		Settlements	29
		Irrigation and Drainage Network	28.257 km
		Road Network	87.627 km
		Population	27097
		Household	4684
Meteorological Drought	Medium - Extreme	Settlements	29
		Agriculture Area	66.21 sq km
		Natural Vegetation in Wet Areas	0.037 sq km
		Range Land	3.063 sq km
		Water Body	0.497 sq km
		Wet Area	0.667 sq km
		Population	21347
		Household	3688
Agricultural Drought	Low	Settlements	2
		Agriculture Area	6.288 sq km
		Range Land	1.911 sq km
		Water Body	0.1 sq km
		Wet Area	0.006 sq km
		Population	329

		Household	56
Heatwave	Medium	Settlements	19
		Population	20999
		Household	3629
		Agriculture Area	0.097 sq km
		Pakka Unplanned Area	1.281 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Sehwani			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	73.759 sq km
		Kachcha Area	0.035 sq km
		Natural Vegetation in Wet Areas	0.148 sq km
		Pakka Unplanned Area	1.665 sq km
		Range Land	0.086 sq km
		Bridges	1
		Education Facilities	46
		Health Facilities	2
		Mobile Towers	3
		Settlements	39
		Irrigation and Drainage Network	21.643 km
		Road Network	59.129 km
		Population	38392
		Household	6551
Meteorological Drought	Medium - Extreme	Settlements	39
		Agriculture Area	73.961 sq km
		Natural Vegetation in Wet Areas	3.094 sq km
		Range Land	2.797 sq km
		Water Body	4.285 sq km
		Wet Area	0.177 sq km
		Population	30351
		Household	5180

Agricultural Drought	Low	Settlements	2
		Agriculture Area	25.136 sq km
		Natural Vegetation in Wet Areas	0.113 sq km
		Range Land	2.829 sq km
		Water Body	0.195 sq km
		Wet Area	0.003 sq km
		Population	319
		Household	53
Heatwave	Medium	Settlements	29
		Population	29748
		Household	5076
		Agriculture Area	0.162 sq km
		Kachcha Area	0.035 sq km
		Pakka Unplanned Area	1.65 sq km
Riverine Flood	Low - Extreme	Agriculture Area	33.649 sq km
		Education Facilities	6
		Irrigation and Drainage Network	0.95 km
		Kachcha Area	0.035 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Unplanned Area	0.004 sq km
		Road Network	0.105 km
		Settlements	4
		Population	862
		Household	149
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Shabira Abad			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	31.529 sq km
		Forest Area	0.021 sq km
		Kachcha Area	0.313 sq km
		Natural Vegetation in Wet Areas	0.011 sq km
		Pakka Planned Area	0.759 sq km
		Pakka Unplanned Area	0.878 sq km

		Range Land	0.167 sq km
		Education Facilities	30
		Grid Stations	1
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	2
		Power Plants	9
		Settlements	33
		Irrigation and Drainage Network	22.5 km
		Road Network	74.169 km
		Population	23418
		Household	3688
Meteorological Drought	Medium - Extreme	Settlements	33
		Agriculture Area	31.66 sq km
		Forest Area	1.189 sq km
		Natural Vegetation in Wet Areas	1.038 sq km
		Range Land	3.703 sq km
		Water Body	1.457 sq km
		Wet Area	3.364 sq km
		Population	18542
		Household	2918
Agricultural Drought	Low	Agriculture Area	0.214 sq km
		Range Land	0.096 sq km
		Water Body	0.102 sq km
		Population	130
		Household	21
Heatwave	Low - Medium	Settlements	28
		Population	18107
		Household	2851
		Agriculture Area	0.111 sq km
		Kachcha Area	0.31 sq km
		Pakka Planned Area	0.756 sq km
		Pakka Unplanned Area	0.869 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood
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Shhato Mangi			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	66.748 sq km
		Forest Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.057 sq km
		Pakka Unplanned Area	2.059 sq km
		Range Land	0.004 sq km
		Education Facilities	45
		Health Facilities	1
		Police Stations	1
		Settlements	58
		Irrigation and Drainage Network	40.707 km
		Road Network	122.771 km
		Population	32185
		Household	5402
Meteorological Drought	Medium - Extreme	Settlements	58
		Agriculture Area	66.914 sq km
		Forest Area	0.037 sq km
		Natural Vegetation in Wet Areas	2.481 sq km
		Range Land	0.074 sq km
		Water Body	1.717 sq km
		Wet Area	1.158 sq km
		Population	25502
Household	4277		
Agricultural Drought	Low - Medium	Settlements	11
		Agriculture Area	28.299 sq km
		Forest Area	0.047 sq km
		Natural Vegetation in Wet Areas	3.128 sq km
		Range Land	0.091 sq km
		Water Body	2.162 sq km
		Wet Area	1.023 sq km
		Population	9760
Household	1636		
Heatwave	Medium	Settlements	50
		Population	24858
		Household	4170

		Agriculture Area	0.214 sq km
		Pakka Unplanned Area	2.031 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Sultan Kot			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	62.03 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.027 sq km
		Natural Vegetation in Wet Areas	0.007 sq km
		Pakka Planned Area	0.038 sq km
		Pakka Unplanned Area	1.455 sq km
		Range Land	0.133 sq km
		Bridges	3
		Education Facilities	25
		Health Facilities	1
		Industries	3
		Petrol Pumps	1
		Police Stations	1
		Settlements	42
		Irrigation and Drainage Network	26.669 km
		Railway Line	6.775 km
		Road Network	78.916 km
Population	24433		
Household	4328		
Meteorological Drought	Medium - Extreme	Settlements	42
		Agriculture Area	62.247 sq km
		Bare Area with sparse Natural Vegetation	0 sq km
		Forest Area	0.157 sq km
		Natural Vegetation in Wet Areas	0.265 sq km
		Range Land	2.972 sq km
		Water Body	5.858 sq km
Wet Area	3.303 sq km		

		Population	19286
		Household	3417
Agricultural Drought	Low - High	Settlements	6
		Agriculture Area	18.874 sq km
		Bare Area with sparse Natural Vegetation	0 sq km
		Forest Area	0.201 sq km
		Natural Vegetation in Wet Areas	0.103 sq km
		Range Land	3.768 sq km
		Water Body	7.462 sq km
		Wet Area	0.116 sq km
		Population	1039
		Household	181
Heatwave	Low - Medium	Settlements	36
		Population	18799
		Household	3330
		Agriculture Area	0.151 sq km
		Kachcha Area	0.026 sq km
		Pakka Planned Area	0.037 sq km
		Pakka Unplanned Area	1.436 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Taib			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	24.616 sq km
		Natural Vegetation in Wet Areas	0.012 sq km
		Pakka Unplanned Area	0.434 sq km
		Range Land	0.011 sq km
		Education Facilities	12
		Settlements	16
		Irrigation and Drainage Network	5.689 km
		Road Network	17.243 km
Population	9382		

		Household	1615
Meteorological Drought	Medium - Extreme	Settlements	16
		Agriculture Area	24.689 sq km
		Natural Vegetation in Wet Areas	0.336 sq km
		Range Land	0.211 sq km
		Water Body	0.41 sq km
		Wet Area	0.645 sq km
		Population	7427
		Household	1278
Agricultural Drought	Low	Agriculture Area	2.506 sq km
		Natural Vegetation in Wet Areas	0.418 sq km
		Range Land	0.13 sq km
		Water Body	0.505 sq km
		Wet Area	0.002 sq km
		Population	241
		Household	42
Heatwave	Medium	Settlements	15
		Population	7188
		Household	1237
		Agriculture Area	0.055 sq km
		Pakka Unplanned Area	0.425 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Tamachani			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	60.648 sq km
		Kachcha Area	0.313 sq km
		Natural Vegetation in Wet Areas	0.121 sq km
		Pakka Planned Area	0.195 sq km
		Pakka Unplanned Area	0.559 sq km
		Range Land	0.026 sq km
		Bridges	1

		Education Facilities	14
		Petrol Pumps	4
		Police Stations	1
		Settlements	31
		Irrigation and Drainage Network	4.04 km
		Railway Line	4.136 km
		Road Network	13.341 km
		Population	23054
		Household	3952
Meteorological Drought	Medium - Extreme	Settlements	31
		Agriculture Area	60.878 sq km
		Natural Vegetation in Wet Areas	33.955 sq km
		Range Land	0.383 sq km
		Water Body	0.386 sq km
		Wet Area	0.377 sq km
		Population	18169
		Household	3111
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	30.03 sq km
		Natural Vegetation in Wet Areas	0.635 sq km
		Water Body	0.427 sq km
		Population	1853
		Household	315
Heatwave	Low - Medium	Settlements	19
		Population	17827
		Household	3057
		Agriculture Area	0.374 sq km
		Kachcha Area	0.31 sq km
		Pakka Planned Area	0.192 sq km
		Pakka Unplanned Area	0.552 sq km
Riverine Flood	Low - Extreme	Agriculture Area	42.837 sq km
		Education Facilities	6
		Kachcha Area	0.139 sq km
		Natural Vegetation in Wet Areas	16.528 sq km
		Pakka Unplanned Area	0.139 sq km
		Settlements	10
		Population	5867
		Household	993

Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone

Thanhrio			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	24.918 sq km
		Forest Area	0.031 sq km
		Kachcha Area	0.08 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Unplanned Area	1.211 sq km
		Range Land	0.037 sq km
		Bridges	3
		Education Facilities	26
		Health Facilities	1
		Mobile Towers	1
		Settlements	25
		Irrigation and Drainage Network	14.031 km
		Road Network	54.145 km
		Population	25865
Household	4250		
Meteorological Drought	Medium - Extreme	Settlements	25
		Agriculture Area	24.986 sq km
		Forest Area	0.912 sq km
		Natural Vegetation in Wet Areas	0.225 sq km
		Range Land	1.266 sq km
		Water Body	0.325 sq km
		Wet Area	0.618 sq km
		Population	20382
Household	3349		
Agricultural Drought	Low	Agriculture Area	0.004 sq km
		Range Land	0.081 sq km
		Water Body	0.047 sq km
		Population	23
		Household	3
Heatwave	Medium	Settlements	17

		Population	20072
		Household	3300
		Agriculture Area	0.056 sq km
		Kachcha Area	0.079 sq km
		Pakka Unplanned Area	1.205 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Waryaso			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	81.411 sq km
		Natural Vegetation in Wet Areas	0.033 sq km
		Pakka Unplanned Area	1.861 sq km
		Range Land	0.017 sq km
		Education Facilities	33
		Settlements	54
		Irrigation and Drainage Network	46.875 km
		Road Network	120.015 km
		Population	29075
		Household	4884
Meteorological Drought	Medium - Extreme	Settlements	54
		Agriculture Area	81.608 sq km
		Natural Vegetation in Wet Areas	2.4 sq km
		Range Land	0.113 sq km
		Water Body	2.381 sq km
		Wet Area	6.187 sq km
		Population	22991
		Household	3861
Agricultural Drought	Low - Medium	Settlements	9
		Agriculture Area	20.171 sq km
		Natural Vegetation in Wet Areas	2.026 sq km
		Range Land	0.133 sq km
		Water Body	2.913 sq km

		Wet Area	0.111 sq km
		Population	1490
		Household	247
Heatwave	Medium	Settlements	31
		Population	22473
		Household	3773
		Agriculture Area	0.159 sq km
		Pakka Unplanned Area	1.839 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Wazirabad			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	31.828 sq km
		Kachcha Area	0.132 sq km
		Natural Vegetation in Wet Areas	0.003 sq km
		Pakka Unplanned Area	1.607 sq km
		Bridges	3
		Education Facilities	33
		Health Facilities	4
		Mobile Towers	1
		Petrol Pumps	2
		Police Stations	1
		Settlements	27
		Irrigation and Drainage Network	24.235 km
		Railway Line	4.023 km
		Road Network	48.12 km
		Population	37384
Household	6441		
Meteorological Drought	Medium - Extreme	Settlements	27
		Agriculture Area	31.89 sq km
		Natural Vegetation in Wet Areas	0.172 sq km
		Water Body	1.112 sq km
		Wet Area	1.367 sq km

