

# MHVRA

## INFORMED DISASTER MANAGEMENT PLAN

### 2023-2032

## DISTRICT HYDERABAD



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 Hyderabad 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 Hyderabad 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 Hyderabad is comprehensive and covers guidelines on the complete spectrum of disaster management and standard operating procedures to efficiently cope with disasters and emergencies in the district.

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

## ACKNOWLEDGEMENTS

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

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

### - - Disclaimer - -

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

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# **INTRODUCTION TO DISASTER MANAGEMENT PLAN OF DISTRICT HYDERABAD**

## 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**

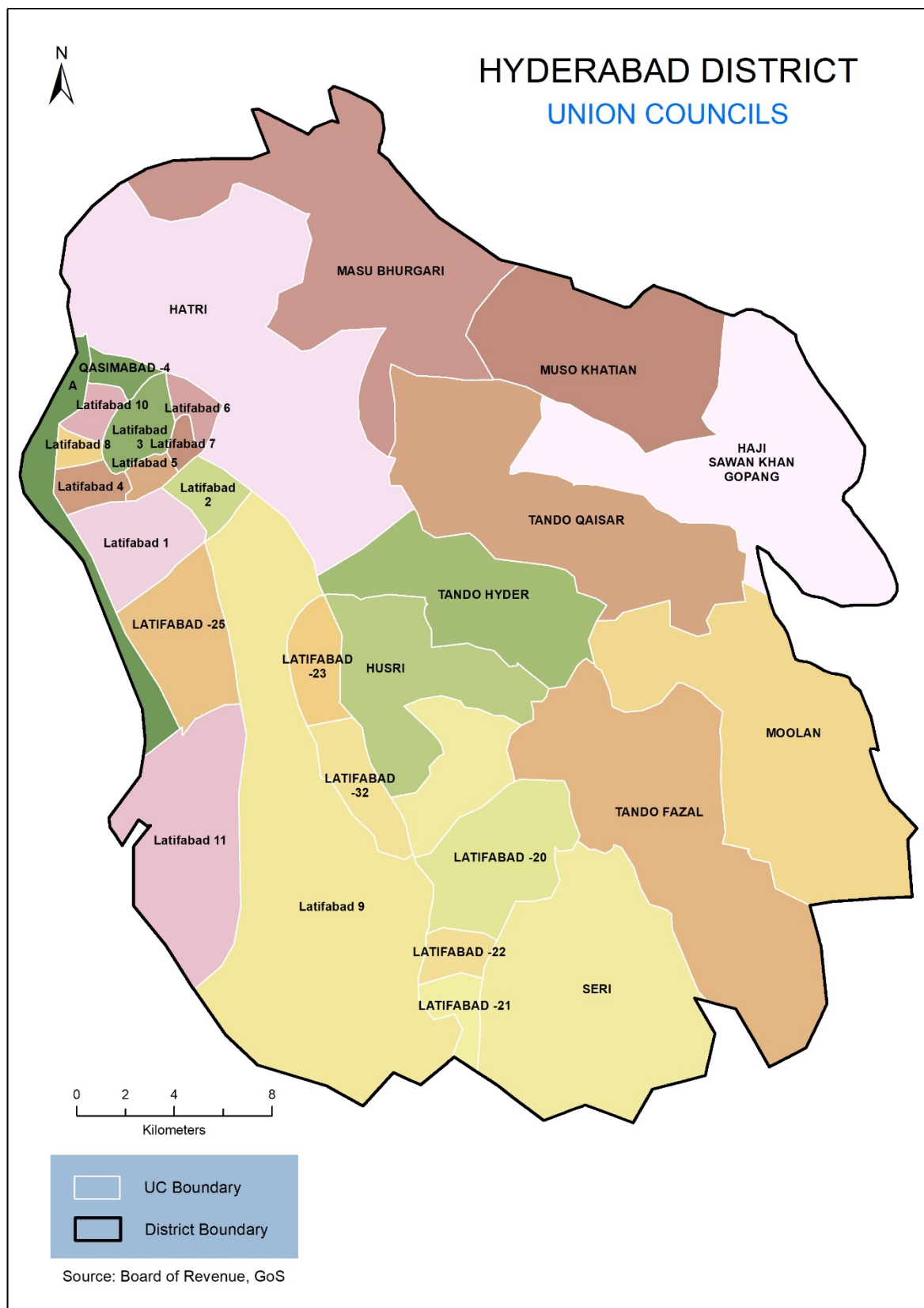
<b>Committee Representative</b>	<b>Role</b>
DG, PDMA Sindh / Dir Ops PDMA	Chairman
Concerned DC or representative officer	Member
Concerned officer from local government	Member
Elected representative of the concerned district	Member
Representatives from disaster affected communities	Member (s)
Representative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



<b>District area in Sq. Km</b>	1,050	
<b>Coordinates</b>	Longitude 68° 19' 3" to 68° 36' 24" East Latitude 25° 11' 20" to 25° 29' 47" North	
<b>Surrounding Districts</b>	Tando Allah Yaar in the East Matlari in the North Jamshoro in the North-West Thatta in South-West Tando M. Khan in South	
<b>Climate Conditions</b>	Hot and Semi-Arid	
<b>Coldest Month</b>	January	
<b>Hottest Month</b>	May	
<b>Seasonal Temperatures</b>	<b>Max Mean (°C)</b>	<b>Min Mean (°C)</b>
Spring (March and April)	38.35	20.59
Dry Summer (May and June)	42.71	27.24
Wet Summer (July to September)	38.71	26.60
Autumn (October to November)	35.71	19.56
Winter (December to February)	28.01	11.71
<b>Average Rainfall</b>	132.78 mm/year	
<b>Physiographic Features</b>	Indus River flows along the western border of the district	

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## DEMOGRAPHY

	Year-1998	Year-2017
<b>Population</b>	1,494,866	2,199,928
Urban	1,193,340	1,826,518
Rural	301,526	373,410
<b>No. of Household</b>	-	435,209
<b>Average Annual Growth Rate 1998-2017</b>	2.05 %	

