

# MHVRA

## INFORMED DISASTER MANAGEMENT PLAN

### 2023-2032

## DISTRICT BADIN



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 Badin 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 Badin 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 Badin 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.

## ACKNOWLEDGEMENT

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 BADIN**

## 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**

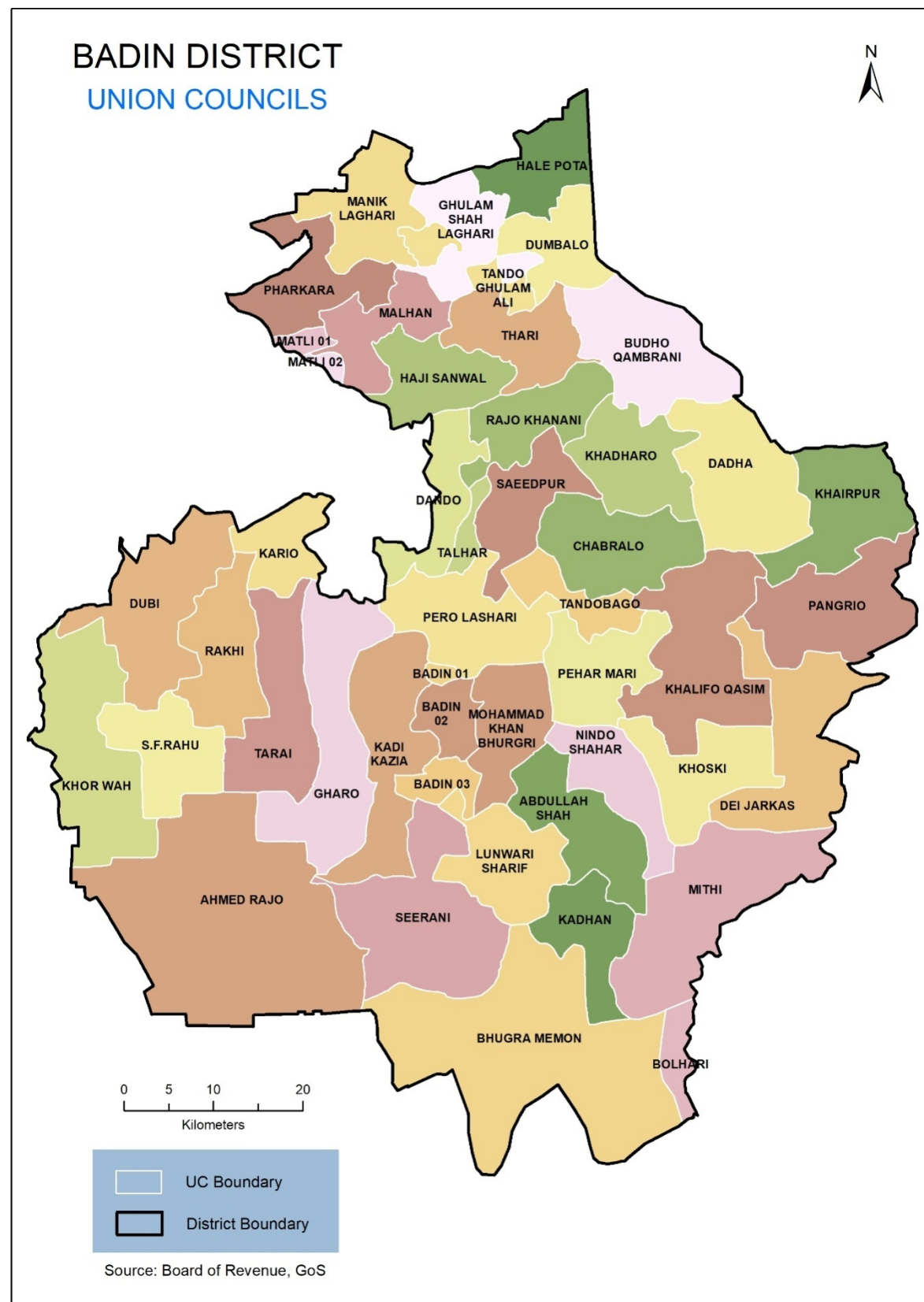
<b>Committee Representative</b>	<b>Role</b>
DG, PDMA Sindh / Dir Ops PDMA	Chairman
Concerned DC or representative officer	Member
Concerned officer from local government	Member
Elected representative of the concerned district	Member
Representatives from disaster affected communities	Member (s)
Representative 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 BADIN**



<b>District area in Sq. Km</b>	6,678	
<b>Coordinates</b>	Longitude 68° 34' 30" to 69° 5' 22" East Latitude 24° 16' 40" to 25° 6' 11"North	
<b>Surrounding Districts</b>	Tando Allahyar in North, Tando M. Khan in North-West Mirpurkhas and Tharparkar in the East Sujawal in the West Indus Deltaic region in South	
<b>Climate Conditions</b>	Hot And Semi-Arid	
Coldest Month	January	
Hottest Month	May	
<b>Seasonal Temperatures</b>	Max Mean (°C)	Min Mean (°C)
Spring (March and April)	38.67	20.79
Dry Summer (May and June)	42.10	27.39
Wet Summer (July to September)	37.88	26.54
Autumn (October to November)	36.11	19.90
Winter (December to February)	28.98	12.31
<b>Average Rainfall</b>	165.23 mm/year	
<b>Physiographic Features</b>	Indus Deltaic Region and Ran of Kuch in South	

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## DEMOGRAPHY

	Year-1998	Year-2017
<b>Population</b>	1,106,272	1,804,958
Urban	186,488	390,344
Rural	919,784	1,414,614
<b>No. of Household</b>	-	359,376
<b>Average Annual Growth Rate 1998-2017</b>	2.61 %	

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## ECONOMY

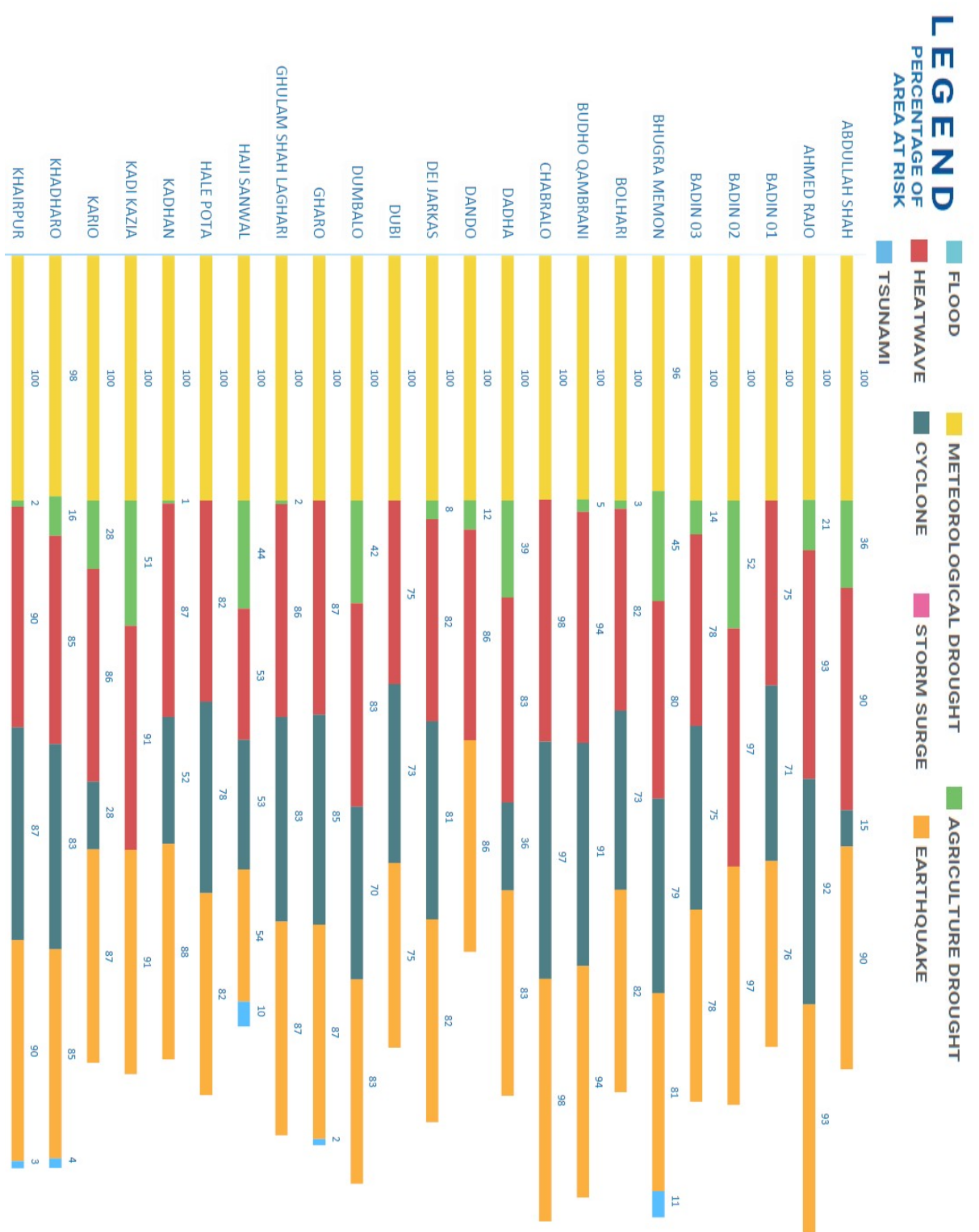
<b>Industries</b>	Fisheries, Sugar & Rice Husking Mills, Oil & Gas Industries
<b>Agriculture</b>	<b>Production in M. tons as per (2016-17)</b>
<b>Major Crops</b>	
Rice	542,967
Wheat	107,884
Sugarcane	2,535,088
Cotton	15,179
<b>Minor Crops</b>	
Rapeseed and Mustard	1,301
Barley	504
Sesame	19
Jowar	264
Maize	12
Gram	238

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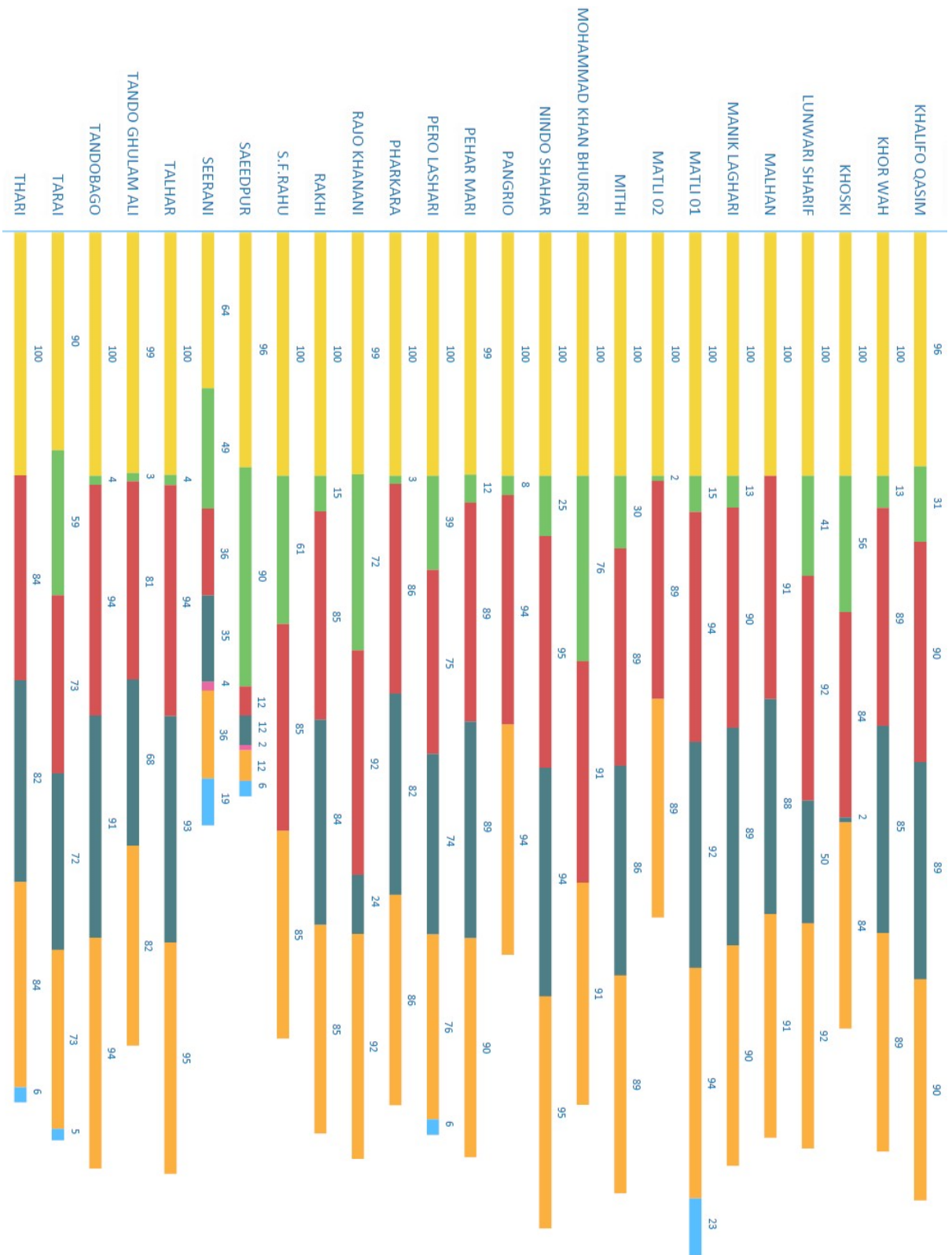
**ADMINISTRATIVE SYSTEM**

TALUKA NAMES	UC NAMES
<ol style="list-style-type: none"> <li>1. Badin Taluka</li> <li>2. Golarchi (S.F.Rahu) Taluka</li> <li>3. Matli Taluka</li> <li>4. Talhar Taluka</li> <li>5. Tando Bago Taluka</li> </ol>	<ol style="list-style-type: none"> <li>1. Abdullah Shah</li> <li>2. Ahmed Rajo</li> <li>3. Badin 01</li> <li>4. Badin 02</li> <li>5. Badin 03</li> <li>6. Bhugra Memon</li> <li>7. Bolhari</li> <li>8. Budho Qambrani</li> <li>9. Chabralo</li> <li>10. Dadha</li> <li>11. Dando</li> <li>12. Dei Jarkas</li> <li>13. Dubi</li> <li>14. Dumbalo</li> <li>15. Gharo</li> <li>16. Ghulam Shah Laghari</li> <li>17. Haji Sanwal</li> <li>18. Hale Pota</li> <li>19. Kadhan</li> <li>20. Kadi Kazia</li> <li>21. Kario</li> <li>22. Khadharo</li> <li>23. Khairpur</li> <li>24. Khalifo Qasim</li> <li>25. Khor Wah</li> <li>26. Khoski</li> <li>27. Lunwari Sharif</li> <li>28. Malhan</li> <li>29. Manik Laghari</li> <li>30. Matli 01</li> <li>31. Matli 02</li> <li>32. Mithi</li> <li>33. Mohammad Khan Bhurgri</li> <li>34. Nindo Shahar</li> <li>35. Pangrio</li> <li>36. Pehar Mari</li> <li>37. Pero Lashari</li> <li>38. Pharkara</li> <li>39. Rajo Khanani</li> <li>40. Rakhi</li> <li>41. S.F.Rahu</li> <li>42. Saeedpur</li> <li>43. Seerani</li> <li>44. Talhar</li> <li>45. Tando Ghulam Ali</li> <li>46. Tandobago</li> <li>47. Tarai</li> <li>48. Thari</li> </ol>

BADIN DISTRICT MULTI-HAZARD RISK PROFILES







Abdullah Shah			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	112.948 sq km
		Kachcha Area	0.051 sq km
		Natural Vegetation in Wet Areas	0.059 sq km
		Pakka Unplanned Area	2.199 sq km
		Range Land	0.019 sq km
		Education Facilities	2
		Health Facilities	1
		Settlements	67
		Irrigation and Drainage Network	68.337 km
		Road Network	177.905 km
		Population	32885
		Household	6684
Meteorological Drought	Medium – Extreme	Settlements	67
		Agriculture Area	113.267 sq km
		Natural Vegetation in Wet Areas	0.743 sq km
		Range Land	0.203 sq km
		Water Body	16.829 sq km
		Wet Area	3.605 sq km
		Population	27556
		Household	5602
Heatwave	Low - Extreme	Settlements	66
		Population	27331
		Household	5557
		Agriculture Area	112.835 sq km
		Kachcha Area	0.051 sq km
		Pakka Unplanned Area	2.209 sq km
Cyclone	Low	Agriculture Area	112.88 sq km
		Kachcha Area	0.051 sq km
		Natural Vegetation in Wet Areas	0.013 sq km
		Pakka Unplanned Area	0.443 sq km
		Range Land	0.011 sq km
		Education Facilities	1
		Health Facilities	1
		Settlements	67
		Irrigation and Drainage Network	63.567 km
		Road Network	159.965 km