		Population	29478
		Household	5083
Agricultural Drought	Low	Agriculture Area	2.621 sq km
		Natural Vegetation in Wet Areas	0.213 sq km
		Water Body	1.26 sq km
		Wet Area	0.025 sq km
		Population	664
		Household	112
Heatwave	Medium	Settlements	19
		Population	28955
		Household	4989
		Agriculture Area	0.126 sq km
		Kachcha Area	0.131 sq km
		Pakka Unplanned Area	1.592 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Zarkhel			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	75.016 sq km
		Forest Area	0.005 sq km
		Kachcha Area	0.108 sq km
		Pakka Planned Area	0.21 sq km
		Pakka Unplanned Area	2.175 sq km
		Range Land	0.162 sq km
		Bridges	2
		Education Facilities	43
		Health Facilities	1
		Industries	1
		Petrol Pumps	2
		Settlements	57
		Irrigation and Drainage Network	30.153 km
		Railway Line	0.928 km
Road Network	110.211 km		

		Population	41310
		Household	6613
Meteorological Drought	Medium - Extreme	Settlements	57
		Agriculture Area	75.292 sq km
		Forest Area	0.091 sq km
		Range Land	4.193 sq km
		Water Body	2.443 sq km
		Wet Area	9.708 sq km
		Population	32611
		Household	5218
Agricultural Drought	Low - Medium	Settlements	14
		Agriculture Area	28.683 sq km
		Forest Area	0.085 sq km
		Range Land	5.036 sq km
		Water Body	2.43 sq km
		Wet Area	4.687 sq km
		Population	6240
		Household	1015
Heatwave	Low - Medium	Settlements	48
		Population	31940
		Household	5111
		Agriculture Area	0.167 sq km
		Kachcha Area	0.107 sq km
		Pakka Planned Area	0.208 sq km
		Pakka Unplanned Area	2.158 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

ORGANIZATION STRUCTURE FOR DISASTER MANAGEMENT AT DISTRICT LEVEL

INTRODUCTION

Each year natural disasters kill thousands of people and inflict billions of dollars in economic losses. No nation or community is immune to the damage of disasters and certainly, the province of Sindh is no exception. Almost every year, a major or minor natural disaster disrupts the life and economy of people living in the province, especially those with high economic vulnerability or the poor strata of the population. Unless action is taken to reduce the toll of natural disasters, the damages and losses of disasters can only be expected to rise. The scientific and technological advances of today's world provide unprecedented opportunities for responding to the urgent need to mitigate the impacts of natural hazards.

It is a globally recognized fact that natural hazards do not kill but poor planning does. Better disaster management and disaster risk reduction can only be achieved through collective efforts in integrating hazard reduction policy and practice throughout the province. It is a need of the time and opportunity to reassess the approach to natural hazards and to develop strategies for reducing losses by prevention and preparedness.

Disaster management can be achieved through the collective effort of all segments of life. A central authority, like Provincial Disaster Management Authority, can oversee, plan, manage and coordinate for disaster management at the provincial scale, however, it is the responsibility of concerned departments and authorities to implement and execute disaster management measures at the grass-root level. For effective disaster management, it is also imperative to take onboard and empower communities at high disaster risk as first responders. The disaster management plan will be effective once the roles and responsibilities of each individual and department are well understood and disaster management measures are implemented.

Keeping in view the importance of disaster management at all levels i.e., from the Provincial level to UC or village level, different disaster management committees have been recommended to be constituted. These committees are District Disaster Management Authority (DDMA), Taluka Disaster Management Committee (TDMC), and Union Council Disaster Management Committee (UCDMC). The recommended composition of each committee is given in Table-2 to 4.

Table 2: District Disaster Management Authority

Sr.#	Committee Representative	Role
1.	Deputy Commissioner	Chairperson
2.	Additional Deputy Commissioner	DDMO
3.	Senior Superintendent of Police	Member
4.	Assistant Director Local Government	Member
5.	District Information Officer	Member
6.	Cantonment Officer (Where Applicable)	Member
7.	District Health Officer	Member
8.	District Education Officer	Member
9.	District Food Controller	Member

10.	Deputy Director Civil Defense	Member
11.	District Officer Social Welfare	Member
12.	District Officer Livestock	Member
13.	District Chairman Zakat	Member
14.	Executive Engineer (Works and Services)	Member
15.	Executive Engineer Irrigation	Member
16.	Executive Engineer Public Health	Member
17.	Municipal Commissioners / CMOs / TMOs	Member(s)
18.	Representative Officer of Armed Forces	Member
19.	Two Elected Representatives nominated by the chair	Members
20.	Two Representatives of NGOs/Civil Society	Members
21.	Two Representatives of Business Community	Members
22.	Representative of Agriculture and Livestock Department	Member
23.	Representative of NHA	Member
24.	Representative of Electric Supply Corporation	Member
25.	Representative of SSGC	Member
26.	Representative of Red Crescent	Member
27.	Representative of Sindh Scouts	Member
28.	Representation of Volunteers from Communities at Risk	Member(s)

Table 3: TDMC Taluka Disaster Management Committee

Sr.#	Committee Representative	Role
1.	Assistant Commissioner	Chairperson
2.	Mukhtiarkar	Secretary
3.	Town Municipal Officer (TMO)	Member(s)
4.	Sub Divisional Police Officer	Member
5.	Taluka Education Officer	Member
6.	Medical Superintendent Taluka Level Medical Facility	Member
7.	Representative from Civil Defense	Member
8.	Representative from Social Welfare Department	Member
9.	Representative from Livestock Department	Member
10.	Assistant Engineer (Works and Services)	Member
11.	Assistant Engineer Irrigation	Member
12.	Assistant Engineer Public Health	Member
13.	Two Representatives of NGOs/Civil Society	Members
14.	Two Representatives of Business Community	Members
15.	Representative of Agriculture and Livestock Department	Member
16.	Representative of Electric Supply Corporation	Member
17.	Representative of SSGC	Member
18.	Representative of Red Crescent	Member
19.	Representative of Sindh Scouts	Member
20.	Representation of Volunteers from Communities at Risk	Member

Table 4: UCDCM Union Council Disaster Management Committee

Sr.#	Committee Representative	Role
1.	UC Administrator	Chairperson
2.	Secretary UC	Secretary
3.	Station House Officer (Police) – Concerned	Member
4.	Two Representatives of NGOs/Civil Society	Members
5.	Representation of Volunteers from Communities at Risk	Members
6.	Representation of Renowned Persons	Members

RESPONSIBILITY OF DISTRICT DISASTER MANAGEMENT AUTHORITY

- The DDMA shall work as a coordinating body of all government agencies and non-government organizations operating in the district and act as a focal authority in the conduction and implementation of plan and actions on disaster management
- Additional Deputy Commissioner who is proposed as Disaster Management Officer shall also work as Secretary DDMA and will provide administrative support to DDMA
- The DDMA shall ensure to take all possible disaster management measures in the district in accordance with the guidelines laid down by PDMA or NDMA
- The DDMA shall provide leadership by taking initiative to achieve MHVRA Informed Disaster Management Plan goals and objectives
- The DDMA shall coordinate with PDMA Sindh in disaster preparedness, response and recovery
- The DDMA shall provide guidance and support for the implementation of district response plans including management of the District Emergency Operation Centre

FUNCTION OF DDMA

- To review district disaster management plan, including district response plan in-line with Provincial and National disaster management plans and policies
- To ensure that risk maps are developed and updated and disaster-prone areas have been identified and prioritized in the district
- To coordinate the efforts for prevention and mitigation measures that are undertaken by the government and local authorities in the identified vulnerable areas of the district
- To organize and coordinate specialized disaster management training programs for different levels of officers, employees, and volunteer rescue workers in the district

- To facilitate community training and awareness programs with the support of local authorities, government and non-government organizations
- To set up, maintain, review and upgrade the mechanism for early warning and dissemination of accurate information to concerned authorities and the general public
- To review development plans prepared by the government departments, statutory or local authorities with a view that disaster management plan has been integrated into the development activities and projects of the plan
- To coordinate with, and give guidelines to, local authorities in the district to ensure that pre-disaster and post-disaster management activities in the district are carried out promptly and effectively
- To prepare, review and update district level response and contingency plans.
- To identify buildings and places which could, in the event of disaster situation be, used as relief centers and camps and make arrangements for water supply and sanitation in such buildings or places
- To distribute relief and facilitate rescue or ensure disaster preparedness and response
- To ensure operationalization of District Emergency Operation Centre (DEOC) equipped with all necessary gadgets
- To activate the District Emergency Operations Centre (DEOC) and ensure its uninterrupted operation during and after disaster events
- To carry out rapid damage and needs assessment and develop a report for assisting PDMA and other relevant stakeholders
- To coordinate and monitor early recovery and rehabilitation activities with the support of PDMA or relevant local and international stakeholders
- To prepare and continuously update databases of external agency projects, future priority areas, funding framework, available resources, areas of operations/expertise etc.
- To perform other functions as deemed necessary by the provincial government or provincial authority for disaster management in the district

RESPONSIBILITY OF TALUKA DISASTER MANAGEMENT COMMITTEE

- The TDMC shall work as front-line body for disaster management in the district and shall ensure implementation of disaster management measures set by DDMA and PDMA
- The TDMC shall interact directly with communities at risk in disaster preparedness, disaster risk reduction and response
- The TDMC shall Bridge between government and communities in disaster response
- The TDMC shall coordinate between DDMA, PDMA and all stakeholders working at grass-root level in pre, during and post disaster events

FUNCTION OF TALUKA DISASTER MANAGEMENT COMMITTEE

- Identification and updation of all hazards in their respective locations and conduct of risk and vulnerability analysis and communicate with DDMA and subsequently with PDMA
- Ensure that the officers and employees are trained in disaster management
- Ensure that resources relating to disaster management are maintained and readily available for use in the event of any threatening disaster situation or disaster
- To coordinate and monitor disaster management plan mainstreaming operations in the district and over all disaster management initiatives
- Land use planning and zoning within the municipality by preparing master plans while keeping the multi hazard of the municipality and Taluka in context
- To ensure the implementation of bylaws related to encroachment at hazardous places, building codes, land use planning and zonation etc.
- To identify evacuation/shelter places to face any disaster/emergency
- To monitor the disaster management activities of NGOs, UCDCMs and private sectors
- To share initial damage and needs assessment reports to DDMA and subsequently to PDMA
- To carry out relief, rehabilitation and reconstruction activities in the affected areas in accordance with the DDMA and PDMA

RESPONSIBILITY OF UNION COUNCIL DISASTER MANAGEMENT COMMITTEE

1. UCDMC shall work as front-line, first responder body at village, mohalla and ward level.
2. Shall assist TDMC, DDMA and PDMA especially in disaster response.
3. Shall encourage and keep record of volunteers in Union Council.
4. Shall formulate different groups to respond disaster and emergency events such as evacuation group, camp management group etc. and share this record with TDMC, DDMA and PDMA.
5. Shall prepare awareness and capacity development proposals and training programs and follow-up with TDMC, DDMA and PDMA for arranging such events at grass root level.

FUNCTION OF UCDMC

1. Identification and updation of all hazards in their respective locations and conduct of risk and vulnerability analysis and communicate with TDMC, DDMA and subsequently with PDMA.
2. To prepare/update UC level disaster management plan for emergent hazards or new hazards caused by any disaster event.
3. To make an analysis of disaster risk and to prepare a list of vulnerable villages and areas of the concerned union councils.
4. To mobilize community for maintaining public ways, public streets, culverts, Bridges and public buildings, de-silting of canals and other development activities.
5. To coordinate with the village and neighborhood UCs in case of emergency in order to get quick information about the severity and extent of a disaster impact and report it to the TDMC and DDMA.
6. To report cases of handicapped, destitute and socially excluded groups to TDMC, DDMA and PDMA in order to streamline their special needs in relief and response operation.
7. Mobilizing and coordinating work of volunteers and ensuring community participation.
8. Conduct of search and rescue operations in coordination with the rescue teams and Police.
9. To provide assistance to other agencies for mobility/transport of staff, including rescue parties, relief personnel and relief materials. To communicate with the TDMC, DDMA or PDMA for required additional resources.