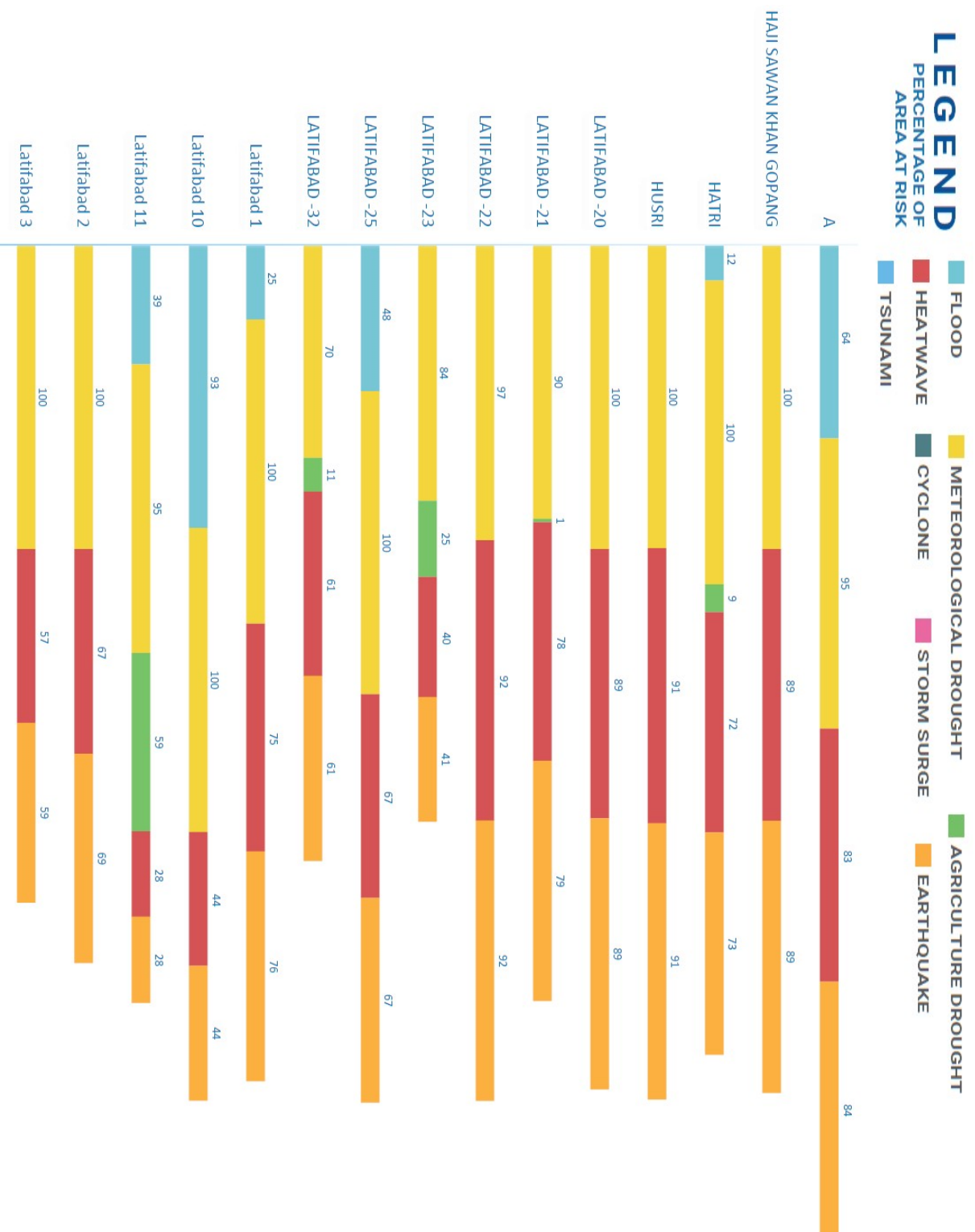
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## ECONOMY

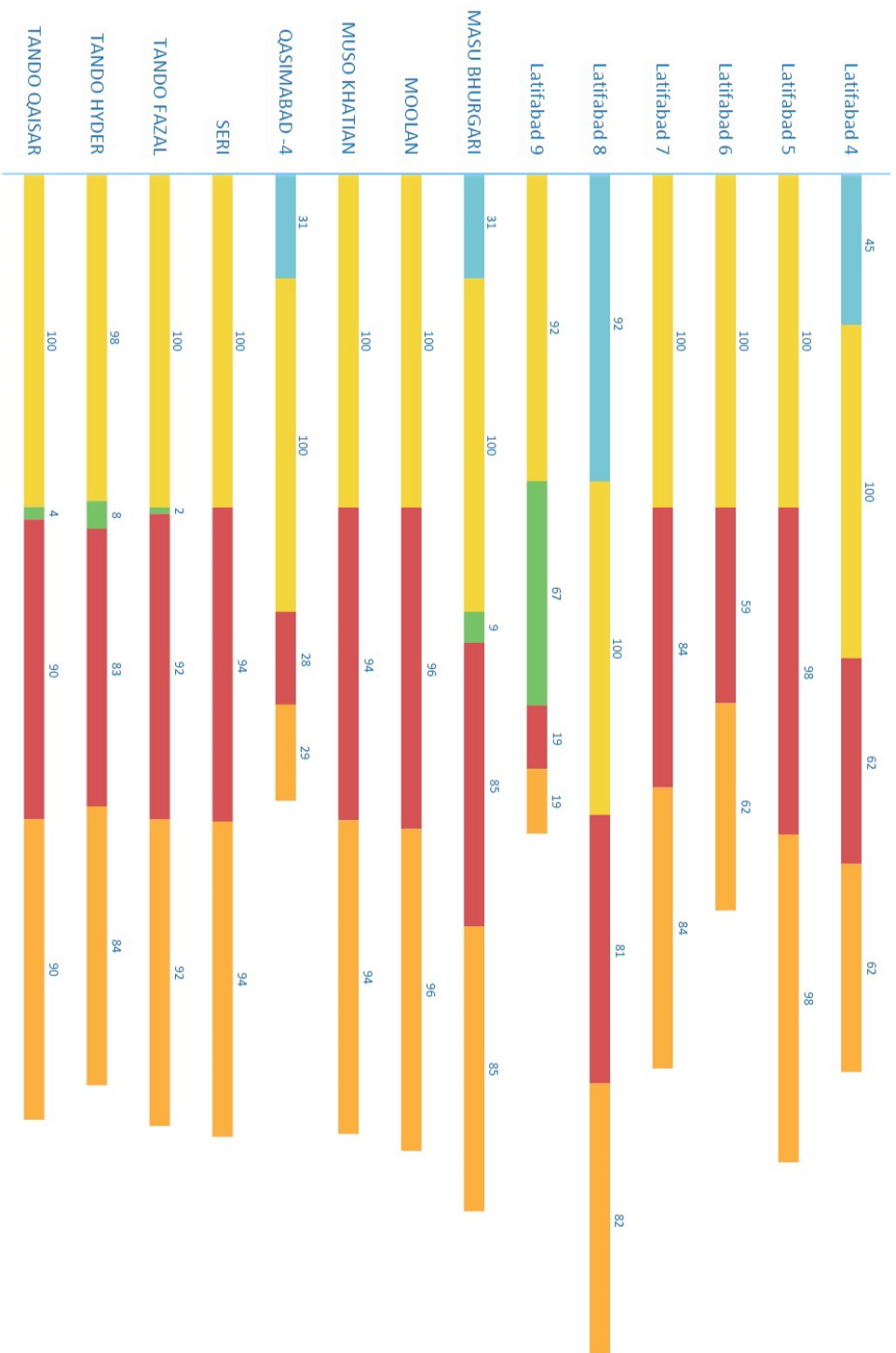
<b>Industries</b>	Agriculture, glass bangles, plastic industries, oil mills & flour mills
<b>Agriculture</b>	<b>Production in M.tons as per (2016-17)</b>
<b>Major Crops</b>	
Rice	3,984
Wheat	47,875
Sugarcane	361,921
Cotton	7,344
<b>Minor Crops</b>	
Rapeseed And Mustard	108
Jowar	49
Maize	39
Bajra	16