		Population	7221
		Household	1462
Tsunami	Low - High	Agriculture Area	8.052 sq km
		Kachcha Area	0.005 sq km
		Natural Vegetation in Wet Areas	0.102 sq km
		Pakka Unplanned Area	0.094 sq km
		Range Land	0.012 sq km
		Settlements	1
		Irrigation and Drainage Network	1.199 km
		Road Network	8.442 km
		Population	1453
		Household	298
Agricultural Drought	Low	Agriculture Area	0.001 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	

Ahmed Rajo			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	385.171 sq km
		Forest Area	0.332 sq km
		Kachcha Area	1.36 sq km
		Natural Vegetation in Wet Areas	0.203 sq km
		Pakka Unplanned Area	3.491 sq km
		Range Land	0.162 sq km
		Bridges	1
		Settlements	49
		Irrigation and Drainage Network	191.808 km
		Road Network	466.136 km
		Population	51630
		Household	9809
Meteorological Drought	Medium - Extreme	Settlements	49
		Agriculture Area	385.551 sq km
		Forest Area	16.242 sq km
		Natural Vegetation in Wet Areas	16.691 sq km
		Range Land	3.268 sq km
		Water Body	1.266 sq km
		Wet Area	50.553 sq km
		Population	43053

		Household	8183
Agricultural Drought	Low - Extreme	Settlements	28
		Agriculture Area	279.53 sq km
		Forest Area	19.586 sq km
		Natural Vegetation in Wet Areas	19.571 sq km
		Range Land	3.91 sq km
		Water Body	1.486 sq km
		Wet Area	56.742 sq km
		Population	15392
		Household	2928
Heatwave	Low - Extreme	Settlements	47
		Population	42887
		Household	8150
		Agriculture Area	385.003 sq km
		Kachcha Area	1.364 sq km
		Pakka Unplanned Area	3.502 sq km
Cyclone	Low	Agriculture Area	385.093 sq km
		Forest Area	0.007 sq km
		Kachcha Area	1.359 sq km
		Natural Vegetation in Wet Areas	0.009 sq km
		Pakka Unplanned Area	0.334 sq km
		Range Land	0.056 sq km
		Bridges	1
		Settlements	49
		Irrigation and Drainage Network	138.903 km
		Road Network	360.081 km
		Population	18019
		Household	3427
Tsunami	Low - High	Agriculture Area	17.337 sq km
		Forest Area	1.936 sq km
		Kachcha Area	0.127 sq km
		Natural Vegetation in Wet Areas	5.246 sq km
		Pakka Unplanned Area	0.06 sq km
		Range Land	0.032 sq km
		Settlements	1
		Irrigation and Drainage Network	2.937 km
		Road Network	21.251 km
		Population	2001
		Household	378

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

<b>Badin 01</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	6.318 sq km
		Pakka Unplanned Area	0.261 sq km
		Settlements	4
		Irrigation and Drainage Network	3.068 km
		Railway Line	2.011 km
		Road Network	13.723 km
		Population	3818
		Household	776
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	4
		Agriculture Area	6.33 sq km
		Water Body	0.39 sq km
		Population	3176
		Household	645
<b>Agricultural Drought</b>	Low	Agriculture Area	0.005 sq km
		Water Body	0.31 sq km
		Population	3
		Household	1
<b>Heatwave</b>	Low - Extreme	Settlements	4
		Population	3164
		Household	642
		Agriculture Area	6.312 sq km
		Pakka Unplanned Area	0.262 sq km
<b>Cyclone</b>	Low	Agriculture Area	6.311 sq km
		Pakka Unplanned Area	0.031 sq km
		Settlements	4
		Irrigation and Drainage Network	3.068 km
		Railway Line	2.011 km
		Road Network	12.941 km
		Population	458
		Household	94
<b>Tsunami</b>	Low - High	Agriculture Area	0.008 sq km
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	

<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge
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<b>Badin 02</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	32.851 sq km
		Kachcha Area	0.033 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Planned Area	3.755 sq km
		Pakka Unplanned Area	2.882 sq km
		Ambulance Services	1
		Bridges	4
		Education Facilities	8
		Grain Mandi	1
		Grid Stations	1
		Health Facilities	17
		Industries	2
		Mobile Towers	16
		Petrol Pumps	18
		Police Stations	3
		Post Offices	4
		Settlements	43
		Welfare Trust	1
		Irrigation and Drainage Network	16.894 km
		Railway Line	6.618 km
		Road Network	85.59 km
		Population	110945
		Household	22137
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	43
		Agriculture Area	33.038 sq km
		Natural Vegetation in Wet Areas	0.315 sq km
		Water Body	4.747 sq km
		Population	92020
		Household	18361
<b>Agricultural Drought</b>	Low	Agriculture Area	0.508 sq km
		Water Body	1.52 sq km
		Population	74
		Household	16
<b>Heatwave</b>	Low - Extreme	Settlements	41
		Population	91717
		Household	18300

		Agriculture Area	32.773 sq km
		Kachcha Area	0.033 sq km
		Pakka Planned Area	3.755 sq km
		Pakka Unplanned Area	2.886 sq km
Cyclone	Low	Agriculture Area	32.802 sq km
		Kachcha Area	0.033 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Planned Area	0.057 sq km
		Pakka Unplanned Area	0.249 sq km
		Bridges	2
		Petrol Pumps	1
		Settlements	43
		Irrigation and Drainage Network	12.709 km
		Railway Line	3.337 km
		Road Network	49.199 km
		Population	5141
		Household	1039
Tsunami	Low - High	Agriculture Area	0.059 sq km
		Pakka Unplanned Area	0.006 sq km
		Railway Network	0.115 km
		Road Network	0.179 km
		Population	111
		Household	22
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	

Badin 03			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	32.899 sq km
		Kachcha Area	0.023 sq km
		Natural Vegetation in Wet Areas	0.002 sq km
		Pakka Unplanned Area	0.866 sq km
		Range Land	0.0001 sq km
		Bridges	1
		Settlements	27
		Irrigation and Drainage Network	12.611 km
		Road Network	54.072 km
		Population	12987
		Household	2640

Meteorological Drought	Medium - Extreme	Settlements	27
		Agriculture Area	32.961 sq km
		Natural Vegetation in Wet Areas	0.092 sq km
		Range Land	0.123 sq km
		Water Body	1.293 sq km
		Population	10907
		Household	2217
Agricultural Drought	Low – Medium	Agriculture Area	1.608 sq km
		Natural Vegetation in Wet Areas	0.109 sq km
		Water Body	0.093 sq km
		Population	115
		Household	23
Heatwave	Low - Extreme	Settlements	26
		Population	10793
		Household	2195
		Agriculture Area	32.874 sq km
		Kachcha Area	0.023 sq km
		Pakka Unplanned Area	0.87 sq km
Cyclone	Low	Agriculture Area	32.863 sq km
		Kachcha Area	0.023 sq km
		Natural Vegetation in Wet Areas	0.002 sq km
		Pakka Unplanned Area	0.211 sq km
		Range Land	0.000123 sq km
		Bridges	1
		Settlements	27
		Irrigation and Drainage Network	12.482 km
		Road Network	50.489 km
		Population	3419
		Household	693
Tsunami	Low - High	Agriculture Area	0.258 sq km
		Natural Vegetation in Wet Areas	0.001 sq km
		Pakka Unplanned Area	0.01 sq km
		Range Land	0.01 sq km
		Irrigation and Drainage Network	0.032 km
		Road Network	0.439 km
		Population	146
		Household	30
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	



<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge
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<b>Bhugra Memon</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	171.081 sq km
		Kachcha Area	0.303 sq km
		Natural Vegetation in Wet Areas	0.068 sq km
		Pakka Unplanned Area	1.528 sq km
		Range Land	0.217 sq km
		Education Facilities	3
		Health Facilities	2
		Settlements	54
		Irrigation and Drainage Network	118.573 km
		Road Network	240.92 km
		Population	26770
		Household	5442
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	54
		Agriculture Area	171.451 sq km
		Bare Area with sparse Natural Vegetation	0.724 sq km
		Natural Vegetation in Wet Areas	11.173 sq km
		Range Land	11.16 sq km
		Water Body	2.061 sq km
		Wet Area	113.467 sq km
		Population	22442
		Household	4560
<b>Agricultural Drought</b>	Low – Extreme	Settlements	29
		Agriculture Area	138.149 sq km
		Bare Area with sparse Natural Vegetation	0.872 sq km
		Natural Vegetation in Wet Areas	12.185 sq km
		Range Land	13.426 sq km
		Water Body	2.352 sq km
		Wet Area	119.9 sq km
		Population	9847
		Household	1999
<b>Heatwave</b>	Low - Extreme	Settlements	51
		Population	22282
		Household	4528
		Agriculture Area	170.958 sq km
		Kachcha Area	0.305 sq km
		Pakka Unplanned Area	1.533 sq km

Cyclone	Low	Agriculture Area	171.037 sq km
		Kachcha Area	0.303 sq km
		Natural Vegetation in Wet Areas	0.024 sq km
		Pakka Unplanned Area	0.227 sq km
		Range Land	0.063 sq km
		Education Facilities	2
		Settlements	54
		Irrigation and Drainage Network	79.83 km
		Road Network	182.864 km
		Population	7758
		Household	1574
Tsunami	Low - High	Agriculture Area	76.564 sq km
		Kachcha Area	0.133 sq km
		Natural Vegetation in Wet Areas	8.779 sq km
		Pakka Unplanned Area	0.408 sq km
		Range Land	6.328 sq km
		Education Facilities	2
		Settlements	19
		Irrigation and Drainage Network	25.607 km
		Road Network	79.462 km
		Population	7912
		Household	1606
Storm Surge	Low - Extreme	Agriculture Area	5.403 sq km
		Natural Vegetation in Wet Areas	7.455 sq km
		Range Land	4.571 sq km
		Settlements	2
		Irrigation and Drainage Network	11.446 km
		Road Network	10.291 km
Riverine Flood	Nil	The Left Bank Outfall Drain (LBOD) passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in LBOD system, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	

<b>Bolhari</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	4.072 sq km
		Kachcha Area	0.067 sq km
		Natural Vegetation in Wet Areas	0.011 sq km
		Range Land	0.02 sq km
		Bridges	1

		Settlements	3
		Road Network	7.251 km
		Population	985
		Household	200
Meteorological Drought	Medium - Extreme	Settlements	3
		Agriculture Area	4.167 sq km
		Bare Area with sparse Natural Vegetation	17.405 sq km
		Natural Vegetation in Wet Areas	0.563 sq km
		Range Land	1.577 sq km
		Wet Area	10.375 sq km
		Population	838
		Household	170
Agricultural Drought	Low - Extreme	Settlements	3
		Agriculture Area	4.965 sq km
		Bare Area with sparse Natural Vegetation	20.747 sq km
		Natural Vegetation in Wet Areas	0.676 sq km
		Range Land	1.893 sq km
		Wet Area	9.829 sq km
		Population	838
		Household	170
Heatwave	Low - Extreme	Settlements	1
		Population	820
		Household	166
		Agriculture Area	4.044 sq km
		Kachcha Area	0.068 sq km
Cyclone	Low	Agriculture Area	4.069 sq km
		Kachcha Area	0.067 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Range Land	0.015 sq km
		Settlements	3
		Road Network	1.392 km
		Population	985
		Household	200
Tsunami	Low - Medium	Agriculture Area	0.613 sq km
		Kachcha Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.205 sq km
		Range Land	0.758 sq km
		Road Network	1.011 km

		Population	10
		Household	2
Storm Surge	Low - Medium	Natural Vegetation in Wet Areas	0.119 sq km
		Range Land	0.613 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

Budho Qambrani			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	150.219 sq km
		Kachcha Area	0.537 sq km
		Pakka Unplanned Area	2.111 sq km
		Range Land	0.169 sq km
		Bridges	1
		Education Facilities	4
		Health Facilities	1
		Settlements	100
		Irrigation and Drainage Network	52.312 km
		Road Network	144.305 km
		Population	37607
		Household	7372
Meteorological Drought	Medium - Extreme	Settlements	100
		Agriculture Area	150.746 sq km
		Range Land	2.536 sq km
		Water Body	2.308 sq km
		Wet Area	21.562 sq km
		Population	31351
		Household	6144
Agricultural Drought	Low - Extreme	Settlements	26
		Agriculture Area	111.002 sq km
		Range Land	3.068 sq km
		Water Body	2.803 sq km
		Wet Area	15.494 sq km
		Population	9397
		Household	1840
Heatwave	Low - Extreme	Settlements	98
		Population	31048
		Household	6079
		Agriculture Area	150.054 sq km
		Kachcha Area	0.541 sq km

		Pakka Unplanned Area	2.122 sq km
<b>Tsunami</b>	Low	Agriculture Area	0.038 sq km
		Range Land	0.001 sq km
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	
<b>Cyclone</b>	Nil	The UC falls out of vulnerable zone for Cyclone	

<b>Chabralo</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	124.106 sq km
		Kachcha Area	1.852 sq km
		Natural Vegetation in Wet Areas	0.062 sq km
		Pakka Unplanned Area	2.058 sq km
		Range Land	0.007 sq km
		Bridges	7
		Mobile Towers	2
		Settlements	76
		Irrigation and Drainage Network	47.904 km
		Road Network	87.939 km
		Population	40827
		Household	8424
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	76
		Agriculture Area	124.564 sq km
		Natural Vegetation in Wet Areas	3.649 sq km
		Range Land	0.169 sq km
		Water Body	14.309 sq km
		Wet Area	3.789 sq km
		Population	34085
		Household	7032
<b>Agricultural Drought</b>	Low - Medium	Agriculture Area	20.75 sq km
		Natural Vegetation in Wet Areas	0.798 sq km
		Range Land	0.081 sq km
		Water Body	3.716 sq km
		Wet Area	1.257 sq km
		Population	469
		Household	97
<b>Heatwave</b>	Low - Extreme	Settlements	76

		Population	33795
		Household	6978
		Agriculture Area	123.951 sq km
		Kachcha Area	1.863 sq km
		Pakka Unplanned Area	2.066 sq km
Cyclone	Low	Agriculture Area	124.052 sq km
		Kachcha Area	1.852 sq km
		Natural Vegetation in Wet Areas	0.048 sq km
		Pakka Unplanned Area	0.305 sq km
		Range Land	0.004 sq km
		Bridges	7
		Mobile Towers	2
		Settlements	76
		Irrigation and Drainage Network	46.97 km
		Road Network	75.713 km
		Population	22625
		Household	4664
Tsunami	Low - High	Agriculture Area	0.191 sq km
		Natural Vegetation in Wet Areas	0.024 sq km
		Road Network	0.078 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	

Dadha			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	170.898 sq km
		Forest Area	0.002 sq km
		Kachcha Area	1.101 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Unplanned Area	1.733 sq km
		Range Land	0.194 sq km
		Bridges	2
		Petrol Pumps	1
		Settlements	78
		Irrigation and Drainage Network	69.838 km
		Road Network	118.778 km
		Population	30250
		Household	6225
Meteorological	Medium - Extreme	Settlements	78

Drought		Agriculture Area	171.275 sq km
		Forest Area	0.048 sq km
		Natural Vegetation in Wet Areas	0.341 sq km
		Range Land	3.477 sq km
		Water Body	0.316 sq km
		Wet Area	9.702 sq km
		Population	25193
		Household	5188
Agricultural Drought	Low - Extreme	Settlements	39
		Agriculture Area	148.217 sq km
		Forest Area	0.051 sq km
		Natural Vegetation in Wet Areas	0.414 sq km
		Range Land	4.056 sq km
		Water Body	0.381 sq km
		Wet Area	10.886 sq km
		Population	11235
		Household	2311
Heatwave	Low - Extreme	Settlements	78
		Population	25016
		Household	5149
		Agriculture Area	170.75 sq km
		Kachcha Area	1.109 sq km
		Pakka Unplanned Area	1.74 sq km
Cyclone	Low	Agriculture Area	44.951 sq km
		Kachcha Area	0.472 sq km
		Pakka Unplanned Area	0.074 sq km
		Range Land	0.003 sq km
		Petrol Pumps	1
		Settlements	24
		Irrigation and Drainage Network	17.484 km
		Road Network	30.662 km
		Population	5785
		Household	1191
Tsunami	Low - High	Agriculture Area	0.508 sq km
		Natural Vegetation in Wet Areas	0.026 sq km
		Pakka Unplanned Area	0.004 sq km
		Range Land	0.021 sq km
		Road Network	0.039 km
		Population	42
		Household	9