10. To monitor NGO activities and provide necessary support to ensure community participation by establishing coordination mechanisms among NGOs and local communities.

ESTABLISHMENT OF EMERGENCY OPERATION CENTERS

PROVINCIAL EMERGENCY OPERATION CENTER (PEOC)

As envisioned by PDMA Sindh, PEOC is established at HQ of PDMA Sindh. The center is equipped with modern tools and techniques for management and operation activities in pre, during and post disaster events. The center works under the management of PDMA with 24/7 operation.

The functions of PEOC are summarized below;

- Coordinating node for planning, management and operations of disaster management activities
- Inventory management and goods distribution.
- Assets and vehicles management and monitoring
- Monitoring of extreme weather and disasters
- Issuance of early warnings
- Disposal and monitoring of man and material resources during disaster events
- Coordination with community based associations, volunteers, NGOs and other relevant institutions involved in disaster management
- Assessment of disaster risk and elements at risk and dissemination of information to concerned departments
- Coordination for evacuation, medical, search, rescue and relief
- Preparation and collection of damage assessment reports
- Coordination with all management tiers
- Daily briefings on disaster events, search and rescue operations, damages and losses, recovery and rehabilitation
- Hosting of online meetings
- Damage data collection through imaging drones

DISTRICT EMERGENCY OPERATION CENTER (DEOC)

The PEOC established at PDMA HQ is connected with districts through DEOC. The DEOC is supposed to work as field arm of PEOC for execution and implementation of instructions passed on by PEOC. The center is equipped with modern tools and techniques for management and operation activities in pre, during and post disaster events. The center works under the management of DDMA with 24/7 operation during disasters.

FUNCTION OF DEOC

The functions of DEOC are appended below;

- Receive information and instructions from PEOC regarding implementation and execution of action plans
- Monitor the situation and put everything ready and functional in the DEOC
- Dissemination of early warnings issued from PEOC to stakeholders and communities
- To coordinate with PEOC, PDMA, concerned departments and other stakeholders
- To monitor emergency operations and make efforts for preventing secondary hazards
- To conduct rapid assessment of the relief needs by collecting information from affected areas and circulate to PDMA and other concerned departments and stakeholders
- To deploy evacuation, medical, search and rescue teams in the affected areas
- To provide relief assistance in terms of relief camps, medical and sanitation facilities and temporary shelter to the affected population in the district
- To establish a liaison with concerned departments and stakeholders engaged in emergency response by anticipating resource inventory
- To collect information for daily briefings on disaster situation for PEOC, media, general public and other stakeholders
- Record keeping and preparation of consolidated reports and response plans and projects.
- Coordination and mobilization of community based associations, volunteers, NGOs and other relevant institutions involved in disaster management

SECTOR WISE ROLES AND RESPONSIBILITIES OF GOVERNMENT FUNCTIONARIES

AGRICULTURE AND LIVESTOCK DEPARTMENT

Pre-Disaster

- Capacity building of department regarding disaster management and risk reduction and implementation of sector specific disaster risk reduction measures
- Provide recommendation on changing/rescheduling of cropping patterns with respect to changing climate and weather scenarios
- Create Community Seed Bank at Union Council level
- Provide livestock vaccination and de-worming
- Assessment of high prone areas and estimation of possible damage and needs for recovery regarding livestock, crops, irrigation facilities in case of any disaster
- Mass awareness regarding epidemics and diseases to livestock and crops
- Close coordination with PDMA and DDMA

During-Disaster

- Close and regular coordination with DDMA and PDMA
- Immediate transfer of current situation to DDMA and PDMA
- Vaccination of livestock

Post-Disaster

- Facilitation to institutions / NGOs/ INGOs which focus on rehabilitation activities as per guidelines provided by DDMA and PDMA
- Submit report on damages and needs to DDMA and PDMA
- Mass awareness regarding epidemics and diseases to livestock and crops
- Vaccination of livestock
- Upgrade Community Seed Bank (CSB)
- Timely compensation to affected farmers

- Prepare overall report of the department regarding intervention and disseminate to DDMA and PDMA

PROVINCIAL DISASTER MANAGEMENT AUTHORITY (PDMA)

Pre-Disaster

- Close coordination with national and international institutions engaged in disaster forecasting.
- Coordinate meeting and engage DDMA for preparation of anticipated disasters
- Ensure readiness of equipment and inventory
- Disseminate disaster alerts to concerned DDMA with action plans for forecastable disasters
- Ensure availability of relief goods and other relevant stuff before anticipated disaster
- Advise concerned departments on removal of congestion from water ways before monsoon and flooding period
- Aware and sensitize public and private departments on main streaming disaster risk reduction in developing planning
- Ensure availability and functioning of provincial emergency operation center
- Provide and report high risk population and infrastructure in anticipated hazard areas.
- Capacity building of line and stakeholder department on disaster risk reduction and management.

During-Disaster

- Coordination and mobilization of man and material resources
- For rescue and evacuation of people, provide and manage temporary shelter and life restoration equipment in disaster affected regions
- Coordinate with line departments for health and veterinary services in the affected regions and ensure to control outbreak of any communicable diseases
- Coordinate with DDMA and line departments
- Coordinate with individual donors, donor organizations, NGOs and INGOs and ensure distribution of relief among disaster affectees

Post-Disaster

- Coordination with DDMA and line departments for need and damage assessment
- Need and damage assessment reporting to higher management, NGOs, INGOs and other agencies for rehabilitation
- Ensure rehabilitation on build back better principle

DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)

Pre-Disaster

- Close coordination with PDMA and other relevant stakeholders
- Risk assessment and identification of disaster-prone areas
- Aware and sensitize public and private departments on main streaming disaster risk reduction in developing planning
- Coordinate meeting and engage TDMC for preparation of anticipated disasters.
- Ensure readiness of equipment and inventory
- Disseminate disaster alerts to concerned TDMC with action plans for forecastable disasters
- Ensure availability of relevant staff before anticipated disaster
- Advise concerned departments on removal of congestion from water ways before monsoon and flooding period
- Ensure availability and functioning of district emergency operation center
- Arrange emergency response exercises and drills along with volunteer groups, social welfare and civil defense on various disaster scenarios

During-Disaster

- Mobilization of man and material resources
- For rescue and evacuation of people, provide and manage temporary shelter and life restoration equipment in disaster affected regions
- Coordinate with TDMC and line departments

- The DDMA shall lead the evacuation of people to safer places with the assistance of PDMA. DDMA shall also ensure safety, security, supply chain, life commodities and management of relief camps
- Only authorized officials of DDMA shall brief media on disaster situation and the response activities.

Post-Disaster

- Coordination with TDMC and line departments for need and damage assessment
- Need and damage assessment reporting to PDMA
- Ensure rehabilitation on Build Back Better principle

CIVIL DEFENSE

Pre-Disaster

- Assign representatives for DDMA to participate in meetings
- Information sharing regarding capacities and needs of Civil Defense department regarding disaster risk management
- Capacity building of Civil Defense department regarding disaster risk management
- Information sharing regarding technical and personnel expertise with DDMA
- Conduct trainings for Volunteers regarding Rescue and other relevant expertise in collaboration with Health department and PDMA
- Create awareness regarding rescue, evacuation and first aid
- Effectively establish, train and systemize volunteers initiatives in collaboration with education department / institutions

During-Disaster

- Fire fighting
- Rescue and evacuation
- Assign volunteers in coordination with PDMA and DDMA

- Communicate to DEOC about details of all activities
- Communicate to DEOC any additional resources required for performing the above tasks
- Facilitate line departments as per demand in disaster response

Post-Disaster

- Assist in rehabilitation process if required

EDUCATION DEPARTMENT

Pre-Disaster

- Assign representatives for DDMA and participate in meetings
- Information sharing regarding capacities and needs of Education department regarding disaster risk management
- Teachers and students are informed about the disaster prone areas of the district
- Teachers and students are informed of their responsibilities to take care of materials and documents to safe places during disaster
- Facilitate and collaborate with PDMA in preparation of disaster management curriculum
- Collaborate with PDMA and DDMA in synergizing volunteers

During-Disaster

- Mobilize human resources for intervention during disaster
- Inform schools situated in high risk areas about hazard and hazard forecast
- Assist in arrangement of relief and shelter camps in educational institutes for the disaster affectees
- Facilitate Health department and other relevant entities in arranging medical camps, blood donations and provision of medical aid during disaster and emergencies
- Coordinate with PDMA and DDMA in assigning volunteers for emergency response

Post-Disaster

- Assessment of damages occurred to educational institutes

- Provide assistance to teachers, students and other staff who are victimized by disasters (lack of food, shelter, etc.)
- Rehabilitation and reconstruction of affected educational facilities
- Facilitate institutions / NGOs / INGOs which focus on rehabilitation of educational facilities
- Prepare overall report of the department regarding intervention and disseminate to PDMA and DDMA

FINANCE DEPARTMENT

Pre-Disaster

- Regular coordination with PDMA
- Allocate budget on contingency basis, to handle any emergency situations
- Facilitate other departments in planning and meeting their financial needs

During-Disaster

- Provide funds to PDMA and other line departments for procurement of material and equipment required for emergency response
- Provide funds to PDMA and other line departments for rescue and relief activities

Post-Disaster

- Get statistical data regarding actual damage and recovery needs from all line departments
- Provide funds for execution of rehabilitation process

HEALTH DEPARTMENT

Pre-Disaster

- Assign representatives for DDMA, and participate in meetings
- Information sharing regarding capacities and needs of Health department regarding disaster risk management

- Build capacity of health department regarding disaster risk management and preventive health care especially in disaster prone areas
- Monitor the general health situation, e.g. monitor outbreak of diseases
- Provide specific information required regarding precautions for epidemics
- Establish a health mobile team in district and taluka headquarter hospital
- Set-up an information Centre to organize sharing of information for public information purposes
- Prepare first aid kits, medicines, water test kits, chloramines and anti-snake venom serum.
- Collaboration with relevant organizations / partner NGOs for participation and support through technical resources
- Up-gradation and smooth functioning of hospitals, BHUs, equipped with required staff, medicines and equipment
- Database and linkages with ambulance services/blood banks
- Health and hygiene awareness and education
- Ensure proper disposal of hospital waste

During-Disaster

- Provide emergency treatment for the seriously injured
- Ensure emergency supplies of medicines and first-aid
- Supervise food, water supplies, sanitation and disposal of waste
- Assess and co-ordinate provision of ambulances and hospitals where they could be sent (public and private);
- Provide special information required regarding precautions for epidemics
- Set-up an information Centre to organize sharing of information for public information purposes
- Conduct disaster impact assessment on health
- Intervene in case of disease outbreak

- Medical camps and vaccination
- Ongoing surveillance with regard to health issues and disease outbreaks

Post-Disaster

- Conduct disaster impact assessment on health situation
- Prepare plan for the following year along with reports and submit to PDMA and concerned department.
- Medical camps and vaccination
- Rehabilitation of health infrastructure affected during disaster
- Preparation of impact assessment surveys covering strengths and weaknesses of interventions and impact on affected victims and dissemination of learning to PDMA and other concerned institutions

IRRIGATION DEPARTMENT

Pre-Disaster

- Inspection and identification of vulnerable embankments
- Monitoring and dissemination of river water levels
- Implementation of SOPs defined by Bund Manual
- Ensure readiness of equipment and machinery before monsoon and flooding season
- Monitor and disseminate flood level information to DDMA and PDMA
- Initiate necessary embankments reinforcing interventions for vulnerable embankments
- Initiate interventions for river training where necessary
- Introduce and ensure water harvesting and modern water management interventions in likely drought affected areas
- Ensure safety and compactness of irrigation channels, canals, branches, etc. before start of monsoon season to avoid breaches in irrigation system during heavy rains
- Ensure removal of congestion from storm water and draining channels before monsoon