TALUKA NAMES	UC NAMES
<ol style="list-style-type: none"><li>1. Hyderabad City Taluka</li><li>2. Hyderabad Taluka</li><li>3. Latifabad Taluka</li><li>4. Qasimabad Taluka</li></ol>	<ol style="list-style-type: none"><li>1. A</li><li>2. Haji Sawan Khan Gopang</li><li>3. Hatri</li><li>4. Husri</li><li>5. Latifabad 1</li><li>6. Latifabad 10</li><li>7. Latifabad 11</li><li>8. Latifabad 2</li><li>9. Latifabad -20</li><li>10. Latifabad -21</li><li>11. Latifabad -22</li><li>12. Latifabad -23</li><li>13. Latifabad -25</li><li>14. Latifabad 3</li><li>15. Latifabad -32</li><li>16. Latifabad 4</li><li>17. Latifabad 5</li><li>18. Latifabad 6</li><li>19. Latifabad 7</li><li>20. Latifabad 8</li><li>21. Latifabad 9</li><li>22. Masu Bhurgari</li><li>23. Moolan</li><li>24. Muso Khatian</li><li>25. Qasimabad -4</li><li>26. Seri</li><li>27. Tando Fazal</li><li>28. Tando Hyder</li><li>29. Tando Qaisar</li></ol>

HYDERABAD DISTRICT MULTI-HAZARD RISK PROFILES







# UC WISE RISK PROFILE

A			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	11.354 sq km
		Natural Vegetation in Wet Areas	0.025 sq km
		Pakka Planned Area	0.976 sq km
		Pakka Unplanned Area	0.495 sq km
		Range Land	0.003 sq km
		Bridges	4
		Education Facilities	26
		Mobile Towers	4
		Petrol Pumps	1
		Settlements	31
		Irrigation and Drainage Network	9.115 km
		Railway Line	7.861 km
		Road Network	48.421 km
		Population	46833
		Household	9268
Meteorological Drought	Medium - Extreme	Settlements	31
		Agriculture Area	11.406 sq km
		Natural Vegetation in Wet Areas	0.228 sq km
		Range Land	0.023 sq km
		Water Body	0.418 sq km
		Wet Area	0.411 sq km
		Population	38547
		Household	7628
Agricultural Drought	Low	Agriculture Area	0.001 sq km
		Range Land	0.004 sq km
		Water Body	0.052 sq km
Heatwave	Low - Extreme	Settlements	31
		Population	38184
		Household	7556
		Agriculture Area	11.334 sq km
		Pakka Planned Area	0.973 sq km
		Pakka Unplanned Area	0.496 sq km
Riverine Flood	Low - Extreme	Agriculture Area	8.817 sq km
		Natural Vegetation in Wet Areas	0.108 sq km
		Pakka Planned Area	0.701 sq km

		Pakka Unplanned Area	0.157 sq km
		Bridges	1
		Education Facilities	19
		Petrol Pumps	1
		Settlements	17
		Railway Network	4.69 km
		Road Network	25.125 km
		Population	32216
		Household	6391
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

HAJI SAWAN KHAN GOPANG			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	68.375 sq km
		Forest Area	0.005 sq km
		Kachcha Area	0.059 sq km
		Natural Vegetation in Wet Areas	0.006 sq km
		Pakka Planned Area	0.727 sq km
		Pakka Unplanned Area	1.346 sq km
		Range Land	0.15 sq km
		Bridges	1
		Education Facilities	52
		Health Facilities	1
		Mobile Towers	2
		Petrol Pumps	3
		Settlements	55
		Irrigation and Drainage Network	34.378 km
		Railway Line	4.406 km
		Road Network	131.1 km
		Population	23223
		Household	4530
Meteorological Drought	Medium - Extreme	Settlements	55
		Agriculture Area	68.588 sq km
		Forest Area	0.106 sq km
		Natural Vegetation in Wet Areas	0.26 sq km
		Range Land	4.691 sq km
		Water Body	0.714 sq km
		Wet Area	1.735 sq km

		Population	19234
		Household	3750
Heatwave	Low - High	Settlements	53
		Population	19016
		Household	3711
		Agriculture Area	68.279 sq km
		Kachcha Area	0.059 sq km
		Pakka Planned Area	0.727 sq km
		Pakka Unplanned Area	1.35 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>HATRI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	60.59 sq km
		Forest Area	0.006 sq km
		Kachcha Area	0.216 sq km
		Natural Vegetation in Wet Areas	0.086 sq km
		Pakka Planned Area	14.811 sq km
		Pakka Unplanned Area	4.374 sq km
		Range Land	0.154 sq km
		Bridges	27
		Bus Stops	3
		Education Facilities	227
		Fire Stations	2
		Grain Mandi	4
		Grid Stations	3
		Health Facilities	29
		Industries	4
		Mobile Towers	34
		Petrol Pumps	31
		Police Stations	6
		Post Offices	5
		Power Plants	1

