

# MHVRA

## INFORMED DISASTER MANAGEMENT PLAN

### 2023-2032

## DISTRICT KASHMORE



DEVELOPED BY  
**PDMA SINDH**



THROUGH  
**SUPARCO**



WITH THE SUPPORT OF



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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 Kashmore 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 Kashmore 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 Kashmore 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 KASHMORE**

## 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**

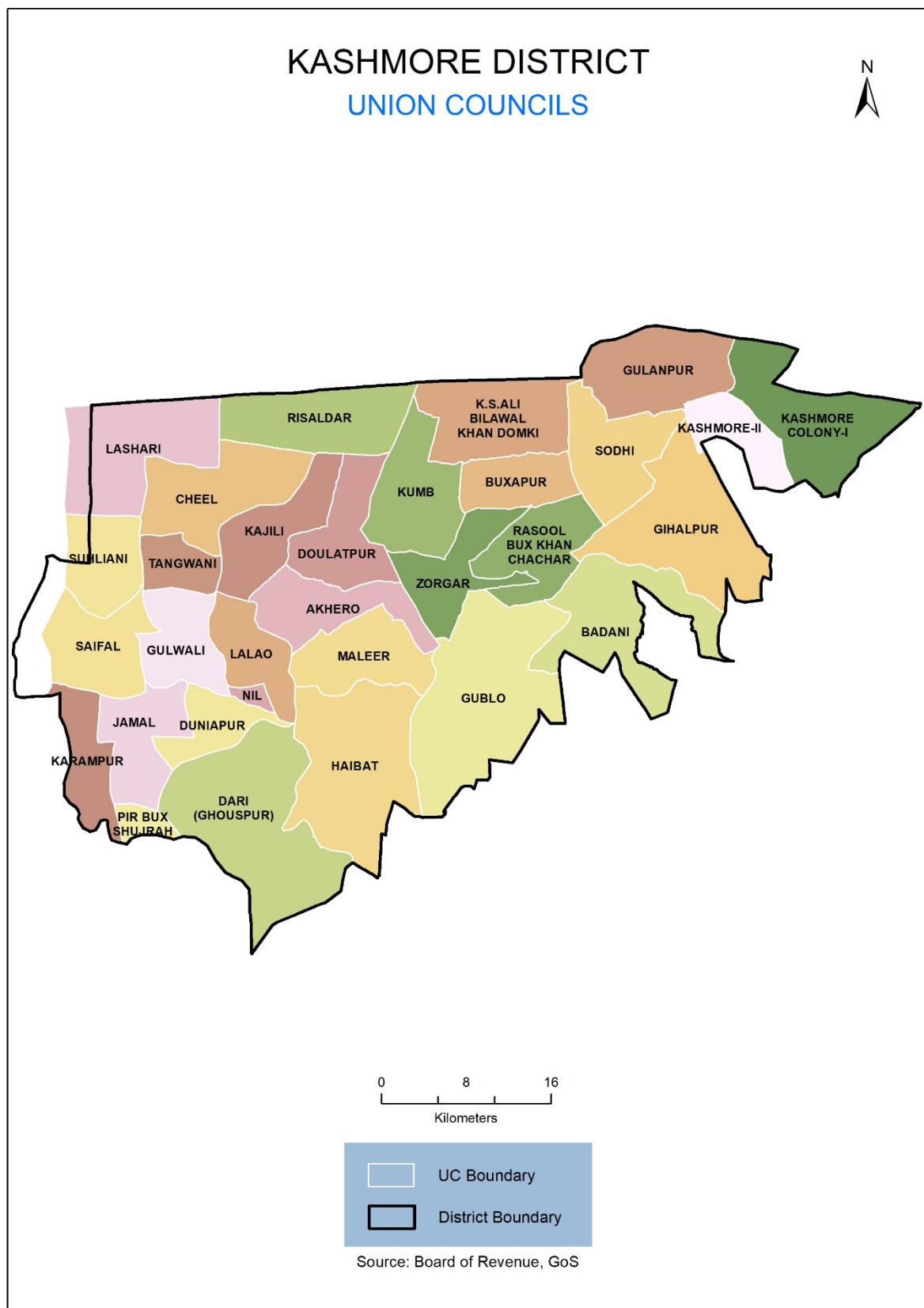
<b>Committee Representative</b>	<b>Role</b>
DG, PDMA Sindh / Dir Ops PDMA	Chairman
Concerned DC or representative officer	Member
Concerned officer from local government	Member
Elected representative of the concerned district	Member
Representatives from disaster affected communities	Member (s)
Representative 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
Representatives from Business Committee	Member
Representatives from Chamber of Agriculture	Member
Any other member as deemed appropriate (Need Basis)	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 KASHMORE**



<b>District area in Sq. Km</b>	2,605	
<b>Coordinates</b>	68° 52' 12" E to 9° 44' 44" E 27° 57' 50" N to 28° 30' 3" N	
<b>Surrounding Districts</b>	Balochistan Province on North District Ghotki And Sukkur on South Punjab Province on East District Jacobabad And Shikarpur on West	
<b>Climate Conditions</b>	Hot and Arid	
<b>Coldest Month</b>	January	
<b>Hottest Month</b>	May	
<b>Seasonal Temperatures</b>	<b>Max Mean (°C)</b>	<b>Min Mean (°C)</b>
Spring (March and April)	37.25	20.72
Dry Summer (May and June)	44.42	29.47
Wet Summer (July to September)	41.33	29.23
Autumn (October to November)	34.74	19.16
Winter (December to February)	25.86	10.54
<b>Average Rainfall</b>	94.53 mm/year	
<b>Physiographic Features</b>	Kacha Forest	

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## DEMOGRAPHY

	Year-1998	Year-2017
<b>Population</b>	677,120	1,090,336
Urban	167,921	253,659
Rural	509,199	836,677
<b>No. of Household</b>	-	185,143
<b>Average Annual Growth Rate 1998-2017</b>	2.53 %	

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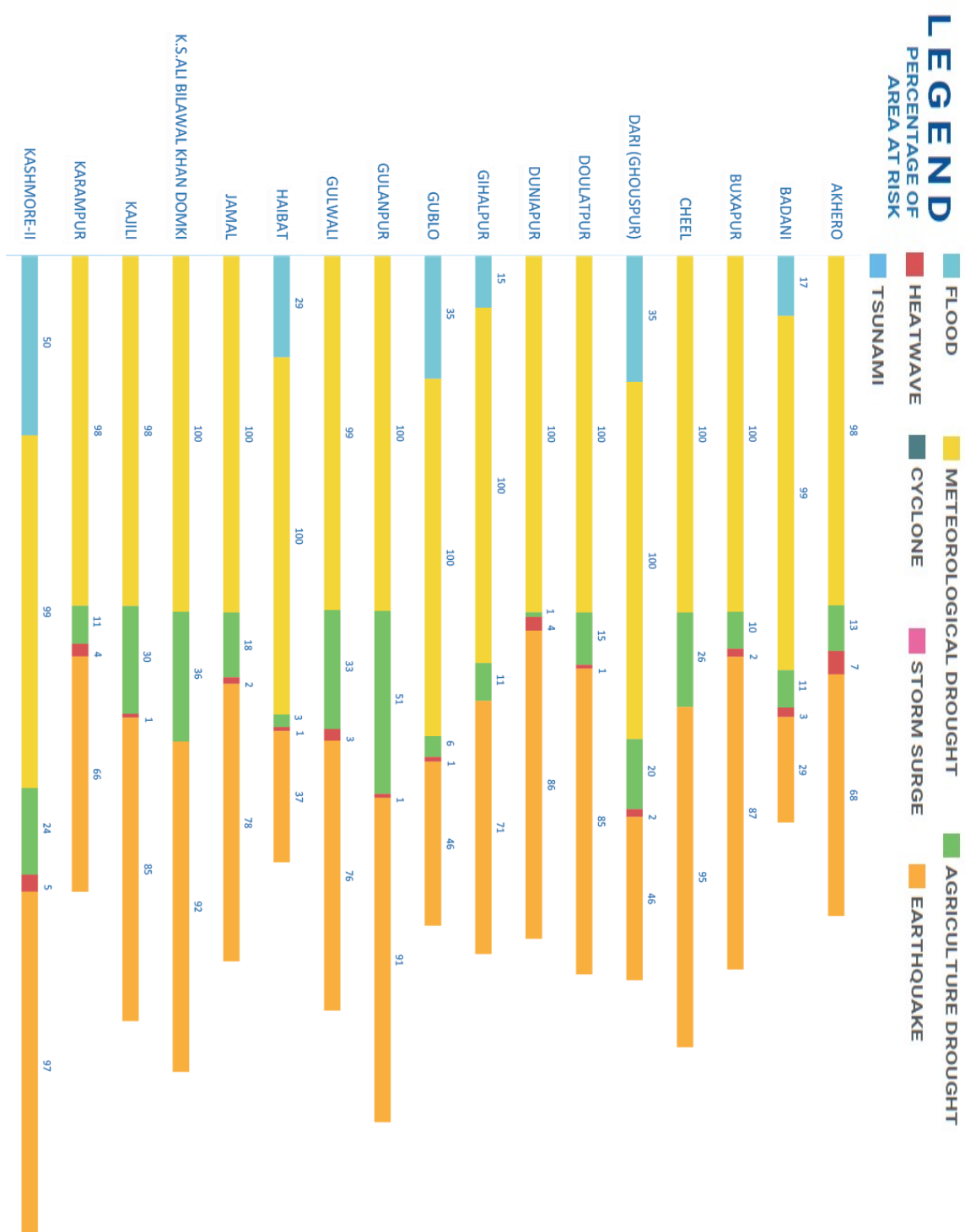
## ECONOMY

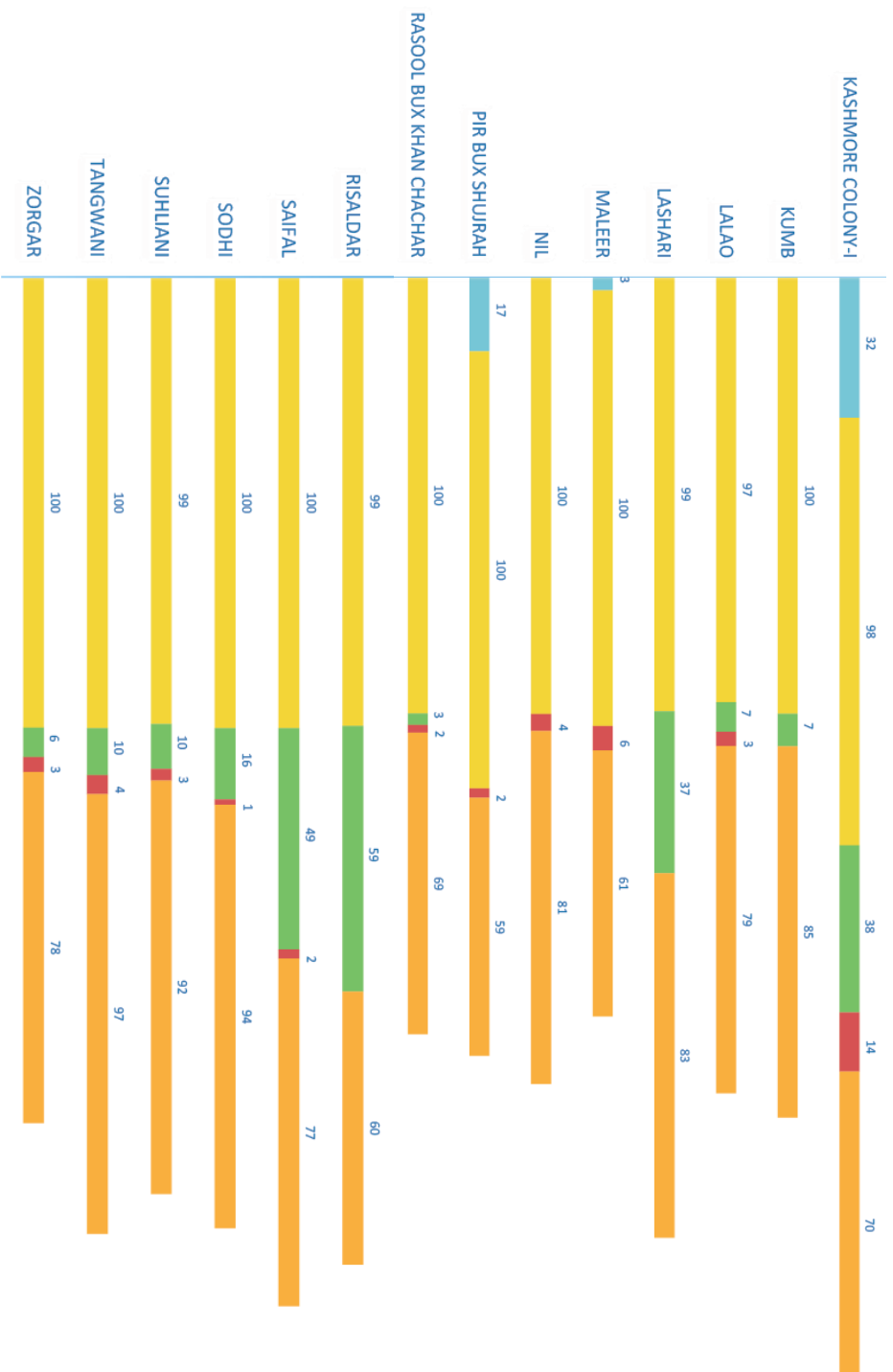
<b>Industries</b>	Agriculture and Oil & Gas
<b>Agriculture</b>	<b>Production in M.tons as per (2016-17)</b>
<b>Major Crops</b>	
Rice	249,013
Wheat	86,657
<b>Minor Crops</b>	
Bajra	6
Rapeseed And Mustard	2,993
Barley	316
Sesame	30
Maize	5
Gram	9151
Jowar	17