During-Disaster

- Ensure 24/7 vigilance of vulnerable embankments
- Measure and report flood water inundation levels to DDMA and PDMA
- Ensure to drain/de-water from agriculture fields and its safe conveyance to minimize losses
- Coordinate with PDMA and DDMA during entire disaster event for execution of on-demand action plans

Post-Disaster

- Conduct assessment of damages and needs and report to PDMA through DEOC
- Restore and repair damaged irrigation systems
- Prepare overall report of the department regarding intervention and disseminate to PDMA and DDMA

INFORMATION DEPARTMENT

Pre-Disaster

- Close coordination and liaison with PDMA and DDMA
- During monsoon, flooding season and forecastable hazards issuance of press releases regarding hazards and preparedness plans of the government
- Issue and publish disaster alerts on appropriate media forums
- Coverage and publication of government initiatives on disaster risk reduction and management
- Ensure media coverage and publication of PDMA and DDMA meetings for pre disaster preparations

During-Disaster

- Coordination with PDMA and DDMA for announcement of warnings and updates on disasters
- Publication of bulletins on government actions, facilities, relief and rescue efforts
- Publication of camp management and relief distribution announcements

- Publication of safety measures during disasters to minimize disaster domino effects
- Communicate voice of affectees to concerned departments

Post-Disaster

- Focus on problems being faced by the people of the affected area
- Publish, broadcast /telecast programs highlighting strengths, weaknesses and scams in disaster response activities
- Publish, broadcast /telecast programs highlighting government initiatives and collective response of NGOs, INGOs and other departments for relief and rehabilitation

PAKISTAN METEOROLOGICAL DEPARTMENT (PMD)

Pre-Disaster

- Update and upgrade forecast equipment
- Timely and authentic forecast of rains, windstorms and other forecastable hazards
- Timely transfer of information regarding abnormal weather conditions to PDMA

During-Disaster

- Monitoring of flood waters, river flows and sharing of information with PDMA
- Forecasting for any confluencing disaster
- Issuance of precautionary measures to avoid domino effects of disaster

Post-Disaster

- Technical assistance in rescue and rehabilitation process

POLICE DEPARTMENT

Pre-Disaster

- Coordinate with the DDMA in the pre-disaster planning
- Participate in DDMA meetings
- Capacity building of Police department regarding disaster risk management

- Information dissemination through 15 helpline service to local residents
- Prepare team for emergency intervention
- Prepare plan for shifting to safer places and early warning system

During-Disaster

- Co-ordinate with DEOC
- Assistance in shifting of rescued/affected people to relief camps and hospitals
- Provide protection and easy access to rescue and relief personnel/vehicles
- Maintain law and order
- Provide warning / instruction to travelers
- Divert traffic on alternate routes as and when necessary
- Ensure security to workers of NGOs and INGOS who perform duties for disaster response
- Ensure safety and security of relief goods and maintain discipline during relief distribution process
- Provide security in Relief Camps

Post-Disaster

- Assist in relief and rehabilitation process

REVENUE DEPARTMENT

Pre-Disaster

- Assign representatives for DDMA, and participate in meetings
- Information sharing regarding capacities and needs of Revenue department regarding disaster risk management
- Capacity building of Revenue department regarding disaster risk management
- Assessment of high prone areas and estimation of possible damage and needs for recovery in case of emergency

- Arrangement of financial resources
- Facilitate getting tax exemptions to institutions/NGOs/INGOs focus on disaster risk management
- Collect and update population data at village level

During-Disaster

- Coordination with the DEOC
- Establish relief distribution centers
- Accept relief donations and relief support
- Timely release of funds

Post-Disaster

- Allocation of funds for recovery and rehabilitation process
- Assessment of damage of industry/business, crops and livestock and settlement of applicable taxes accordingly in coordination with Industry, Agriculture and Irrigation departments

ARMED FORCES

Pre-Disaster

- Coordinate with the DDMA in the pre-disaster planning
- Prepare necessary equipment, labor, transportation and other materials for emergency interventions
- Provide training to soldiers and determine the role of soldiers who are stationed in flood prone areas
- Assist in evacuation of people to safe places

During-Disaster

- Maintain liaison with the DEOC for vital inputs during response
- Collect information and warn appropriate Army units for engagement in safety, rescue and evacuation activities

- Establish communication infrastructure and supplement the civil communication set-up if required
- Coordinate all military activity required by the civil administration
- Provision of medical care with the help of the medical teams, including treatment at the nearest armed forces hospital
- Transportation of relief material
- Provision of logistic back-up (aircrafts, helicopters, boats)
- Assist in establishment of Relief Camps
- Assist in evacuation of people to safe places during the disaster
- Installation of temporary Bridges, Bunds

Post-Disaster

- Cooperate and coordinate with district authorities
- Assist in rehabilitation process if required

SOCIAL WELFARE AND COMMUNITY DEVELOPMENT

Pre-Disaster

- Coordination with NGOs and civil society organizations working for disaster risk management
- Empower the extremely vulnerable people emphasizing women and children through public awareness involving respective departments for various fields such as Education, Health etc.
- Capacity building of community based groups and volunteers engaged in disaster management activities

During-Disaster

- Provide information on the situation of the disaster to the DEOC
- Coordinate all NGOs / INGOs and civil society organizations working during the emergency response
- Monitor progress of relief operations in the affected areas

- In coordination with PDMA, Health, Revenue and other line departments, ensure delivery of relief to most vulnerable segments of society such as children, orphans, widows, destitute
- Assist and facilitate Damage and Needs Assessment teams from NGOs
- Share human resources with DDMA

Post-Disaster

- Monitor and follow up the status of the extremely vulnerable people
- Assist and facilitate Damage and Needs Assessment teams from NGOs
- Conduct impact assessment studies and analysis of strengths and weaknesses of stakeholders and disseminate learning to PDMA, DDMA and other concerned institutions
- Facilitate institutions / NGOs/ INGOs which focus on rehabilitation activities

NGOs / INGOs

Pre-Disaster

- Facilitate PDMA and DDMA for capacity building regarding disaster risk management
- Capacity building of community groups regarding disaster risk management
- Linkages with concerned departments and institutions for providing technical and financial resources regarding diverse sectors related to disaster management
- Resource mobilization at local and international level

During-Disaster

- Collaborate and facilitate in relief operations
- Incorporate local and international expertise in disaster response
- Facilitate establishment of temporary shelters and camps
- Facilitate in overall disaster response in collaboration with concerned departments
- Regular updates and alerts to local and international partners
- Utilization of existing resources and further mobilization at local and international level

- Assessment of losses using sphere standards

Post-Disaster

- Collaborate and facilitate in rehabilitation activities
- Incorporate local and international expertise in rehabilitation activities
- Facilitate overall rehabilitation in collaboration with concerned departments
- Impact assessment studies and sharing findings with PDMA, DDMA, local and international partners
- Linkages with partners for sustainable resources mobilization

DISASTER MANAGEMENT GUIDELINES

INTRODUCTION

Multi-hazard vulnerability Risk Assessment of Shikarpur district reveals that the district is prone to multiple natural disasters. The pertinent hazards to district are hydro-meteorological hazards including drought, heatwave and riverine flood with the potential to cause urban flooding. The risk of geophysical hazards is low in the district. In modern technological era, hydro-meteorological hazards can be precisely forecasted and action can be taken well in time to minimize damages and losses. In other words, the vulnerabilities and risks are manageable and losses and damages can be minimized through adoption of best management practices and mobilization of resources.

These guidelines introduce best practices which can be adopted to manage risk of natural disasters in the district.

Riverine Flood	<ol style="list-style-type: none">1. River Indus in Sindh can be segmented in three broad reaches Guddu to Hyderabad, Hyderabad to Kotri and Kotri to Arabian Sea. Additionally, during past years, road bridges have been built over river Indus at different location. Though such developments and interventions were essential to bring prosperity in the region, however, have embedded impacts on fluvial geomorphology and natural flood plain of the Indus. Further, extensive human interventions such as use of land for agriculture, road infrastructure, civil embankments, etc. are observed through satellite imagery within the existing flood plain. In such scenario, risk of breaches in flood protective embankments and consequential flooding of adjoining areas have been increased. To minimize this risk, it is essential to restore Indus flood plain in its natural form. This arrangement will significantly reduce riverine flood risk through adoption of ecosystem friendly disaster risk reduction. The arrangement will not only reduce disaster risk but restore and enrich biodiversity in Indus flood plain.2. Though river Indus floodplain is bounded by flood protective embankment, but still some parts of district Shikarpur adjoining river Indus are likely to be affected due to breaches in embankments of river Indus.3. It is highly recommended to identify and reinforce sections of vulnerable embankments before flooding season to avoid breaches in embankments and consequential damages.4. As far as riverine floods are concerned, the Sindh province has sufficient time for preparation and reaction. Close monitoring of river discharge
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	<p>level in coordination with irrigation department, the government of Punjab, Federal Flood Commission and Pakistan Meteorological Department (PMD) be conducted.</p> <ol style="list-style-type: none"> 5. Timely alerts be issued to people living in low lying areas within flood plain. 6. In case of high anticipated flows evacuation of people and livestock be carried out. 7. Soaking and compacting of embankments before arrival of flood water. 8. Reinforcement and stone pitching of high-risk embankments. 9. Use alternative eco-friendly options like use of bamboo wood etc. to minimize erosion impact on high-risk embankments. 10. Where necessary and possible, erection of guide embankments and spur before arrival of high flood water. 11. 24/7 vigilance of high-risk embankments by Sindh Irrigation Department. 12. Readily availability of breach filling stock and machinery at high risk embankments. 13. Restoration of natural eco-system within flood plain such as revival of braided/Yazoo channels and natural lakes within flood plain to disperse and distribute flood water across the plain. 14. Removal of possible congestion factors within the flood plain. 15. Public participation comprising local people be encouraged in pre and during flood periods.
Earthquake	<ol style="list-style-type: none"> 1. The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karoonjhar Mountains, which is famous for Nagar Parkar Granite. District Shikarpur falls away from any major fault line and is unlikely to be affected by a massive earthquake. 2. Some of prominent faults situated in Sindh are (a) Karachi-Jati, (b)

	<p>Surjan-Jhimpir, (c) Pab Fault (d) Hub Fault and (e) Allah Bund-Rann of Kutch faults.</p> <ol style="list-style-type: none"> 3. Though risk of geophysical hazards in Shikarpur district is low but still some actions must be taken to avoid losses in case of minor jolts. It is highly recommended to identify old and weak buildings in the city and other urban settings of the district. Local concerned authorities may decide evacuation or retrofitting of such buildings / structures. 4. It is also recommended that, new housing schemes, societies and infrastructure be built with proper town planning and following Building Codes recommended for the zone in which Shikarpur district is situated. 5. Local government departments must be strengthened to manage situation arisen from earthquake jolts. Strengthening must include capacity building to act as first responder in any likely situation.
Heatwave	<ol style="list-style-type: none"> 1. The district has witnessed rapidly increased severity of heatwave in the past five years. The district is moderately populated, which significantly increases the chances of heatwave impacts. 2. Heatwaves are forecastable hazards and actions can be taken well before occurrence of heatwaves. The most suitable action is issuance of warnings and alerts in public for precautions and safety. Suitable media for the purpose is social media and SMS. 3. Scientific studies suggest that, frequency and intensity of heatwaves is increased due to climate change. Though climate change is global phenomena, however, its impacts can be minimized through local interventions. The most efficient and cost-effective solution is tree plantation. Tree plantation must be encouraged at different levels including government functionaries, NGOs, community and individual levels. 4. Additionally, introduction of reduced Urban Heat Islands (UHI) through policies and implementation in infrastructure development will significantly reduce impacts of heatwaves.
Drought	<ol style="list-style-type: none"> 1. Climatic condition of the district can be categorized as Hot and Arid (Climate Classification of Pakistan (Khan et al., 2010). Average annual

	<p>rainfall received during a year across the district is 75.95mm. Agriculture is practiced in the district which is mainly dependent on canal irrigation.</p> <p>2. Drought is also forecastable hazard and can be predicted well in advance. Though drought may not bring any prominent or famine like conditions in the district, however, it may cause reduction in agricultural production and some extent disturb food supply for the animals and livestock. The best practice to manage drought related impacts is storage of food supplies for both humans and animals.</p> <p>3. The situation of drought may vary in future due to climate change effects, therefore, introduction of drought resilient crops is need of the time. Additionally, efficient use of available water resources and introduction of efficient irrigation systems in agriculture sector is also required.</p>
Cyclone	According to MHVRA Study 2022, there is no Cyclone Hazard in Shikarpur district.
Tsunami	According to MHVRA Study 2022, there is no Tsunami Hazard in Shikarpur district.