		Settlements	87
		Tourist Places	3
		Irrigation and Drainage Network	49.074 km
		Railway Line	8.198 km
		Road Network	216.7 km
		Population	505505
		Household	100247
Meteorological Drought	Medium - Extreme	Settlements	87
		Agriculture Area	60.887 sq km
		Forest Area	0.065 sq km
		Natural Vegetation in Wet Areas	7.608 sq km
		Range Land	4.295 sq km
		Water Body	1.143 sq km
		Wet Area	5.328 sq km
		Population	413375
		Household	81976
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	7.476 sq km
		Natural Vegetation in Wet Areas	0.357 sq km
		Range Land	4.162 sq km
		Water Body	0.077 sq km
		Wet Area	0.026 sq km
		Population	5361
		Household	1047
Heatwave	Low - High	Settlements	85
		Population	412673
		Household	81837
		Agriculture Area	60.465 sq km
		Kachcha Area	0.216 sq km
		Pakka Planned Area	14.807 sq km
		Pakka Unplanned Area	4.372 sq km
Riverine Flood	Low - Extreme	Agriculture Area	7.29 sq km
		Natural Vegetation in Wet Areas	5.342 sq km
		Range Land	0.003 sq km
		Bridges	1
		Irrigation and Drainage Network	0.084 km
		Road Network	1.786 km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

<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>HUSRI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	30.526 sq km
		Forest Area	0.02 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Planned Area	0.358 sq km
		Pakka Unplanned Area	1.526 sq km
		Range Land	0.029 sq km
		Education Facilities	41
		Health Facilities	1
		Settlements	51
		Irrigation and Drainage Network	22.937 km
		Railway Line	1.343 km
		Road Network	78.473 km
		Population	46486
		Household	9243
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	51
		Agriculture Area	30.614 sq km
		Forest Area	0.176 sq km
		Natural Vegetation in Wet Areas	0.121 sq km
		Range Land	0.423 sq km
		Water Body	0.342 sq km
		Wet Area	0.5 sq km
		Population	38324
		Household	7616
<b>Agricultural Drought</b>	Low	Agriculture Area	0.032 sq km
		Forest Area	0.007 sq km
		Range Land	0.299 sq km
		Population	99
		Household	19
<b>Heatwave</b>	Low - Extreme	Settlements	51
		Population	38016
		Household	7557
		Agriculture Area	30.488 sq km
		Pakka Planned Area	0.357 sq km
		Pakka Unplanned Area	1.526 sq km

<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood
<b>Cyclone</b>	Nil	The UC falls out of vulnerable zone for Cyclone
<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>LATIFABAD 1</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	2.881 sq km
		Natural Vegetation in Wet Areas	0.032 sq km
		Pakka Planned Area	8.499 sq km
		Pakka Unplanned Area	0.725 sq km
		Bridges	2
		Bus Stops	11
		Education Facilities	74
		Health Facilities	12
		Mobile Towers	20
		Petrol Pumps	9
		Police Stations	8
		Post Offices	6
		Settlements	25
		Tourist Places	2
		Railway Line	7.595 km
		Road Network	41.816 km
		Population	321498
		Household	63848
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	25
		Agriculture Area	2.904 sq km
		Natural Vegetation in Wet Areas	0.867 sq km
		Water Body	0.059 sq km
		Wet Area	0.007 sq km
		Population	262877
		Household	52206
<b>Heatwave</b>	Low - High	Settlements	24
		Population	262463
		Household	52124
		Agriculture Area	2.873 sq km
		Pakka Planned Area	8.496 sq km
		Pakka Unplanned Area	0.725 sq km

Riverine Flood	Low - Extreme	Agriculture Area	2.395 sq km
		Natural Vegetation in Wet Areas	0.791 sq km
		Pakka Planned Area	0.721 sq km
		Pakka Unplanned Area	0.033 sq km
		Bridges	1
		Education Facilities	2
		Health Facilities	2
		Mobile Towers	4
		Petrol Pumps	1
		Police Stations	1
		Post Offices	1
		Settlements	4
		Railway Network	3.112 km
		Road Network	12.822 km
		Population	28427
		Household	5655
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 10			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	1.579 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Education Facilities	1
		Road Network	2.716 km
Meteorological Drought	Medium - Extreme	Agriculture Area	1.586 sq km
		Natural Vegetation in Wet Areas	1.748 sq km
Heatwave	Low	Agriculture Area	1.572 sq km
Riverine Flood	Low - Extreme	Agriculture Area	1.58 sq km
		Natural Vegetation in Wet Areas	1.743 sq km
		Education Facilities	1
		Road Network	2.708 km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural	



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

LATIFABAD 11			
Hazard Type	Risk	Elements at Risk	
<b>Earthquake</b>	Low	Agriculture Area	11.056 sq km
		Natural Vegetation in Wet Areas	0.179 sq km
		Pakka Planned Area	0.121 sq km
		Pakka Unplanned Area	0.323 sq km
		Range Land	0.008 sq km
		Education Facilities	3
		Settlements	5
		Road Network	10.021 km
		Population	5394
		Household	1052
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	5
		Agriculture Area	11.188 sq km
		Bare Area with sparse Natural Vegetation	11.332 sq km
		Natural Vegetation in Wet Areas	9.763 sq km
		Range Land	0.796 sq km
		Water Body	0.08 sq km
		Wet Area	0.017 sq km
		Population	4487
		Household	875
<b>Agricultural Drought</b>	Low - High	Agriculture Area	9.025 sq km
		Bare Area with sparse Natural Vegetation	8.693 sq km
		Natural Vegetation in Wet Areas	9.468 sq km
		Range Land	0.946 sq km
		Wet Area	0.001 sq km
		Population	82
		Household	15
<b>Heatwave</b>	Low - Extreme	Settlements	3
		Population	4425
		Household	863

		Agriculture Area	10.989 sq km
		Pakka Planned Area	0.121 sq km
		Pakka Unplanned Area	0.324 sq km
Riverine Flood	Low - Extreme	Agriculture Area	8.88 sq km
		Natural Vegetation in Wet Areas	7.214 sq km
		Pakka Unplanned Area	0.099 sq km
		Range Land	0.006 sq km
		Settlements	1
		Road Network	3.007 km
		Population	1657
		Household	323
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 02			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Pakka Planned Area	3.571 sq km
		Pakka Unplanned Area	0.585 sq km
		Bridges	6
		Bus Stops	6
		Education Facilities	41
		Health Facilities	8
		Mobile Towers	7
		Petrol Pumps	4
		Police Stations	3
		Post Offices	7
		Settlements	15
		Railway Line	0.437 km
		Road Network	19.545 km
		Population	117287
		Household	23294
Meteorological Drought	Medium - Extreme	Settlements	15
		Water Body	0.927 sq km
		Population	95908
		Household	19049
Heatwave	Medium - High	Settlements	15
		Population	95741