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

<b>Dando</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	74.295 sq km
		Kachcha Area	0.137 sq km
		Pakka Planned Area	0.182 sq km
		Pakka Unplanned Area	3.44 sq km
		Range Land	0.108 sq km
		Bus Stops	1
		Education Facilities	7
		Grid Stations	1
		Health Facilities	9
		Industries	2
		Mobile Towers	7
		Petrol Pumps	4
		Police Stations	1
		Post Offices	1
		Settlements	79
		Irrigation and Drainage Network	30.573 km
		Railway Line	8.554 km
		Road Network	111.17 km
		Population	51199
		Household	10601
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	79
		Agriculture Area	74.682 sq km
		Range Land	2.215 sq km
		Water Body	9.828 sq km
		Wet Area	0.212 sq km
		Population	42579
		Household	8815
<b>Agricultural Drought</b>	Low	Agriculture Area	0.942 sq km
		Range Land	2.402 sq km
		Water Body	0.329 sq km
		Population	135
		Household	28
<b>Heatwave</b>	Low - Extreme	Settlements	76
		Population	42213



		Household	8740
		Agriculture Area	74.152 sq km
		Kachcha Area	0.137 sq km
		Pakka Planned Area	0.181 sq km
		Pakka Unplanned Area	3.447 sq km
Cyclone	Low	Agriculture Area	74.216 sq km
		Kachcha Area	0.137 sq km
		Pakka Unplanned Area	0.502 sq km
		Range Land	0.061 sq km
		Education Facilities	1
		Health Facilities	2
		Mobile Towers	2
		Settlements	79
		Irrigation and Drainage Network	30.468 km
		Railway Line	6.579 km
		Road Network	87.485 km
		Population	6741
		Household	1392
Tsunami	Low - High	Agriculture Area	0.024 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	

Dei Jarkas			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	147.692 sq km
		Forest Area	0.279 sq km
		Kachcha Area	0.253 sq km
		Natural Vegetation in Wet Areas	0.095 sq km
		Pakka Unplanned Area	3.472 sq km
		Range Land	0.672 sq km
		Bridges	4
		Education Facilities	7
		Petrol Pumps	4
		Settlements	95
		Irrigation and Drainage Network	79.548 km
		Road Network	158.599 km
		Population	39444
		Household	8130
Meteorological	Medium - Extreme	Settlements	95

Drought		Agriculture Area	148.397 sq km
		Forest Area	5.319 sq km
		Natural Vegetation in Wet Areas	3.17 sq km
		Range Land	18.508 sq km
		Water Body	1.385 sq km
		Wet Area	18.345 sq km
		Population	32964
		Household	6790
Agricultural Drought	Low - Medium	Settlements	21
		Agriculture Area	46.495 sq km
		Forest Area	5.894 sq km
		Natural Vegetation in Wet Areas	3.803 sq km
		Range Land	21.898 sq km
		Water Body	1.652 sq km
		Wet Area	11.289 sq km
		Population	7191
		Household	1482
Heatwave	Low - Extreme	Settlements	89
		Population	32682
		Household	6735
		Agriculture Area	147.507 sq km
		Kachcha Area	0.252 sq km
		Pakka Unplanned Area	3.483 sq km
Cyclone	Low	Agriculture Area	147.592 sq km
		Forest Area	0.117 sq km
		Kachcha Area	0.252 sq km
		Natural Vegetation in Wet Areas	0.052 sq km
		Pakka Unplanned Area	0.703 sq km
		Range Land	0.395 sq km
		Bridges	1
		Petrol Pumps	2
		Settlements	95
		Irrigation and Drainage Network	62.594 km
		Road Network	109.186 km
		Population	10125
		Household	2080
Tsunami	Low - High	Agriculture Area	10.266 sq km
		Forest Area	0.112 sq km
		Kachcha Area	0.013 sq km
		Natural Vegetation in Wet Areas	0.447 sq km

		Pakka Unplanned Area	0.155 sq km
		Range Land	1.503 sq km
		Bridges	1
		Petrol Pumps	1
		Settlements	2
		Irrigation and Drainage Network	5.956 km
		Road Network	12.079 km
		Population	1781
		Household	369
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	

Dubi			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	174.728 sq km
		Forest Area	0.005 sq km
		Kachcha Area	0.363 sq km
		Pakka Unplanned Area	1.989 sq km
		Range Land	0.017 sq km
		Education Facilities	1
		Settlements	72
		Irrigation and Drainage Network	108.184 km
		Road Network	124.662 km
		Population	25021
		Household	4753
Meteorological Drought	Medium - Extreme	Settlements	72
		Agriculture Area	175.142 sq km
		Bare Area with sparse Natural Vegetation	0.424 sq km
		Forest Area	0.085 sq km
		Range Land	0.694 sq km
		Wet Area	17.513 sq km
		Population	20923
		Household	3971
Agricultural Drought	Low	Agriculture Area	27.272 sq km
		Forest Area	0.069 sq km
		Range Land	0.382 sq km
		Wet Area	0.07 sq km
		Population	255
		Household	48

<b>Heatwave</b>	Low - Extreme	Settlements	69
		Population	20705
		Household	3927
		Agriculture Area	174.571 sq km
		Kachcha Area	0.363 sq km
		Pakka Unplanned Area	1.997 sq km
<b>Cyclone</b>	Low	Agriculture Area	174.672 sq km
		Forest Area	0.005 sq km
		Kachcha Area	0.363 sq km
		Pakka Unplanned Area	0.427 sq km
		Range Land	0.014 sq km
		Settlements	72
		Irrigation and Drainage Network	101.493 km
		Road Network	117.398 km
		Population	8390
		Household	1588
<b>Tsunami</b>	Low - High	Agriculture Area	0.038 sq km
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>Dumbalo</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	84.516 sq km
		Forest Area	0.002 sq km
		Kachcha Area	0.035 sq km
		Pakka Unplanned Area	2.471 sq km
		Range Land	0.064 sq km
		Bridges	1
		Education Facilities	7
		Grain Mandi	1
		Health Facilities	3
		Mobile Towers	6
		Petrol Pumps	4
		Settlements	96
		Irrigation and Drainage Network	35.101 km
		Road Network	105.388 km
		Population	35949
		Household	7038

Meteorological Drought	Medium - Extreme	Settlements	96
		Agriculture Area	84.668 sq km
		Forest Area	0.098 sq km
		Range Land	1.737 sq km
		Water Body	0.049 sq km
		Wet Area	3.292 sq km
		Population	29828
		Household	5842
Agricultural Drought	Low	Settlements	1
		Agriculture Area	8.55 sq km
		Range Land	0.316 sq km
		Wet Area	0.001 sq km
		Population	109
		Household	22
Heatwave	Low - Extreme	Settlements	92
		Population	29533
		Household	5782
		Agriculture Area	84.454 sq km
		Kachcha Area	0.035 sq km
		Pakka Unplanned Area	2.476 sq km
Tsunami	Nil	Agriculture Area	0.038 sq km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
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>Gharo</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	206.358 sq km
		Natural Vegetation in Wet Areas	0.063 sq km
		Pakka Unplanned Area	3.331 sq km
		Range Land	0.108 sq km
		Bridges	2
		Bus Stops	1
		Education Facilities	6
		Health Facilities	2
		Settlements	92
		Irrigation and Drainage Network	67.954 km
		Road Network	173.288 km

		Population	35454
		Household	6736
Meteorological Drought	Medium - Extreme	Settlements	92
		Agriculture Area	206.706 sq km
		Natural Vegetation in Wet Areas	1.884 sq km
		Range Land	1.422 sq km
		Water Body	6.063 sq km
		Wet Area	0.604 sq km
		Population	29644
		Household	5625
Agricultural Drought	Low - High	Settlements	11
		Agriculture Area	59.969 sq km
		Natural Vegetation in Wet Areas	1.595 sq km
		Range Land	1.187 sq km
		Water Body	2.522 sq km
		Wet Area	0.276 sq km
		Population	3299
		Household	624
Heatwave	Low - Extreme	Settlements	87
		Population	29413
		Household	5579
		Agriculture Area	206.223 sq km
		Pakka Unplanned Area	3.344 sq km
Cyclone	Low	Agriculture Area	206.25 sq km
		Natural Vegetation in Wet Areas	0.048 sq km
		Pakka Unplanned Area	0.63 sq km
		Range Land	0.051 sq km
		Bridges	2
		Bus Stops	1
		Education Facilities	4
		Health Facilities	1
		Settlements	92
		Irrigation and Drainage Network	63.528 km
		Road Network	154.84 km
		Population	6699
		Household	1267
Tsunami	Low - High	Agriculture Area	0.432 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Unplanned Area	0.004 sq km

		Range Land	0.003 sq km
		Irrigation and Drainage Network	0.086 km
		Road Network	0.438 km
		Population	43
		Household	8
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	

Ghulam Shah Laghari			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	88.555 sq km
		Forest Area	0.015 sq km
		Kachcha Area	0.355 sq km
		Natural Vegetation in Wet Areas	0.014 sq km
		Pakka Unplanned Area	2.445 sq km
		Range Land	0.137 sq km
		Ambulance Services	1
		Bridges	1
		Education Facilities	8
		Health Facilities	5
		Mobile Towers	8
		Petrol Pumps	4
		Police Stations	1
		Settlements	53
		Irrigation and Drainage Network	17.372 km
		Road Network	80.794 km
		Population	60653
		Household	11783
Meteorological Drought	Medium - Extreme	Settlements	53
		Agriculture Area	88.756 sq km
		Forest Area	0.586 sq km
		Natural Vegetation in Wet Areas	1.573 sq km
		Range Land	3.119 sq km
		Water Body	0.669 sq km
		Wet Area	2.91 sq km
		Population	50124
		Household	9738
Agricultural Drought	Low - Medium	Settlements	21
		Agriculture Area	82.21 sq km
		Forest Area	0.618 sq km

		Natural Vegetation in Wet Areas	1.918 sq km
		Range Land	3.762 sq km
		Water Body	0.789 sq km
		Wet Area	2.933 sq km
		Population	10181
		Household	1990
Heatwave	Low - Extreme	Settlements	50
		Population	49810
		Household	9676
		Agriculture Area	88.493 sq km
		Kachcha Area	0.357 sq km
		Pakka Unplanned Area	2.45 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	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Haji Sanwal			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	92.99 sq km
		Kachcha Area	0.1 sq km
		Natural Vegetation in Wet Areas	0.035 sq km
		Pakka Unplanned Area	2.408 sq km
		Range Land	0.047 sq km
		Bridges	2
		Bus Stops	2
		Education Facilities	8
		Health Facilities	1
		Mobile Towers	6
		Petrol Pumps	2
		Police Stations	1
		Settlements	103
		Irrigation and Drainage Network	43.448 km
		Road Network	80.896 km
		Population	35773
		Household	7002
Meteorological Drought	Medium - Extreme	Settlements	103
		Agriculture Area	93.4 sq km



		Natural Vegetation in Wet Areas	1.402 sq km
		Range Land	0.696 sq km
		Water Body	5.354 sq km
		Wet Area	4.142 sq km
		Population	29864
		Household	5853
Agricultural Drought	Low - Medium	Settlements	16
		Agriculture Area	33.369 sq km
		Natural Vegetation in Wet Areas	1.693 sq km
		Range Land	0.564 sq km
		Water Body	3.142 sq km
		Wet Area	0.007 sq km
		Population	2833
		Household	552
Heatwave	Low - Extreme	Settlements	103
		Population	29536
		Household	5782
		Agriculture Area	92.844 sq km
		Kachcha Area	0.101 sq km
		Pakka Unplanned Area	2.421 sq km
Cyclone	Low	Agriculture Area	91.449 sq km
		Kachcha Area	0.1 sq km
		Natural Vegetation in Wet Areas	0.031 sq km
		Pakka Unplanned Area	0.599 sq km
		Range Land	0.024 sq km
		Bridges	2
		Education Facilities	2
		Health Facilities	1
		Settlements	100
		Irrigation and Drainage Network	41.205 km
		Road Network	69.494 km
		Population	9942
		Household	1944
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	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

#### Hale Pota

Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	83.845 sq km
		Forest Area	0.012 sq km
		Kachcha Area	0.123 sq km
		Natural Vegetation in Wet Areas	0.011 sq km
		Pakka Unplanned Area	2.484 sq km
		Range Land	0.207 sq km
		Bridges	2
		Education Facilities	3
		Mobile Towers	1
		Petrol Pumps	2
		Settlements	88
		Irrigation and Drainage Network	26.752 km
		Road Network	141.951 km
		Population	37405
		Household	7325
Meteorological Drought	Medium - Extreme	Settlements	88
		Agriculture Area	84.106 sq km
		Forest Area	0.432 sq km
		Natural Vegetation in Wet Areas	0.969 sq km
		Range Land	5.625 sq km
		Water Body	0.541 sq km
		Wet Area	2.275 sq km
		Population	31036
		Household	6075
Agricultural Drought	Low	Agriculture Area	0.671 sq km
		Natural Vegetation in Wet Areas	0.504 sq km
		Range Land	0.681 sq km
		Water Body	0.484 sq km
		Wet Area	0.005 sq km
		Population	43
		Household	9
Heatwave	Low - Extreme	Settlements	84
		Population	30744
		Household	6022
		Agriculture Area	83.755 sq km
		Kachcha Area	0.123 sq km
		Pakka Unplanned Area	2.495 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

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

<b>Kadhan</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	91.661 sq km
		Kachcha Area	0.005 sq km
		Pakka Unplanned Area	1.843 sq km
		Range Land	0.021 sq km
		Bridges	1
		Grid Stations	1
		Health Facilities	1
		Mobile Towers	2
		Petrol Pumps	2
		Police Stations	1
		Post Offices	1
		Settlements	29
		Irrigation and Drainage Network	45.716 km
		Road Network	95.154 km
		Population	26153
		Household	5346
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	29
		Agriculture Area	91.77 sq km
		Range Land	0.354 sq km
		Water Body	3.678 sq km
		Wet Area	1.52 sq km
		Population	21853
		Household	4466
<b>Agricultural Drought</b>	Low - Medium	Settlements	2
		Agriculture Area	17.021 sq km
		Range Land	0.416 sq km
		Wet Area	0.325 sq km
		Population	394
		Household	79
<b>Heatwave</b>	Low - Extreme	Settlements	29
		Population	21747
		Household	4444
		Agriculture Area	91.606 sq km

		Kachcha Area	0.005 sq km
		Pakka Unplanned Area	1.85 sq km
<b>Cyclone</b>	Low	Agriculture Area	91.62 sq km
		Kachcha Area	0.005 sq km
		Pakka Unplanned Area	0.21 sq km
		Range Land	0.013 sq km
		Grid Stations	1
		Settlements	29
		Irrigation and Drainage Network	42.517 km
		Road Network	85.666 km
		Population	3127
		Household	635
<b>Tsunami</b>	Low - High	Agriculture Area	22.801 sq km
		Kachcha Area	0.005 sq km
		Pakka Unplanned Area	0.325 sq km
		Range Land	0.191 sq km
		Settlements	4
		Irrigation and Drainage Network	9.311 km
		Road Network	24.627 km
		Population	4685
		Household	956
<b>Riverine Flood</b>	Nil	The Left Bank Outfall Drain (LBOD) passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in LBOD system, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>Kadi Kazia</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	159.508 sq km
		Kachcha Area	0.069 sq km
		Natural Vegetation in Wet Areas	0.03 sq km
		Pakka Planned Area	0.049 sq km
		Pakka Unplanned Area	2.021 sq km
		Range Land	0.01 sq km
		Bridges	4
		Education Facilities	1
		Health Facilities	1
		Mobile Towers	3

		Petrol Pumps	1
		Settlements	57
		Irrigation and Drainage Network	61.441 km
		Road Network	152.2 km
		Population	28239
		Household	5662
Meteorological Drought	Medium - Extreme	Settlements	57
		Agriculture Area	159.844 sq km
		Natural Vegetation in Wet Areas	2.284 sq km
		Range Land	0.507 sq km
		Water Body	11.483 sq km
		Wet Area	1.151 sq km
		Population	23663
		Household	4742
Agricultural Drought	Low - High	Settlements	5
		Agriculture Area	22.818 sq km
		Natural Vegetation in Wet Areas	1.784 sq km
		Range Land	0.142 sq km
		Water Body	2.746 sq km
		Wet Area	0.667 sq km
		Population	1938
		Household	375
Heatwave	Low - Extreme	Settlements	55
		Population	23466
		Household	4704
		Agriculture Area	159.381 sq km
		Kachcha Area	0.07 sq km
		Pakka Planned Area	0.049 sq km
		Pakka Unplanned Area	2.031 sq km
Cyclone	Low	Agriculture Area	159.439 sq km
		Kachcha Area	0.069 sq km
		Natural Vegetation in Wet Areas	0.03 sq km
		Pakka Planned Area	0.001 sq km
		Pakka Unplanned Area	0.356 sq km
		Range Land	0.01 sq km
		Bridges	4
		Education Facilities	1
		Mobile Towers	2
		Settlements	57
		Irrigation and Drainage Network	58.957 km