STANDARD OPERATING PROCEDURES

INTRODUCTION

Overall, disaster risk reduction is collective responsibility of concerned departments, associated line departments, private sector and communities. Synergized and coherent efforts are required at each cycle of disaster in order to minimize and avoid disaster losses and damages. The implementation of this disaster management plan would only be possible until roles and responsibilities of every department are defined and well understood.

ACTION PLAN FOR FLOOD

The monsoon and flooding period is well defined and occur almost every year with different intensities and cause losses at different scales. The recommended action plan for monsoon and flooding is tabulated below:

Table 5: Action Plan for Flood Hazard Management

Action	Timelines	Responsibility
Letter to irrigation department for identification of vulnerable embankments and disaster mitigation measures	April-May	PDMA
Inspection, maintenance and ensure readiness of flood fighting equipment available with PDMA	May-June	PDMA
Inspection, maintenance and ensure readiness of flood fighting equipment available with line departments	May-June	Local Government, Irrigation, and other relevant functionaries
Letter to concerned departments for removal of congestions in water ways	May-June	PDMA
Conduct pre monsoon meetings/conference with concerned departments	June-July	PDMA

Organization and conduct of pre monsoon meetings headed by DDMA and chalking out of monsoon contingency and action plans	June-July	PDMA to write letter to concerned departments and organize such meetings through online or other feasible mechanism
Interaction and close liaison with Pakistan MD on weather forecast	June-July	PDMA
Dissemination of severe weather alerts to concerned DDMA and likely population to be affected	Based on forecast	PDMA
Daily monitoring of discharge data and flood inundation levels	During flooding	Sindh Irrigation Department
Deployment of man and material resources and soaking, inspection and monitoring of flood protecting infrastructure	Pre and during flooding	Sindh Irrigation Department

ACTION PLAN FOR FORECASTABLE DISASTERS

Severe weather, heatwave, and drought are only forecastable hazards. For such hazards following action plan is recommended

Table 6: Action Plan for Heatwave Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of heatwave	Based on forecast	PDMA
Dissemination of forecast to	Based on forecast	PDMA

concerned DDMA and local community		
Mobilization of NGOs, INGOs and individuals for arrangement of heat stroke and medical camps within affected areas	During disturbance period	PDMA and DDMA

Table 7: Action Plan for Drought Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of drought	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA
Mobilization of NGOs, INGOs and individuals for stocking of food and life support items to prevent and mitigate famine conditions depending upon severity and spell of drought	During disturbance period	PDMA and DDMA

ACTION PLAN FOR UNFORECASTABLE HAZARDS

Earthquake

The earthquake is unforecastable hazard and does not provide reaction time to prevent damages. The recommended post disaster action plan are as follows

Table 8: Action Plan for Earthquake Hazard Management

Action	Timelines	Responsibility
Mobilization of man and material resources for rescue and recovery	Post disaster	PDMA and DDMA

Mobilization of NGO, INGO, volunteer groups, scouts and armed services for rescue and recovery	Post disaster	PDMA and DDMA
Coordination and establishment of relief camps, mobile medical camps, life support facilities and provision of relief to affectees	Post disaster	PDMA and DDMA
Coordination and mobilization of rescue teams to search and rescue life in collapsed structures	Post disaster	PDMA and DDMA
Coordination with National Disaster Management Authority (NDMA) for seeking assistance from international agencies (depending on severity of events and damages/losses)	Post disaster	PDMA
Coordination and mobilization of resources on Build Back Better principles.	Post disaster	PDMA

SOP FOR PEOC AND DEOCs

- For the smooth operation of the emergency activities the PEOC and District Emergency Response Centre (DEOC) will work under defined Standard Operating Procedures (SOPs). These SOPs are broadly categorized in three sections
 - a. Action on receipt of early warning, safe evacuation, search and rescue, initial assessment, relief distribution, recovery and deactivation of response.
 - b. Coordination and information dissemination
 - c. Contingency planning and response actions

- For localized emergencies, the situation shall be dealt within the regular operating mode of the emergency management services in the district.
- DDMA shall activate the DEOC and take the operational lead for the district government response.
- The DEOC will serve as the center for receiving early warning and issuing information to public at village level, taking measures to evacuate people, updating relevant departments, response agencies, and media etc.
- The DEOC will lead the coordination and management of relief operations in affected areas in the district with the assistance of PEOC.
- DEOC will coordinate with all concerned departments and humanitarian agencies at district level.
- DEOC will coordinate for early recovery with the assistance of PDMA and other concerned departments.
- In standby position, PEOC and DEOC shall be alert and ready to start emergency operations. The PEOC shall coordinate with concerned departments like NDMA, PMD, etc. for regular updates on likely disaster events. Once the threat is established, the PDMA shall approve the alert and activate response mechanism of PEOC and DEOC.
- Once PEOC and DEOC activation is approved or issued, both centers will remain fully operational on 24/7 basis and coordination shall be established with all concerned departments.
- PEOC and DEOC will collect regular updates on disaster situation and after normalization of situation and with mutual consultation shall inform PDMA to issue stand down or disaster deactivation call and final report on emergency operations will be circulated to stakeholders.
- The operationalization of PEOC and DEOC means complete activation of centers during disaster situation. Management of PDMA shall ensure full functionalities of PEOC including stock for emergency food, office supplies, communication system with backup support, electricity generators, computers, screens, multimedia projectors and other necessary equipment. While Deputy Commissioner Shikarpur shall ensure availability of all necessary equipment and supplies at DEOC for 24/7 operations. The deputy commissioner or chairperson DDMA will also ensure availability and presence of representatives of DDMA in DEOC during emergency operations for liaison and close coordination and smooth emergency response.
- A contact information of relevant government officials, influential personnel, political figures, volunteer groups, social welfare organizations and communities of high disaster risk prone areas shall be collected and maintained by PEOC and DEOC. For establishing quick liaison and coordination this

contact information shall be used by both PEOC and DEOC. In addition to these contacts, PEOC will arrange random SMS alerts, robo calls etc. through commercial cellular services.

- The PEOC will establish the direct contact/coordination with district disaster management officer for disaster alerts and warnings and onward dissemination and other immediate actions.
- All warnings and alerts shall be carefully scrutinized by the central body i.e. PDMA and disaster warning alerts shall only be issued through single nodal agency to avoid any circulation of misinformation etc.
- During the disaster, all instructions, guidelines, action plans and advisories on disaster events, evacuation, relief operations etc. shall be issued by PEOC or DEOC in consultation with PEOC.

DISASTER MANAGEMENT PLAN

INTRODUCTION

Following disaster management measures are recommended for effective preparation, response and rehabilitation of communities. PDMA may identify suitable partners/agencies to carry out each of the below-mentioned measures to maximize the effectiveness of disaster management plan and minimize losses in case of any disaster.

Riverine Flood	
UCs at Risk (13)	Bagerji, Arain, Chak, Garhi Tegho, Jindo Dero, Lakhi, Loung Bhatti, Mehmooda Bagh, Mirzapur, Nauraja, Ruk, Sehwan, Tamachani
UCs not at Risk (30)	Abdoo, Amrote, Bhambhir, Bhirkan, Dakhan, Gaheja, Garhi Yasin, Ghari Dhako, Hamayun, Jagan, Jahanwah, Jano, Jehan Khan, Karan, Lodra, Madeji, Mian Sahib, Naushahro Abro, Nim, Pir Bux Shujrah, Rahimabad, Rustam, Shabira Abad, Shhato Mangi, Sultan Kot, Taib, Thanhrio, Waryaso, Wazirabad, Zarkhel
General Description	<ol style="list-style-type: none"> The district is prone to riverine flood. Heavy rains are also a major cause of flooding in the district. The total population of district Shikarpur according to 2017 census was recorded to be 1,231,481. Majority of the people live in the rural areas. Like other districts of Sindh, Shikarpur is also an agro-based district with majority of the people earning their livelihood through agriculture while the second largest group, depends upon casual labour. Agriculture, in Shikarpur, mainly depends upon canal irrigation. Out of 234 rural mouzas, 211 (90%) are irrigated with the help of canals. In 2010, District Shikarpur was severely hit by floods affecting population of 778,000. Whereas, a total of 865 sq km area of the district was inundated with flood water. The flood also partially damaged and destroyed many health care facilities in the district. 2011 floods affected Shikarpur district to a lesser extent with only 4 UCs affected. Compared to 2011 flooding, the severity of 2012 floods was much higher. The district was inundated with 2-3 feet standing water. More than 100 houses were collapsed in 4 UCs of the district. According to MHVRA study 2022, Flood hazard in the district is of intensity “Low to Very High”. According to MHVRA study 2022, Flood risk in the district is “Low to Extreme”.
Disaster Management Measures	
Preparedness	
	<ol style="list-style-type: none"> Recording of daily river discharge at barrages in Sindh, and regular dissemination among stakeholders. In case of high discharge, dissemination of warnings and alerts to masses living in flood plain. Identification and inspection of vulnerable embankments likely to be affected due to flooding during pre-monsoon season, as per “Bund Manual” of irrigation department. Inspection and readiness of flood fighting equipment available with district government departments prior to flooding season. Classify and map bunds based on their origin (Mud, Brick, Stone, Concrete, Boulder, etc.) Readiness of flood camps in high riverine flood and breaching risk areas. Maintenance and strengthening of identified weak embankments. Awareness and motivation campaigns on construction of flood resilient buildings and infrastructures.

9. Regular awareness campaigns on flood precautions and safe evacuations using various media platform.
10. Inclusion and implementation of Disaster Risk Reduction (DRR) measures in development projects at planning stage for building flood resilient infrastructure.
11. Conduct of satellite imagery based study for identification of vulnerable embankments before each monsoon and flooding period.
12. Collection and management of contact information of area/village influential for alert and warning dissemination.
13. Readiness of community-based volunteers and other related organizations / NGOs.
14. Regular community-based flood fighting trainings through government departments or any other appropriate platforms.
15. Installation of digital flood level gauges along embankments and dissemination of real-time flow level measurements to concerned authorities.
16. Installation of surveillance cameras at safe places for consistent monitoring of structural integrity of vulnerable embankments.

Response

1. Mobilization of rescue services, relevant NGOs, scouts and volunteers.
2. Evacuation of people and livestock to shelters/camps.
3. Camp management as per standard practices.
4. Relief distribution.
5. Precautionary measures for communicable diseases.
6. Activation of mobile health and education services for flood affectees.
7. Arrangements for early recovery including flood de-watering and early restoration of communication and essential services.

Recovery and Rehabilitation

1. Damage assessment of flood affected areas.
2. Conduct post flood repairs or refurbishment of embankments/barrages/canals
3. Resettlement of population on build back better basis.
4. Complete restoration of communication and essential services.