TALUKA NAMES	UC NAMES
<ol style="list-style-type: none"> <li>1. Kandhkot Taluka</li> <li>2. Kashmor Taluka</li> <li>3. Tangwani Taluka</li> </ol>	<ol style="list-style-type: none"> <li>1. Akhero</li> <li>2. Badani</li> <li>3. Buxapur</li> <li>4. Cheel</li> <li>5. Dari (Ghouspur)</li> <li>6. Doulatpur</li> <li>7. Duniapur</li> <li>8. Gihalpur</li> <li>9. Gublo</li> <li>10. Gulanpur</li> <li>11. Gulwali</li> <li>12. Haibat</li> <li>13. Jamal</li> <li>14. K.S. Ali Bilawal Khan Domki</li> <li>15. Kajili</li> <li>16. Karampur</li> <li>17. Kashmore Colony-I</li> <li>18. Kashmore-li</li> <li>19. Kumb</li> <li>20. Lalao</li> <li>21. Lashari</li> <li>22. Maleer</li> <li>23. Nil</li> <li>24. Pir Bux Shujrah</li> <li>25. Rasool Bux Khan Chachar</li> <li>26. Risaldar</li> <li>27. Saifal</li> <li>28. Sodhi</li> <li>29. Suhliani</li> <li>30. Tangwani</li> <li>31. Zorgar</li> </ol>



# KASHMORE DISTRICT MULTI-HAZARD RISK PROFILES





AKHERO			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	42.828 sq km
		Forest Area	0.007 sq km
		Kachcha Area	1.211 sq km
		Natural Vegetation in Wet Areas	0.019 sq km
		Pakka Planned Area	2.361 sq km
		Pakka Unplanned Area	0.831 sq km
		Range Land	0.097 sq km
		Education Facilities	74
		Grain Mandi	1
		Grid Stations	1
		Health Facilities	8
		Industries	13
		Mobile Towers	13
		Petrol Pumps	8
		Police Stations	4
		Post Offices	3
		Settlements	67
		Irrigation and Drainage Network	19.494 km
		Railway Line	15.054 km
		Road Network	110.733 km
		Population	95100
		Household	16992
Meteorological Drought	Medium - Extreme	Settlements	66
		Agriculture Area	43.013 sq km
		Forest Area	0.427 sq km
		Natural Vegetation in Wet Areas	0.112 sq km
		Range Land	1.648 sq km
		Water Body	4.164 sq km
		Wet Area	14.91 sq km
		Population	73744
		Household	13174
Agricultural Drought	Low	Agriculture Area	4.386 sq km
		Forest Area	0.017 sq km
		Range Land	1.198 sq km
		Water Body	0.038 sq km
		Wet Area	6.001 sq km
		Population	949

		Household	167
<b>Heatwave</b>	<b>Low - Medium</b>	Settlements	55
		Population	73505
		Household	13133
		Agriculture Area	0.357 sq km
		Kachcha Area	1.2 sq km
		Pakka Planned Area	2.355 sq km
		Pakka Unplanned Area	0.827 sq km
<b>Riverine Flood</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>BADANI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	34.108 sq km
		Forest Area	0.001 sq km
		Kachcha Area	0.718 sq km
		Natural Vegetation in Wet Areas	0.179 sq km
		Pakka Planned Area	0.49 sq km
		Range Land	0.01 sq km
		Education Facilities	23
		Settlements	23
		Irrigation and Drainage Network	9.546 km
		Road Network	28.208 km
		Population	33370
		Household	5325
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	23
		Agriculture Area	34.306 sq km
		Forest Area	0.048 sq km
		Natural Vegetation in Wet Areas	43.198 sq km
		Range Land	0.331 sq km
		Water Body	0.304 sq km
		Wet Area	3.918 sq km
		Population	26023
		Household	4151
<b>Agricultural Drought</b>	<b>Low</b>	Agriculture Area	11.737 sq km

		Forest Area	0.024 sq km
		Natural Vegetation in Wet Areas	4.361 sq km
		Range Land	0.125 sq km
		Water Body	0.089 sq km
		Wet Area	0.01 sq km
		Population	498
		Household	82
Heatwave	Low - Medium	Settlements	21
		Population	25765
		Household	4111
		Agriculture Area	1.96 sq km
		Kachcha Area	0.713 sq km
		Pakka Planned Area	0.489 sq km
Riverine Flood	Low - Extreme	Agriculture Area	17.803 sq km
		Natural Vegetation in Wet Areas	2.64 sq km
		Road Network	0.02 km
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>BUXAPUR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	42.855 sq km
		Forest Area	0.009 sq km
		Kachcha Area	0.228 sq km
		Natural Vegetation in Wet Areas	0.021 sq km
		Pakka Planned Area	0.63 sq km
		Pakka Unplanned Area	0.207 sq km
		Range Land	0.046 sq km
		Bridges	1
		Education Facilities	41
		Health Facilities	3
		Petrol Pumps	1
		Police Stations	2
		Settlements	29
		Irrigation and Drainage Network	14.762 km
		Railway Line	6.423 km
		Road Network	112.655 km
		Population	22450

		Household	3933
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	29
		Agriculture Area	42.966 sq km
		Forest Area	0.103 sq km
		Natural Vegetation in Wet Areas	0.943 sq km
		Range Land	1.202 sq km
		Water Body	1.481 sq km
		Wet Area	2.587 sq km
		Population	17562
		Household	3076
<b>Agricultural Drought</b>	<b>Low</b>	Agriculture Area	3.914 sq km
		Forest Area	0.13 sq km
		Natural Vegetation in Wet Areas	0.313 sq km
		Range Land	0.815 sq km
		Water Body	1.543 sq km
		Wet Area	0.017 sq km
		Population	522
		Household	87
<b>Heatwave</b>	<b>Low - Medium</b>	Settlements	12
		Population	17185
		Household	3012
		Agriculture Area	0.072 sq km
		Kachcha Area	0.224 sq km
		Pakka Planned Area	0.625 sq km
		Pakka Unplanned Area	0.204 sq km
<b>Riverine Flood</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>CHEEL</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	95.257 sq km
		Kachcha Area	0.575 sq km
		Education Facilities	27
		Settlements	34
		Irrigation and Drainage Network	44.256 km

		Road Network	197.898 km
		Population	9764
		Household	1649
Meteorological Drought	Medium - Extreme	Settlements	34
		Agriculture Area	95.372 sq km
		Range Land	0.033 sq km
		Water Body	2.895 sq km
		Wet Area	1.779 sq km
		Population	7675
		Household	1296
Agricultural Drought	Low	Settlements	6
		Agriculture Area	30.413 sq km
		Range Land	0.041 sq km
		Water Body	3.699 sq km
		Wet Area	0.023 sq km
		Population	1981
		Household	336
Heatwave	Medium	Settlements	19
		Population	7474
		Household	1263
		Agriculture Area	0.08 sq km
		Kachcha Area	0.568 sq km
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River; however, it can be affected by rainwater drainage channels that are flowing from Balochistan province during monsoon / heavy rains.	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>DARI (GHOUSPUR)</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	81.677 sq km
		Forest Area	0.034 sq km
		Kachcha Area	2.19 sq km
		Natural Vegetation in Wet Areas	0.406 sq km
		Pakka Unplanned Area	1.684 sq km



		Range Land	0.19 sq km
		Bridges	2
		Education Facilities	22
		Health Facilities	3
		Mobile Towers	6
		Petrol Pumps	1
		Police Stations	1
		Settlements	36
		Irrigation and Drainage Network	26.541 km
		Road Network	74.599 km
		Population	87698
		Household	15701
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	36
		Agriculture Area	82.311 sq km
		Forest Area	1.76 sq km
		Natural Vegetation in Wet Areas	49.099 sq km
		Range Land	7.487 sq km
		Water Body	23.941 sq km
		Wet Area	3.547 sq km
		Population	68793
		Household	12312
<b>Agricultural Drought</b>	<b>Low</b>	Agriculture Area	29.071 sq km
		Natural Vegetation in Wet Areas	18.799 sq km
		Population	51
		Household	9
<b>Heatwave</b>	<b>Medium</b>	Settlements	28
		Population	67953
		Household	12164
		Agriculture Area	0.204 sq km
		Kachcha Area	2.176 sq km
		Pakka Unplanned Area	1.679 sq km
<b>Riverine Flood</b>	<b>Low - Extreme</b>	Agriculture Area	62.224 sq km
		Kachcha Area	0.79 sq km
		Natural Vegetation in Wet Areas	4.257 sq km
		Range Lands	0.007 sq km
		Settlements	15
		Irrigation and Drainage Network	0.009 km
		Road Network	0.027 km
		Population	20763
		Household	3772

<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami

<b>DOULATPUR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	59.986 sq km
		Forest Area	0.019 sq km
		Kachcha Area	0.678 sq km
		Pakka Planned Area	0.006 sq km
		Range Land	0.106 sq km
		Education Facilities	39
		Health Facilities	1
		Settlements	32
		Irrigation and Drainage Network	21.916 km
		Road Network	130.808 km
		Population	18140
		Household	3298
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	32
		Agriculture Area	60.115 sq km
		Forest Area	0.532 sq km
		Range Land	2.836 sq km
		Water Body	1.803 sq km
		Wet Area	5.319 sq km
		Population	14191
		Household	2579
<b>Agricultural Drought</b>	<b>Low - Medium</b>	Settlements	4
		Agriculture Area	8.263 sq km
		Forest Area	0.157 sq km
		Range Land	1.793 sq km
		Water Body	2.288 sq km
		Wet Area	0.905 sq km
		Population	3778
		Household	686
<b>Heatwave</b>	<b>Low - Medium</b>	Settlements	19
		Population	13893
		Household	2526
		Agriculture Area	0.171 sq km
		Kachcha Area	0.67 sq km

		Pakka Planned Area	0.006 sq km
<b>Riverine Flood</b>	<b>Nil</b>	The UC is not prone to flood hazard due to Indus River; however, it can be affected by rainwater drainage channels that are flowing from Balochistan province during monsoon / heavy rains.	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>DUNIAPUR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	34.363 sq km
		Forest Area	0.002 sq km
		Kachcha Area	1.314 sq km
		Pakka Planned Area	0.013 sq km
		Pakka Unplanned Area	0.173 sq km
		Range Land	0.054 sq km
		Bridges	3
		Education Facilities	43
		Health Facilities	2
		Mobile Towers	1
		Petrol Pumps	4
		Police Stations	1
		Settlements	52
		Irrigation and Drainage Network	43.205 km
		Road Network	97.473 km
		Population	25961
		Household	4407
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	
		Agriculture Area	34.493 sq km
		Forest Area	0.055 sq km
		Range Land	1.984 sq km
		Water Body	1.868 sq km
		Wet Area	1.384 sq km
		Population	20479
		Household	3474
<b>Agricultural Drought</b>	<b>Low</b>	Agriculture Area	0.592 sq km
		Water Body	0.085 sq km

		Population	737
		Household	122
<b>Heatwave</b>	<b>Low - Medium</b>	Settlements	48
		Population	19983
		Household	3392
		Agriculture Area	0.206 sq km
		Kachcha Area	1.299 sq km
		Pakka Planned Area	0.013 sq km
		Pakka Unplanned Area	0.173 sq km
<b>Riverine Flood</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>GIHALPUR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	102.077 sq km
		Forest Area	0.011 sq km
		Kachcha Area	0.424 sq km
		Natural Vegetation in Wet Areas	0.098 sq km
		Pakka Planned Area	0.248 sq km
		Pakka Unplanned Area	0.02 sq km
		Range Land	0.27 sq km
		Education Facilities	25
		Health Facilities	1
		Mobile Towers	2
		Settlements	22
		Irrigation and Drainage Network	35.964 km
		Road Network	153.587 km
		Population	19103
		Household	3046
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Agriculture Area	102.321 sq km
		Forest Area	0.28 sq km
		Natural Vegetation in Wet Areas	7.768 sq km
		Range Land	9.009 sq km
		Water Body	0.835 sq km
		Wet Area	2.88 sq km
		Population	14989