		Household	19016
		Pakka Planned Area	3.569 sq km
		Pakka Unplanned Area	0.584 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 20			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	23.474 sq km
		Forest Area	0.028 sq km
		Natural Vegetation in Wet Areas	0.025 sq km
		Pakka Unplanned Area	0.423 sq km
		Range Land	0.125 sq km
		Education Facilities	16
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	14
		Irrigation and Drainage Network	13.389 km
		Railway Line	0.845 km
		Road Network	46.69 km
		Population	6995
		Household	1366
Meteorological Drought	Medium - Extreme	Settlements	14
		Agriculture Area	23.553 sq km
		Forest Area	0.922 sq km
		Natural Vegetation in Wet Areas	0.221 sq km
		Range Land	0.915 sq km
		Water Body	0.143 sq km
		Wet Area	0.785 sq km
		Population	5774
		Household	1128
Heatwave	Low - Extreme	Settlements	14
		Population	5734

		Household	1119
		Agriculture Area	23.439 sq km
		Pakka Unplanned Area	0.424 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 21			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	4.353 sq km
		Kachcha Area	0.04 sq km
		Pakka Unplanned Area	0.00033 sq km
		Range Land	0.00048 sq km
		Education Facilities	3
		Settlements	4
		Irrigation and Drainage Network	1.444 km
		Railway Line	3.558 km
		Road Network	7.873 km
		Population	666
		Household	130
Meteorological Drought	Medium - Extreme	Settlements	1
		Agriculture Area	4.376 sq km
		Range Land	0.023 sq km
		Water Body	0.268 sq km
		Wet Area	0.398 sq km
		Population	264
		Household	52
Agricultural Drought	Low	Agriculture Area	0.062 sq km
		Range Land	0.003 sq km
		Water Body	0.005 sq km
Heatwave	Low - Extreme	Settlements	4
		Population	542
		Household	106

		Agriculture Area	4.346 sq km
		Kachcha Area	0.04 sq km
		Pakka Unplanned Area	0.00021 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 22			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	4.645 sq km
		Pakka Unplanned Area	0.088 sq km
		Range Land	0.00034 sq km
		Bridges	2
		Education Facilities	1
		Health Facilities	1
		Settlements	2
		Irrigation and Drainage Network	2.488 km
		Railway Line	1.962 km
		Road Network	9.37 km
		Population	1447
		Household	283
Meteorological Drought	Medium - Extreme	Settlements	2
		Agriculture Area	4.653 sq km
		Range Land	0.002 sq km
		Water Body	0.064 sq km
		Wet Area	0.182 sq km
		Population	1202
		Household	235
Heatwave	Low - Extreme	Settlements	2
		Population	1190
		Household	233
		Agriculture Area	4.642 sq km
		Pakka Unplanned Area	0.088 sq km
Agricultural Drought	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>Cyclone</b>	Nil	The UC falls out of vulnerable zone for Cyclone
<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>LATIFABAD 23</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	2.031 sq km
		Pakka Planned Area	1.037 sq km
		Pakka Unplanned Area	0.588 sq km
		Range Land	0.015 sq km
		Education Facilities	3
		Health Facilities	1
		Industries	1
		Mobile Towers	1
		Petrol Pumps	4
		Police Stations	1
		Settlements	6
		Irrigation and Drainage Network	2.498 km
		Railway Line	3.721 km
		Road Network	10.818 km
		Population	25329
		Household	4972
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	6
		Agriculture Area	2.054 sq km
		Bare Area with sparse Natural Vegetation	2.334 sq km
		Range Land	0.159 sq km
		Water Body	0.452 sq km
		Wet Area	0.008 sq km
		Population	20825
		Household	4088
<b>Agricultural Drought</b>	Low - Medium	Agriculture Area	0.847 sq km
		Bare Area with sparse Natural Vegetation	1.796 sq km
		Range Land	0.189 sq km
		Water Body	0.001 sq km
		Population	200
		Household	38

Heatwave	Low - Extreme	Settlements	5
		Population	20706
		Household	4064
		Agriculture Area	2.02 sq km
		Pakka Planned Area	1.04 sq km
		Pakka Unplanned Area	0.586 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 25			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	9.252 sq km
		Natural Vegetation in Wet Areas	0.027 sq km
		Pakka Planned Area	4.401 sq km
		Pakka Unplanned Area	0.569 sq km
		Range Land	0.001 sq km
		Bus Stops	4
		Education Facilities	50
		Fire Stations	1
		Health Facilities	5
		Mobile Towers	6
		Petrol Pumps	1
		Post Offices	1
		Settlements	23
		Tourist Places	1
		Road Network	34.397 km
		Population	177111
		Household	35158
Meteorological Drought	Medium - Extreme	Settlements	23
		Agriculture Area	9.316 sq km
		Bare Area with sparse Natural Vegetation	0.182 sq km
		Natural Vegetation in Wet Areas	1.262 sq km
		Range Land	0.064 sq km
		Water Body	0.628 sq km
		Wet Area	0.02 sq km

		Population	145008
		Household	28789
Agricultural Drought	Low	Agriculture Area	0.052 sq km
		Bare Area with sparse Natural Vegetation	0.002 sq km
		Range Land	0.071 sq km
		Population	10
		Household	2
Heatwave	Low - Extreme	Settlements	23
		Population	144800
		Household	28747
		Agriculture Area	9.216 sq km
		Pakka Planned Area	4.402 sq km
		Pakka Unplanned Area	0.57 sq km
Riverine Flood	Low - Extreme	Agriculture Area	8.733 sq km
		Natural Vegetation in Wet Areas	1.218 sq km
		Pakka Planned Area	0.044 sq km
		Pakka Unplanned Area	0.207 sq km
		Range Land	0.00027 sq km
		Education Facilities	4
		Settlements	9
		Road Network	14.199 km
		Population	4306
		Household	843
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>LATIFABAD 3</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	2.07 sq km
		Natural Vegetation in Wet Areas	0.024 sq km
		Pakka Planned Area	1.701 sq km
		Pakka Unplanned Area	0.544 sq km
		Bus Stops	1
		Education Facilities	20
		Health Facilities	2
		Mobile Towers	1