		Road Network	137.392 km
		Population	5905
		Household	1188
Tsunami	Low - High	Agriculture Area	1.61 sq km
		Kachcha Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.143 sq km
		Pakka Unplanned Area	0.023 sq km
		Irrigation and Drainage Network	0.58 km
		Road Network	1.871 km
		Population	307
		Household	65
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	

Kario			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	66.329 sq km
		Kachcha Area	0.309 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Unplanned Area	2.817 sq km
		Range Land	0.027 sq km
		Education Facilities	2
		Health Facilities	2
		Mobile Towers	8
		Petrol Pumps	4
		Settlements	85
		Irrigation and Drainage Network	21.326 km
		Road Network	48.314 km
		Population	39371
		Household	7597
Meteorological Drought	Medium - Extreme	Settlements	85
		Agriculture Area	66.546 sq km
		Natural Vegetation in Wet Areas	0.137 sq km
		Range Land	0.257 sq km
		Water Body	0.94 sq km
		Wet Area	4.218 sq km
		Population	32768
		Household	6320

Agricultural Drought	Low	Agriculture Area	0.061 sq km
		Population	20
		Household	4
Heatwave	Low - Extreme	Settlements	77
		Population	32499
		Household	6273
		Agriculture Area	66.253 sq km
		Kachcha Area	0.309 sq km
		Pakka Unplanned Area	2.823 sq km
Cyclone	Low	Agriculture Area	66.27 sq km
		Kachcha Area	0.309 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Unplanned Area	0.449 sq km
		Range Land	0.005 sq km
		Education Facilities	1
		Mobile Towers	2
		Settlements	85
		Irrigation and Drainage Network	18.1 km
		Road Network	38.094 km
		Population	8254
		Household	1573
Tsunami	Nil	The UC falls out of vulnerable zone for Riverine Flood	
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>Khadharo</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	113.553 sq km
		Kachcha Area	1.466 sq km
		Pakka Unplanned Area	3.289 sq km
		Range Land	0.012 sq km
		Bridges	1
		Education Facilities	7
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	2
		Settlements	79
		Irrigation and Drainage Network	37.464 km

		Road Network	111.371 km
		Population	49641
		Household	10231
Meteorological Drought	Medium - Extreme	Settlements	79
		Agriculture Area	113.798 sq km
		Range Land	0.069 sq km
		Water Body	5.526 sq km
		Wet Area	4.094 sq km
		Population	41322
		Household	8520
Agricultural Drought	Low - High	Settlements	24
		Agriculture Area	53.619 sq km
		Range Land	0.084 sq km
		Water Body	4.746 sq km
		Wet Area	3.514 sq km
		Population	12546
		Household	2576
Heatwave	Low - Extreme	Settlements	77
		Population	40978
		Household	8437
		Agriculture Area	113.463 sq km
		Kachcha Area	1.473 sq km
		Pakka Unplanned Area	3.298 sq km
Cyclone	Low	Agriculture Area	63.432 sq km
		Kachcha Area	0.8 sq km
		Pakka Unplanned Area	0.317 sq km
		Bridges	1
		Education Facilities	2
		Settlements	46
		Irrigation and Drainage Network	15.934 km
		Road Network	54.267 km
		Population	11533
		Household	2385
Tsunami	Low - Medium	Agriculture Area	0.046 sq km
		Pakka Unplanned Area	0.006 sq km
		Range Land	0.000013 sq km
		Road Network	0.064 km
		Population	64
		Household	14



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

<b>Khairpur</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	124.16 sq km
		Forest Area	0.061 sq km
		Kachcha Area	0.128 sq km
		Pakka Unplanned Area	3.442 sq km
		Range Land	0.263 sq km
		Bridges	1
		Education Facilities	19
		Health Facilities	4
		Mobile Towers	3
		Petrol Pumps	2
		Police Stations	1
		Settlements	87
		Irrigation and Drainage Network	50.546 km
		Road Network	105.104 km
		Population	37612
		Household	7753
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	87
		Agriculture Area	124.592 sq km
		Forest Area	0.626 sq km
		Range Land	10.488 sq km
		Wet Area	13.064 sq km
		Population	31304
		Household	6452
<b>Agricultural Drought</b>	Low - High	Settlements	38
		Agriculture Area	75.784 sq km
		Forest Area	0.645 sq km
		Range Land	12.171 sq km
		Wet Area	12.544 sq km
		Population	14402
		Household	2966
<b>Heatwave</b>	Low - Extreme	Settlements	85
		Population	31078
		Household	6409

		Agriculture Area	123.997 sq km
		Kachcha Area	0.129 sq km
		Pakka Unplanned Area	3.454 sq km
Cyclone	Low	Agriculture Area	3.189 sq km
		Pakka Unplanned Area	0.002 sq km
		Settlements	2
		Irrigation and Drainage Network	2.563 km
		Population	25
		Household	5
Tsunami	Low - High	Agriculture Area	0.793 sq km
		Pakka Unplanned Area	0.018 sq km
		Range Land	0.096 sq km
		Road Network	0.541 km
		Population	187
		Household	37
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	

Khalifo Qasim			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	200.368 sq km
		Kachcha Area	0.819 sq km
		Natural Vegetation in Wet Areas	0.012 sq km
		Pakka Unplanned Area	3.888 sq km
		Range Land	0.016 sq km
		Bridges	4
		Bus Stops	1
		Education Facilities	2
		Mobile Towers	2
		Settlements	109
		Irrigation and Drainage Network	53.802 km
		Road Network	114.99 km
		Population	49848
		Household	10280
Meteorological Drought	Medium - Extreme	Settlements	109
		Agriculture Area	200.929 sq km
		Natural Vegetation in Wet Areas	0.694 sq km
		Range Land	0.325 sq km

		Water Body	12.165 sq km
		Wet Area	10.797 sq km
		Population	41574
		Household	8579
Agricultural Drought	Low - High	Settlements	12
		Agriculture Area	30.742 sq km
		Natural Vegetation in Wet Areas	0.267 sq km
		Range Land	0.364 sq km
		Water Body	1.658 sq km
		Wet Area	2.81 sq km
		Population	6248
		Household	1288
Heatwave	Low - Extreme	Settlements	107
		Population	41283
		Household	8513
		Agriculture Area	200.199 sq km
		Kachcha Area	0.822 sq km
		Pakka Unplanned Area	3.902 sq km
Cyclone	Low	Agriculture Area	193.394 sq km
		Kachcha Area	0.735 sq km
		Natural Vegetation in Wet Areas	0.012 sq km
		Pakka Unplanned Area	0.729 sq km
		Range Land	0.009 sq km
		Bridges	3
		Bus Stops	1
		Mobile Towers	1
		Settlements	106
		Irrigation and Drainage Network	47.905 km
		Road Network	98.573 km
		Population	15510
		Household	3194
Tsunami	Low - High	Agriculture Area	2.129 sq km
		Kachcha Area	0.002 sq km
		Natural Vegetation in Wet Areas	0.017 sq km
		Pakka Unplanned Area	0.029 sq km
		Irrigation and Drainage Network	0.03 km
		Road Network	1.372 km
		Population	324
		Household	66

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

<b>Khor Wah</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	202.366 sq km
		Forest Area	0.02 sq km
		Kachcha Area	0.83 sq km
		Pakka Unplanned Area	3.542 sq km
		Range Land	0.052 sq km
		Bridges	6
		Education Facilities	5
		Mobile Towers	9
		Petrol Pumps	3
		Police Stations	1
		Settlements	92
		Irrigation and Drainage Network	89.309 km
		Road Network	179.489 km
		Population	46535
		Household	8842
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	92
		Agriculture Area	202.685 sq km
		Forest Area	0.305 sq km
		Range Land	3.006 sq km
		Water Body	0.072 sq km
		Wet Area	10.06 sq km
		Population	38836
		Household	7371
<b>Agricultural Drought</b>	Low - Medium	Settlements	13
		Agriculture Area	78.54 sq km
		Forest Area	0.336 sq km
		Range Land	3.602 sq km
		Water Body	0.07 sq km
		Wet Area	2.575 sq km
		Population	4955
		Household	939
<b>Heatwave</b>	Low - Extreme	Settlements	90

		Population	38602
		Household	7332
		Agriculture Area	202.194 sq km
		Kachcha Area	0.835 sq km
		Pakka Unplanned Area	3.554 sq km
Cyclone	Low	Agriculture Area	202.28 sq km
		Forest Area	0.014 sq km
		Kachcha Area	0.829 sq km
		Pakka Unplanned Area	0.63 sq km
		Range Land	0.051 sq km
		Bridges	5
		Education Facilities	2
		Mobile Towers	3
		Petrol Pumps	1
		Settlements	92
		Irrigation and Drainage Network	76.591 km
		Road Network	152.741 km
		Population	15524
		Household	2949
Tsunami	Low - High	Agriculture Area	0.135 sq km
		Pakka Unplanned Area	0.003 sq km
		Range Land	0.002 sq km
		Road Network	0.133 km
		Population	28
		Household	5
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>Khoski</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	110.173 sq km
		Forest Area	0.03 sq km
		Kachcha Area	0.183 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Planned Area	0.417 sq km
		Pakka Unplanned Area	4.138 sq km
		Range Land	0.001 sq km
		Bridges	6
		Education Facilities	10

		Grain Mandi	1
		Health Facilities	2
		Industries	1
		Mobile Towers	7
		Petrol Pumps	8
		Police Stations	1
		Settlements	63
		Irrigation and Drainage Network	50 km
		Road Network	133.236 km
		Population	65643
		Household	13417
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	63
		Agriculture Area	110.514 sq km
		Forest Area	0.159 sq km
		Natural Vegetation in Wet Areas	0.306 sq km
		Range Land	0.048 sq km
		Water Body	5.163 sq km
		Wet Area	6.738 sq km
		Population	54725
		Household	11180
<b>Agricultural Drought</b>	Low	Agriculture Area	3.346 sq km
		Forest Area	0.177 sq km
		Natural Vegetation in Wet Areas	0.291 sq km
		Range Land	0.056 sq km
		Wet Area	0.006 sq km
		Population	14
		Household	2
<b>Heatwave</b>	Low - Extreme	Settlements	61
		Population	54376
		Household	11116
		Agriculture Area	110.075 sq km
		Kachcha Area	0.183 sq km
		Pakka Planned Area	0.418 sq km
		Pakka Unplanned Area	4.151 sq km
<b>Cyclone</b>	Low	Agriculture Area	110.08 sq km
		Forest Area	0.009 sq km
		Kachcha Area	0.183 sq km
		Natural Vegetation in Wet Areas	0.007 sq km
		Pakka Planned Area	0.002 sq km
		Pakka Unplanned Area	0.514 sq km

		Range Land	0.001 sq km
		Bridges	5
		Education Facilities	2
		Petrol Pumps	6
		Settlements	63
		Irrigation and Drainage Network	46.572 km
		Road Network	113.71 km
		Population	8316
		Household	1705
Tsunami	Low - High	Agriculture Area	3.593 sq km
		Forest Area	0.006 sq km
		Kachcha Area	0.008 sq km
		Natural Vegetation in Wet Areas	0.054 sq km
		Pakka Planned Area	0.001 sq km
		Pakka Unplanned Area	0.125 sq km
		Settlements	2
		Irrigation and Drainage Network	0.704 km
		Road Network	3.512 km
		Population	1955
		Household	405
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	

Lunwari Sharif			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	107.178 sq km
		Natural Vegetation in Wet Areas	0.132 sq km
		Pakka Planned Area	0.186 sq km
		Pakka Unplanned Area	1.81 sq km
		Range Land	0.041 sq km
		Bridges	3
		Education Facilities	6
		Health Facilities	2
		Mobile Towers	4
		Settlements	48
		Irrigation and Drainage Network	55.132 km
		Road Network	156.608 km
		Population	26453
		Household	5380

Meteorological Drought	Medium - Extreme	Settlements	48
		Agriculture Area	107.412 sq km
		Natural Vegetation in Wet Areas	3.712 sq km
		Range Land	0.732 sq km
		Water Body	6.398 sq km
		Wet Area	6.58 sq km
		Population	22115
		Household	4496
Agricultural Drought	Low - High	Agriculture Area	17.79 sq km
		Natural Vegetation in Wet Areas	1.459 sq km
		Range Land	0.7 sq km
		Water Body	2.471 sq km
		Wet Area	2.708 sq km
		Population	195
		Household	41
Heatwave	Low - Extreme	Settlements	47
		Population	21964
		Household	4467
		Agriculture Area	107.076 sq km
		Pakka Planned Area	0.186 sq km
		Pakka Unplanned Area	1.815 sq km
Cyclone	Low	Agriculture Area	107.117 sq km
		Natural Vegetation in Wet Areas	0.061 sq km
		Pakka Planned Area	0.004 sq km
		Pakka Unplanned Area	0.315 sq km
		Range Land	0.014 sq km
		Bridges	3
		Education Facilities	3
		Mobile Towers	2
		Settlements	48
		Irrigation and Drainage Network	49.577 km
		Road Network	136.074 km
		Population	4605
Household	933		
Tsunami	Low - High	Agriculture Area	4.628 sq km
		Natural Vegetation in Wet Areas	0.222 sq km
		Pakka Planned Area	0.013 sq km
		Pakka Unplanned Area	0.031 sq km
		Range Land	0.022 sq km
		Bridges	1



		Irrigation and Drainage Network	1.363 km
		Road Network	5.823 km
		Population	458
		Household	93
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	

Malhan			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	81.593 sq km
		Kachcha Area	0.037 sq km
		Natural Vegetation in Wet Areas	0.104 sq km
		Pakka Planned Area	0.005 sq km
		Pakka Unplanned Area	2.094 sq km
		Range Land	0.01 sq km
		Bridges	2
		Bus Stops	2
		Education Facilities	2
		Mobile Towers	2
		Petrol Pumps	4
		Settlements	65
		Irrigation and Drainage Network	35.198 km
		Road Network	94.901 km
		Population	30753
		Household	6019
Meteorological Drought	Medium - Extreme	Settlements	65
		Agriculture Area	81.972 sq km
		Natural Vegetation in Wet Areas	4.461 sq km
		Range Land	0.169 sq km
		Water Body	4.425 sq km
		Wet Area	3.198 sq km
		Population	25556
		Household	5004
Agricultural Drought	Low - Medium	Settlements	4
		Agriculture Area	21.425 sq km
		Natural Vegetation in Wet Areas	5.283 sq km
		Range Land	0.202 sq km
		Water Body	3.665 sq km
		Wet Area	1.389 sq km
		Population	5609

		Household	1097
<b>Heatwave</b>	Low - Extreme	Settlements	65
		Population	25311
		Household	4955
		Agriculture Area	81.471 sq km
		Kachcha Area	0.037 sq km
		Pakka Planned Area	0.005 sq km
		Pakka Unplanned Area	2.1 sq km
<b>Cyclone</b>	Low	Agriculture Area	26.56 sq km
		Natural Vegetation in Wet Areas	0.04 sq km
		Pakka Planned Area	0.005 sq km
		Pakka Unplanned Area	0.133 sq km
		Range Land	0.001 sq km
		Bridges	1
		Education Facilities	2
		Settlements	28
		Irrigation and Drainage Network	19.28 km
		Road Network	26.241 km
		Population	2073
		Household	402
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Tsunami</b>	Nil	The UC falls out of vulnerable zone for Tsunami	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>Manik Laghari</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	110.999 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.202 sq km
		Natural Vegetation in Wet Areas	0.001 sq km
		Pakka Unplanned Area	2.836 sq km
		Range Land	0.293 sq km
		Bridges	1
		Education Facilities	7
		Mobile Towers	3
		Settlements	95
		Tourist Places	1
		Irrigation and Drainage Network	20.88 km

		Road Network	97.501 km
		Population	43585
		Household	8534
Meteorological Drought	Medium - Extreme	Settlements	95
		Agriculture Area	111.275 sq km
		Forest Area	0.064 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Range Land	8.302 sq km
		Water Body	0.688 sq km
		Wet Area	1.677 sq km
		Population	36108
		Household	7073
Agricultural Drought	Low - Medium	Settlements	20
		Agriculture Area	67.121 sq km
		Forest Area	0.078 sq km
		Natural Vegetation in Wet Areas	0.009 sq km
		Range Land	9.384 sq km
		Water Body	0.817 sq km
		Wet Area	0.004 sq km
		Population	7549
		Household	1475
Heatwave	Low - Extreme	Settlements	93
		Population	35814
		Household	7017
		Agriculture Area	110.906 sq km
		Kachcha Area	0.203 sq km
		Pakka Unplanned Area	2.845 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

<b>Matli 01</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	9.592 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Planned Area	1.658 sq km