		Household	2390
<b>Agricultural Drought</b>	<b>Low</b>	Agriculture Area	16.809 sq km
		Forest Area	0.016 sq km
		Natural Vegetation in Wet Areas	1.567 sq km
		Range Land	1.215 sq km
		Wet Area	0.002 sq km
		Population	346
		Household	54
<b>Heatwave</b>	<b>Low - Medium</b>	Settlements	17
		Population	14686
		Household	2341
		Agriculture Area	0.55 sq km
		Kachcha Area	0.418 sq km
		Pakka Planned Area	0.247 sq km
		Pakka Unplanned Area	0.02 sq km
<b>Riverine Flood</b>	<b>Low - High</b>	Agriculture Area	21.015 sq km
		Kachcha Area	0.094 sq km
		Natural Vegetation in Wet Areas	0.184 sq km
		Range Lands	0.001 sq km
		Settlements	2
		Road Network	0.909 km
		Population	2593
		Household	414
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>GUBLO</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	85.148 sq km
		Forest Area	0.042 sq km
		Kachcha Area	2.455 sq km
		Natural Vegetation in Wet Areas	0.642 sq km
		Range Land	0.132 sq km
		Education Facilities	17
		Settlements	43
		Irrigation and Drainage Network	22.5 km
		Road Network	43.362 km

		Population	66841
		Household	11164
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	43
		Agriculture Area	86.034 sq km
		Forest Area	0.924 sq km
		Natural Vegetation in Wet Areas	57.09 sq km
		Range Land	5.495 sq km
		Water Body	0.81 sq km
		Wet Area	9.435 sq km
		Population	52419
		Household	8757
<b>Agricultural Drought</b>	<b>Low - Medium</b>	Settlements	1
		Agriculture Area	6.862 sq km
		Forest Area	0.53 sq km
		Natural Vegetation in Wet Areas	5.021 sq km
		Range Land	1.968 sq km
		Wet Area	0.047 sq km
		Population	1168
		Household	186
<b>Heatwave</b>	<b>Medium</b>	Settlements	38
		Population	51642
		Household	8626
		Agriculture Area	0.691 sq km
		Kachcha Area	2.44 sq km
<b>Riverine Flood</b>	<b>Low - Extreme</b>	Agriculture Area	59.926 sq km
		Forest Area	0.004 sq km
		Kachcha Area	1.581 sq km
		Natural Vegetation in Wet Areas	5.403 sq km
		Range Lands	0.002 sq km
		Education Facilities	4
		Settlements	27
		Road Network	0.106 km
		Population	42843
		Household	7272
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

GULANPUR			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	85.176 sq km
		Forest Area	0.006 sq km
		Kachcha Area	0.726 sq km
		Natural Vegetation in Wet Areas	0.209 sq km
		Pakka Unplanned Area	0.178 sq km
		Education Facilities	42
		Health Facilities	1
		Mobile Towers	3
		Petrol Pumps	3
		Settlements	30
		Irrigation and Drainage Network	69.906 km
		Railway Line	6.501 km
		Road Network	194.963 km
		Population	24149
		Household	3860
Meteorological Drought	Medium - Extreme	Settlements	29
		Agriculture Area	85.445 sq km
		Forest Area	0.024 sq km
		Natural Vegetation in Wet Areas	2.091 sq km
		Water Body	6.37 sq km
		Population	18869
		Household	3014
Agricultural Drought	Low - Medium	Settlements	16
		Agriculture Area	57.672 sq km
		Natural Vegetation in Wet Areas	0.15 sq km
		Water Body	4.649 sq km
		Population	10669
		Household	1705
Heatwave	Medium	Settlements	23
		Population	18380
		Household	2937
		Agriculture Area	0.175 sq km
		Kachcha Area	0.714 sq km
		Pakka Unplanned Area	0.176 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	



<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami

<b>GULWALI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	44.604 sq km
		Forest Area	0.011 sq km
		Kachcha Area	1.248 sq km
		Pakka Unplanned Area	0.588 sq km
		Range Land	0.046 sq km
		Bridges	1
		Education Facilities	44
		Health Facilities	3
		Petrol Pumps	2
		Settlements	68
		Irrigation and Drainage Network	18.894 km
		Road Network	115.171 km
		Population	30353
		Household	5127
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	67
		Agriculture Area	44.868 sq km
		Forest Area	0.235 sq km
		Range Land	1.134 sq km
		Water Body	5.158 sq km
		Wet Area	7.944 sq km
		Population	23785
		Household	4018
<b>Agricultural Drought</b>	<b>Low - Medium</b>	Settlements	22
		Agriculture Area	17.075 sq km
		Forest Area	0.294 sq km
		Range Land	0.948 sq km
		Water Body	5.226 sq km
		Wet Area	2.74 sq km
		Population	5076
		Household	856
<b>Heatwave</b>	<b>Medium</b>	Settlements	58
		Population	23371

		Household	3944
		Agriculture Area	0.241 sq km
		Kachcha Area	1.238 sq km
		Pakka Unplanned Area	0.582 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

HAIBAT			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	56.38 sq km
		Forest Area	0.006 sq km
		Kachcha Area	1.484 sq km
		Natural Vegetation in Wet Areas	0.326 sq km
		Pakka Planned Area	0.14 sq km
		Pakka Unplanned Area	0.044 sq km
		Range Land	0.075 sq km
		Education Facilities	24
		Settlements	44
		Irrigation and Drainage Network	12.837 km
		Road Network	38.873 km
		Population	41499
		Household	7479
Meteorological Drought	Medium - Extreme	Settlements	44
		Agriculture Area	56.867 sq km
		Forest Area	0.231 sq km
		Natural Vegetation in Wet Areas	52.632 sq km
		Range Land	4.287 sq km
		Water Body	5.023 sq km
		Wet Area	11.595 sq km
		Population	32758
		Household	5900
Agricultural Drought	Low	Agriculture Area	2.661 sq km
		Forest Area	0.174 sq km
		Natural Vegetation in Wet Areas	4.272 sq km
		Water Body	0.008 sq km
		Population	12

		Household	2
Heatwave	Low - Medium	Settlements	39
		Population	32127
		Household	5788
		Agriculture Area	0.138 sq km
		Kachcha Area	1.477 sq km
		Pakka Planned Area	0.141 sq km
		Pakka Unplanned Area	0.044 sq km
Riverine Flood	Low - Extreme	Agriculture Area	40.867 sq km
		Forest Area	0.006 sq km
		Kachcha Area	0.722 sq km
		Natural Vegetation in Wet Areas	4.152 sq km
		Education Facilities	8
		Settlements	14
		Road Network	1.571 km
		Population	19120
		Household	3475
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

JAMAL			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	51.528 sq km
		Forest Area	0.001 sq km
		Kachcha Area	0.778 sq km
		Pakka Unplanned Area	0.374 sq km
		Range Land	0.085 sq km
		Bridges	1
		Education Facilities	40
		Mobile Towers	2
		Police Stations	1
		Settlements	37
		Irrigation and Drainage Network	26.826 km
		Road Network	87.137 km
		Population	19558
		Household	3302
	Medium - Extreme	Settlements	37

Meteorological Drought		Agriculture Area	51.758 sq km
		Forest Area	0.022 sq km
		Natural Vegetation in Wet Areas	0.121 sq km
		Range Land	3.86 sq km
		Water Body	2.604 sq km
		Wet Area	7.716 sq km
		Population	15420
		Household	2604
Agricultural Drought	Low - Medium	Settlements	4
		Agriculture Area	9.762 sq km
		Range Land	0.992 sq km
		Water Body	0.381 sq km
		Wet Area	4.761 sq km
		Population	1278
		Household	216
Heatwave	Medium	Settlements	31
		Population	15104
		Household	2550
		Agriculture Area	0.18 sq km
		Kachcha Area	0.77 sq km
		Pakka Unplanned Area	0.373 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

K.S.ALI BILAWAL KHAN DOMKI			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	90.892 sq km
		Kachcha Area	0.266 sq km
		Range Land	0.008 sq km
		Education Facilities	37
		Settlements	30
		Irrigation and Drainage Network	53.049 km
		Road Network	148.326 km
		Population	7101
		Household	1138

Meteorological Drought	Medium - Extreme	Settlements	30
		Agriculture Area	90.879 sq km
		Bare Area with sparse Natural Vegetation	6.098 sq km
		Range Land	0.059 sq km
		Wet Area	1.216 sq km
		Population	5574
		Household	891
Agricultural Drought	Low - High	Settlements	6
		Agriculture Area	36.546 sq km
		Bare Area with sparse Natural Vegetation	7.891 sq km
		Range Land	0.074 sq km
		Wet Area	1.631 sq km
		Population	1890
		Household	303
Heatwave	Medium	Settlements	11
		Population	5426
		Household	868
		Agriculture Area	0.049 sq km
		Kachcha Area	0.262 sq km
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River; however, it can be affected by rainwater drainage channels that are flowing from Balochistan province during monsoon / heavy rains.	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>KAJILI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	60.555 sq km
		Forest Area	0.002 sq km
		Kachcha Area	0.717 sq km
		Range Land	0.001 sq km
		Bridges	1
		Education Facilities	30
		Petrol Pumps	2
		Settlements	33

		Irrigation and Drainage Network	7.204 km
		Railway Line	2.888 km
		Road Network	101.213 km
		Population	18268
		Household	3307
Meteorological Drought	Medium - Extreme	Settlements	32
		Agriculture Area	60.673 sq km
		Forest Area	0.062 sq km
		Natural Vegetation in Wet Areas	0.07 sq km
		Range Land	0.02 sq km
		Water Body	5.964 sq km
		Wet Area	3.607 sq km
		Population	14340
		Household	2595
Agricultural Drought	Low - Medium	Settlements	1
		Agriculture Area	19.524 sq km
		Forest Area	0.08 sq km
		Natural Vegetation in Wet Areas	0.09 sq km
		Range Land	0.026 sq km
		Water Body	7.647 sq km
		Wet Area	0.726 sq km
		Population	3167
		Household	574
Heatwave	Medium	Settlements	21
		Population	13971
		Household	2530
		Agriculture Area	0.187 sq km
		Kachcha Area	0.706 sq km
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River; however, it can be affected by rainwater drainage channels that are flowing from Balochistan province during monsoon / heavy rains.	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

#### KARAMPUR

Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	32.212 sq km
		Kachcha Area	0.476 sq km
		Natural Vegetation in Wet Areas	0.025 sq km
		Pakka Unplanned Area	1.26 sq km
		Range Land	0.226 sq km
		Bridges	2
		Education Facilities	26
		Industries	1
		Mobile Towers	5
		Settlements	19
		Irrigation and Drainage Network	23.714 km
		Road Network	72.186 km
		Population	35967
		Household	6212
Meteorological Drought	Medium - Extreme	Settlements	19
		Agriculture Area	32.369 sq km
		Forest Area	0.014 sq km
		Natural Vegetation in Wet Areas	0.866 sq km
		Range Land	7.553 sq km
		Water Body	1.767 sq km
		Wet Area	6.407 sq km
		Population	28232
		Household	4877
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	0.7 sq km
		Forest Area	0.017 sq km
		Natural Vegetation in Wet Areas	1.065 sq km
		Range Land	3.768 sq km
		Water Body	0.818 sq km
		Wet Area	0.736 sq km
		Population	433
		Household	72
Heatwave	Medium	Settlements	14
		Population	27893
		Household	4817
		Agriculture Area	0.317 sq km
		Kachcha Area	0.473 sq km
		Pakka Unplanned Area	1.254 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	



<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami

<b>KASHMORE COLONY -1</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	69.256 sq km
		Kachcha Area	0.834 sq km
		Natural Vegetation in Wet Areas	0.135 sq km
		Pakka Planned Area	6.913 sq km
		Pakka Unplanned Area	3.597 sq km
		Range Land	0.006 sq km
		Bridges	9
		Education Facilities	64
		Grid Stations	2
		Health Facilities	11
		Industries	8
		Mobile Towers	10
		Petrol Pumps	4
		Police Stations	3
		Post Offices	4
		Settlements	39
		Tourist Places	1
		Irrigation and Drainage Network	45.904 km
		Railway Line	3.4 km
		Road Network	119.056 km
		Population	169804
		Household	27336
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	36
		Agriculture Area	69.496 sq km
		Natural Vegetation in Wet Areas	8.183 sq km
		Range Land	0.246 sq km
		Water Body	0.225 sq km
		Wet Area	0.022 sq km
		Population	131096
		Household	21106
<b>Agricultural Drought</b>	<b>Low - Medium</b>	Settlements	7
		Agriculture Area	43.43 sq km
		Natural Vegetation in Wet Areas	5.532 sq km
		Range Land	0.335 sq km