Earthquake	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> 1. An earthquake is a sudden shaking of the ground caused by two chunks of earth's crust sliding past one another. 2. Although earthquakes are short-lived, usually not lasting more than a minute, they can leave behind incredible damage. 3. Identifying potential hazards ahead of time and advance planning can reduce the dangers of serious injury or loss of life from an earthquake. 4. According to MHVRA study 2022, Earthquake hazard in the district is of intensity "Low". 5. According to MHVRA study 2022, Earthquake risk in the district is "Low".
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> 1. Identifying and inventorying weak buildings and structures especially in urban settings of the district and situation demanding action by concerned departments. 2. Preparation of landuse plans, town plans and implementation of building codes in new residential schemes, schools, public and private offices. 3. Implementation of DRR measures in public infrastructure development schemes. 4. Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation. 5. Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings. 6. Availability of necessary material and equipment required for establishing temporary shelters with life support facilities i.e. mobile medical camps, schools, power supply, water and sanitation etc. 7. Availability of alternative communication system in case if usual communication means are disturbed by earthquake. 8. Preparation of medical emergency plan to manage mass casualties in case of any major earthquake event. 	
Response	
<ol style="list-style-type: none"> 1. Obtain firsthand information on intensity of earthquake and damages; prioritize areas for search and rescue operation. 2. Mobilize community-based volunteers, scouts and other trained personnel to hard hit areas to assess situation and help victims. 3. Establish emergency camps / shelters with necessary life support facilities. 4. Establish medical camps for provision of first aid and possible medical assistance to injured. 5. Evacuate people from damaged houses to safe places and shelters. 6. Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede. 7. Arrangement and conduct of aerial / drone survey of the affected areas. 8. Establish information and help desks for facilitation of affectees. 9. Restore essential services like power, water supply, and telecommunication of critical infrastructure like hospitals, control Rooms, etc. on priority basis. 	

Recovery and Rehabilitation

1. Detailed damage and need assessment for recovery and rehabilitation.
2. Rehabilitation on build back better principle.

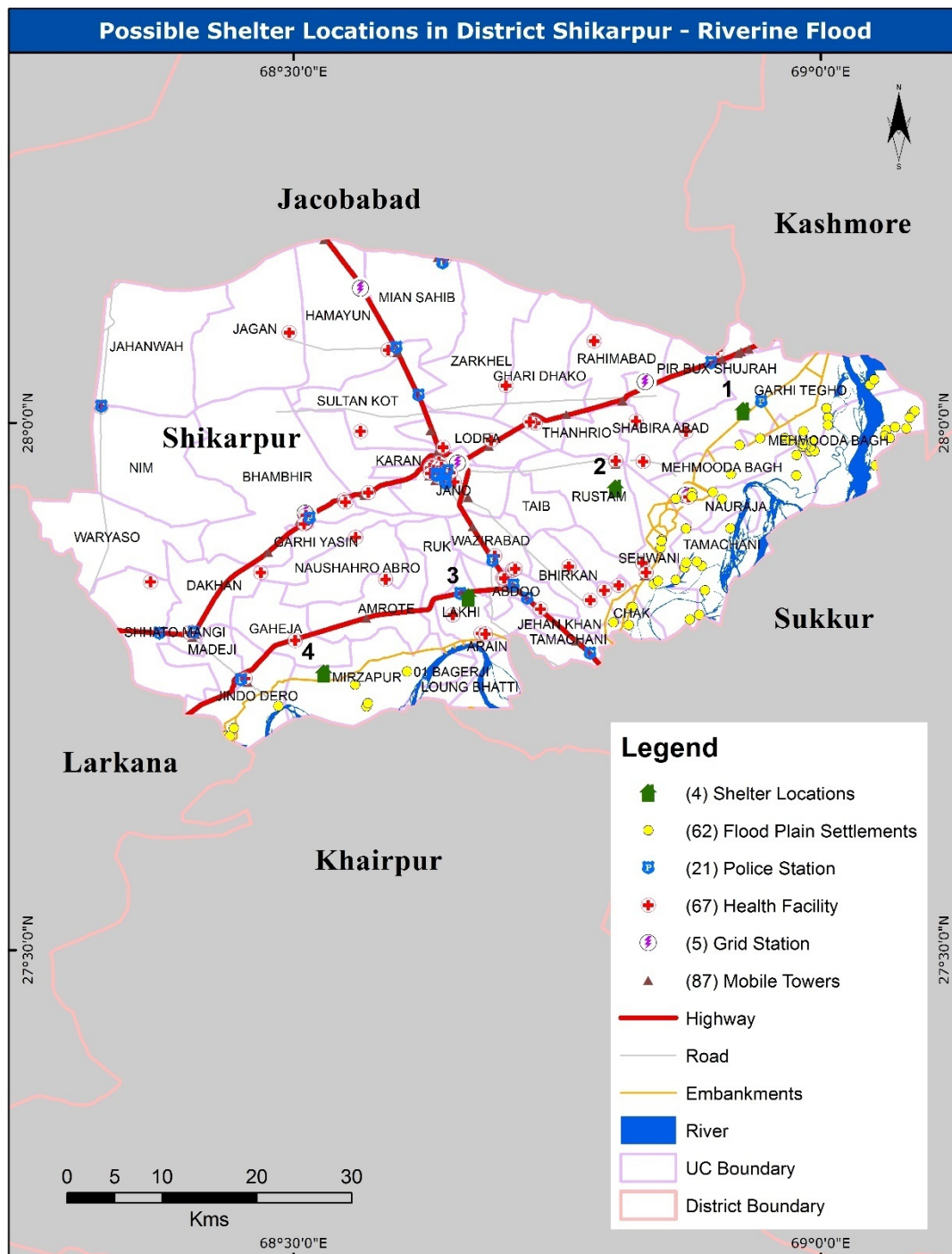
Heatwave	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> 1. The climate of district Shikarpur is Hot and Arid. (Climate Classification of Pakistan (Khan et al., 2010)) with warm conditions year-round. 2. The climate of the district is extreme, both in winters and summers. The summer season commences from April and continues till October. 3. The months of May and June are very hot; during the day with average maximum and minimum temperatures being 46 °C and 30 °C respectively. 4. December and January are the coldest months with average maximum and minimum temperature of 25 °C and 9.5 °C. 5. The annual average rainfall across the district is about 75.95 mm. 6. According to MHVRA study 2022, Heatwave hazard in the district is of intensity “High”. 7. According to MHVRA study 2022, Heatwave risk in the district is “Low to Medium”.
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> 1. Consistent future development strategy: Tree plantation, restoration of natural ecosystem, construction of environment friendly and well planned residential societies, offices, infrastructure and human dwellings. 2. Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings. 3. Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients. 4. Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations. 5. Arrangements for uninterrupted supply of electricity and water in vulnerable areas. 	
Response	
<ol style="list-style-type: none"> 1. Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas. 2. Local radio FM broadcasts to disseminate heatstroke safety and precautions. 3. Mobilize mobile medical teams for first-aid and other medical emergency support in affected area. 4. Record keeping of heatwave patients and fatalities. 	
Recovery and Rehabilitation	
<ol style="list-style-type: none"> 1. Post event review of heatwave plan and modifications if required. 	

Cyclone/Tsunami	
UCs at Risk	Nil
General Description	According to MHVRA study 2022, there is no risk of Cyclone/Tsunami in Shikarpur district

Drought	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> 1. Climatic condition of the district can be categorized as Hot and Arid (Climate Classification of Pakistan (Khan et al., 2010)) 2. Rainfall is very scant, average annual rainfall received during a year across the district is 75.95 mm. 3. River Indus is flowing along the eastern and southern boundary of the district. 4. Agricultural water needs of the district are mostly catered through canal irrigation system, other modes of land irrigation, i.e. pumping and tube-well are also being used. 5. 64% of the total district area is covered with irrigated crop fields, besides, some marginal and irrigated saline fields are also found. 6. According to MHVRA study 2022. <ol style="list-style-type: none"> a. Meteorological drought hazard for district Shikarpur is “Extreme” b. Meteorological drought risk for district Shikarpur is “Medium to Extreme” c. Agricultural drought hazard for district Shikarpur is “Mild to Extreme” d. Agricultural drought risk for district Shikarpur is “Low to High”
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> 1. Implement Drought Early Warning System (EWS) at provincial/district level to get clear indications of the impending drought and its consequences, e.g. forecast of impending drought conditions related to changing weather conditions linked to El Nino or La Nina events. 2. Implementation of water supply and demand management and encouragement of efficient irrigation systems in agriculture. 3. Research and promote drought resistant agriculture crops. 4. Resilience and improvement of adaptive capacity of farmers. 5. Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, stream flow, groundwater levels, lakes, and reservoirs for drought forecasting. 6. Control ground water extraction from upper and lower aquifers to be within the sustainable yield limits. 	
Response	
<ol style="list-style-type: none"> 1. Assess data about the nature of drought conditions and their impact. 2. Provision and installation of solar water pumps for availability of clean drinking water. 3. Public information campaign for water management and saving. 	
Recovery and Rehabilitation	
<ol style="list-style-type: none"> 1. Cash and in-kind support to farmers for next cropping. 2. Awareness and encouragement of farmers on best irrigation practices and water saving. 	

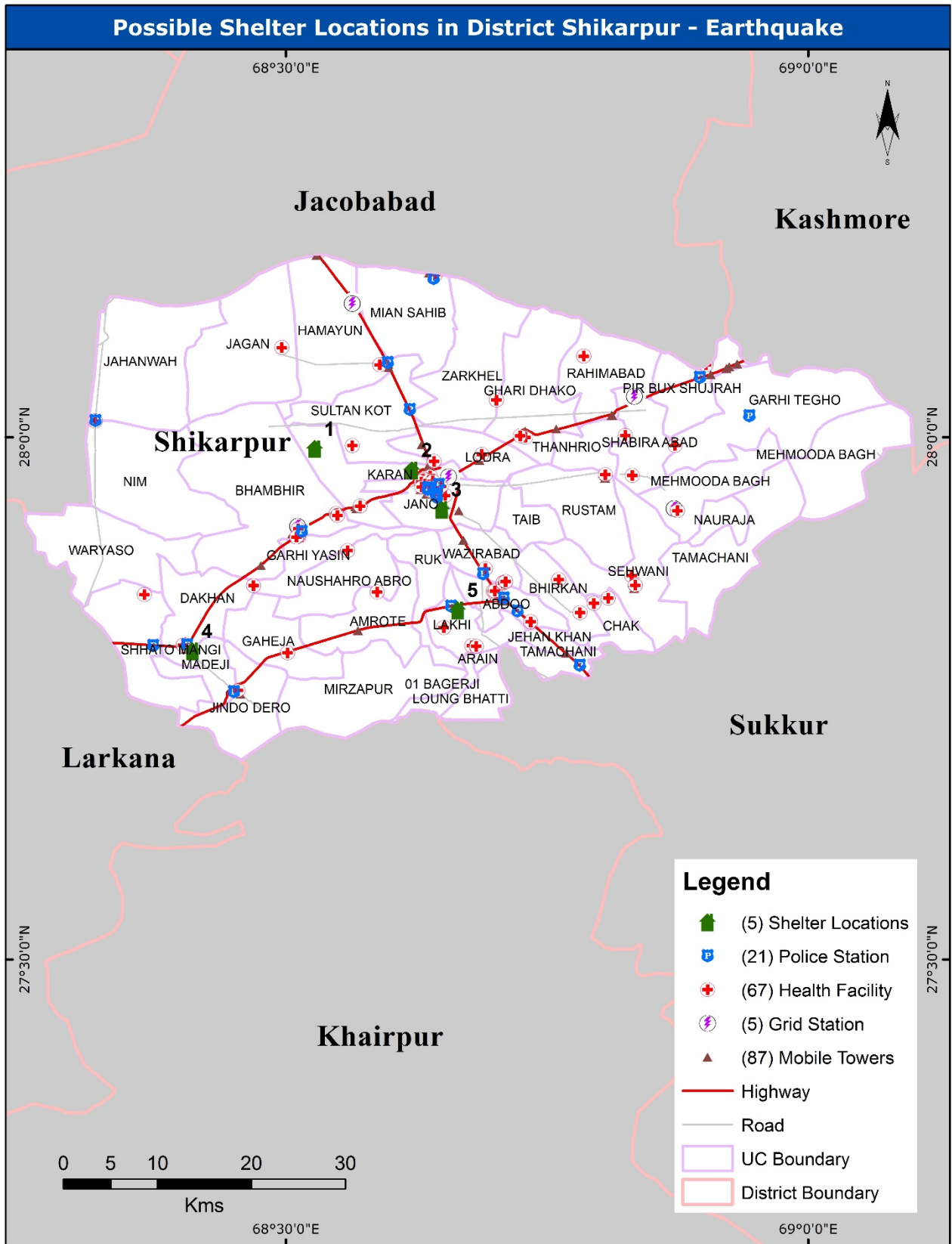
SHELTER LOCATION MAP

As part of preparedness, response, and rehabilitation against hazards, shelter places are integral. These are necessary to relocate, evacuate, or replenish the population that may be affected from hazards. Proposed shelters are illustrated in the maps.