		Pakka Unplanned Area	0.314 sq km
		Bridges	2
		Education Facilities	13
		Health Facilities	12
		Mobile Towers	3
		Petrol Pumps	7
		Post Offices	1
		Settlements	10
		Irrigation and Drainage Network	6.704 km
		Road Network	29.725 km
		Population	61901
		Household	11241
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	10
		Agriculture Area	9.646 sq km
		Natural Vegetation in Wet Areas	0.222 sq km
		Water Body	0.795 sq km
		Wet Area	0.088 sq km
		Population	51088
		Household	9277
<b>Agricultural Drought</b>	Low	Agriculture Area	0.181 sq km
		Water Body	0.021 sq km
<b>Heatwave</b>	Low - Extreme	Settlements	9
		Population	50846
		Household	9231
		Agriculture Area	9.564 sq km
		Pakka Planned Area	1.659 sq km
		Pakka Unplanned Area	0.314 sq km
<b>Cyclone</b>	Low	Agriculture Area	6.784 sq km
		Natural Vegetation in Wet Areas	0.003 sq km
		Pakka Planned Area	0.015 sq km
		Pakka Unplanned Area	0.064 sq km
		Bridges	1
		Education Facilities	1
		Health Facilities	1
		Petrol Pumps	1
		Settlements	10
		Irrigation and Drainage Network	3.944 km
		Road Network	14.701 km
		Population	1612
		Household	303

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

<b>Matli 02</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	6.341 sq km
		Natural Vegetation in Wet Areas	0.018 sq km
		Pakka Planned Area	0.127 sq km
		Pakka Unplanned Area	0.295 sq km
		Bridges	1
		Mobile Towers	1
		Settlements	16
		Irrigation and Drainage Network	5.457 km
		Road Network	17.918 km
		Population	8569
		Household	1612
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	16
		Agriculture Area	6.374 sq km
		Natural Vegetation in Wet Areas	0.491 sq km
		Water Body	0.785 sq km
		Wet Area	0.149 sq km
		Population	7111
		Household	1335
<b>Heatwave</b>	Low - Extreme	Settlements	16
		Population	7038
		Household	1324
		Agriculture Area	6.332 sq km
		Pakka Planned Area	0.127 sq km
		Pakka Unplanned Area	0.295 sq km
<b>Cyclone</b>	Low	Agriculture Area	6.329 sq km
		Natural Vegetation in Wet Areas	0.011 sq km
		Pakka Planned Area	0.009 sq km
		Pakka Unplanned Area	0.098 sq km
		Bridges	1
		Settlements	16
		Irrigation and Drainage Network	4.738 km
		Road Network	15.429 km

		Population	1710
		Household	328
<b>Agricultural Drought</b>	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Tsunami</b>	Nil	The UC falls out of vulnerable zone for Tsunami	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	

Mithi			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	129.975 sq km
		Forest Area	0.019 sq km
		Kachcha Area	1.845 sq km
		Pakka Unplanned Area	2.36 sq km
		Range Land	0.466 sq km
		Bridges	1
		Education Facilities	3
		Settlements	116
		Irrigation and Drainage Network	70.96 km
		Road Network	203.654 km
		Population	55315
		Household	11295
Meteorological Drought	Medium - Extreme	Settlements	116
		Agriculture Area	130.816 sq km
		Bare Area with sparse Natural Vegetation	98.418 sq km
		Forest Area	0.425 sq km
		Range Land	9.673 sq km
		Water Body	1.569 sq km
		Wet Area	6.978 sq km
		Population	46553
		Household	9505
Agricultural Drought	Low - High	Settlements	21
		Agriculture Area	32.581 sq km
		Bare Area with sparse Natural Vegetation	86.132 sq km
		Forest Area	0.487 sq km
		Range Land	10.887 sq km
		Water Body	1.879 sq km

		Wet Area	0.932 sq km
		Population	11381
		Household	2330
Heatwave	Low - Extreme	Settlements	111
		Population	45927
		Household	9376
		Agriculture Area	129.754 sq km
		Kachcha Area	1.849 sq km
		Pakka Unplanned Area	2.365 sq km
Cyclone	Low	Agriculture Area	129.896 sq km
		Forest Area	0.011 sq km
		Kachcha Area	1.845 sq km
		Pakka Unplanned Area	0.5 sq km
		Range Land	0.274 sq km
		Bridges	1
		Education Facilities	2
		Settlements	116
		Irrigation and Drainage Network	62.536 km
		Road Network	153.999 km
		Population	31955
		Household	6515
Tsunami	Low - High	Agriculture Area	20.87 sq km
		Forest Area	0.064 sq km
		Kachcha Area	0.084 sq km
		Pakka Unplanned Area	0.22 sq km
		Range Land	0.704 sq km
		Bridges	1
		Education Facilities	1
		Settlements	11
		Irrigation and Drainage Network	8.557 km
		Road Network	31.678 km
		Population	4089
		Household	835
Riverinesss Flood	Nil	The Left Bank Outfall Drain (LBOD) passes through the UC and has potential to produce flooding during monsoon / heavy rains. In case of excessive water in LBOD system, overtopping / breaching and consequent residual risk of flooding cannot be ruled out for UC.	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Mohammad Khan Bhurgri			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	89.762 sq km
		Kachcha Area	0.019 sq km
		Natural Vegetation in Wet Areas	0.023 sq km
		Pakka Planned Area	1.238 sq km
		Pakka Unplanned Area	2.897 sq km
		Bridges	2
		Education Facilities	4
		Health Facilities	1
		Industries	2
		Mobile Towers	4
		Petrol Pumps	1
		Police Stations	1
		Settlements	89
		Irrigation and Drainage Network	37.147 km
		Road Network	171.147 km
		Population	53509
		Household	10819
Meteorological Drought	Medium - Extreme	Settlements	89
		Agriculture Area	90.125 sq km
		Natural Vegetation in Wet Areas	0.605 sq km
		Range Land	0.024 sq km
		Water Body	9.896 sq km
		Wet Area	0.897 sq km
		Population	44700
		Household	9034
Agricultural Drought	Low	Agriculture Area	0.147 sq km
		Water Body	1.865 sq km
		Wet Area	0.000017 sq km
		Population	96
		Household	19
Heatwave	Low - Extreme	Settlements	88
		Population	44294
		Household	8961
		Agriculture Area	89.624 sq km
		Kachcha Area	0.019 sq km
		Pakka Planned Area	1.238 sq km
		Pakka Unplanned Area	2.905 sq km
Cyclone	Low	Agriculture Area	89.649 sq km



		Kachcha Area	0.019 sq km
		Natural Vegetation in Wet Areas	0.018 sq km
		Pakka Planned Area	0.021 sq km
		Pakka Unplanned Area	0.664 sq km
		Range Land	0.000122 sq km
		Bridges	2
		Education Facilities	2
		Health Facilities	1
		Mobile Towers	1
		Settlements	89
		Irrigation and Drainage Network	34.792 km
		Road Network	143.844 km
		Population	10139
		Household	2056
Tsunami	Low - High	Agriculture Area	0.725 sq km
		Natural Vegetation in Wet Areas	0.001 sq km
		Pakka Planned Area	0.004 sq km
		Pakka Unplanned Area	0.023 sq km
		Settlements	1
		Irrigation and Drainage Network	0.061 km
		Road Network	0.79 km
		Population	341
		Household	70
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	

Nindo Shahar			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	86.917 sq km
		Natural Vegetation in Wet Areas	0.026 sq km
		Pakka Unplanned Area	1.943 sq km
		Range Land	0.012 sq km
		Bridges	2
		Settlements	50
		Irrigation and Drainage Network	73.308 km
		Road Network	144.082 km
		Population	28692
		Household	5810
Meteorological	Medium - Extreme	Settlements	50

Drought		Agriculture Area	87.194 sq km
		Natural Vegetation in Wet Areas	0.928 sq km
		Range Land	0.098 sq km
		Water Body	9.124 sq km
		Wet Area	2.863 sq km
		Population	23997
		Household	4863
Agricultural Drought	Low	Agriculture Area	0.487 sq km
		Range Land	0.028 sq km
		Wet Area	0.007 sq km
		Population	15
		Household	3
Heatwave	Low - Extreme	Settlements	50
		Population	23823
		Household	4825
		Agriculture Area	86.822 sq km
		Pakka Unplanned Area	1.951 sq km
Cyclone	Low	Agriculture Area	86.869 sq km
		Natural Vegetation in Wet Areas	0.026 sq km
		Pakka Unplanned Area	0.327 sq km
		Range Land	0.004 sq km
		Bridges	2
		Settlements	50
		Irrigation and Drainage Network	71.956 km
		Road Network	133.042 km
		Population	4810
Household	974		
Tsunami	Low - High	Agriculture Area	2.325 sq km
		Natural Vegetation in Wet Areas	0.01 sq km
		Pakka Unplanned Area	0.056 sq km
		Range Land	0.00026 sq km
		Irrigation and Drainage Network	0.133 km
		Road Network	2.677 km
		Population	871
		Household	176
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	

Pangrio			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	144.045 sq km
		Forest Area	0.082 sq km
		Kachcha Area	0.437 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Unplanned Area	2.738 sq km
		Range Land	0.695 sq km
		Ambulance Services	1
		Bridges	2
		Education Facilities	3
		Grid Stations	1
		Health Facilities	4
		Mobile Towers	3
		Petrol Pumps	5
		Police Stations	1
		Settlements	92
		Irrigation and Drainage Network	61.428 km
		Road Network	113.589 km
		Population	40160
		Household	8448
Meteorological Drought	Medium - Extreme	Settlements	92
		Agriculture Area	144.692 sq km
		Forest Area	1.856 sq km
		Natural Vegetation in Wet Areas	0.259 sq km
		Range Land	19.884 sq km
		Water Body	0.068 sq km
		Wet Area	7.611 sq km
		Population	33466
Agricultural Drought	Low - Medium	Household	7038
		Settlements	18
		Agriculture Area	59.091 sq km
		Forest Area	2.151 sq km
		Natural Vegetation in Wet Areas	0.304 sq km
		Range Land	23.914 sq km
		Water Body	0.081 sq km
		Wet Area	4.46 sq km
		Population	4232
Heatwave	Low - Extreme	Household	876
		Settlements	86
		Population	33218

		Household	6990
		Agriculture Area	143.856 sq km
		Kachcha Area	0.438 sq km
		Pakka Unplanned Area	2.747 sq km
Cyclone	Low	Agriculture Area	124.202 sq km
		Forest Area	0.059 sq km
		Kachcha Area	0.429 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Unplanned Area	0.476 sq km
		Range Land	0.318 sq km
		Bridges	2
		Education Facilities	1
		Grid Stations	1
		Petrol Pumps	2
		Settlements	79
		Irrigation and Drainage Network	43.329 km
		Road Network	79.134 km
		Population	9899
		Household	2047
Tsunami	Low - High	Agriculture Area	1.531 sq km
		Forest Area	0.013 sq km
		Natural Vegetation in Wet Areas	0.011 sq km
		Pakka Unplanned Area	0.005 sq km
		Range Land	0.102 sq km
		Irrigation and Drainage Network	0.252 km
		Road Network	0.981 km
		Population	76
		Household	15
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	

Pehar Mari			
Hazard Type	Risk	Elements at Risk	
<b>Earthquake</b>	Low	Agriculture Area	86.327 sq km
		Natural Vegetation in Wet Areas	0.01 sq km
		Pakka Unplanned Area	2.879 sq km
		Range Land	0.035 sq km
		Education Facilities	5
		Grid Stations	1
		Health Facilities	1

		Settlements	70
		Irrigation and Drainage Network	59.691 km
		Road Network	113.497 km
		Population	31137
		Household	6409
Meteorological Drought	Medium - Extreme	Settlements	70
		Agriculture Area	86.778 sq km
		Natural Vegetation in Wet Areas	0.485 sq km
		Range Land	0.191 sq km
		Water Body	28.562 sq km
		Wet Area	0.389 sq km
		Population	26028
		Household	5359
Heatwave	Low - Extreme	Settlements	68
		Population	25828
		Household	5321
		Agriculture Area	86.169 sq km
		Pakka Unplanned Area	2.893 sq km
Cyclone	Low	Agriculture Area	86.239 sq km
		Natural Vegetation in Wet Areas	0.009 sq km
		Pakka Unplanned Area	0.559 sq km
		Range Land	0.005 sq km
		Education Facilities	2
		Grid Stations	1
		Settlements	70
		Irrigation and Drainage Network	55.375 km
		Road Network	97.7 km
		Population	6081
		Household	1249
Tsunami	Low - High	Agriculture Area	0.311 sq km
		Natural Vegetation in Wet Areas	0.001 sq km
		Pakka Unplanned Area	0.006 sq km
		Irrigation and Drainage Network	0.015 km
		Road Network	0.171 km
		Population	66
		Household	13
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	

Pero Lashari			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	126.407 sq km
		Kachcha Area	0.35 sq km
		Natural Vegetation in Wet Areas	0.168 sq km
		Pakka Unplanned Area	3.245 sq km
		Education Facilities	3
		Mobile Towers	3
		Petrol Pumps	2
		Settlements	95
		Irrigation and Drainage Network	40.888 km
		Railway Line	10.068 km
		Road Network	154.774 km
		Population	35052
		Household	7240
Meteorological Drought	Medium - Extreme	Settlements	95
		Agriculture Area	127.088 sq km
		Natural Vegetation in Wet Areas	4.301 sq km
		Water Body	22.821 sq km
		Wet Area	0.525 sq km
		Population	29241
		Household	6039
Agricultural Drought	Low	Agriculture Area	0.274 sq km
		Natural Vegetation in Wet Areas	1.99 sq km
		Water Body	12.401 sq km
		Wet Area	0.001 sq km
		Population	392
		Household	78
Heatwave	Low - Extreme	Settlements	93
		Population	28998
		Household	5986
		Agriculture Area	126.19 sq km
		Kachcha Area	0.351 sq km
		Pakka Unplanned Area	3.257 sq km
Cyclone	Low	Agriculture Area	126.318 sq km
		Kachcha Area	0.35 sq km
		Natural Vegetation in Wet Areas	0.103 sq km
		Pakka Unplanned Area	0.57 sq km
		Education Facilities	3

		Mobile Towers	2
		Petrol Pumps	1
		Settlements	95
		Irrigation and Drainage Network	34.768 km
		Railway Line	8.413 km
		Road Network	130.312 km
		Population	8986
		Household	1850
Tsunami	Low - High	Agriculture Area	0.085 sq km
		Kachcha Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.024 sq km
		Road Network	0.044 km
		Population	6
		Household	1
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	

Pharkara			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	99.873 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.054 sq km
		Natural Vegetation in Wet Areas	0.163 sq km
		Pakka Planned Area	0.067 sq km
		Pakka Unplanned Area	2.66 sq km
		Range Land	0.064 sq km
		Bridges	4
		Education Facilities	6
		Mobile Towers	7
		Petrol Pumps	4
		Power Plants	1
		Settlements	107
		Irrigation and Drainage Network	34.608 km
		Road Network	122.454 km
		Population	38939
		Household	7623
Meteorological Drought	Medium - Extreme	Settlements	107
		Agriculture Area	100.186 sq km
		Forest Area	0.143 sq km
		Natural Vegetation in Wet Areas	6.133 sq km

		Range Land	2.677 sq km
		Water Body	2.631 sq km
		Wet Area	4.664 sq km
		Population	32309
		Household	6328
Agricultural Drought	Low	Agriculture Area	9.278 sq km
		Natural Vegetation in Wet Areas	4.91 sq km
		Range Land	1.522 sq km
		Water Body	1.637 sq km
		Wet Area	0.011 sq km
		Population	364
		Household	70
Heatwave	Low - Extreme	Settlements	105
		Population	32022
		Household	6265
		Agriculture Area	99.76 sq km
		Kachcha Area	0.054 sq km
		Pakka Planned Area	0.067 sq km
		Pakka Unplanned Area	2.667 sq km
Cyclone	Low	Agriculture Area	0.113 sq km
		Pakka Unplanned Area	0.005 sq km
		Petrol Pumps	1
		Road Network	0.052 km
		Population	74
		Household	14
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	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

<b>Rajo Khanani</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	88.124 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.529 sq km
		Pakka Unplanned Area	1.804 sq km
		Range Land	0.053 sq km
		Bridges	1
		Bus Stops	2



		Education Facilities	5
		Health Facilities	2
		Mobile Towers	5
		Petrol Pumps	8
		Police Stations	1
		Post Offices	1
		Settlements	63
		Irrigation and Drainage Network	30.388 km
		Road Network	66.997 km
		Population	38926
		Household	8013
Meteorological Drought	Medium - Extreme	Settlements	63
		Agriculture Area	88.453 sq km
		Forest Area	0.1 sq km
		Range Land	2.239 sq km
		Water Body	3.125 sq km
		Wet Area	11.847 sq km
		Population	32324
		Household	6652
Agricultural Drought	Low - Extreme	Settlements	14
		Agriculture Area	35.847 sq km
		Forest Area	0.122 sq km
		Range Land	0.759 sq km
		Water Body	1.954 sq km
		Wet Area	12.989 sq km
		Population	2616
		Household	537
Heatwave	Low - Extreme	Settlements	59
		Population	32037
		Household	6597
		Agriculture Area	88.012 sq km
		Kachcha Area	0.531 sq km
		Pakka Unplanned Area	1.807 sq km
Cyclone	Low	Agriculture Area	38.475 sq km
		Kachcha Area	0.17 sq km
		Pakka Unplanned Area	0.308 sq km
		Range Land	0.027 sq km
		Bridges	1
		Education Facilities	2
		Petrol Pumps	4