		Petrol Pumps	14
		Police Stations	1
		Post Offices	1
		Power Plants	1
		Settlements	8
		Road Network	21.055 km
		Population	84404
		Household	16752
Meteorological Drought	Medium - Extreme	Settlements	8
		Agriculture Area	2.101 sq km
		Natural Vegetation in Wet Areas	0.159 sq km
		Water Body	0.775 sq km
		Wet Area	0.03 sq km
		Population	69434
		Household	13780
Heatwave	Low - High	Settlements	8
		Population	68997
		Household	13695
		Agriculture Area	2.054 sq km
		Pakka Planned Area	1.702 sq km
		Pakka Unplanned Area	0.546 sq km
Riverine Flood	Low - High	Natural Vegetation in Wet Areas	0.059 sq km
		Pakka Unplanned Area	0.00000177 sq km
		Road Network	0.065 km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 32			
Hazard Type	Risk	Elements at Risk	
<b>Earthquake</b>	Low	Agriculture Area	5.747 sq km
		Pakka Planned Area	0.542 sq km
		Pakka Unplanned Area	0.156 sq km
		Range Land	0.00011 sq km
		Education Facilities	2

		Mobile Towers	1
		Settlements	4
		Railway Line	6.26 km
		Road Network	16.084 km
		Population	11536
		Household	2250
Meteorological Drought	Medium - Extreme	Settlements	4
		Agriculture Area	5.766 sq km
		Bare Area with sparse Natural Vegetation	0.273 sq km
		Range Land	0.015 sq km
		Water Body	0.064 sq km
		Wet Area	0.786 sq km
		Population	9472
		Household	1848
Agricultural Drought	Low - Medium	Agriculture Area	1.241 sq km
		Bare Area with sparse Natural Vegetation	0.11 sq km
		Range Land	0.019 sq km
		Water Body	0.041 sq km
		Wet Area	0.003 sq km
Heatwave	Low - Extreme	Settlements	4
		Population	9454
		Household	1844
		Agriculture Area	5.739 sq km
		Pakka Planned Area	0.543 sq km
		Pakka Unplanned Area	0.156 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>LATIFABAD 4</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	2.315 sq km
		Natural Vegetation in Wet Areas	0.025 sq km
		Pakka Planned Area	0.648 sq km

		Pakka Unplanned Area	0.03 sq km
		Education Facilities	1
		Settlements	3
		Road Network	9.966 km
		Population	28345
		Household	5627
Meteorological Drought	Medium - Extreme	Settlements	3
		Agriculture Area	2.329 sq km
		Natural Vegetation in Wet Areas	0.264 sq km
		Wet Area	0.003 sq km
		Population	23359
		Household	4638
Heatwave	Low - High	Settlements	2
		Population	23234
		Household	4612
		Agriculture Area	2.309 sq km
		Pakka Planned Area	0.65 sq km
		Pakka Unplanned Area	0.03 sq km
Riverine Flood	Low - Extreme	Agriculture Area	2.019 sq km
		Natural Vegetation in Wet Areas	0.162 sq km
		Pakka Planned Area	0.006 sq km
		Settlements	1
		Road Network	5.948 km
		Population	241
		Household	48
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>LATIFABAD 5</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	0.445 sq km
		Pakka Planned Area	2.148 sq km
		Pakka Unplanned Area	0.00017 sq km
		Bus Stops	5

		Education Facilities	15
		Health Facilities	4
		Mobile Towers	7
		Petrol Pumps	5
		Post Offices	3
		Settlements	4
		Road Network	9.517 km
		Population	89167
		Household	17707
Meteorological Drought	Medium - High	Settlements	4
		Agriculture Area	0.448 sq km
		Population	72899
		Household	14477
Heatwave	Low - Medium	Settlements	4
		Population	72841
		Household	14465
		Agriculture Area	0.444 sq km
		Pakka Planned Area	2.149 sq km
		Pakka Unplanned Area	0.00017 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 6			
Hazard Type	Risk	Elements at Risk	
<b>Earthquake</b>	Low	Agriculture Area	0.425 sq km
		Pakka Planned Area	1.713 sq km
		Pakka Unplanned Area	0.013 sq km
		Range Land	0.004 sq km
		Bridges	4
		Education Facilities	11
		Health Facilities	3
		Mobile Towers	5
		Petrol Pumps	6

		Police Stations	1
		Post Offices	2
		Settlements	6
		Irrigation and Drainage Network	1.948 km
		Road Network	15.461 km
		Population	48165
		Household	9565
Meteorological Drought	Medium - Extreme	Settlements	6
		Agriculture Area	0.432 sq km
		Range Land	0.052 sq km
		Water Body	0.092 sq km
		Wet Area	1.042 sq km
		Population	39415
		Household	7827
Heatwave	Low - High	Settlements	6
		Population	39302
		Household	7804
		Agriculture Area	0.423 sq km
		Pakka Planned Area	1.711 sq km
		Pakka Unplanned Area	0.013 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>LATIFABAD 7</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Pakka Planned Area	1.609 sq km
		Pakka Unplanned Area	0.053 sq km
		Bus Stops	1
		Education Facilities	18
		Grid Stations	1
		Health Facilities	1
		Mobile Towers	1
		Petrol Pumps	1

		Post Offices	1
		Settlements	3
		Road Network	5.854 km
		Population	71422
		Household	14184
Meteorological Drought	Medium - Extreme	Settlements	3
		Water Body	0.099 sq km
		Wet Area	0.023 sq km
		Population	58337
		Household	11585
Heatwave	Medium - High	Settlements	3
		Population	58263
		Household	11571
		Pakka Planned Area	1.608 sq km
		Pakka Unplanned Area	0.053 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

LATIFABAD 8			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	1.84 sq km
		Natural Vegetation in Wet Areas	0.013 sq km
		Bridges	2
		Education Facilities	2
		Tourist Places	1
		Road Network	6.055 km
Meteorological Drought	Medium - Extreme	Agriculture Area	1.841 sq km
		Natural Vegetation in Wet Areas	0.26 sq km
Riverine Flood	Low - Extreme	Agriculture Area	1.824 sq km
		Natural Vegetation in Wet Areas	0.257 sq km
		Bridges	2