*Annex-A details the list of vulnerable settlements within flood plains prone to riverine flooding

*Annex-B details the list of flood shelter locations



*Annex-C details the list of earthquake shelter locations

PROPOSED PRIORITY DISASTER RISK MANAGEMENT PROJECTS

INTRODUCTION

Following are the recommended disaster risk management projects, which may be initiated to ensure effective disaster management in district Shikarpur. PDMA may identify suitable partnering agencies / line departments to carry out and prioritize each proposed project.

Hazard wise list of Priority Disaster Risk Management Projects	
Disaster Risk Management Projects/ Studies	Brief
Riverine Floods	
1. Geomorphological study of flood plain & river course modelling	Conduct flood plain study for identification of bottlenecks, including elevated islands (Annex – D) impeding the flow of (super) flood water, and Indus River course modeling (historic and predictive) for simulating catchment processes and river flow, etc.
2. Conduct feasibility study for Indus River training and straightening (Annex – E).	The river has a tendency to meander over large width of low lying land thereby flooding it occasionally. River training measures, like bell bunds, guide and confine the river flow within the embankments. Straightening the river speeds up the water so high volumes of water can pass through an area quickly. Dredging makes the river deeper so it can hold more water.
3. Installation of river/flood flow digital gauges at suitable locations for real time monitoring of water level, water discharge rates, wave height and flow speed.	Digital water gauges may be installed to collect water flow characteristics. Digital water gauge is an electronic device, which uses an advance processor chip as a controller, records the water flow characteristics through measuring electrodes and transmit it using wired/wireless communication channel after digital processing.
4. Monitoring of vulnerable bunds using IP Camera systems and Drones for surveillance during floods.	Image camera sensors and drones have relatively low procurement cost, portability, high efficiency, durability, maintenance and power consumption. Camera networks can effectively be used at remote 'Landhis' for real-time monitoring of flood level.
5. Capacity building of vulnerable communities	Create Community based disaster risk management (CBDRM) associations and equip them with training and equipment for early response, including rope rescue, sand bags, bamboo and others.
6. Develop emergency operation center.	Establish and equip emergency operation center with modern tools and techniques for management and operation activities in pre, during and post disaster events.
7. Establish a database of resources and equipment for emergency response in relevant agencies.	Create a well-maintained data repository for all available resources with operational status, quantity, location, and maintenance authority in the district.
Earthquake	
1. Ensure implementation of building codes and standards.	Prepare policy and SOP to ensure new buildings in the district are constructed as per the seismic codes and standard of the area.
2. Identification and retrofitting of weak existing structures and unsafe buildings (schools, hospitals and government offices).	Coordinate with local community regarding unsafe buildings and regularly conduct building safety surveys to check structural integrity of buildings against the seismic risk of the district and take necessary retrofitting measures to strengthen weak structures. Create database of vulnerable and unsafe buildings and retrofitting measures taken to strengthen the structure of such buildings.
3. Preparation of rescue and rehabilitation plan	Coordinate with line departments to create a comprehensive plan with clearly defined roles and responsibilities of first responding departments, as well as, correspond with rescue agencies/NGOs for their role in an event of earthquake. The

	plan should also details the rescue equipment available with concerned departments.
Drought	
1. Conduct feasibility study for identification of suitable sites for rainwater harvesting and aquifer recharge in the district.	<p>The rainwater harvesting sites should be identified by using geospatial technologies and ancillary data, which can be used as clean water aquifers by communities, which in turn can use it for drinking, and irrigation purposes.</p> <p>Potential rainwater harvesting sites may be identified by using Analytical Hierarchy Process (AHP) and spatial analyst tool, with multiple thematic layers (rain data, population, digital elevation model, soil type, etc.)</p>

COST BENEFIT ANALYSIS

INTRODUCTION

1. Cost Benefit Analysis (CBA) is a key analytical tool that can provide quantitative information regarding the prioritization of risk reduction based on comparing benefits of an actual or planned intervention with its costs.
2. Cost Benefit Analysis (CBA) can play a pivotal role in advocacy and decision-making on Disaster Risk Reduction (DRR) by demonstrating the financial and economic value of incorporating DRR initiatives into planning.
3. In an age of austerity, cost–benefit analysis continues to be an important tool for prioritizing efficient DRM measures but with a shifting emphasis from infrastructure-based options (hard resilience) to preparedness and systemic interventions (soft resilience), other tools such as cost-effectiveness analysis, multi-criteria analysis and robust decision-making approaches deserve more attention.
4. Studies categorize interventions into hard and soft type of measures. Hard resilience refers to the strengthening of structures and physical components of systems in order to brace against shocks imposed by extremes such as earthquakes, storms and floods. In contrast, soft resilience (Behavioural DRR) refers to less tangible and process-oriented measures as well as policy in order to robustly cope with events as they occur and minimize the adverse outcomes.
5. The studies find that many of the highest economic returns exist for behavioural DRR strategies
6. The benefits of hazard mitigation are the avoided losses, i.e., those losses that would have occurred in a probabilistic sense if the mitigation activity had not been implemented.

COST BENEFIT ANALYSIS – SHIKARPUR DISTRICT

The existing nature of disasters in Shikarpur district can be categorized as low to Extreme. The prominent hazards in the district is heatwave, drought and flood. The meteorological drought risk in the district ranges from medium to extreme, while agricultural drought risk in the district ranges from low to high. There is no risk of storm surge, and Tsunami in the district. The risk of earthquake is determined to be low. As far as Heatwave is concerned Shikarpur district is at low to medium risk. As far as riverine flood is concerned the settled areas of UCs in the district are likely to be effected in breaching scenario of flood protection embankments of river Indus. As far as population living within the flood plain is concerned, they are well aware of flood risk and live on their own risk, therefore, government functionary is recommended to be mobilized for dissemination of warnings and alerts to population, safe evacuation and providing temporary shelters. Based on the results of the MHVRA study the hazards of the district can be managed through soft and enhanced management measures. In this scenario, cost benefit analysis of proposed interventions is appended in table below:

Table 10: Cost Benefit Analysis of Disaster Risk Measures in District Shikarpur

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Identification and management of shelters	Identification and management of shelter spaces is a cost-effective way to ensure rapid, and effective management of population in times of crisis. Government schools can serve as ideal cost-effective shelter spaces in district Shikarpur, as these can accommodate large number of people. Gradually, permanent shelters can be established in future to avoid use of educational facilities.	Shelter places are highly beneficial at times of disaster as it offers a unified accommodation place for affected people. Shelter place also helps administration in effective management of affectees and provide them with required relief. Shelters serve as centralized facilities where government can concentrate relief efforts including distribution of relief goods and essential food supplies to affected people. Shelter spaces keep people off the highways during and after disaster. Shelters are often the only safe heaven for those without the financial means to take other protective measures.
2.	Monitoring / Strengthening of flood protection embankments	Pre-emptive monitoring activity to check the wellness and structural integrity of flood protection embankments before the onset of monsoon season. This would allow identification of embankments that are in need of repairs and would help identify areas where new embankments are required. Following this activity, assets can be mobilized to enhance the flood protection embankments prior to the occurrence of high flow in rivers.	Timely identification of weak embankments and repairs would prevent flood water from breaching the river floodplains and thereby save millions of acres of crop land, settlements and infrastructure from inundation, possibly saving life and property. This would also reduce the burden on emergency services during hazard and the government can concentrate efforts on severely affected areas. Less damage to communication lines including roads and power lines would improve disaster response and outreach. This would also result in reduced number of internally displaced people (IDPs).
3.	Early warning system for heatwave	Dissemination of forecast of heatwaves from the meteorological department through public radio announcements, print and digital media increases the preparedness of local populace against the impending hazard.	Early warnings give people time to prepare in advance and postpone activities after daytime. Local authorities would get ample time to establish relief centers with provisions of shade and hydration. Hospitals would be prepared to receive more patients than usual. An overall reduction in emergency cases would reflect in less mortality and more savings in medical

			expenditure.
4.	Awareness campaigns	Public private partnership and use of electronic/print media for raising public awareness is a cost-effective approach to build society resilience and improved disaster risk management capabilities of vulnerable communities.	Public awareness and public education for disaster reduction helps to reduce disaster risks. It mobilizes people through clear messages, supported with detailed information. People who know how to react in case of a disaster, community leaders who have learned to warn their people in time, and whole social layers who have been taught how to prepare themselves for natural hazards can contribute to better mitigation strategies and dissemination of information on the consequences of hazards. Education and knowledge can provide people with tools for vulnerability reduction and life-improving self-help strategies.
5.	Early warning for riverine floods	Enhanced communication between the upstream and local Irrigation department allows ample time for emptying reservoirs and increase flows to downstream areas in advance of the arrival of flood waters.	Early warning system and streamlined communication between the upstream and local irrigation department help lowers the adverse impacts of floods in the shape of reduced damage to crops, settlements and infrastructure. This all results in a positive socio-economic impact.
6.	Strengthening of mobile health care facilities	Setup of temporary health facilities reduce difficulty in patients' transportation to permanent hospital facilities. Mobile health care units are already available with government of Sindh, their mobilization to disaster management will ensure lifesaving.	Mobile health facilities play a very significant role in the mitigation of disaster because of their particular function in providing essential first aid. Ease of access to basic health facilities will reduce burden on hospitals. The systematic organization and easy mobilization of the staff, equipment and medical supplies in a safe environment are crucial if disaster response is to be prompt and effective.

ANNEX – A – VULNERABLE SETTLEMENTS PRONE TO RIVERINE FLOOD

List of Vulnerable Settlements (62) within flood Plains Prone to Riverine Flood

S.No	Name	Latitude	Longitude	Area (acres)
1	Godpur	27.988	69.061	9.12
2	Goth Ali Akber Mehar	27.868	68.873	12.96
3	Goth Amil	27.928	68.907	38.30
4	Goth Dakhan	27.863	68.871	13.00
5	Goth Dharani	27.882	68.848	15.38
6	Goth Fazal Jatoi	27.979	68.923	11.80
7	Goth Gazi Mehar	27.864	68.887	10.20
8	Goth Ghulam Mohammad Mirbaha	27.900	68.872	27.80
9	Goth Ghulam Nabi Kalhoro	27.847	68.842	7.41
10	Goth Haji Bachal Lalejo Jatoi	27.985	68.943	31.20
11	Goth Karamullah Mehar	27.934	68.898	3.61
12	Goth Khanan	27.960	69.052	10.62
13	Goth Khawand Bux	27.995	69.081	20.25
14	Goth Mazarjo	27.928	68.863	49.66
15	Goth Minhan Khan	27.732	68.486	4.82
16	Goth Mithal Kursi	27.808	68.818	5.63
17	Goth Mubarak Unar	27.900	68.914	17.20
18	Goth Musafir	27.889	68.849	7.23
19	Goth Qutub Jatoi	27.986	68.966	4.17
20	Goth Raban	27.811	68.804	1.72
21	Goth Saleh	27.825	68.822	2.37
22	Goth Saleh Machhi	27.952	68.915	26.67
23	Goth Sarfo	27.851	68.863	16.00
24	Goth Shahan Khan	27.711	68.444	17.94
25	Goth Suleman Mehar	27.841	68.890	55.30
26	Goth Tando Ali Sher Shah	27.934	68.878	22.59
27	Jalal Goth	27.993	69.062	5.34
28	Jam Bhar	27.986	69.066	19.87
29	Jam Goth	27.996	69.071	4.71
30	Ketl Pandhi	27.764	68.608	36.00
31	Mohra Mari	28.005	69.007	3.00
32	Muhammada Bagh	27.930	68.878	61.79
33	Sadaoro Mahser	27.850	68.846	2.10
34	Untitled Settlement	27.703	68.436	1.99
35	Untitled Settlement	28.009	69.087	9.37
36	Untitled Settlement	28.011	69.089	11.78
37	Untitled Settlement	27.973	68.990	2.70
38	Untitled Settlement	27.974	68.994	9.73
39	Untitled Settlement	27.977	68.988	8.15
40	Untitled Settlement	27.977	68.991	2.28