		Population	55648
		Household	8881
Heatwave	Low - Medium	Settlements	33
		Population	130641
		Household	21034
		Agriculture Area	3.632 sq km
		Kachcha Area	0.819 sq km
		Pakka Planned Area	6.9 sq km
		Pakka Unplanned Area	3.576 sq km
Riverine Flood	Low - Extreme	Agriculture Area	35.241 sq km
		Kachcha Area	0.389 sq km
		Natural Vegetation in Wet Areas	1.716 sq km
		Pakka Planned Area	0.01 sq km
		Pakka Unplanned Area	0.096 sq km
		Bridges	1
		Education Facilities	14
		Settlements	14
		Irrigation and Drainage Network	2.963 km
		Road Network	10.43 km
		Population	12187
		Household	1942
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>KASHMORE -II</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	42.578 sq km
		Kachcha Area	0.329 sq km
		Natural Vegetation in Wet Areas	0.022 sq km
		Pakka Planned Area	0.698 sq km
		Pakka Unplanned Area	0.829 sq km
		Bridges	2
		Education Facilities	23
		Industries	4
		Mobile Towers	1
		Petrol Pumps	6
		Settlements	27
		Irrigation and Drainage Network	21.688 km

		Railway Line	5.562 km
		Road Network	78.407 km
		Population	24336
		Household	3945
Meteorological Drought	Medium - Extreme	Settlements	27
		Agriculture Area	42.47 sq km
		Natural Vegetation in Wet Areas	0.343 sq km
		Water Body	0.038 sq km
		Population	18933
		Household	3069
Agricultural Drought	Low	Settlements	3
		Agriculture Area	13.996 sq km
		Natural Vegetation in Wet Areas	0.214 sq km
		Population	2753
		Household	445
Heatwave	Low - High	Settlements	27
		Population	18593
		Household	3011
		Agriculture Area	0.552 sq km
		Kachcha Area	0.322 sq km
		Pakka Planned Area	0.693 sq km
		Pakka Unplanned Area	0.824 sq km
Riverine Flood	Low - High	Agriculture Area	22.741 sq km
		Kachcha Area	0.185 sq km
		Natural Vegetation in Wet Areas	0.007 sq km
		Pakka Unplanned Area	0.033 sq km
		Education Facilities	1
		Settlements	15
		Road Network	16.59 km
		Population	5600
		Household	896
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>KUMB</b>		
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>

<b>Earthquake</b>	<b>Low</b>	Agriculture Area	73.175 sq km
		Forest Area	0.006 sq km
		Kachcha Area	0.512 sq km
		Pakka Unplanned Area	0.077 sq km
		Range Land	0.091 sq km
		Education Facilities	35
		Health Facilities	1
		Settlements	31
		Irrigation and Drainage Network	23.61 km
		Road Network	141.571 km
		Population	16155
		Household	2640
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	31
		Agriculture Area	73.386 sq km
		Forest Area	0.24 sq km
		Range Land	2.653 sq km
		Water Body	5.575 sq km
		Wet Area	4.768 sq km
		Population	12628
		Household	2064
<b>Agricultural Drought</b>	<b>Low</b>	Settlements	2
		Agriculture Area	4.432 sq km
		Forest Area	0.101 sq km
		Range Land	1.82 sq km
		Water Body	2.03 sq km
		Wet Area	0.027 sq km
		Population	2522
		Household	404
<b>Heatwave</b>	<b>Medium</b>	Settlements	19
		Population	12343
		Household	2018
		Agriculture Area	0.194 sq km
		Kachcha Area	0.505 sq km
		Pakka Unplanned Area	0.077 sq km
<b>Riverine Flood</b>	<b>Nil</b>	The UC is not prone to flood hazard due to Indus River; however, it can be affected by rainwater drainage channels that are flowing from Balochistan province during monsoon / heavy rains.	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	

<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami

<b>LALAO</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	41.45 sq km
		Forest Area	0.012 sq km
		Kachcha Area	1.372 sq km
		Natural Vegetation in Wet Areas	0.002 sq km
		Pakka Unplanned Area	0.228 sq km
		Range Land	0.101 sq km
		Bridges	3
		Bus Stops	1
		Education Facilities	56
		Health Facilities	2
		Mobile Towers	1
		Petrol Pumps	2
		Settlements	77
		Irrigation and Drainage Network	20.416 km
		Railway Line	1.023 km
		Road Network	100.946 km
		Population	27164
		Household	4590
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	77
		Agriculture Area	41.659 sq km
		Forest Area	0.365 sq km
		Natural Vegetation in Wet Areas	0.048 sq km
		Range Land	1.303 sq km
		Water Body	3.953 sq km
		Wet Area	3.095 sq km
		Population	21374
		Household	3612
<b>Agricultural Drought</b>	<b>Low - Medium</b>	Settlements	5
		Agriculture Area	3.891 sq km
		Natural Vegetation in Wet Areas	0.059 sq km
		Range Land	0.016 sq km
		Water Body	0.711 sq km
		Wet Area	0.104 sq km
		Population	668
		Household	114

Heatwave	Medium	Settlements	68
		Population	20797
		Household	3512
		Agriculture Area	0.267 sq km
		Kachcha Area	1.352 sq km
		Pakka Unplanned Area	0.224 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

LASHARI			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	99.351 sq km
		Kachcha Area	0.288 sq km
		Natural Vegetation in Wet Areas	0.015 sq km
		Pakka Unplanned Area	0.063 sq km
		Range Land	0.014 sq km
		Education Facilities	17
		Settlements	30
		Irrigation and Drainage Network	63.815 km
		Road Network	254.991 km
		Population	5976
		Household	1042
Meteorological Drought	Medium - Extreme	Settlements	30
		Agriculture Area	99.485 sq km
		Natural Vegetation in Wet Areas	0.438 sq km
		Range Land	0.203 sq km
		Water Body	18.951 sq km
		Population	4656
		Household	812
Agricultural Drought	Low - Extreme	Settlements	9
		Agriculture Area	32.335 sq km
		Natural Vegetation in Wet Areas	0.563 sq km
		Range Land	0.256 sq km
		Water Body	24.434 sq km
		Population	342
		Household	56

Heatwave	Medium	Settlements	15
		Population	4585
		Household	799
		Agriculture Area	0.046 sq km
		Kachcha Area	0.285 sq km
		Pakka Unplanned Area	0.062 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

MALEER			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	40.751 sq km
		Forest Area	0.086 sq km
		Kachcha Area	1.695 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Planned Area	1.347 sq km
		Pakka Unplanned Area	0.897 sq km
		Range Land	0.126 sq km
		Education Facilities	60
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	9
		Police Stations	1
		Settlements	73
		Irrigation and Drainage Network	35.502 km
		Road Network	125.688 km
		Population	93601
		Household	16745
Meteorological Drought	Medium - Extreme	Settlements	73
		Agriculture Area	40.987 sq km
		Forest Area	2.556 sq km
		Natural Vegetation in Wet Areas	0.479 sq km
		Range Land	5.604 sq km
		Water Body	13.869 sq km
		Wet Area	6.323 sq km
		Population	73002

		Household	13062
<b>Heatwave</b>	<b>Low - Medium</b>	Settlements	62
		Population	72320
		Household	12935
		Agriculture Area	0.836 sq km
		Kachcha Area	1.681 sq km
		Pakka Planned Area	1.342 sq km
		Pakka Unplanned Area	0.894 sq km
<b>Riverine Flood</b>	<b>Low - High</b>	Agriculture Area	2.238 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Range Lands	0.001 sq km
<b>Agricultural Drought</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Agricultural Drought	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>NILL</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	4.83 sq km
		Forest Area	0.009 sq km
		Kachcha Area	0.219 sq km
		Range Land	0.009 sq km
		Education Facilities	4
		Settlements	6
		Road Network	5.712 km
		Population	3711
		Household	626
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	6
		Agriculture Area	4.853 sq km
		Forest Area	0.096 sq km
		Range Land	0.191 sq km
		Water Body	0.208 sq km
		Wet Area	0.65 sq km
		Population	2940
		Household	496



Heatwave	Medium	Settlements	5
		Population	2869
		Household	485
		Agriculture Area	0.03 sq km
		Kachcha Area	0.217 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

PIR BUX SHURJAH			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	7.981 sq km
		Kachcha Area	0.08 sq km
		Natural Vegetation in Wet Areas	0.027 sq km
		Pakka Unplanned Area	0.211 sq km
		Range Land	0.117 sq km
		Education Facilities	3
		Police Stations	1
		Settlements	3
		Irrigation and Drainage Network	14.106 km
		Road Network	24.401 km
		Population	4949
		Household	835
Meteorological Drought	Medium - Extreme	Settlements	3
		Agriculture Area	8.007 sq km
		Natural Vegetation in Wet Areas	1.298 sq km
		Range Land	3.028 sq km
		Water Body	0.277 sq km
		Wet Area	0.706 sq km
		Population	3882
		Household	655
Agricultural Drought	Low	Agriculture Area	0.001 sq km
		Range Land	0.078 sq km
		Water Body	0.066 sq km

<b>Heatwave</b>	<b>Medium</b>	Settlements	3
		Population	3846
		Household	649
		Agriculture Area	0.021 sq km
		Kachcha Area	0.08 sq km
		Pakka Unplanned Area	0.211 sq km
<b>Riverine Flood</b>	<b>Low - High</b>	Agriculture Area	2.174 sq km
		Kachcha Area	0.006 sq km
		Natural Vegetation in Wet Areas	0.236 sq km
		Road Network	0.5 km
		Population	110
		Household	19
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami	

<b>RASOOL BUX KHAN CHACHAR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	48.487 sq km
		Forest Area	0.04 sq km
		Kachcha Area	0.872 sq km
		Natural Vegetation in Wet Areas	0.114 sq km
		Pakka Planned Area	0.228 sq km
		Pakka Unplanned Area	0.124 sq km
		Range Land	0.044 sq km
		Education Facilities	52
		Petrol Pumps	1
		Settlements	43
		Irrigation and Drainage Network	39.851 km
		Road Network	85.416 km
		Population	27500
		Household	4386
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	43
		Agriculture Area	48.748 sq km
		Forest Area	0.603 sq km
		Natural Vegetation in Wet Areas	2.778 sq km
		Range Land	1.39 sq km
		Water Body	5.399 sq km

		Wet Area	12.602 sq km
		Population	21289
		Household	3398
Agricultural Drought	Low	Agriculture Area	1.55 sq km
		Natural Vegetation in Wet Areas	0.146 sq km
		Range Land	0.456 sq km
		Water Body	0.325 sq km
		Wet Area	0.007 sq km
		Population	376
		Household	61
Heatwave	Low - Medium	Settlements	25
		Population	21147
		Household	3374
		Agriculture Area	0.166 sq km
		Kachcha Area	0.864 sq km
		Pakka Planned Area	0.226 sq km
		Pakka Unplanned Area	0.123 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

RISALDAR			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	58.319 sq km
		Kachcha Area	0.14 sq km
		Pakka Unplanned Area	0.169 sq km
		Bridges	1
		Education Facilities	25
		Settlements	17
		Irrigation and Drainage Network	38.47 km
		Road Network	114.928 km
		Population	6863
		Household	1218
Meteorological Drought	Medium - Extreme	Settlements	16
		Agriculture Area	58.342 sq km
		Water Body	38.871 sq km

		Wet Area	0.029 sq km
		Population	4304
		Household	757
Agricultural Drought	Low - Extreme	Settlements	11
		Agriculture Area	24.05 sq km
		Water Body	50.26 sq km
		Wet Area	0.036 sq km
		Population	1515
		Household	255
Heatwave	Medium	Settlements	11
		Population	5276
		Household	938
		Agriculture Area	0.026 sq km
		Kachcha Area	0.138 sq km
		Pakka Unplanned Area	0.169 sq km
Riverine Flood	Nil	The UC is not prone to flood hazard due to Indus River; however, it can be affected by rainwater drainage channels that are flowing from Balochistan province during monsoon / heavy rains.	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>SAIFAL</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	56.343 sq km
		Forest Area	0.009 sq km
		Kachcha Area	1.018 sq km
		Natural Vegetation in Wet Areas	0.015 sq km
		Pakka Planned Area	0.028 sq km
		Pakka Unplanned Area	0.34 sq km
		Range Land	0.005 sq km
		Bridges	1
		Education Facilities	44
		Petrol Pumps	1
		Settlements	52
		Irrigation and Drainage Network	37.86 km
		Railway Line	0.187 km

		Road Network	114.992 km
		Population	23773
		Household	4019
Meteorological Drought	Medium - Extreme	Settlements	52
		Agriculture Area	56.551 sq km
		Forest Area	0.216 sq km
		Natural Vegetation in Wet Areas	1.578 sq km
		Range Land	0.349 sq km
		Water Body	4.694 sq km
		Wet Area	10.057 sq km
		Population	18591
		Household	3147
Agricultural Drought	Low - Medium	Settlements	13
		Agriculture Area	28.133 sq km
		Forest Area	0.276 sq km
		Natural Vegetation in Wet Areas	2.004 sq km
		Range Land	0.442 sq km
		Water Body	5.984 sq km
		Wet Area	10.122 sq km
		Population	8746
		Household	1481
Heatwave	Low - Medium	Settlements	40
		Population	18220
		Household	3078
		Agriculture Area	0.56 sq km
		Kachcha Area	1.004 sq km
		Pakka Planned Area	0.027 sq km
		Pakka Unplanned Area	0.335 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>SODHI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	76.223 sq km
		Forest Area	0.015 sq km