		Education Facilities	2
		Tourist Places	1
		Road Network	6.034 km
Heatwave	Low	Agriculture Area	1.836 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>LATIFABAD 9</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	11.249 sq km
		Kachcha Area	0.022 sq km
		Natural Vegetation in Wet Areas	0.001 sq km
		Pakka Planned Area	9.037 sq km
		Pakka Unplanned Area	3.422 sq km
		Range Land	0.026 sq km
		Bridges	4
		Bus Stops	4
		Education Facilities	127
		Fire Stations	1
		Grain Mandi	1
		Grid Stations	2
		Health Facilities	10
		Industries	25
		Mobile Towers	15
		Petrol Pumps	15
		Police Stations	2
		Post Offices	5
		Power Plants	1
		Settlements	46
		Tourist Places	2
		Irrigation and Drainage Network	0.873 km
		Railway Line	10.591 km
		Road Network	72.817 km
		Population	296774
		Household	58913

Meteorological Drought	Medium - Extreme	Settlements	42
		Agriculture Area	11.317 sq km
		Bare Area with sparse Natural Vegetation	75.947 sq km
		Natural Vegetation in Wet Areas	0.052 sq km
		Range Land	1.92 sq km
		Water Body	0.873 sq km
		Wet Area	0.517 sq km
		Population	242373
		Household	48114
Agricultural Drought	Low - High	Settlements	4
		Agriculture Area	6.097 sq km
		Bare Area with sparse Natural Vegetation	84.59 sq km
		Natural Vegetation in Wet Areas	0.064 sq km
		Range Land	2.139 sq km
		Water Body	0.691 sq km
		Wet Area	0.352 sq km
		Population	1681
		Household	328
Heatwave	Low - Extreme	Settlements	40
		Population	242280
		Household	48095
		Agriculture Area	11.224 sq km
		Kachcha Area	0.022 sq km
		Pakka Planned Area	9.035 sq km
		Pakka Unplanned Area	3.42 sq km
Riverine Flood	Low - Extreme	Agriculture Area	0.301 sq km
		Natural Vegetation in Wet Areas	0.029 sq km
		Road Network	0.318 km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>MASU BHURGARI</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	67.716 sq km
		Forest Area	0.028 sq km
		Kachcha Area	0.008 sq km



		Natural Vegetation in Wet Areas	0.096 sq km
		Pakka Planned Area	0.59 sq km
		Pakka Unplanned Area	1.818 sq km
		Range Land	0.069 sq km
		Bridges	2
		Bus Stops	2
		Education Facilities	49
		Mobile Towers	5
		Petrol Pumps	17
		Police Stations	1
		Settlements	47
		Irrigation and Drainage Network	28.883 km
		Road Network	106.65 km
		Population	38650
		Household	7540
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	47
		Agriculture Area	67.895 sq km
		Forest Area	1.124 sq km
		Natural Vegetation in Wet Areas	7.541 sq km
		Range Land	0.18 sq km
		Water Body	0.145 sq km
		Wet Area	0.515 sq km
		Population	31757
		Household	6195
<b>Agricultural Drought</b>	Low	Settlements	2
		Agriculture Area	8.002 sq km
		Forest Area	0.237 sq km
		Natural Vegetation in Wet Areas	0.787 sq km
		Range Land	0.14 sq km
		Water Body	0.058 sq km
		Wet Area	0.001 sq km
		Population	3523
		Household	686
<b>Heatwave</b>	Low - High	Settlements	47
		Population	31559
		Household	6156
		Agriculture Area	67.656 sq km
		Kachcha Area	0.008 sq km
		Pakka Planned Area	0.589 sq km
		Pakka Unplanned Area	1.822 sq km

Riverine Flood	Low - Extreme	Agriculture Area	18.227 sq km
		Natural Vegetation in Wet Areas	7.365 sq km
		Pakka Unplanned Area	0.001 sq km
		Range Land	0.000431 sq km
		Road Network	0.206 km
		Population	17
		Household	3
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

MOOLAN			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	79.614 sq km
		Forest Area	0.01 sq km
		Kachcha Area	0.031 sq km
		Pakka Unplanned Area	1.749 sq km
		Range Land	0.06 sq km
		Bridges	1
		Education Facilities	47
		Health Facilities	2
		Petrol Pumps	3
		Power Plants	1
		Settlements	61
		Irrigation and Drainage Network	27.293 km
		Road Network	163.933 km
		Population	29435
		Household	5742
Meteorological Drought	Medium - Extreme	Settlements	61
		Agriculture Area	79.733 sq km
		Forest Area	0.13 sq km
		Range Land	1.593 sq km
		Wet Area	0.443 sq km
		Population	24363
		Household	4755
Agricultural Drought	Low	Agriculture Area	0.001 sq km
		Range Land	0.041 sq km
Heatwave	Low - Extreme	Settlements	60

		Population	24136
		Household	4707
		Agriculture Area	79.562 sq km
		Kachcha Area	0.031 sq km
		Pakka Unplanned Area	1.754 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

MUSO KHATIAN			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	43.987 sq km
		Forest Area	0.005 sq km
		Pakka Planned Area	3.078 sq km
		Pakka Unplanned Area	0.925 sq km
		Range Land	0.043 sq km
		Bus Stops	1
		Education Facilities	67
		Grid Stations	1
		Health Facilities	11
		Mobile Towers	6
		Petrol Pumps	6
		Police Stations	1
		Post Offices	3
		Settlements	37
		Irrigation and Drainage Network	8.666 km
		Railway Line	11.177 km
		Road Network	97.006 km
		Population	86429
		Household	16476
Meteorological Drought	Medium - Extreme	Settlements	37
		Agriculture Area	44.072 sq km
		Forest Area	0.118 sq km
		Range Land	0.765 sq km
		Water Body	0.013 sq km
		Wet Area	0.774 sq km
		Population	79090
		Household	15068

Heatwave	Low - High	Settlements	37
		Population	78785
		Household	15008
		Agriculture Area	43.941 sq km
		Pakka Planned Area	3.075 sq km
		Pakka Unplanned Area	0.928 sq km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