S.No	Name	Latitude	Longitude	Area (acres)
41	Untitled Settlement	27.979	68.986	1.90
42	Untitled Settlement	28.005	69.084	5.43
43	Untitled Settlement	27.983	68.993	9.28
44	Untitled Settlement	27.818	68.885	19.64
45	Untitled Settlement	27.814	68.876	8.75
46	Untitled Settlement	27.703	68.440	3.50
47	Untitled Settlement	27.731	68.569	11.82
48	Untitled Settlement	27.734	68.571	14.42
49	Untitled Settlement	27.752	68.559	12.88
50	Untitled Settlement	27.868	68.883	21.95
51	Untitled Settlement	27.888	68.849	1.15
52	Untitled Settlement	27.950	68.977	10.46
53	Untitled Settlement	27.970	68.977	4.59
54	Untitled Settlement	27.978	68.983	4.97
55	Untitled Settlement	27.981	68.982	2.55
56	Untitled Settlement	27.980	68.984	9.69
57	Untitled Settlement	27.984	68.971	10.90
58	Untitled Settlement	27.992	68.984	3.11
59	Untitled Settlement	27.998	69.007	10.60
60	Untitled Settlement	28.014	69.006	6.81
61	Untitled Settlement	28.036	69.047	5.07
62	Untitled Settlement	28.041	69.051	2.61

ANNEX – B – SHELTER LOCATIONS DESCRIPTION – RIVERINE FLOOD

The given shelter locations for riverine flood are proposed on the findings of the MHVRA 2022 study and information obtained through satellite technology and online verifiable sources. It is recommended to conduct on ground physical surveys to evaluate their suitability.

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 28° 0'49.96"N 68°56'2.30"E	137	~6,000	216
	Upper left corner: 28° 0'50.29"N 68°55'12.30"E			
	Lower right corner: 28° 0'29.13"N 68°55'38.12"E			
	Lower left corner: 28° 0'41.65"N 68°55'11.24"E			
2	Upper right corner: 27°56'26.34"N 68°48'41.55"E	200	~9,000	221
	Upper left corner: 27°56'31.30"N 68°47'53.16"E			
	Lower right corner: 27°56'11.25"N 68°48'45.32"E			
	Lower left corner: 27°55'58.17"N 68°48'14.97"E			
3	Upper right corner: 27°50'26.33"N 68°40'35.00"E	528	~23,000	194
	Upper left corner: 27°50'15.25"N 68°39'17.25"E			
	Lower right corner: 27°49'48.50"N 68°40'12.69"E			
	Lower left corner: 27°49'36.00"N 68°39'27.85"E			
4	Upper right corner: 27°46'21.79"N 68°31'55.03"E	595	~26,000	188
	Upper left corner: 27°45'53.92"N 68°31'7.46"E			
	Lower right corner: 27°45'26.50"N 68°32'21.55"E			
	Lower left corner: 27°45'24.56"N 68°31'2.45"E			

A total of 4 shelter locations have been selected as Flood shelter places across district Shikarpur. The shelter locations are selected based on their proximity to the population vulnerable to flood, distance from area under high flood risk, elevation from the nearby areas, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.) A total of approximately 64,000 tents (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

ANNEX – C – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

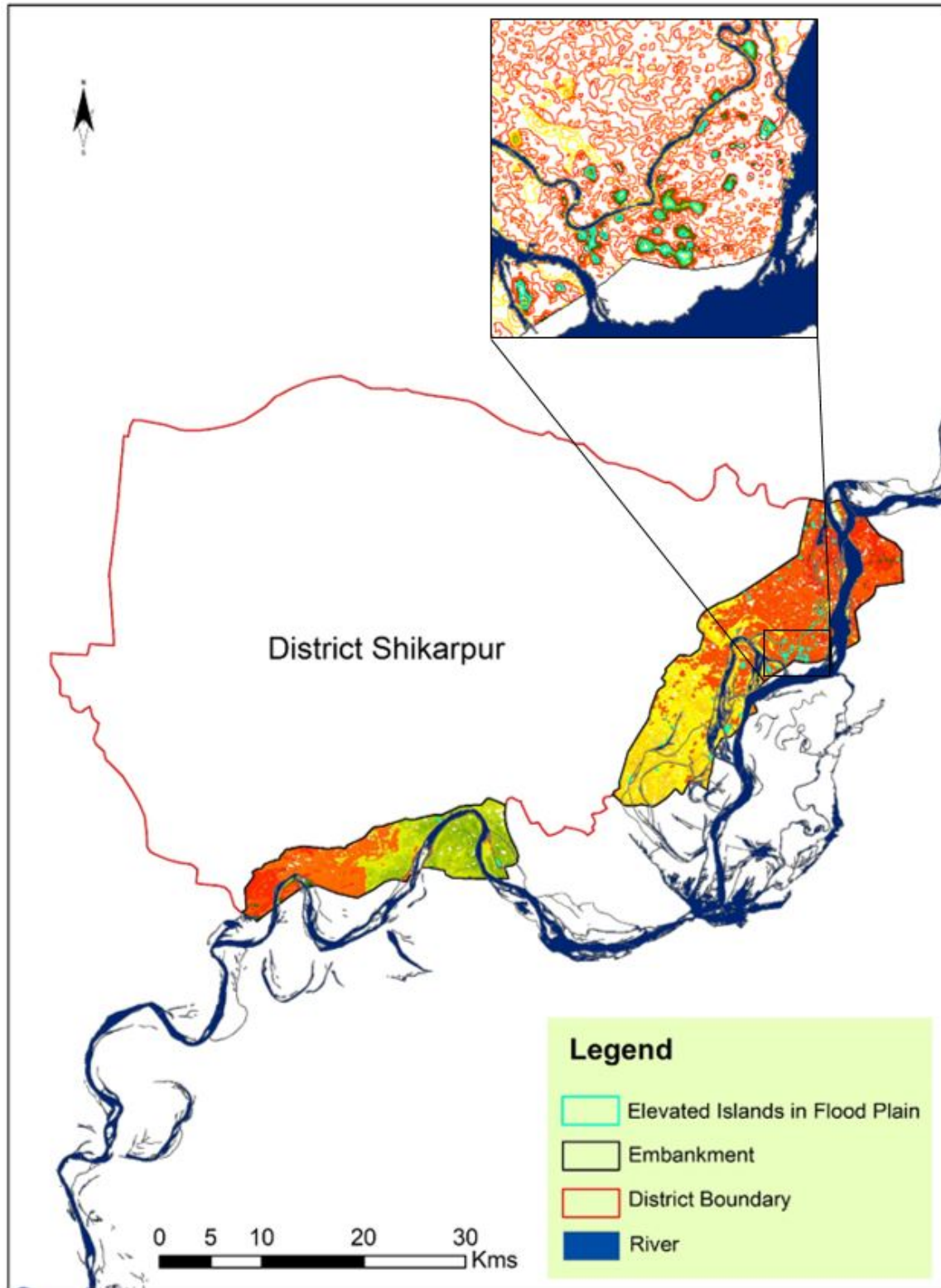
The given shelter locations for earthquake are proposed on the findings of the MHVRA 2022 study and information obtained through satellite technology and online verifiable sources. It is recommended to conduct on ground physical surveys to evaluate their suitability.

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 27°59'55.07"N 68°32'5.66"E Upper left corner: 27°59'26.73"N 68°31'3.61"E Lower right corner: 27°58'52.73"N 68°32'5.96"E Lower left corner: 27°58'42.46"N 68°31'33.25"E	713	~32,000	208
2	Upper right corner: 27°58'3.24"N 68°37'28.67"E Upper left corner: 27°58'19.78"N 68°37'8.34"E Lower right corner: 27°58'0.72"N 68°37'26.67"E Lower left corner: 27°57'59.73"N 68°37'6.73"E	56.4	~2,500	193
3	Upper right corner: 27°55'38.35"N 68°39'14.45"E Upper left corner: 27°56'17.34"N 68°38'50.64"E Lower right corner: 27°55'38.35"N 68°39'14.45"E Lower left corner: 27°55'37.75"N 68°38'51.41"E	105	~4,700	197
4	Upper right corner: 27°47'45.79"N 68°24'45.92"E Upper left corner: 27°47'48.84"N 68°24'31.28"E Lower right corner: 27°47'39.88"N 68°24'47.11"E Lower left corner: 27°47'39.57"N 68°24'32.79"E	22.8	~1,000	184
5	Upper right corner: 27°50'26.36"N 68°40'35.04"E Upper left corner: 27°50'15.47"N 68°39'17.20"E Lower right corner: 27°49'48.50"N 68°40'12.39"E Lower left corner: 27°49'35.65"N 68°39'27.61"E	528	~23,000	194

A total of 5 shelter locations have been selected as Earthquake shelter places across district Shikarpur. The shelter locations are selected based on their proximity to the population vulnerable to earthquake, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.) A total of 63,200 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

ANNEX – D – ELEVATED ISLANDS WITHIN EMBANKMENTS IN SHIKARPUR

Total 55 elevated islands have been identified within the embankments in district Shikarpur, with a cumulative area of approximately 276.83 acres. These elevated islands obstruct the river flow and thereby may be demolished/removed to reinstate the normal river flow within the flood plain.



ANNEX – E – RIVER TRAINING AND STRAIGHTENING

Since most of the time riverine flood are contained in between river embankments therefore only settlements lying in flood plain are prone to low to very high floods while settled areas of Shikarpur district are safe from riverine flood. However, settled areas of the district may be endangered to severe flooding condition if any breaching occurs in river embankment.

Embankment breach due to Normal River flow meandering:

Indus river continuously meander within flood plain area (3-5 miles). As river reached very close to embankments it starts eroding it hence making it vulnerable to any type of flood (low to very high flood). To avoid this situation irrigation department, make loop bund where river is close to main bund. This is a costly task and not a permanent solution because of the reason that river again change its path in 4-5 years and starts meandering to other part of bund. Therefore, there is need to stop the river to come close to the main bunds. It is, thereby, suggested to straight the path of river where it is currently meandering inside the flood plain away from the both sides of main bunds.

Below figure illustrate the concept:



Once path A to B has been developed, then river in normal condition will flow in this path. However annual or bi-annual cleaning of this path will be required by removing the sediments/clay deposit in this path. Special boats will be required to carry out this task by excavating the sand/clay beneath the river and put it on its sides. The feasibility study may be carried out to estimate the cost of digging of A-to-B path and its bi-annual maintenance and to compare it with the cost of making and maintenance of loop bunds to avoid meandering of the river. If the proposed conceptual model is financially and technically viable than it can be taken as project. If this conceptual model is implemented than damaged losses (life and material) due to breaching scenarios may be minimized or even reduced to zero.

ANNEX – F – LIST OF EQUIPMENT AVAILABLE IN DISTRICT SHIKARPUR

Equipment	Quantity
De-watering Machine	15
Buildozers / Dozers	7
Fire Brigade / Engine / Tender	6
Tractor / Trolley / Blade	4
Vehicle / Bus/ Van/Truck/	5
Loader	1
Ambulances	38
Riksha Container	4
Hand Moving Trolleys	70

Source: Provincial Monsoon contingency plan 2020 – PDMA, Government of Sindh