		Kachcha Area	0.902 sq km
		Natural Vegetation in Wet Areas	0.042 sq km
		Range Land	0.003 sq km
		Education Facilities	61
		Mobile Towers	2
		Settlements	51
		Irrigation and Drainage Network	65.484 km
		Railway Line	5.739 km
		Road Network	206.446 km
		Population	24916
		Household	3979
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	51
		Agriculture Area	76.334 sq km
		Forest Area	0.09 sq km
		Natural Vegetation in Wet Areas	1.301 sq km
		Range Land	0.032 sq km
		Water Body	0.499 sq km
		Wet Area	3.145 sq km
		Population	19550
		Household	3118
<b>Agricultural Drought</b>	<b>Low</b>	Settlements	15
		Agriculture Area	13.989 sq km
		Forest Area	0.11 sq km
		Natural Vegetation in Wet Areas	1.649 sq km
		Range Land	0.038 sq km
		Water Body	0.636 sq km
		Wet Area	0.009 sq km
		Population	7207
		Household	1149
<b>Heatwave</b>	<b>Medium</b>	Settlements	38
		Population	18950
		Household	3025
		Agriculture Area	0.198 sq km
		Kachcha Area	0.886 sq km
<b>Riverine Flood</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone	

<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami
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<b>SUHLIANI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	54.198 sq km
		Forest Area	0.001 sq km
		Kachcha Area	1.214 sq km
		Natural Vegetation in Wet Areas	0.05 sq km
		Pakka Unplanned Area	0.196 sq km
		Range Land	0.008 sq km
		Bridges	1
		Education Facilities	81
		Health Facilities	2
		Police Stations	1
		Settlements	52
		Irrigation and Drainage Network	24.256 km
		Railway Line	7.323 km
		Road Network	117.298 km
		Population	24373
		Household	4159
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	52
		Agriculture Area	54.314 sq km
		Forest Area	0.037 sq km
		Natural Vegetation in Wet Areas	1.912 sq km
		Range Land	0.098 sq km
		Water Body	2.246 sq km
		Population	18997
		Household	3241
<b>Agricultural Drought</b>	<b>Low</b>	Agriculture Area	2.285 sq km
		Forest Area	0.048 sq km
		Natural Vegetation in Wet Areas	2.449 sq km
		Range Land	0.125 sq km
		Water Body	2.863 sq km
		Population	2854
		Household	479
<b>Heatwave</b>	<b>Medium</b>	Settlements	42
		Population	18674
		Household	3186
		Agriculture Area	0.319 sq km
		Kachcha Area	1.199 sq km
		Pakka Unplanned Area	0.192 sq km

<b>Riverine Flood</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Riverine Flood
<b>Storm Surge</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Storm Surge
<b>Cyclone</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Cyclone
<b>Tsunami</b>	<b>Nil</b>	The UC falls out of vulnerable zone for Tsunami

<b>TANGWANI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	<b>Low</b>	Agriculture Area	31.832 sq km
		Kachcha Area	0.766 sq km
		Pakka Unplanned Area	0.541 sq km
		Bridges	1
		Education Facilities	44
		Health Facilities	2
		Mobile Towers	4
		Post Offices	1
		Settlements	51
		Irrigation and Drainage Network	12.14 km
		Railway Line	7.163 km
		Road Network	82.343 km
		Population	26049
		Household	4459
<b>Meteorological Drought</b>	<b>Medium - Extreme</b>	Settlements	51
		Agriculture Area	31.883 sq km
		Water Body	0.169 sq km
		Wet Area	0.415 sq km
		Population	20399
		Household	3490
<b>Agricultural Drought</b>	<b>Low - Medium</b>	Settlements	2
		Agriculture Area	3.805 sq km
		Water Body	0.21 sq km
		Wet Area	0.469 sq km
		Population	1865
		Household	310
<b>Heatwave</b>	<b>Medium</b>	Settlements	43
		Population	19992
		Household	3423
		Agriculture Area	0.185 sq km



		Kachcha Area	0.756 sq km
		Pakka Unplanned Area	0.536 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

ZORGAR			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	49.065 sq km
		Forest Area	0.01 sq km
		Kachcha Area	1.281 sq km
		Natural Vegetation in Wet Areas	0.023 sq km
		Pakka Planned Area	0.706 sq km
		Pakka Unplanned Area	0.076 sq km
		Range Land	0.124 sq km
		Education Facilities	40
		Mobile Towers	2
		Petrol Pumps	3
		Police Stations	1
		Power Plant	1
		Settlements	56
		Irrigation and Drainage Network	46.766 km
		Railway Line	14.196 km
		Road Network	136.169 km
		Population	41863
		Household	7128
Meteorological Drought	Medium - Extreme	Settlements	56
		Agriculture Area	49.276 sq km
		Forest Area	0.12 sq km
		Natural Vegetation in Wet Areas	0.593 sq km
		Range Land	2.628 sq km
		Water Body	5.597 sq km
		Wet Area	6.001 sq km
		Population	32816
		Household	5584
Agricultural Drought	Low	Settlements	1
		Agriculture Area	2.307 sq km

		Range Land	1.911 sq km
		Water Body	1.302 sq km
		Wet Area	0.01 sq km
		Population	2835
		Household	477
Heatwave	Low - Medium	Settlements	44
		Population	32121
		Household	5472
		Agriculture Area	0.401 sq km
		Kachcha Area	1.266 sq km
		Pakka Planned Area	0.704 sq km
		Pakka Unplanned Area	0.075 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	



## **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: UCDMC 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

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## 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, UCDMCs 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.

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## 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

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## **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.

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## **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 Riverine 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 Riverine 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 Riverine Flooding season
- Monitor and disseminate Riverine 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 Riverine 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, Riverine 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 Riverine 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 Riverine 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 Kashmore district reveals that the district is relatively safe in terms of natural disasters. The pertinent hazards to district are hydro-meteorological hazards; specifically, riverine flood. 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.

<b>Riverine Flood</b>	<ol style="list-style-type: none"><li>1. River Indus in Sindh can be segmented in three broad reaches Guddu to Sukkur, Sukkur 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 Riverine 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 Riverine Flood plain. In such scenario, risk of breaches in Riverine Flood protective embankments and consequential Riverine Flooding of adjoining areas have been increased. To minimize this risk, it is essential to restore Indus Riverine 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 Riverine Flood plain.</li><li>2. Though river Indus Riverine Floodplain is bounded by Riverine Flood protective embankment, but still some parts of district Kashmore adjoining river Indus are at high vulnerability to be affected due to breaches in embankments of river Indus.</li><li>3. It is highly recommended to identify and reinforce sections of vulnerable embankments before Riverine Flooding season to avoid breaches in embankments and consequential damages.</li></ol>
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	<ol style="list-style-type: none"> <li>4. As far as Riverine Floods are concerned, the Sindh province has sufficient time for preparation and reaction. Close monitoring of river discharge level in coordination with irrigation department, the government of Punjab, Federal Riverine Flood Commission and Pakistan Meteorological Department (PMD) be conducted.</li> <li>5. Timely alerts be issued to people living in low lying areas within Riverine Flood plain.</li> <li>6. In case of high anticipated flows evacuation of people and livestock be carried out.</li> <li>7. Soaking and compacting of embankments before arrival of Riverine Flood water.</li> <li>8. Reinforcement and stone pitching of high-risk embankments.</li> <li>9. Use alternative eco-friendly options like use of bamboo wood etc. to minimize erosion impact on high-risk embankments.</li> <li>10. Where necessary and possible, erection of guide embankments and spur before arrival of high Riverine Flood water.</li> <li>11. 24/7 vigilance of high-risk embankments by Sindh Irrigation Department.</li> <li>12. Readily availability of breach filling stock and machinery at high risk embankments.</li> <li>13. Restoration of natural eco-system within Riverine Flood plain such as revival of braided/Yazoo channels and natural lakes within Riverine Flood plain to disperse and distribute Riverine Flood water across the plain.</li> <li>14. Removal of possible congestion factors within the Riverine Flood plain.</li> <li>15. Public participation comprising local people be encouraged in pre and during Riverine Flood periods.</li> </ol>
<b>Earthquake</b>	<ol style="list-style-type: none"> <li>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</li> </ol>

	<p>Granite. District Kashmore falls away from any major fault line and is unlikely to be affected by a massive earthquake.</p> <ol style="list-style-type: none"> <li>2. Some of prominent faults situated in Sindh are (a) Karachi-Jati, (b) Surjan-Jhimpir, (c) Pab Fault (d) Hub Fault and (e) Allah Bund-Rann of Kutch faults.</li> <li>3. Though risk of geophysical hazards in Kashmore district is low but still some actions must be taken to avoid losses in case of minor jolts. It is recommended to identify old and weak buildings in urban settings of the district. Local concerned authorities may decide evacuation or retrofitting of such buildings / structures.</li> <li>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 Kashmore district is situated.</li> <li>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.</li> </ol>
<b>Heatwave</b>	<ol style="list-style-type: none"> <li>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 moderate heatwave impacts.</li> <li>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.</li> <li>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.</li> <li>4. Additionally, introduction of reduced Urban Heat Islands (UHI) through policies and implementation in infrastructure development will significantly reduce impacts of heatwaves.</li> </ol>



<b>Drought</b>	<ol style="list-style-type: none"> <li>1. Kashmore is a moderately populated district with closely spaced homes in major cities. Climatic condition of the district can be categorized as Hot and Arid (Climate Classification of Pakistan (Khan et al., 2010). Average annual rainfall received during a year across the district is 94.64 mm. Agriculture is practiced in the district which is mainly dependent on rainfall.</li> <li>2. Drought is also forecastable hazard and can be predicted well in advance. Though drought does not bring any prominent or famine like conditions in the districts, however, it causes 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.</li> <li>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.</li> </ol>
<b>Cyclone</b>	According to MHVRA Study 2022, there is no Cyclone Hazard in Kashmore district.
<b>Tsunami</b>	According to MHVRA Study 2022, there is no Tsunami Hazard in Kashmore district.

## STANDARD OPERATING PROCEDURES

## INTRODUCTION

Overall, disaster risk reduction is collective responsibility of concerned departments, associated line departments, private sector and communities. Synergized and coherence 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 RIVERINE FLOOD

The monsoon and Riverine 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 Riverine Flooding is tabulated below:

**Table 5: Action Plan for Riverine 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 Riverine Flood fighting equipment available with PDMA	May-June	PDMA
Inspection, maintenance and ensure readiness of Riverine 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 Riverine Flood inundation levels	During Riverine Flooding	Sindh Irrigation Department
Deployment of man and material resources and soaking, inspection and monitoring of Riverine Flood protecting infrastructure	Pre and during Riverine 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 concerned DDMA and local community	Based on forecast	PDMA
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 Kashmore 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 (09)	<b>Badani, Dari (Ghouspur), Gihampur, Gublo, Haibat, Kashmore Colony-I, Kashmore-II, Maleer, Pir Bux Shujrah</b>
UCs not at Risk (22)	<b>Akhero, Buxapur, Cheel, Doulatpur, Duniapur, Gulanpur, Gulwali, Jamal, K.S.Ali Bilawal Khan Domki, Kajili, Karampur, Kumb, Lalao, Lashari, Nill, Rasool Bux Khan Chachar, Risaldar, Saifal, Sodhi, Suhliani, Tangwani, Zorgar</b>
General Description	<ol style="list-style-type: none"> <li>1. Riverine Flooding is a major threat to the people living especially in Katcha areas of two Talukas namely Kashmore and Ubauro. The 49,067 people living in the Katcha areas of these talukas are most at risk.</li> <li>2. One of the peculiar features of this area is the nomadic living style, poverty, low literacy rate and a tribal setup that is common among these people, this aids to the problem at hand and makes the people more vulnerable to harm from any potential disasters.</li> <li>3. The district has seen some of the worst Riverine Flooding multiple times in the past decades, including the Riverine Floods in 2012, 2011, 2012, and 2013.</li> <li>4. According to MHVRA study 2022, Riverine Flood hazard intensity for district Kashmore is “<b>Low to Very High</b>”</li> <li>5. According to MHVRA study 2022, Riverine Flood risk for district Kashmore is “<b>Low to Extreme</b>”</li> </ol>
Disaster Management Measures	
Preparedness	
<ul style="list-style-type: none"> <li>• Recording of daily river discharge at barrages in Sindh, and regular dissemination among stakeholders.</li> </ul>	

- In case of high discharge, dissemination of warnings and alerts to masses living in Riverine Flood plain.
- Identification and inspection of vulnerable embankments likely to be affected due to Riverine Flooding during pre-monsoon season, as per “Bund Manual” of irrigation department.
- Inspection and readiness of Riverine Flood fighting equipment available with district government departments prior to Riverine Flooding season.
- Classify and map bunds based on their origin (Mud, Brick, Stone, Concrete, Boulder, etc.)
- Readiness of Riverine Flood camps in high Riverine Flood and breaching risk areas.
- Maintenance and strengthening of identified weak embankments.
- Awareness and motivation campaigns on construction of Riverine Flood resilient buildings and infrastructures.
- Regular awareness campaigns on Riverine Flood precautions and safe evacuations using various media platform.
- Inclusion and implementation of Disaster Risk Reduction (DRR) measures in development projects at planning stage for building Riverine Flood resilient infrastructure.
- Conduct of satellite imagery based study for identification of vulnerable embankments before each monsoon and Riverine Flooding period.
- Collection and management of contact information of area/village influential for alert and warning dissemination.
- Readiness of community-based volunteers and other related organizations / NGOs.
- Regular community-based Riverine Flood fighting trainings through government departments or any other appropriate platforms.
- Installation of digital Riverine Flood level gauges along embankments and dissemination of real-time flow level measurements to concerned authorities.
- Installation of surveillance cameras at safe places for consistent monitoring of structural integrity of vulnerable embankments.