		Settlements	39
		Irrigation and Drainage Network	18.417 km
		Road Network	37.819 km
		Population	5058
		Household	1045
Tsunami	Low - High	Agriculture Area	0.01 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	
Rakhi			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	127.13 sq km
		Kachcha Area	0.439 sq km
		Pakka Planned Area	0.309 sq km
		Pakka Unplanned Area	2.45 sq km
		Range Land	0.001 sq km
		Bridges	1
		Education Facilities	4
		Health Facilities	1
		Petrol Pumps	1
		Power Plants	2
		Settlements	41
		Irrigation and Drainage Network	66.491 km
		Road Network	55.678 km
		Population	30937
		Household	5884
Meteorological Drought	Medium - Extreme	Settlements	41
		Agriculture Area	127.228 sq km
		Range Land	0.04 sq km
		Water Body	0.026 sq km
		Wet Area	0.511 sq km
		Population	25706
		Household	4885
Agricultural Drought	Low	Agriculture Area	0.492 sq km
		Water Body	0.017 sq km
		Population	63
		Household	11
Heatwave	Low - Extreme	Settlements	41
		Population	25575

		Household	4861
		Agriculture Area	127.094 sq km
		Kachcha Area	0.439 sq km
		Pakka Planned Area	0.308 sq km
		Pakka Unplanned Area	2.454 sq km
Cyclone	Low	Agriculture Area	127.079 sq km
		Kachcha Area	0.439 sq km
		Pakka Planned Area	0.068 sq km
		Pakka Unplanned Area	0.256 sq km
		Range Land	0.001 sq km
		Bridges	1
		Education Facilities	3
		Settlements	41
		Irrigation and Drainage Network	62.817 km
		Road Network	51.707 km
		Population	7449
		Household	1417
Tsunami	Low - High	Agriculture Area	0.021 sq km
		Kachcha Area	0.001 sq km
		Population	6
		Household	1
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>S.F.Rahu</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	106.983 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.236 sq km
		Pakka Planned Area	0.561 sq km
		Pakka Unplanned Area	3.093 sq km
		Range Land	0.049 sq km
		Bridges	6
		Education Facilities	8
		Grid Stations	1
		Health Facilities	5
		Industries	1
		Mobile Towers	4
		Petrol Pumps	11
		Police Stations	1

		Post Offices	1
		Power Plants	1
		Settlements	38
		Irrigation and Drainage Network	64.909 km
		Road Network	99.794 km
		Population	59801
		Household	11119
Meteorological Drought	Medium - Extreme	Settlements	37
		Agriculture Area	107.158 sq km
		Forest Area	0.087 sq km
		Range Land	1.107 sq km
		Water Body	0.07 sq km
		Wet Area	3.829 sq km
		Population	49591
		Household	9217
Agricultural Drought	Low - Medium	Agriculture Area	5.765 sq km
		Forest Area	0.102 sq km
		Range Land	1.323 sq km
		Wet Area	0.011 sq km
		Population	270
		Household	50
Heatwave	Low - Extreme	Settlements	36
		Population	49461
		Household	9193
		Agriculture Area	106.92 sq km
		Kachcha Area	0.237 sq km
		Pakka Planned Area	0.56 sq km
		Pakka Unplanned Area	3.096 sq km
Cyclone	Low	Agriculture Area	106.934 sq km
		Forest Area	0.003 sq km
		Kachcha Area	0.235 sq km
		Pakka Planned Area	0.042 sq km
		Pakka Unplanned Area	0.313 sq km
		Range Land	0.033 sq km
		Bridges	6
		Petrol Pumps	6
		Settlements	38
		Irrigation and Drainage Network	61.175 km
		Road Network	88.365 km
		Population	7521

		Household	1413
Tsunami	Low - High	Agriculture Area	0.051 sq km
		Pakka Planned Area	0.0004 sq km
		Pakka Unplanned Area	0.005 sq km
		Population	50
		Household	10
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	
Saeedpur			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	86.235 sq km
		Kachcha Area	0.136 sq km
		Pakka Unplanned Area	2.406 sq km
		Range Land	0.001 sq km
		Bridges	1
		Education Facilities	1
		Health Facilities	1
		Settlements	78
		Irrigation and Drainage Network	42.859 km
		Road Network	58.522 km
		Population	24312
		Household	5036
Meteorological Drought	Medium - Extreme	Settlements	78
		Agriculture Area	86.702 sq km
		Range Land	0.087 sq km
		Water Body	16.049 sq km
		Wet Area	3.135 sq km
		Population	20319
		Household	4206
Agricultural Drought	Low	Agriculture Area	2.294 sq km
		Range Land	0.048 sq km
		Water Body	2.138 sq km
		Wet Area	0.003 sq km
		Population	225
		Household	45
Heatwave	Low - Extreme	Settlements	76
		Population	20101
		Household	4160

		Agriculture Area	86.088 sq km
		Kachcha Area	0.137 sq km
		Pakka Unplanned Area	2.416 sq km
Cyclone	Low	Agriculture Area	78.269 sq km
		Kachcha Area	0.136 sq km
		Pakka Unplanned Area	0.408 sq km
		Range Land	0.001 sq km
		Bridges	1
		Health Facilities	1
		Settlements	75
		Irrigation and Drainage Network	36.631 km
		Road Network	44.2 km
		Population	5212
		Household	1076
Tsunami	Nil	The UC falls out of vulnerable zone for Riverine Flood	
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	

Seerani			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	193.601 sq km
		Natural Vegetation in Wet Areas	0.152 sq km
		Pakka Unplanned Area	3.643 sq km
		Range Land	0.023 sq km
		Bridges	2
		Education Facilities	3
		Health Facilities	2
		Mobile Towers	2
		Petrol Pumps	2
		Settlements	89
		Irrigation and Drainage Network	82.138 km
		Road Network	270.835 km
		Population	51843
		Household	10496
Meteorological Drought	Medium - Extreme	Settlements	89
		Agriculture Area	194.121 sq km
		Forest Area	0.577 sq km
		Natural Vegetation in Wet Areas	6.918 sq km
		Range Land	0.648 sq km

		Water Body	11.602 sq km
		Wet Area	18.784 sq km
		Population	43467
		Household	8797
Agricultural Drought	Low - Extreme	Settlements	30
		Agriculture Area	99.461 sq km
		Forest Area	0.69 sq km
		Natural Vegetation in Wet Areas	8.203 sq km
		Range Land	0.779 sq km
		Water Body	12.502 sq km
		Wet Area	9.049 sq km
		Population	17332
		Household	3476
Heatwave	Low - Extreme	Settlements	85
		Population	43158
		Household	8734
		Agriculture Area	193.422 sq km
		Pakka Unplanned Area	3.66 sq km
Cyclone	Low	Agriculture Area	193.48 sq km
		Forest Area	0.00018 sq km
		Natural Vegetation in Wet Areas	0.084 sq km
		Pakka Unplanned Area	0.572 sq km
		Range Land	0.013 sq km
		Bridges	1
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	89
		Irrigation and Drainage Network	68.18 km
		Road Network	229.042 km
		Population	8197
		Household	1661
Tsunami	Low - High	Agriculture Area	23.971 sq km
		Forest Area	0.012 sq km
		Natural Vegetation in Wet Areas	1.359 sq km
		Pakka Unplanned Area	0.365 sq km
		Range Land	0.084 sq km
		Education Facilities	1
		Health Facilities	1
		Mobile Towers	1
		Settlements	6

		Irrigation and Drainage Network	4.99 km
		Road Network	25.783 km
		Population	5226
		Household	1061
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	

Talhar			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	15.204 sq km
		Kachcha Area	0.06 sq km
		Pakka Unplanned Area	0.714 sq km
		Range Land	0.002 sq km
		Settlements	14
		Irrigation and Drainage Network	5.291 km
		Road Network	20.471 km
		Population	7405
		Household	1533
Meteorological Drought	Medium - Extreme	Settlements	14
		Agriculture Area	15.342 sq km
		Range Land	0.003 sq km
		Water Body	4.114 sq km
		Wet Area	0.434 sq km
		Population	6144
		Household	1272
Agricultural Drought	Low	Agriculture Area	2.006 sq km
		Water Body	1.463 sq km
		Wet Area	0.000067 sq km
		Population	63
		Household	13
Heatwave	Low - Extreme	Settlements	13
		Population	6110
		Household	1264
		Agriculture Area	15.161 sq km
		Kachcha Area	0.06 sq km
		Pakka Unplanned Area	0.716 sq km



Cyclone	Low	Agriculture Area	15.19 sq km
		Kachcha Area	0.06 sq km
		Pakka Unplanned Area	0.086 sq km
		Range Land	0.001 sq km
		Settlements	14
		Irrigation and Drainage Network	5.196 km
		Road Network	16.511 km
		Population	1393
		Household	288
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	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

Tando Ghulam Ali			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	39.431 sq km
		Forest Area	0.002 sq km
		Kachcha Area	0.133 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Unplanned Area	0.627 sq km
		Range Land	0.013 sq km
		Grid Stations	1
		Settlements	29
		Irrigation and Drainage Network	8.504 km
		Road Network	26.9 km
		Population	10923
		Household	2136
Meteorological Drought	Medium - Extreme	Settlements	29
		Agriculture Area	39.475 sq km
		Forest Area	0.024 sq km
		Natural Vegetation in Wet Areas	0.514 sq km
		Range Land	0.093 sq km
		Water Body	0.537 sq km
		Population	9096
		Household	1780
Agricultural Drought	Low - Medium	Settlements	10
		Agriculture Area	24.739 sq km
		Natural Vegetation in Wet Areas	0.627 sq km
		Range Land	0.058 sq km

		Water Body	0.652 sq km
		Population	2731
		Household	533
Heatwave	Low - Extreme	Settlements	27
		Population	9002
		Household	1761
		Agriculture Area	39.414 sq km
		Kachcha Area	0.134 sq km
		Pakka Unplanned Area	0.629 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	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

Tandobago			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	44.282 sq km
		Kachcha Area	0.241 sq km
		Natural Vegetation in Wet Areas	0.012 sq km
		Pakka Unplanned Area	2.586 sq km
		Ambulance Services	1
		Bridges	3
		Education Facilities	9
		Health Facilities	9
		Mobile Towers	2
		Petrol Pumps	8
		Settlements	42
		Irrigation and Drainage Network	23.894 km
		Road Network	59.836 km
		Population	29114
		Household	6043
Meteorological Drought	Medium - Extreme	Settlements	42
		Agriculture Area	44.516 sq km
		Natural Vegetation in Wet Areas	0.34 sq km
		Water Body	14.172 sq km
		Wet Area	0.038 sq km
		Population	24220
		Household	5026

<b>Heatwave</b>	Low - Extreme	Settlements	41
		Population	24048
		Household	4991
		Agriculture Area	44.193 sq km
		Kachcha Area	0.242 sq km
		Pakka Unplanned Area	2.59 sq km
<b>Cyclone</b>	Low	Agriculture Area	44.241 sq km
		Kachcha Area	0.241 sq km
		Natural Vegetation in Wet Areas	0.01 sq km
		Pakka Unplanned Area	0.262 sq km
		Bridges	1
		Petrol Pumps	2
		Settlements	42
		Irrigation and Drainage Network	21.067 km
		Road Network	44.011 km
		Population	5287
		Household	1090
<b>Tsunami</b>	Low - High	Agriculture Area	0.084 sq km
		Kachcha Area	0.00029 sq km
		Natural Vegetation in Wet Areas	0.022 sq km
		Pakka Unplanned Area	0.002 sq km
		Road Network	0.09 km
		Population	20
		Household	5
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Storm Surge</b>	Nil	The UC falls out of vulnerable zone for Storm Surge	
<b>Agricultural Drought</b>	Nil	The UC falls out of vulnerable zone for Agricultural Drought	

<b>Tarai</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	145.203 sq km
		Kachcha Area	0.406 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Unplanned Area	2.438 sq km
		Range Land	0.1 sq km
		Bridges	2

		Bus Stops	1
		Education Facilities	5
		Mobile Towers	3
		Petrol Pumps	1
		Settlements	71
		Irrigation and Drainage Network	54.016 km
		Road Network	105.84 km
		Population	32540
		Household	6227
Meteorological Drought	Medium - Extreme	Settlements	71
		Agriculture Area	145.472 sq km
		Natural Vegetation in Wet Areas	0.388 sq km
		Range Land	2.893 sq km
		Water Body	3.242 sq km
		Wet Area	3.171 sq km
		Population	27212
		Household	5205
Agricultural Drought	Low - Medium	Settlements	10
		Agriculture Area	29.497 sq km
		Natural Vegetation in Wet Areas	0.466 sq km
		Range Land	3.493 sq km
		Water Body	3.523 sq km
		Wet Area	1.845 sq km
		Population	3996
		Household	757
Heatwave	Low - Extreme	Settlements	68
		Population	26956
		Household	5153
		Agriculture Area	145.111 sq km
		Kachcha Area	0.407 sq km
		Pakka Unplanned Area	2.447 sq km
Cyclone	Low	Agriculture Area	145.14 sq km
		Kachcha Area	0.405 sq km
		Natural Vegetation in Wet Areas	0.008 sq km
		Pakka Unplanned Area	0.457 sq km
		Range Land	0.043 sq km
		Bridges	2
		Bus Stops	1
		Education Facilities	2
		Mobile Towers	3

		Petrol Pumps	1
		Settlements	71
		Irrigation and Drainage Network	49.385 km
		Road Network	95.366 km
		Population	9266
		Household	1756
Tsunami	Low - High	Agriculture Area	0.074 sq km
		Pakka Unplanned Area	0.002 sq km
		Range Land	0.005 sq km
		Road Network	0.05 km
		Population	18
		Household	3
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	

Thari			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	101.679 sq km
		Kachcha Area	0.089 sq km
		Natural Vegetation in Wet Areas	0.012 sq km
		Pakka Unplanned Area	2.216 sq km
		Range Land	0.089 sq km
		Education Facilities	5
		Health Facilities	1
		Settlements	105
		Irrigation and Drainage Network	56.541 km
		Road Network	58.052 km
		Population	33002
		Household	6457
Meteorological Drought	Medium - Extreme	Settlements	105
		Agriculture Area	101.925 sq km
		Natural Vegetation in Wet Areas	0.415 sq km
		Range Land	2.881 sq km
		Water Body	2.893 sq km
		Wet Area	3.979 sq km
		Population	27490
		Household	5379
Agricultural Drought	Low - Medium	Settlements	13
		Agriculture Area	43.761 sq km

		Range Land	2.884 sq km
		Water Body	1.684 sq km
		Wet Area	1.269 sq km
		Population	2202
		Household	429
Heatwave	Low - Extreme	Settlements	101
		Population	27178
		Household	5324
		Agriculture Area	101.579 sq km
		Kachcha Area	0.089 sq km
		Pakka Unplanned Area	2.222 sq km
Cyclone	Low	Agriculture Area	16.955 sq km
		Kachcha Area	0.007 sq km
		Natural Vegetation in Wet Areas	0.003 sq km
		Pakka Unplanned Area	0.083 sq km
		Range Land	0.005 sq km
		Settlements	17
		Irrigation and Drainage Network	14.663 km
		Road Network	9.926 km
		Population	1259
		Household	247
Tsunami	Low	Agriculture Area	0.001 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	

## **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 interface 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**

- UCDMC shall work as front-line, first responder body at village, mohalla and ward level.
- Shall assist TDMC, DDMA and PDMA especially in disaster response.
- Shall encourage and keep record of volunteers in Union Council.

- 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.
- 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**

- 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.
- To prepare/update UC level disaster management plan for emergent hazards or new hazards caused by any disaster event.
- To make an analysis of disaster risk and to prepare a list of vulnerable villages and areas of the concerned union councils.
- To mobilize community for maintaining public ways, public streets, culverts, bridges and public buildings, and other development activities.
- 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.
- 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.
- Mobilizing and coordinating work of volunteers and ensuring community participation.
- Conduct of search and rescue operations in coordination with the rescue teams and Police.
- 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.
- To monitor NGO activities and provide necessary support to ensure community participation by establishing coordination mechanisms among NGOs and local communities.