### Response

- Mobilization of rescue services, relevant NGOs, scouts and volunteers.
- Evacuation of people and livestock to shelters/camps.
- Camp management as per standard practices.
- Relief distribution.
- Precautionary measures for communicable diseases.

- Activation of mobile health and education services for Riverine Flood affectees.
- Arrangements for early recovery including Riverine Flood de-watering and early restoration of communication and essential services.

### Recovery and Rehabilitation

- Damage assessment of Riverine Flood affected areas.
- Resettlement of population on build back better basis.
- Complete restoration of communication and essential services.

Earthquake	
UCs At Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. An earthquake is a sudden shaking of the ground caused by two chunks of earth's crust sliding past one another.</li> <li>2. Although earthquakes are short-lived, usually not lasting more than a minute, they can leave behind incredible damage.</li> <li>3. Identifying potential hazards ahead of time and advance planning can reduce the dangers of serious injury or loss of life from an earthquake.</li> <li>4. The earthquake hazard intensity for district Kashmore is "<b>Low</b>"</li> <li>5. The earthquake risk intensity for district Kashmore is "<b>Low</b>"</li> </ol>
Disaster Management Measures	
Preparedness	
<ul style="list-style-type: none"> <li>• Identifying and inventorying weak buildings and structures especially in urban settings of the district and situation demanding action by concerned departments.</li> <li>• Preparation of landuse plans, town plans and implementation of building codes in new residential schemes, schools, public and private offices.</li> <li>• Implementation of DRR measures in public infrastructure development schemes.</li> <li>• Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation.</li> <li>• Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings.</li> </ul>	

<ul style="list-style-type: none"> <li>• 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.</li> <li>• Availability of alternative communication system in case if usual communication means are disturbed by earthquake.</li> <li>• Preparation of medical emergency plan to manage mass casualties in case of any major earthquake event.</li> </ul>
<b>Response</b>
<ul style="list-style-type: none"> <li>• Obtain firsthand information on intensity of earthquake and damages; prioritize areas for search and rescue operation.</li> <li>• Mobilize community-based volunteers, scouts and other trained personnel to hard hit areas to assess situation and help victims.</li> <li>• Establish emergency camps / shelters with necessary life support facilities.</li> <li>• Establish medical camps for provision of first aid and possible medical assistance to injured.</li> <li>• Evacuate people from damaged houses to safe places and shelters.</li> <li>• Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede.</li> <li>• Arrangement and conduct of aerial / drone survey of the affected areas.</li> <li>• Establish information and help desks for facilitation of affectees.</li> <li>• Restore essential services like power, water supply, and telecommunication of critical infrastructure like hospitals, control Rooms, etc. on priority basis.</li> </ul>
<b>Recovery and Rehabilitation</b>
<ul style="list-style-type: none"> <li>• Detailed damage and need assessment for recovery and rehabilitation.</li> <li>• Rehabilitation on build back better principle.</li> </ul>

Heatwave	
<b>UCs At Risk</b>	<b>All UCs</b>
<b>General Description</b>	<ol style="list-style-type: none"> <li>1. Heatwave is a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life.</li> <li>2. Kashmore is known for its extremely hot summers. Kashmore has a hot and Arid climate, characterized by very hot and hazy summers which creates problem for the individuals like heat stroke, skin burn and sometimes death of a person.</li> </ol>

	<ol style="list-style-type: none"> <li>3. Hottest month during a calendar year during last 19 years remain June and the coldest month is January.</li> <li>4. Average maximum temperature during last 19 years remain 45 degrees and average minimum temperature remain 8.5 degrees in the district.</li> <li>5. Higher daily peak temperatures of longer duration and more intense heatwaves are becoming increasingly frequent globally due to climate change. Sindh too is feeling the impact of climate change in terms of increased instances of heat wave with each passing year.</li> <li>6. Very high temperature not only affects vegetation but also creates problem for the individuals like heat stroke, skin burn etc.</li> <li>7. According to MHVRA study 2022, heatwave hazard intensity for district Kashmore is “High to Severe”</li> <li>8. According to MHVRA study 2022, heatwave risk for district Kashmore is “Low to High”</li> </ol>
<b>Disaster Management Measures</b>	
<b>Preparedness</b>	
<ul style="list-style-type: none"> <li>• Consistent future development strategy: Tree plantation, restoration of natural ecosystem, construction of environment friendly and well planned residential societies, offices, infrastructure and human dwellings.</li> <li>• Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings.</li> <li>• Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients.</li> <li>• Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations.</li> <li>• Arrangements for uninterrupted supply of electricity and water in vulnerable areas.</li> </ul>	
<b>Response</b>	
<ul style="list-style-type: none"> <li>• Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas.</li> <li>• Local radio FM broadcasts to disseminate heatstroke safety and precautions.</li> <li>• Mobilize mobile medical teams for first-aid and other medical emergency support in affected area.</li> <li>• Record keeping of heatwave patients and fatalities.</li> </ul>	

Recovery and Rehabilitation	
<ul style="list-style-type: none"> <li>Post event review of heatwave plan and modifications if required.</li> </ul>	

Cyclone	
UCs At Risk	Nil
General Description	According to MHVRA study 2022, there is no risk of Cyclone in Kashmore district.

Drought	
UCs at Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>River Indus is flowing along southern boundary of the district from eastern side towards west.</li> <li>Climatic condition of the district can be categorized as Hot and Arid (Climate Classification of Pakistan (Khan et al., 2010))</li> <li>Rainfall is scant, average annual rainfall received during a year across the district is only 94.64 mm.</li> <li>Mostly built-up areas are scattered in central areas of the district from east to west with high population densities at central-western areas and at eastern side in proximity to water bodies.</li> <li>Irrigation water needs are mostly being catered through canal irrigation system and tube wells. 64.7% of the total district area is covered with irrigated crop fields.</li> <li>Natural vegetation is mostly found along southern boundary from east towards west in proximity to River Indus. Range lands natural herbs and shrubs are scattered in central areas of the district, in proximity to water bodies</li> <li>According to MHVRA study 2022, <ol style="list-style-type: none"> <li>Meteorological drought hazard for district Kashmore is “<b>Extreme</b>”</li> <li>Meteorological drought risk for district Kashmore is “<b>Medium to Extreme</b>”</li> <li>Agricultural drought hazard for district Kashmore is “<b>Mild to Extreme</b>”</li> <li>Agricultural drought risk for district Kashmore is “<b>Low to Extreme</b>”</li> </ol> </li> </ol>

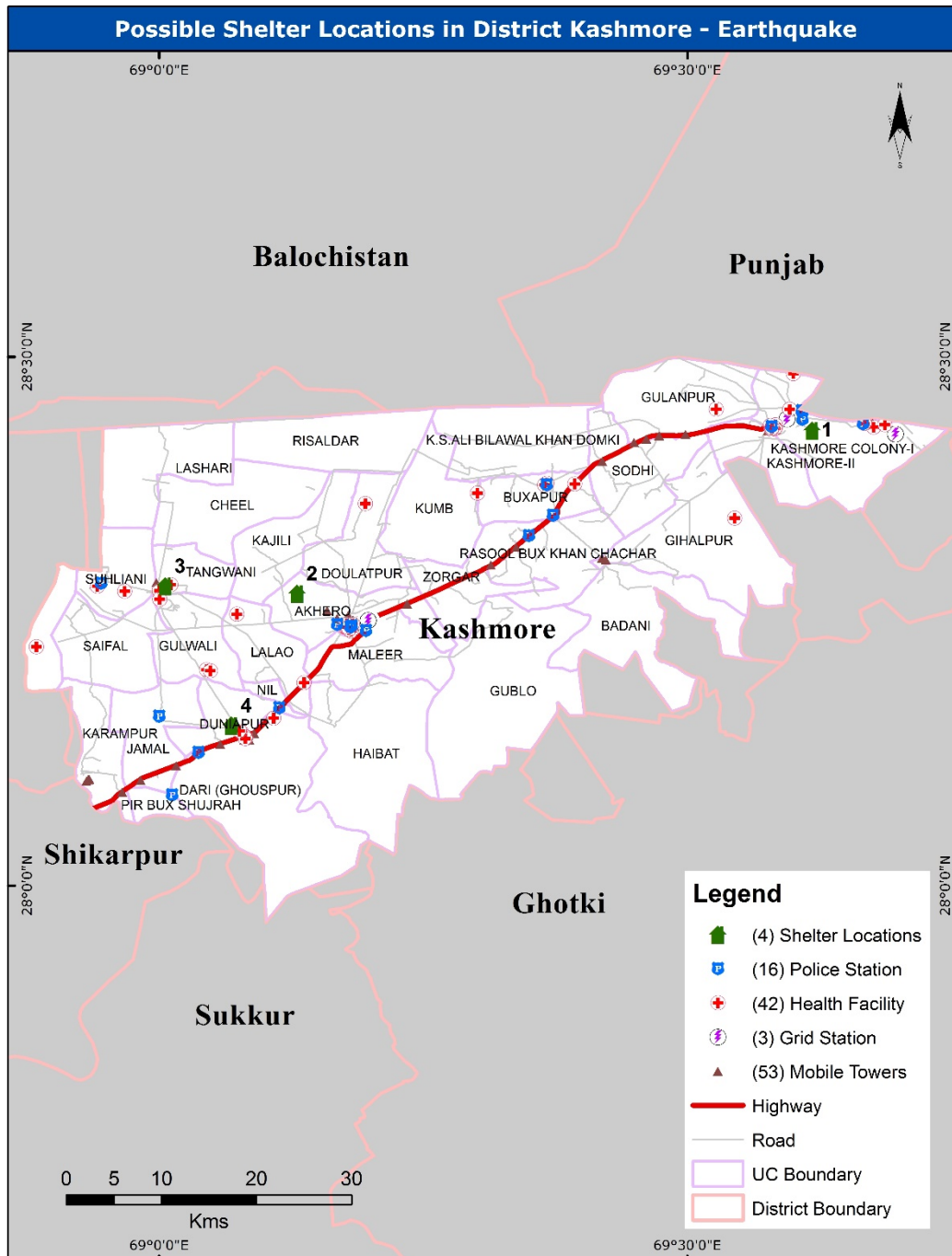
Disaster Management Measures	
Preparedness	
<ul style="list-style-type: none"> <li>• Implement Drought Early Warning System (EWS) at provincial/district level to get clear indications of the impending drought and its consequences, e.g. forecast of impending drought conditions related to changing weather conditions linked to El Nino or La Nina events.</li> <li>• Implementation of water supply and demand management and encouragement of efficient irrigation systems in agriculture.</li> <li>• Research and promote drought resistant agriculture crops.</li> <li>• Resilience and improvement of adaptive capacity of farmers.</li> <li>• Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, stream flow, groundwater levels, lakes, and reservoirs for drought forecasting.</li> <li>• Control ground water extraction from upper and lower aquifers to be within the sustainable yield limits.</li> </ul>	
Response	
<ul style="list-style-type: none"> <li>• Assess data about the nature of drought conditions and their impact.</li> <li>• Provision and installation of solar water pumps for availability of clean drinking water.</li> <li>• Public information campaign for water management and saving.</li> </ul>	
Recovery and Rehabilitation	
<ul style="list-style-type: none"> <li>• Cash and in-kind support to farmers for next cropping.</li> <li>• Awareness and encouragement of farmers on best irrigation practices and water saving.</li> </ul>	

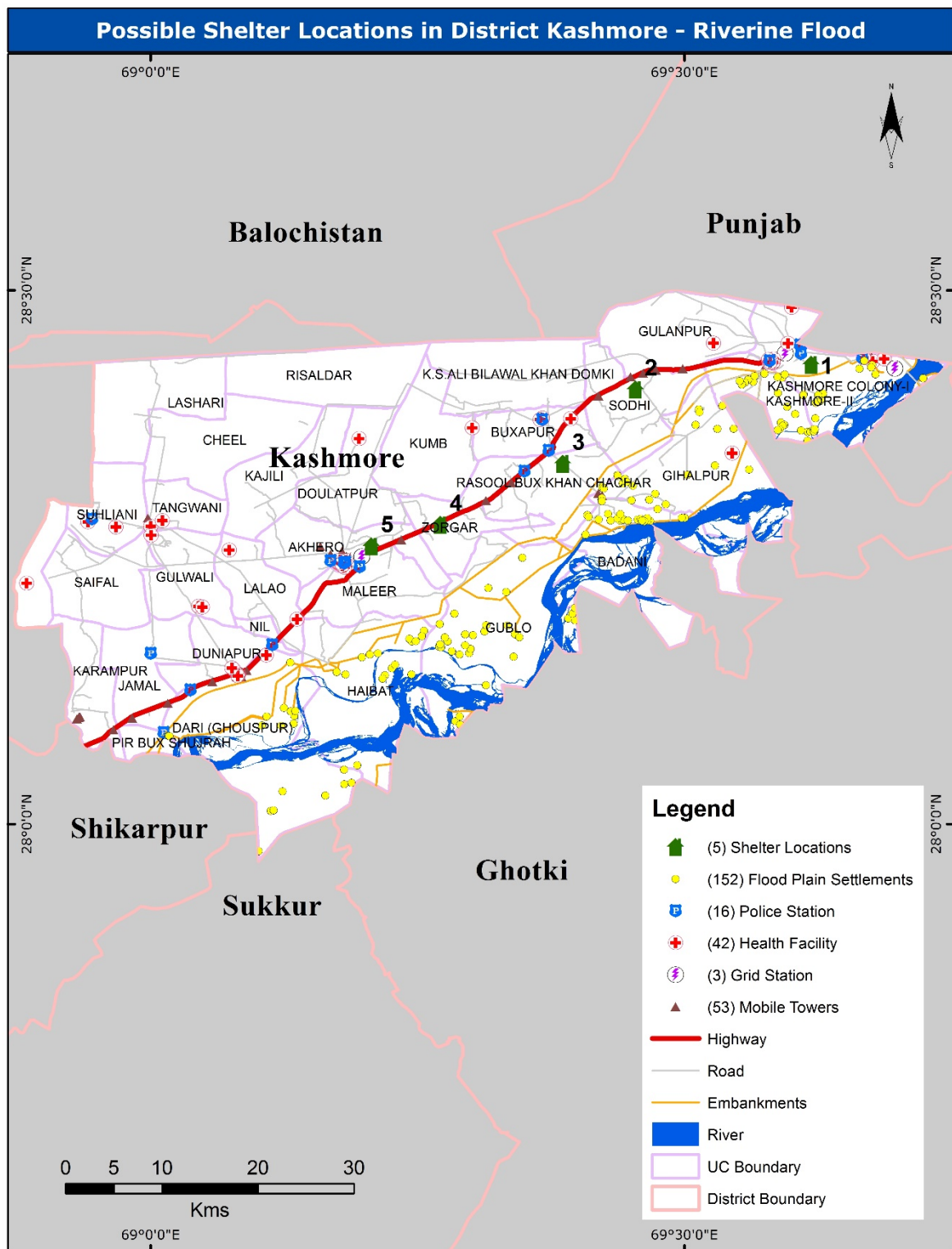
Tsunami	
UCs at Risk	<b>Nil</b>
General Description	According to MHVRA study 2022, there is no risk of Tsunami in Kashmore district.



## 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 Riverine Flood plains prone to Riverine Flood

## **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 Kashmir. 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
<b>Riverine Floods</b>	
1. Geomorphological study of Riverine Flood plain & river course modelling	Conduct Riverine Flood plain study for identification of bottlenecks, including elevated islands ( <b>Annex – D</b> ) impeding the flow of (super) Riverine 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 ( <b>Annex – E</b> ).	The river has a tendency to meander over large width of low lying land thereby Riverine 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/Riverine 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 Riverine 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 Riverine 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.
<b>Earthquake</b>	
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.
<b>Drought</b>	
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 Riverine 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 – KASHMORE DISTRICT

The existing nature of disasters in Kashmore district can be categorized as low to Extreme. The prominent hazards in the district is drought and Riverine Flood. The drought risk in the district ranges from low to extreme. There is no risk of storm surge, cyclone and Tsunami in the district. The risk of earthquake is determined to be low. As far as Heatwave is concerned Kashmore district is at low to high risk. As far as Riverine Flood is concerned the settled areas of few UCs in the district are likely to be effected in breaching scenario of Riverine Flood protection embankments of river Indus. As far as population living within the Riverine Flood plain is concerned, they are well aware of Riverine 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 9: Cost Benefit Analysis of Disaster Risk Measures in District Kashmore**

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Identification and management of shelters for earthquake and Riverine Floods	Identification and management of shelter spaces is a cost-effective way to ensure rapid, and effective management of population at times of crisis. Government schools can serve as ideal cost-effective shelter spaces in district Kashmore, as these can accommodate large number of people during disasters. Gradually, permanent multi-purpose shelters specially in near river Indus and at safe location can be established in future to avoid use of education facilities.	Shelter places are highly beneficial at times of disaster as it offers a unified accommodation place for displaced people. Shelter place also help administration in effective management of displaced people and provide them with much needed relief. Shelter space keeps 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.	Early warning system for disasters	The international and regional early warning system for Riverine Flood and drought can be used to cost-effectively disseminate warnings to vulnerable communities, minimize the impact of disaster and save precious lives, and crucial infrastructure.	Early warnings give people time to flee from a Riverine Floods, or drought; enable local authorities to evacuate or shelter large numbers of people in advance; provide information on the occurrence of a public health hazard; and enable a faster response to problems of food and water insecurity. Warnings issues well before an event also enable people to protect some property and infrastructure. For example, reservoir operators could reduce the water levels gradually to accommodate incoming Riverine Flood waters; local authorities could position equipment for emergency response; aid agencies can mobilize sooner; hospitals could be prepared to receive more patients. In general, the longer the lead time, the greater amount of property and infrastructure that can be protected.
3.	Awareness campaigns for disasters	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	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



		risk management capabilities of vulnerable communities.	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.
4.	Strengthening of mobile health care facilities	In the aftermath of a natural disaster, most of medical functions are provided from temporary locations to avoid 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 treating the injured and handling outbreaks of disease.  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 (152) within Riverine Flood Plains Prone to Riverine Flood

S.#	Name	Longitude	Latitude	Area (acres)
1	Abdul Jan	69.679	28.421	17.70
2	Ali Bux Golo	69.131	28.151	12.20
3	Badani	69.423	28.303	121.43
4	Bahadranpur	69.511	28.374	13.90
5	Baho Khan	69.664	28.427	7.63
6	Deh Shah Mohammad Jilani	69.125	28.109	1.11
7	Dimman	69.182	28.038	22.79
8	Fateh Mohammad Machhi	69.622	28.370	6.68
9	Gahanwer Chachar	69.314	28.130	1.93
10	Goth Ahmed Khan	69.205	28.159	0.64
11	Goth Allah Ditta Lolahi	69.123	28.092	26.45
12	Goth Balawar Khan	69.483	28.300	28.80
13	Goth Faisal Chachar	69.213	28.160	5.97
14	Goth Ghulab Shah	69.440	28.290	9.94
15	Goth Gubla	69.348	28.250	31.29
16	Goth Haji Pehlwan	69.460	28.284	8.75
17	Goth Jam Sowaro Chachar	69.174	28.143	38.52
18	Goth Kalu Mazar	69.446	28.321	10.50
19	Goth Mehar	69.450	28.303	6.65

S.#	Name	Longitude	Latitude	Area (acres)
20	Goth Mewa	69.437	28.286	33.73
21	Goth Mian Shaind	69.194	28.055	6.30
22	Goth Miral Sangi	69.420	28.285	25.44
23	Goth Murad Ogahi	69.104	28.093	5.31
24	Goth Sabzai	69.248	28.172	5.80
25	Goth Tilai	69.340	28.157	7.13
26	Goth Umar Bhutto	69.431	28.284	26.06
27	Goth Umar Bhutto	69.475	28.295	2.79
28	Haji Makhan Khan	69.438	28.326	9.77
29	Jiwan Baja	69.285	28.197	152.79
30	Massuwali	69.546	28.370	2.93
31	Massuwali	69.575	28.422	28.99
32	Mian Jamal Mohani	69.254	28.176	13.93
33	Mohammad Chatani	69.410	28.288	6.50
34	Mohib Chachar	69.289	28.101	22.61
35	Muthri	69.625	28.402	23.26
36	Nur Mohammad Chachar	69.552	28.415	7.27
37	Qabil Sawind	69.295	28.178	12.18
38	Rais Malhar Lakhan	69.334	28.186	7.31
39	Rais Muhammad Hayat Khan Oghahi	69.109	28.101	63.21
40	Rasul Bux Mazari	69.536	28.392	2.60

S.#	Name	Longitude	Latitude	Area (acres)
41	Soidu Chachar	69.290	28.093	12.38
42	Untitled Settlement	69.017	28.083	1.87
43	Untitled Settlement	69.164	28.027	11.17
44	Untitled Settlement	69.188	28.039	8.29
45	Untitled Settlement	69.181	28.051	16.72
46	Untitled Settlement	69.134	28.094	52.22
47	Untitled Settlement	69.135	28.101	16.69
48	Untitled Settlement	69.131	28.106	4.76
49	Untitled Settlement	69.136	28.106	13.71
50	Untitled Settlement	69.244	28.140	14.21
51	Untitled Settlement	69.183	28.140	17.05
52	Untitled Settlement	69.198	28.156	14.73
53	Untitled Settlement	69.289	28.159	11.90
54	Untitled Settlement	69.298	28.160	21.18
55	Untitled Settlement	69.282	28.162	6.81
56	Untitled Settlement	69.300	28.164	4.58
57	Untitled Settlement	69.295	28.168	2.53
58	Untitled Settlement	69.245	28.171	4.33
59	Untitled Settlement	69.278	28.171	3.71
60	Untitled Settlement	69.242	28.174	3.96
61	Untitled Settlement	69.276	28.175	4.62

S.#	Name	Longitude	Latitude	Area (acres)
62	Untitled Settlement	69.302	28.177	3.35
63	Untitled Settlement	69.313	28.181	12.48
64	Untitled Settlement	69.314	28.186	25.78
65	Untitled Settlement	69.398	28.191	5.41
66	Untitled Settlement	69.391	28.193	3.13
67	Untitled Settlement	69.395	28.197	11.04
68	Untitled Settlement	69.398	28.203	0.10
69	Untitled Settlement	69.333	28.218	24.03
70	Untitled Settlement	69.407	28.271	7.63
71	Untitled Settlement	69.468	28.284	4.36
72	Untitled Settlement	69.466	28.284	3.63
73	Untitled Settlement	69.440	28.284	1.68
74	Untitled Settlement	69.456	28.285	3.70
75	Untitled Settlement	69.459	28.286	3.20
76	Untitled Settlement	69.465	28.287	3.91
77	Untitled Settlement	69.410	28.288	0.86
78	Untitled Settlement	69.409	28.290	3.16
79	Untitled Settlement	69.428	28.291	3.46
80	Untitled Settlement	69.423	28.305	61.98
81	Untitled Settlement	69.473	28.310	4.89
82	Untitled Settlement	69.423	28.316	11.99

S.#	Name	Longitude	Latitude	Area (acres)
83	Untitled Settlement	69.423	28.315	0.04
84	Untitled Settlement	69.452	28.317	9.07
85	Untitled Settlement	69.442	28.319	2.80
86	Untitled Settlement	69.444	28.324	5.60
87	Untitled Settlement	69.437	28.327	1.39
88	Untitled Settlement	69.529	28.336	5.38
89	Untitled Settlement	69.615	28.359	3.83
90	Untitled Settlement	69.616	28.368	1.29
91	Untitled Settlement	69.618	28.368	9.12
92	Untitled Settlement	69.609	28.369	2.64
93	Untitled Settlement	69.531	28.370	1.64
94	Untitled Settlement	69.621	28.370	0.08
95	Untitled Settlement	69.604	28.384	1.95
96	Untitled Settlement	69.514	28.389	10.50
97	Untitled Settlement	69.596	28.391	2.78
98	Untitled Settlement	69.627	28.396	2.70
99	Untitled Settlement	69.623	28.395	17.22
100	Untitled Settlement	69.628	28.398	4.68
101	Untitled Settlement	69.630	28.403	3.05
102	Untitled Settlement	69.588	28.404	5.64
103	Untitled Settlement	69.592	28.418	7.26