### 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**



### **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 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 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

### **INFORMATION DEPARTMENT**

#### ***Pre-Disaster***

- Close coordination and liaison with PDMA and DDMA
- During monsoon 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***

- 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 crops and livestock and settlement of applicable taxes accordingly in coordination with relevant 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
- 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

#### ***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 Badin district reveals that the district is prone to multiple natural disasters. The pertinent hazards to district are tsunami, cyclone, drought and heatwave. The risk of earthquake is low in the district. In modern technological era, meteorological hazards including drought, and heatwave 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>	According to MHVRA Study 2022, there is no riverine flood hazard in district Badin
<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 Granite.</li> <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 Badin district is low but still some actions must be taken to avoid losses in case of minor jolts. Urban settings are most likely to be affected by jolts. It is highly recommended to identify old and weak buildings in the cities and other 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 Badin 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. Historically, Badin district has a Hot and Semi-Arid climate and prone to severe heatwave seasons. However, most of the district is sparsely populated, which significantly lowers the chances of severe heatwave impacts. However, urban centers including Badin City are vulnerable to heatwave.</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 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>Cyclone</b>	<ol style="list-style-type: none"> <li>1. The cyclone hazard threat to district Badin is Cat-1 TC. However, the frequency and intensity of cyclone formation in Arabian Sea may further increase due to climate change and global warming. Fortunately, cyclone is forecastable hazard, its intensity, possible landfall, timings etc. can be precisely predicted before landfall. If population to be affected is well aware and already prepared for likely event, then major losses and damages can be minimized. Such example can be seen in regional countries like India, Bangladesh and Philippines etc.</li> <li>2. It is utmost important to strengthen cyclone detection and warning systems in the coastal belt along entire coast in Sindh. Community based disaster risk management, capacity development of prone communities, establishment of permanent shelters and provision of life support facilities will increase the trust and confidence of communities on government functionaries in early evacuation process.</li> </ol>
<b>Drought</b>	<ol style="list-style-type: none"> <li>1. District Badin is a moderately populated district with closely spaced</li> </ol>

	<p>homes in major cities. Climatic condition of the district can be categorized as Hot and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010). Average annual rainfall received during a year across the district is 165.23mm. Agriculture is practiced in the district which is mainly dependent on canal irrigation and rainfall.</p> <ol style="list-style-type: none"> <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 district, 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 agricultural systems is also required.</li> <li>4. Further, farmers may be encouraged for alternative crops during expected drought seasons. Also policies for compensation of framers must also be introduced to assist and encourage drought hit farmers.</li> </ol>
<b>Tsunami</b>	<ol style="list-style-type: none"> <li>1. The only known tsunami which hit some parts of Sindh coast happened due to major earthquake in Makran coast in Balochistan which triggered tsunami in the region. This event happened in November 1945. No authentic record is available on damage and losses caused by tsunami in Badin. The effects of the Tsunami of December, 2004 caused by earthquake in Indonesia were along the coastline of Pakistan in the form of abnormal changes in tide gauge stations placed at Ketu Bunder.</li> <li>2. As tsunami is consequence of major earthquake, hence not forecastable hazard in true sense but once the earthquake is occurred in sea or near coast, special sensors can detect the occurrence of tsunami. Once tsunami is detected little time is left for evacuation. However, installation of tsunami early warning system along the coast may greatly impact losses. The best approaches to tsunami response are; <ul style="list-style-type: none"> <li>○ Installation of tsunami early warning and dissemination system in coastal settlements</li> <li>○ Awareness of communities at risk on tsunami precautions and response</li> </ul> </li> </ol>

## **STANDARD OPERATING PROCEDURES**

## INTRODUCTION

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

## ACTION PLAN FOR FORECASTABLE DISASTERS

In addition to severe weather, heatwave, cyclones and drought are only forecastable hazards. For such hazards following action plan is recommended:

**Table 5: Action Plan for Cyclone Hazard Management**

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of cyclone and likely landfall	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA
Evacuation of population likely to be affected to safe places	Before forecasted landfall	PDMA and DDMA
Temporary shelter and camp management for affected population and livestock	Before forecasted landfall	PDMA and DDMA
Arrangement of initial relief for affectees	During disturbance period	PDMA and DDMA
Recovery and resettlement of population to native places	Post disaster	PDMA and DDMA

**Table 6: Action Plan for Heatwave Hazard Management**

<b>Action</b>	<b>Timelines</b>	<b>Responsibility</b>
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**

<b>Action</b>	<b>Timelines</b>	<b>Responsibility</b>
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/Tsunami

The earthquake and consequential tsunami are unforecastable hazards and do not provide reaction time to prevent damages. The recommended post disaster action plan are as follows

**Table 8: Action Plan for Earthquake/Tsunami 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 Badin 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	Nil
General Description	According to MHVRA Study 2022, there is no risk of riverine flood in Badin district.

Earthquake	
UCs At Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. District Badin falls away from any major fault line and is less likely to be affected by a massive earthquake.</li> <li>2. In the last hundred years, only one Earthquake of magnitude 6 Mw was reported in the nearby area, whereas, couple of earthquake of magnitudes 4 and 5 were also recorded in the area.</li> <li>3. There is no recorded historical data available of the damages in the district due to previous earthquakes. However, October 2005 earthquake caused minor damages in the district.</li> <li>4. Lately, a low magnitude 3.5 Mw earthquake was recorded in the area in October 2015, while the tremors of the same were felt in district Badin, Thatta, and Karachi.</li> <li>5. Some of prominent faults situated in the coastal zones are (a). Karachi-Jati, (b). Surjan-Jhimpir, (c). Pab Fault (d). Hub Fault and (e). Allah Bund-Rann of Kutch faults.</li> <li>6. Over the last sixty years, earthquakes of intensity lower than 5 on Richter Scale, including those in 1945 and 1985, have struck the region comprising the macro-environment and thus far they have been of minor significance.</li> </ol>

	<p>7. According to MHVRA study 2022, Earthquake hazard in the district is of “<b>Low</b>” intensity.</p> <p>8. According to MHVRA study 2022, Earthquake risk in the district is of “<b>Low</b>” intensity.</p>
<b>Disaster Management Measures</b>	
<b>Preparedness</b>	
<ol style="list-style-type: none"> <li>1. Identifying and inventorying weak buildings and structures especially in urban settings of the district and situation demanding action by concerned departments.</li> <li>2. Preparation of landuse plans, town plans and implementation of building codes in new residential schemes, schools, public and private offices.</li> <li>3. Implementation of disaster risk reduction measures in public infrastructure development schemes.</li> <li>4. Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation.</li> <li>5. Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings.</li> <li>6. Availability of necessary material and equipment required for establishing temporary shelters with life support facilities i.e. mobile medical camps, schools, power supply, water and sanitation etc.</li> <li>7. Availability of alternative communication system in case if usual communication means are disturbed by earthquake.</li> <li>8. Preparation of medical emergency plan to manage mass casualties in face of any major earthquake event.</li> </ol>	
<b>Response</b>	
<ol style="list-style-type: none"> <li>1. Obtain firsthand information on intensity of earthquake and damages; prioritize areas for search and rescue operation.</li> <li>2. Mobilize community-based volunteers, scouts and other trained personnel to hard hit areas to assess situation and help victims.</li> <li>3. Establish emergency camps / shelters with necessary life support facilities.</li> <li>4. Establish medical camps for provision of first aid and possible medical assistance to injured.</li> <li>5. Evacuate people from damaged houses to safe places and shelters.</li> <li>6. Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede.</li> <li>7. Arrangement and conduct of aerial / drone survey of the affected areas.</li> <li>8. Establish information and help desks for facilitation of affectees.</li> <li>9. Restore essential services like power, water supply, and telecommunication of critical infrastructure like hospitals, control Rooms, etc. on priority basis.</li> </ol>	
<b>Recovery and Rehabilitation</b>	
<ol style="list-style-type: none"> <li>1. Detailed damage and need assessment for recovery and rehabilitation.</li> <li>2. Rehabilitation on built back better principal.</li> </ol>	

Heatwave	
UCs At Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. The climate of district Badin is Hot and Semi-Arid. (Climate Classification of Pakistan (Khan et al., 2010))</li> <li>2. As a coastal district, there's a constant sea breeze that keeps the climate of Badin moderate.</li> <li>3. The Dry Summer season starts in May and ends in June, with May being the hottest month of the year, while January is the coldest month.</li> <li>4. The average annual rainfall in the district is 165.23 mm/year.</li> <li>5. The majority of build-up areas are not very far from the coast in Badin, whereby, no significant losses have been reported during previous heatwave events in Badin.</li> <li>6. According to MHVRA study 2022, heatwave hazard intensity for the district is "<b>Extreme</b>".</li> <li>7. According to MHVRA study 2022, heatwave risk in the district is of "<b>Low to Extreme</b>" intensity.</li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>1. Consistent future development strategy: Tree plantation, restoration of natural ecosystem, construction of environment friendly and well planned residential societies, offices, infrastructure and human dwellings.</li> <li>2. Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings.</li> <li>3. Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients.</li> <li>4. Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations.</li> <li>5. Arrangements for uninterrupted supply of electricity and water in vulnerable areas.</li> </ol>	
Response	
<ol style="list-style-type: none"> <li>1. Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas.</li> <li>2. Local radio FM broadcasts to disseminate heatstroke safety and precautions.</li> <li>3. Mobilize mobile medical teams for first-aid and other medical emergency support in affected area.</li> <li>4. Record keeping of heatwave patients and fatalities.</li> </ol>	
Recovery and Rehabilitation	
<ol style="list-style-type: none"> <li>1. Post event review of heatwave plan and modifications if required.</li> </ol>	

Cyclone	
UCs At Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. Badin district is highly vulnerable to tropical cyclones.</li> <li>2. The tropical cyclones, which are characterized by torrential rain, gales, and storm surge, causing heavy loss of human lives and destruction of property, crops, and loss of livestock.</li> <li>3. Although not a frequent phenomenon, cyclones can cause large-scale damage to the coastal areas of Sindh and Balochistan.</li> <li>4. The period between 1971 and 2001 recorded 14 cyclones. The coastal areas of Sindh are most vulnerable and exposed to cyclones.</li> <li>5. The cyclone of 1999 in Thatta and Badin districts wiped out 73 settlements, and resulted in 168 lives lost, nearly 0.6 million people were affected. The cyclone killed 11,000 cattle, destroyed 1,800 small and big boats and partially damaged 642 boats; causing a loss of Rs.380 million. The losses to infrastructure were estimated at Rs.750 million.</li> <li>6. According to MHVRA study 2022, Cyclone hazard intensity for the district is “Tropical Storm to Cat-1 TC”, while the risk is “Low”.</li> <li>7. According to MHVRA study 2022, Storm Surge hazard intensity for the district is “<b>Low to Very High</b>”, while the risk is “<b>Low to Extreme</b>”</li> </ol>
Disaster Management Measures	
Preparedness	
<ol style="list-style-type: none"> <li>1. Community based disaster risk reduction measures and inclusion of disaster prone communities in disaster management cycle, specially preparedness, evacuation and resettlement.</li> <li>2. Establishment of multipurpose permanent shelters with all life support facilities to facilitate safe evacuation of people and livestock.</li> <li>3. Disaster Risk Reduction mainstreaming in development planning.</li> <li>4. Strengthening of cyclone detection, forecasting and warning dissemination centres.</li> <li>5. Launching a series of public awareness campaign in the district by various means including Radio, TV and other media.</li> <li>6. Training of local administration in warning dissemination and evacuation techniques.</li> <li>7. Mobilization of NGOs and community based organizations for awareness on construction of houses, billboards, roof tops, and boundary walls, keeping in view effects of high winds.</li> <li>8. Review/Update emergency response plans and disaster recovery plans.</li> <li>9. Stocking of key equipment and supplies to carry out immediate response activities including</li> </ol>	

<p>evacuation, shelters, medical camps, water and sanitation, power supply, alternate communication means etc.</p> <p>10. Design, practice and implementation of evacuation plans with emphasis on self-reliance.</p> <p>11. Cleaning of water channel, drainage and sewerage before cyclone season in Arabian Sea.</p> <p>12. Readiness of de-watering machines before start of monsoon and cyclone season.</p>
<b>Response</b>
<ol style="list-style-type: none"> <li>1. Issue early reliable warning through siren or other relevant means to reduce the severity of the cyclone related disasters and save valuable human lives.</li> <li>2. Identify, involve and mobilize local NGOs which can assist in community awareness and mobilisation for response.</li> <li>3. Identify and mobilize volunteers' / volunteer organizations which can assist various facets of response like provision of emergency healthcare and relief items.</li> <li>4. Initiate preliminary damage assessment and run search and rescue operations.</li> <li>5. Provision of immediate relief including provision of food and potable water to affectees.</li> <li>6. Deployment of emergency medical support.</li> <li>7. Provide emergency health care to the affected population, in order to cover risk of spread of epidemic prone diseases like acute watery diarrhea, typhoid fever, malaria and measles, relapsing of fever and acute respiratory illness.</li> </ol>
<b>Recovery and Rehabilitation</b>
<ol style="list-style-type: none"> <li>1. Assess damage to buildings across the impacted areas to gather information about the extent and severity of damage.</li> <li>2. Monitor potential water quality issues.</li> <li>3. Rehabilitation on built back better principal.</li> </ol>

<b>Drought</b>	
<b>UCs At Risk</b>	<b>All UCs</b>
<b>General Description</b>	<ol style="list-style-type: none"> <li>1. Generally, Badin has Indus deltaic and coastal region with bare areas and bare areas with sparse natural vegetation in its south.</li> <li>2. The district is situated in a Hot and Semi-Arid climate zone. Agricultural water needs are mostly catered through the canal irrigation system</li> <li>3. The average annual rainfall received during a year in the district is 165.23 mm.</li> <li>4. During 1999-2002, severe drought affected huge regions across South Asia including Badin. 2004-05, 2014-15, and 2018-19 were also the drought years in Badin of mild to moderate intensities due to which crop losses were reported.</li> <li>5. According to MHVRA Study 2022,</li> </ol>

	<ul style="list-style-type: none"> <li>a. Meteorological drought hazard for district Badin is “<b>Extreme</b>”</li> <li>b. Meteorological drought risk for district Badin is “<b>Medium to Extreme</b>”</li> <li>c. Agricultural drought hazard for district Badin is “<b>Mild to Extreme</b>”</li> <li>d. Agricultural drought risk for district Badin is “<b>Low to Extreme</b>”.</li> </ul>
<b>Disaster Management Measures</b>	
<b>Preparedness</b>	
<ol style="list-style-type: none"> <li>1. Implement Drought Early Warning System (EWS) at provincial/district level to get clear indications of the impending drought and its consequences, e.g. forecast of impending drought conditions related to changing weather conditions linked to El Nino or La Nina events.</li> <li>2. Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, groundwater levels, and reservoirs.</li> <li>3. Building of small-scale reservoir for rainwater harvesting</li> <li>4. Implementation of water supply and demand management.</li> <li>5. Control ground water extraction from upper and lower aquifers to be within the sustainable yield limits.</li> </ol>	
<b>Response</b>	
<ol style="list-style-type: none"> <li>1. Assess data about the nature of drought conditions and their impact.</li> <li>2. Provision and installation of solar water pumps for availability of clean drinking water.</li> <li>3. Public information campaign for water management and saving.</li> </ol>	
<b>Recovery and Rehabilitation</b>	
<ol style="list-style-type: none"> <li>1. Awareness and encouragement of on best practices for water conservation.</li> </ol>	

<b>Tsunami</b>	
<b>UCs at Risk (38)</b>	<b>Abdullah Shah, Ahmed Rajo, Badin 01, Badin 02, Badin 03, Bhugra Memon, Bolhari, Budho Qambrani, Chabralo, Dadha, Dando, Dei Jarkas, Dubi, Gharo, Kadhan, Kadi Kazia, Kario, Khadharo, Khairpur, Khalifo Qasim, Khor Wah, Khoski, Lunwari Sharif, Mithi, Mohammad Khan Bhurgri, Nindo Shahar, Pangrio, Pehar Mari, Pero Lashari, Rajo Khanani, Rakhi, S.F.Rahu, Saeedpur, Seerani, Talhar, Tandobago, Tarai, Thari</b>
<b>UCs not at Risk (10)</b>	<b>Dumbalo, Ghulam Shah Laghari, Haji Sanwal, Hale Pota, Malhan, Manik aghari, Matli 01, Matli 02, Pharkara, Tando Ghulam Ali</b>
<b>General Description</b>	<ol style="list-style-type: none"> <li>1. Being a coastal district, threat of tsunami has been always present in Badin, as a major fault line crossing from Makran coast poses threat to Badin coast.</li> <li>2. In November 1945 an earthquake with a magnitude of 8.1 on the Richter scale generated a tsunami resulted a sea waves of 12-15-meter height that killed about 4,000 people in the Makran coast. Although Badin was away from the epicenter, but still 6 feet high sea waves were</li> </ol>