S.#	Name	Longitude	Latitude	Area (acres)
104	Untitled Settlement	69.587	28.419	3.84
105	Untitled Settlement	69.676	28.430	5.87
106	Untitled Settlement	69.668	28.434	3.22
107	Untitled Settlement	69.101	27.975	2.97
108	Untitled Settlement	69.113	28.012	5.09
109	Untitled Settlement	69.115	28.013	3.82
110	Untitled Settlement	69.124	28.031	8.59
111	Untitled Settlement	69.226	28.146	9.25
112	Untitled Settlement	69.229	28.149	10.28
113	Untitled Settlement	69.219	28.140	9.68
114	Untitled Settlement	69.217	28.136	28.98
115	Untitled Settlement	69.256	28.181	5.92
116	Untitled Settlement	69.270	28.166	2.56
117	Untitled Settlement	69.272	28.166	2.53
118	Untitled Settlement	69.271	28.169	3.98
119	Untitled Settlement	69.271	28.187	21.73
120	Untitled Settlement	69.316	28.221	17.45
121	Untitled Settlement	69.341	28.178	5.60
122	Untitled Settlement	69.345	28.175	27.30
123	Untitled Settlement	69.425	28.315	4.39
124	Untitled Settlement	69.443	28.285	3.59

S.#	Name	Longitude	Latitude	Area (acres)
125	Untitled Settlement	69.447	28.284	2.44
126	Untitled Settlement	69.462	28.284	4.29
127	Untitled Settlement	69.467	28.304	9.42
128	Untitled Settlement	69.500	28.287	16.99
129	Untitled Settlement	69.497	28.287	10.52
130	Untitled Settlement	69.503	28.327	5.00
131	Untitled Settlement	69.561	28.332	23.50
132	Untitled Settlement	69.514	28.386	1.79
133	Untitled Settlement	69.590	28.376	4.26
134	Untitled Settlement	69.594	28.374	2.99
135	Untitled Settlement	69.592	28.373	1.01
136	Untitled Settlement	69.589	28.370	3.72
137	Untitled Settlement	69.587	28.369	3.21
138	Untitled Settlement	69.622	28.368	1.01
139	Untitled Settlement	69.621	28.368	2.02
140	Untitled Settlement	69.623	28.380	11.04
141	Untitled Settlement	69.612	28.403	6.88
142	Untitled Settlement	69.611	28.402	1.59
143	Untitled Settlement	69.564	28.414	6.19
144	Untitled Settlement	69.566	28.420	6.66
145	Untitled Settlement	69.560	28.416	6.26



S.#	Name	Longitude	Latitude	Area (acres)
146	Untitled Settlement	69.557	28.414	3.18
147	Untitled Settlement	69.554	28.412	2.49
148	Untitled Settlement	69.675	28.428	1.78
149	Untitled Settlement	69.594	28.421	20.90
150	Untitled Settlement	69.724	28.418	3.51
151	Untitled Settlement	69.285	28.096	10.39
152	Untitled Settlement	69.018	28.082	4.31

## 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°26'21.84"N 69°37'26.76"E Upper left corner: 28°26'20.73"N 69°37'8.44"E Lower right corner: 28°25'33.51"N 69°37'25.85"E Lower left corner: 28°25'26.60"N 69°36'55.55"E	328	~14,700	251
2	Upper right corner: 28°24'51.71"N 69°27'9.23"E Upper left corner: 28°24'48.07"N 69°26'59.27"E Lower right corner: 28°24'13.55"N 69°27'29.00"E Lower left corner: 28°24'10.11"N 69°27'5.79"E	169	~7,600	239
3	Upper right corner: 28°20'38.69"N 69°23'46.65"E Upper left corner: 28°20'36.68"N 69°22'54.63"E Lower right corner: 28°19'31.83"N 69°23'1.51"E Lower left corner: 28°19'31.94"N 69°22'45.83"E	458	~20,600	236
4	Upper right corner: 28°16'58.00"N 69°16'16.43"E Upper left corner: 28°16'49.39"N 69°15'59.94"E Lower right corner: 28°16'47.39"N 69°16'43.72"E Lower left corner: 28°16'38.04"N 69°16'5.77"E	94.4	~4,200	224
5	Upper right corner: 28°15'53.80"N 69°12'41.77"E Upper left corner: 28°15'41.15"N 69°12'2.80"E Lower right corner: 28°15'33.06"N 69°12'46.16"E Lower left corner: 28°15'22.11"N 69°12'8.50"E	72.7	~3,200	219

A total of 5 shelter locations have been selected as Riverine Flood shelter places across district Kashmir. The shelter locations are selected based on their proximity to the population vulnerable to Riverine Flood, distance from area under high Riverine Flood risk, elevation from the nearby areas, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.). A total of approximately 50,300 tents (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

## ANNEX – C – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

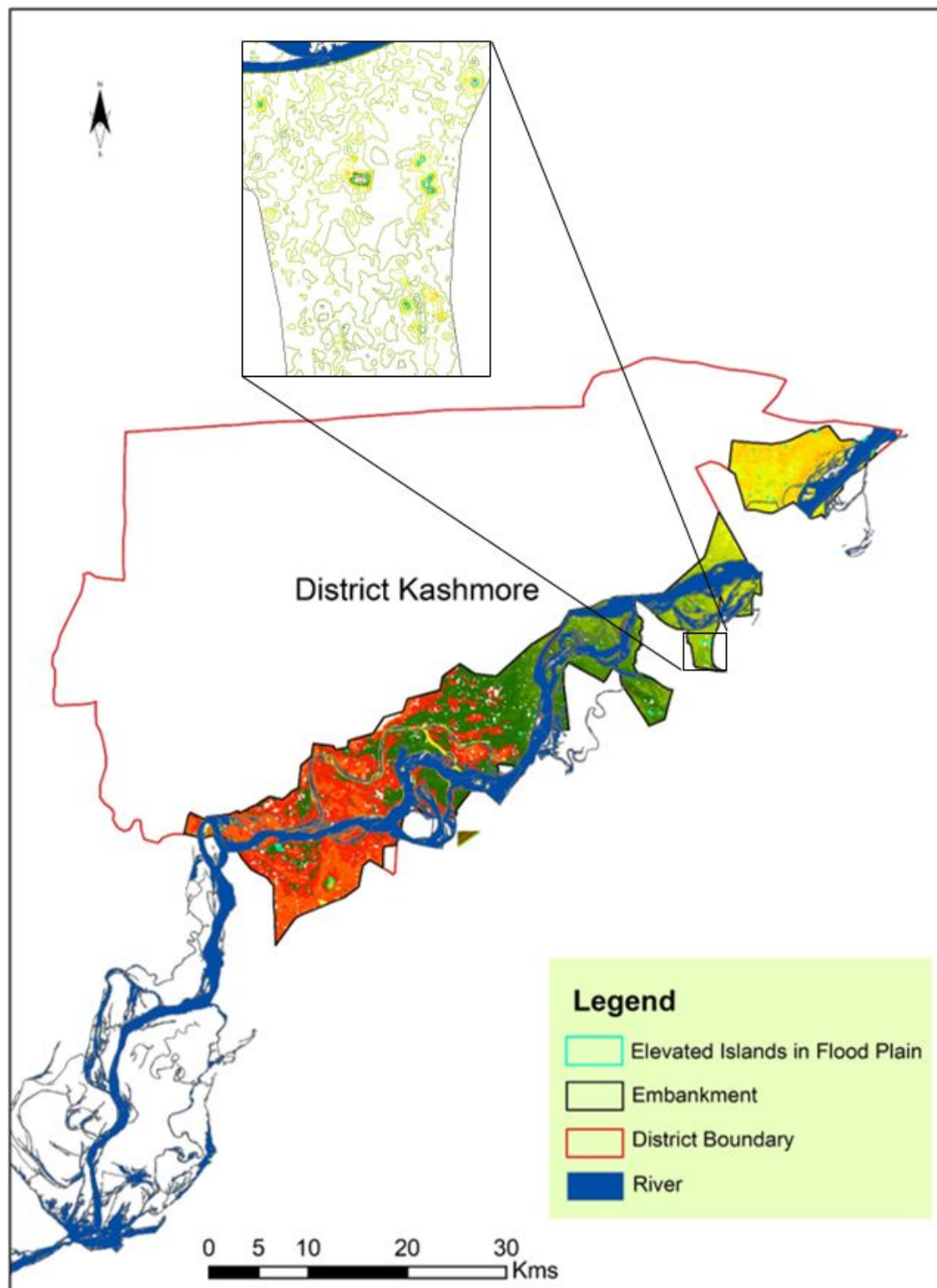
The given shelter locations for earthquake are proposed on the findings of the MHVRA 2022 study and information obtained through satellite technology and online verifiable sources. It is recommended to conduct on ground physical surveys to evaluate their suitability.

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 28°26'21.84"N 69°37'26.76"E Upper left corner: 28°26'20.73"N 69°37'8.44"E Lower right corner: 28°25'33.51"N 69°37'25.85"E Lower left corner: 28°25'26.60"N 69°36'55.55"E	328	~14,700	251
2	Upper right corner: 28°17'16.62"N 69° 8'54.23"E Upper left corner: 28°16'43.46"N 69° 6'29.31"E Lower right corner: 28°16'22.15"N 69° 9'25.39"E Lower left corner: 28°15'55.68"N 69° 6'40.37"E	1787	~80,000	223
3	Upper right corner: 28°17'2.28"N 69° 0'33.74"E Upper left corner: 28°17'1.60"N 69° 0'10.37"E Lower right corner: 28°16'57.52"N 69° 0'34.09"E Lower left corner: 28°16'54.75"N 69° 0'10.70"E	30.5	~1,300	208
4	Upper right corner: 28° 9'14.36"N 69° 4'12.74"E Upper left corner: 28° 9'16.38"N 69° 3'56.83"E Lower right corner: 28° 8'53.40"N 69° 4'26.05"E Lower left corner: 28° 8'57.16"N 69° 3'51.44"E	103	~4,600	218

A total of 4 shelter locations have been selected as Earthquake shelter places across district Kashmore. 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 100,600 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 KASHMORE

Total 41 elevated islands have been identified within the embankments in district Kashmore, with a cumulative area of approximately 68.17 acres. These elevated islands obstruct the river flow and thereby may be demolished/removed to reinstate the normal river flow within the Riverine Flood plain.



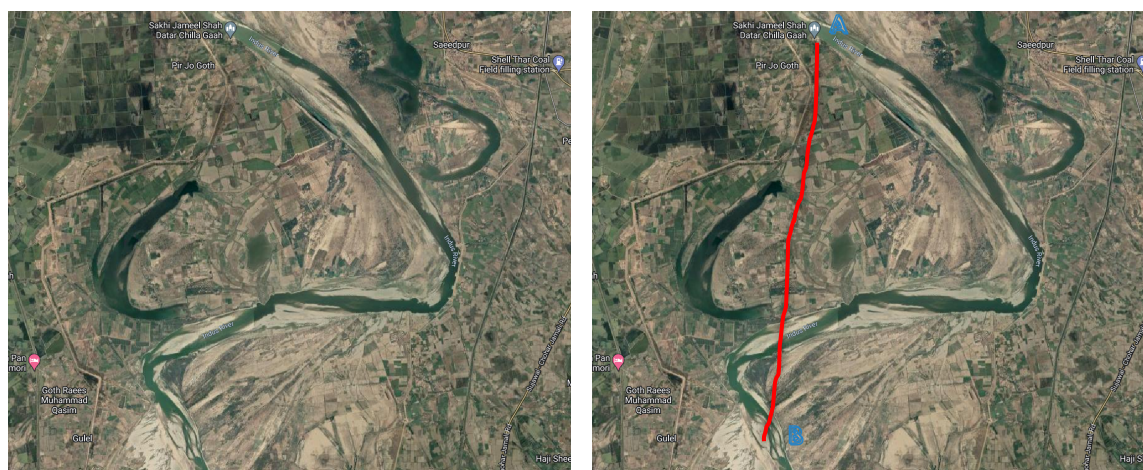
## ANNEX – E – RIVER TRAINING AND STRAIGHTENING

Since most of the time Riverine Flood are contained in between river embankments therefore only settlements lying in Riverine Flood plain are prone to low to very high Riverine Floods while settled areas of Kashmir districts are safe from Riverine Flood. However, settled areas of the district may be endangered to severe Riverine Flooding condition if any breaching occurs in river embankment.

**Embankment breach due to Normal River flow meandering:**

Indus river continuously meander within Riverine 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 Riverine Flood (low to very high Riverine 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 Riverine 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 KASHMORE

Equipment	Quantity
De-watering Machine	17
Buildozers / Dozers	6
Fire Brigade / Engine / Tender	4
Tractor / Trolley / Blade	12
Loader	1
Ambulances	6
Refuge Van	2
Boats	1
Solar Lights	120
Sucker Machine	1
Mosquito Nets	150
Water Filter	300
Jerry Can	300

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