	<p>observed which affected harbor facilities.</p> <p>3. Today Badin is much more vulnerable to tsunami than it was in 1945 because of high population density, rapid urbanization, lack of land use planning and loss of natural safeguards such as mangroves and sand dunes.</p> <p>4. According to MHVRA study 2022, tsunami hazard intensity for the district is “<b>Medium to Very High</b>”, while the risk is “<b>Low to High</b>”</p>
<b>Disaster Management Measures</b>	
<b>Preparedness</b>	
<ol style="list-style-type: none"> <li>1. Strengthening of tsunami detection, forecasting and warning dissemination centers.</li> <li>2. Installation of tsunami early warning systems in coastal belt of Sindh.</li> <li>3. Launching a series of public awareness campaign through NGOs and community development organizations.</li> <li>4. Training of local administration in warning dissemination and evacuation techniques.</li> <li>5. Plantation of mangroves and coastal forests along the coast line</li> <li>6. Development of a network of local knowledge centers (rural/urban) along the coast lines to provide necessary training and emergency communication during crisis time.</li> <li>7. Design, practice and implementation of evacuation plans and shelter sites with emphasis on self-reliance.</li> <li>8. Plan the timing of initial actions to be taken in the event of a Tsunami.</li> <li>9. Ensure all communities and response agencies are prepared and ready to respond to a tsunami event.</li> <li>10. Identify buildings and places that could, in the event of a Tsunami, be used as relief centers or camps and make arrangements for water supply and sanitation in such buildings or places.</li> <li>11. Protect hazardous material storage facility located in tsunami prone area</li> </ol>	
<b>Response</b>	
<ol style="list-style-type: none"> <li>1. Coordination with Pakistan Meteorological Department as nodal agency for earthquake and tsunami detection service and dissemination of alerts and warnings through dedicated tsunami warning systems in coastal belt.</li> <li>2. Immediate evacuation of nearest coastal belt population to safe sides emphasizing population living near coastal creeks.</li> <li>3. Arrangement for alternate communication links like satellite phones, HF/ VHF communication, VSAT, etc.</li> <li>4. Establishment of shelters with all necessary life support facilities</li> <li>5. Mobilize and deploy resources e.g. search and rescue, medical teams in the Tsunami affected areas.</li> <li>6. Supply food, drinking water, medical supplies to the affected population.</li> </ol>	



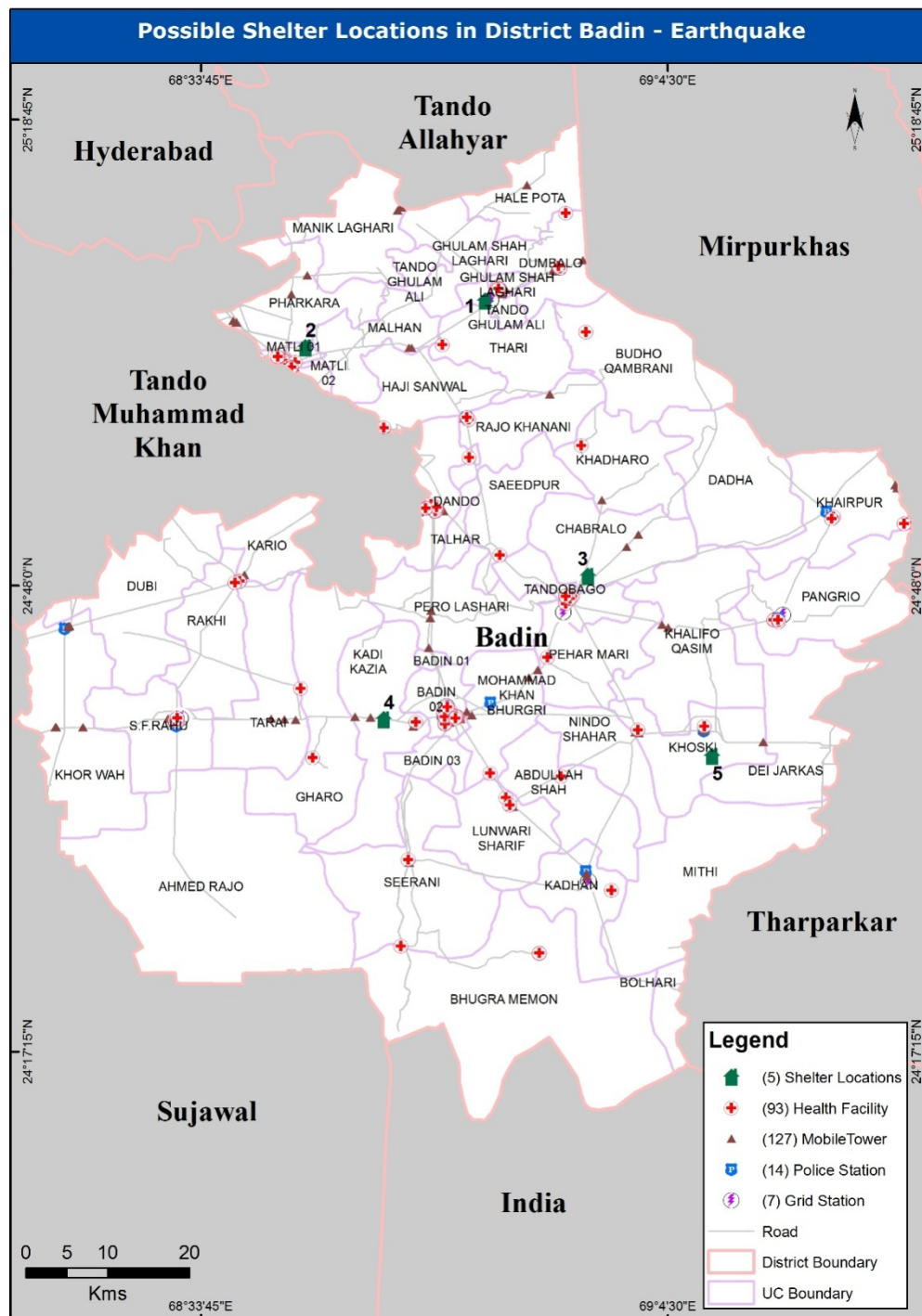
7. Assess hygiene of affected area and preventing the spread of disease.

#### **Recovery and Rehabilitation**

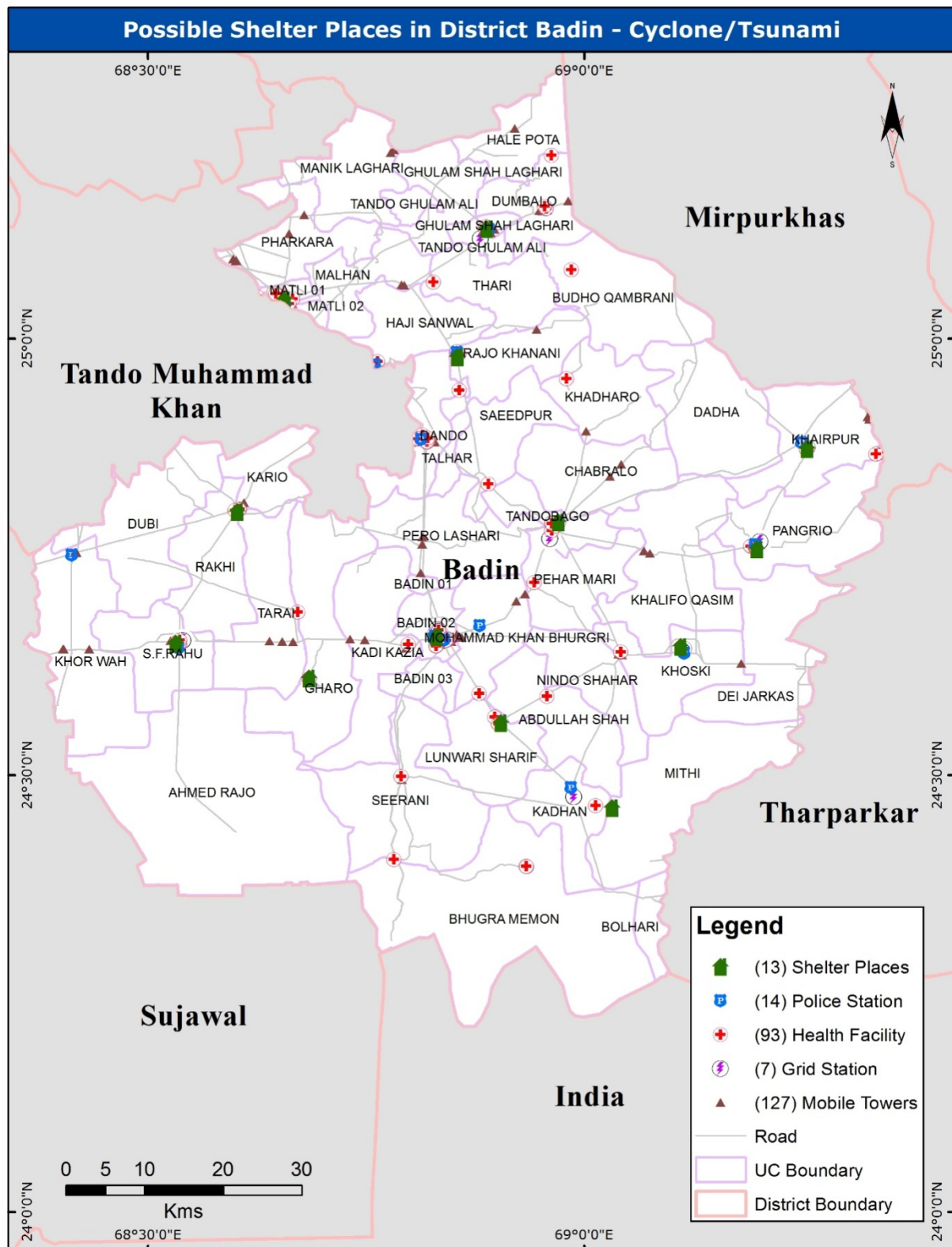
1. Reconstruction of essential infrastructure, such as access to roads, water supply and sanitation, waste water treatment and solid waste disposal.
2. Enhance the ability of the natural system to act as a bio-shield to protect people and their livelihoods by conserving, managing and restoring wetlands, mangroves, spawning areas, seagrass beds and coral reefs.
3. Conduct post-Tsunami damage assessment analysis to provide a clear, and concise picture of post disaster situation, to identify damage caused to different sectors and to develop strategies for rehabilitation, reconstruction and recovery on built back better principal.

## 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 Earthquake shelter locations



## **PROPOSED PRIORITY DISASTER RISK MANAGEMENT PROJECTS**

## INTRODUCTION

Following are the recommended disaster risk management projects, which may be initiated to ensure effective disaster management in district Thatta. 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>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 clear roles and responsibilities defined 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.	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.  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.)
<b>Cyclone/Tsunami</b>	
1. Establishment of tsunami/cyclone early warning detection and dissemination system using Common Alert Protocol (CAP).	A single emergency alert using Common Alert Protocol (CAP) can trigger a variety of public warning systems, increasing the likelihood that people receive the alert by one or more communication pathways. The CAP is capable to disseminate rich multimedia such as photographs, maps, streaming video and audio. An early warning system based on CAP may be established at suitable location.
2. Construction of permanent multipurpose Cyclone / Tsunami shelters.	Multi-Purpose Shelters are meant to provide refuge to vulnerable populations at the time of a cyclonic storm and otherwise to be used as community centers etc. The Multi-Purpose Cyclone Shelters act as a safe shelter for people living in a cyclone threatened region or meant for those who fail to evacuate due to various reasons. The number of Multi-Purpose Shelters should be proportionate to the population size with due examination of its safety and sustainability aspects.
3. Preparation of cyclone/Tsunami response and evacuation plan	Collaborate with community leaders to create community evacuation plans, including evacuation zones and routes. Identify and prepare shelter locations above sea level and conduct emergency evacuation trainings to ensure readiness of communities.

4. Conduct of District Level Mock Exercise (DLME).	Develop a calendar for mock exercises to assess the preparedness, review the District Disaster Management Plans, Standard Operating Procedures and to evaluate the readiness of various departments to any disaster or emergency.
5. Development of insurance policy for financial risk management	Collaborate with Provincial Govt. and Private Partners to devise a disaster insurance policy for vulnerable communities. Disaster insurance provides a means of covering losses incurred through disasters and catastrophic events and reducing disasters' severe financial impact on individuals and communities. Financial liquidity provided by insurance helps mitigate disasters' effects on food security, health and livelihood assets.

## **COST BENEFIT ANALYSIS**

## INTRODUCTION

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

## COST BENEFIT ANALYSIS – BADIN DISTRICT

The existing nature of disasters in Badin district can be categorized as low to Extreme. The prominent hazards in the district is cyclone, tsunami, heatwave, and drought. The agricultural drought risk in the district ranges from low to extreme, while meteorological drought ranges from medium to extreme. The risk of tsunami in the district ranges from low to high, whereas, the risk of storm surge ranges from low to extreme. The risk of earthquake is determined to be low. As far as Heatwave is concerned Badin district is at low to extreme risk. There is no riverine flood risk in the district. 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:



**Table9: Cost Benefit Analysis of Disaster Risk Measures in District Badin**

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Identification and management of shelters for earthquake, cyclone, and Tsunami	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 Badin, as these can accommodate large number of people during disasters. Gradually, permanent multi-purpose shelters specially in near coast line 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 heatwave	Dissemination of forecast of heatwaves from the meteorological department through public radio announcements, print and digital media. Increase the preparedness of local populace against the impending hot climate.	Early warnings give people time to prepare in advance and postpone activities after daytime. Authorities will be able to procure emergency food and water supplies for distribution. Local authorities would get ample time to establish relief centers with provisions of shade and hydration. Hospitals could be prepared to receive more patients and check their inventory for necessary medicine / equipment in advance. An overall reduction in emergency cases would reflect in less mortality and more savings in medical expenditure.
3.	Early warning system for drought	Dissemination of information by meteorological department regarding delays in rainfall season using radio announcements, print and digital media. Warnings to be issued prior to commencing maintenance upstream and for low flow in channels.	Equipping farmers with knowledge of impending dry season will enable them to procure animal fodder in advance and making arrangements for proper storage. Households can start to store food supplies for the coming days. This shall lead to an overall reduction in cases of malnutrition, dehydration, save medical expenses and possibly save lives.
4.	Awareness campaigns	Public private partnership and use of electronic/print media for raising public awareness is a cost-effective approach to build society resilience	Public awareness and public education for disaster reduction helps to reduce disaster risks. It mobilizes people through clear messages, supported with detailed

		and improved disaster risk management capabilities of vulnerable communities.	information. People who know how to react in case of a disaster, community leaders who have learned to warn their people in time, and whole social layers who have been taught how to prepare themselves for natural hazards can contribute to better mitigation strategies and dissemination of information on the consequences of hazards. Education and knowledge can provide people with tools for vulnerability reduction and life-improving self-help strategies.
5.	Strengthening of mobile health care facilities	Setup of temporary health facilities reduce difficulty in patients' transportation to permanent hospital facilities. Mobile health care units are already available with government of Sindh, their mobilization to disaster management will ensure lifesaving.	Mobile health facilities play a very significant role in the mitigation of disaster because of their particular function in providing essential first aid. Ease of access to basic health facilities will reduce burden on hospitals.  The systematic organization and easy mobilization of the staff, equipment and medical supplies in a safe environment are crucial if disaster response is to be prompt and effective.

## ANNEX – A – 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: 25° 6'59.82"N 68°52'53.67"E Upper left corner: 25° 6'59.63"N 68°52'16.25"E Lower right corner: 25° 6'29.83"N 68°52'22.60"E Lower left corner: 25° 6'29.34"N 68°52'15.35"E	143	~6500	55
2	Upper right corner: 25° 3'53.15"N 68°40'47.75"E Upper left corner: 25° 3'49.22"N 68°40'21.56"E Lower right corner: 25° 3'32.70"N 68°40'48.31"E Lower left corner: 25° 3'32.98"N 68°40'32.36"E	92	~4200	50
3	Upper right corner: 24°48'56.91"N 68°59'56.97"E Upper left corner: 24°48'57.72"N 68°59'3.18"E Lower right corner: 24°48'10.71"N 68°59'6.44"E Lower left corner: 24°48'20.20"N 68°58'49.26"E	349	~15700	40
4	Upper right corner: 24°39'29.34"N 68°46'31.17"E Upper left corner: 24°39'40.56"N 68°45'9.35"E Lower right corner: 24°38'24.22"N 68°46'40.54"E Lower left corner: 24°38'57.98"N 68°44'50.82"E	1158	~50000	30
5	Upper right corner: 24°37'9.67"N 69° 7'45.25"E Upper left corner: 24°37'7.95"N 69° 7'5.16"E Lower right corner: 24°36'17.08"N 69° 7'45.08"E Lower left corner: 24°36'16.16"N 69° 7'9.92"E	448	~20000	18

A total of 5 shelter locations have been selected as Earthquake shelter places across the district. 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 96,400 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

## ANNEX – B – LIST OF EQUIPMENT AVAILABLE IN DISTRICT BADIN

Equipment	Quantity
De-watering Machine	2
Tractor / Trolley / Blade	5
Vehicle / Bus/ Van/Truck/	53
Diesel / Petrol Engine	1
Ambulances	5

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