QASIMABAD 4			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	0.641 sq km
		Natural Vegetation in Wet Areas	0.023 sq km
		Pakka Planned Area	0.2 sq km
		Pakka Unplanned Area	0.087 sq km
		Education Facilities	5
		Health Facilities	1
		Power Plants	1
		Settlements	2
		Irrigation and Drainage Network	0.189 km
		Road Network	4.197 km
		Population	6388
		Household	1263
Meteorological Drought	Medium - Extreme	Settlements	2
		Agriculture Area	0.649 sq km
		Natural Vegetation in Wet Areas	0.961 sq km
		Water Body	0.033 sq km
		Population	5229
		Household	1034
Heatwave	Low - High	Settlements	2
		Population	5216
		Household	1032

		Agriculture Area	0.637 sq km
		Pakka Planned Area	0.2 sq km
		Pakka Unplanned Area	0.087 sq km
Riverine Flood	Low - Extreme	Agriculture Area	0.186 sq km
		Natural Vegetation in Wet Areas	0.859 sq km
		Pakka Planned Area	0.0000009sq km
		Pakka Unplanned Area	0.0000016 sq km
		Road Network	0.269 km
Agricultural Drought	Nil	The UC falls out of vulnerable zone for Agricultural Drought	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

SERI			
Hazard Type	Risk	Elements at Risk	
Earthquake	Low	Agriculture Area	87.127 sq km
		Forest Area	0.032 sq km
		Kachcha Area	0.099 sq km
		Pakka Planned Area	0.173 sq km
		Pakka Unplanned Area	1.614 sq km
		Range Land	0.085 sq km
		Bridges	3
		Education Facilities	64
		Mobile Towers	4
		Petrol Pumps	3
		Settlements	75
		Irrigation and Drainage Network	35.039 km
		Railway Line	0.696 km
		Road Network	196.728 km
		Population	31016
		Household	6057
Meteorological Drought	Medium - Extreme	Settlements	75
		Agriculture Area	87.265 sq km
		Forest Area	0.478 sq km
		Range Land	2.273 sq km
		Water Body	1.341 sq km
		Wet Area	0.698 sq km

		Population	25651
		Household	5001
<b>Heatwave</b>	Low - Extreme	Settlements	74
		Population	25461
		Household	4966
		Agriculture Area	87.063 sq km
		Kachcha Area	0.099 sq km
		Pakka Planned Area	0.174 sq km
		Pakka Unplanned Area	1.619 sq km
<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>Cyclone</b>	Nil	The UC falls out of vulnerable zone for Cyclone	
<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>TANDO FAZAL</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	78.265 sq km
		Forest Area	0.038 sq km
		Pakka Planned Area	0.293 sq km
		Pakka Unplanned Area	2.712 sq km
		Range Land	0.106 sq km
		Education Facilities	54
		Power Plants	1
		Settlements	77
		Irrigation and Drainage Network	27.826 km
		Road Network	152.078 km
		Population	45649
		Household	8903
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	77
		Agriculture Area	78.485 sq km
		Forest Area	0.763 sq km
		Range Land	2.684 sq km
		Water Body	0.02 sq km
		Wet Area	1.176 sq km
		Population	37802

		Household	7375
<b>Agricultural Drought</b>	Low	Agriculture Area	1.075 sq km
		Forest Area	0.027 sq km
		Range Land	0.949 sq km
		Water Body	0.025 sq km
		Population	27
		Household	6
<b>Heatwave</b>	Low - Extreme	Settlements	77
		Population	37511
		Household	7315
		Agriculture Area	78.161 sq km
		Pakka Planned Area	0.293 sq km
		Pakka Unplanned Area	2.723 sq km
<b>Riverine Flood</b>	Nil	The UC falls out of vulnerable zone for Riverine Flood	
<b>Cyclone</b>	Nil	The UC falls out of vulnerable zone for Cyclone	
<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>TANDO HYDER</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	31.339 sq km
		Pakka Planned Area	0.039 sq km
		Pakka Unplanned Area	1.145 sq km
		Range Land	0.083 sq km
		Education Facilities	38
		Industries	1
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	32
		Irrigation and Drainage Network	8.39 km
		Road Network	52.822 km
		Population	18925
		Household	3689
<b>Meteorological Drought</b>	Medium - Extreme	Settlements	32
		Agriculture Area	31.478 sq km
		Range Land	2.485 sq km
		Water Body	0.063 sq km

		Wet Area	0.317 sq km
		Population	15612
		Household	3046
Agricultural Drought	Low	Settlements	1
		Agriculture Area	1.588 sq km
		Range Land	2.355 sq km
		Water Body	0.024 sq km
		Wet Area	0.006 sq km
		Population	709
		Household	138
Heatwave	Low - High	Settlements	32
		Population	15467
		Household	3017
		Agriculture Area	31.28 sq km
		Pakka Planned Area	0.039 sq km
		Pakka Unplanned Area	1.145 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

<b>TANDO QAISAR</b>			
<b>Hazard Type</b>	<b>Risk</b>	<b>Elements at Risk</b>	
<b>Earthquake</b>	Low	Agriculture Area	63.569 sq km
		Forest Area	0.003 sq km
		Pakka Unplanned Area	2.207 sq km
		Range Land	0.123 sq km
		Education Facilities	58
		Health Facilities	4
		Industries	1
		Mobile Towers	2
		Petrol Pumps	2
		Police Stations	1
		Settlements	63
		Irrigation and Drainage Network	25.156 km
		Railway Line	8.725 km
		Road Network	107.047 km
		Population	36480



		Household	7111
Meteorological Drought	Medium - Extreme	Settlements	63
		Agriculture Area	63.75 sq km
		Forest Area	0.045 sq km
		Range Land	2.609 sq km
		Wet Area	0.982 sq km
		Population	30087
		Household	5868
Agricultural Drought	Low	Agriculture Area	1.827 sq km
		Range Land	1.432 sq km
		Wet Area	0.003 sq km
		Population	1159
		Household	226
Heatwave	Low - High	Settlements	60
		Population	29841
		Household	5817
		Agriculture Area	63.502 sq km
		Pakka Unplanned Area	2.211 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
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 interact directly with communities at risk in disaster preparedness, disaster risk reduction and response
- The TDMC shall Bridge between government and communities in disaster response
- The TDMC shall coordinate between DDMA, PDMA and all stakeholders working at grass-root level in pre, during and post disaster events

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#### **FUNCTION OF TALUKA DISASTER MANAGEMENT COMMITTEE**

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

#### **RESPONSIBILITY OF UNION COUNCIL DISASTER MANAGEMENT COMMITTEE**

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

4. Shall formulate different groups to respond disaster and emergency events such as evacuation group, camp management group etc. and share this record with TDMC, DDMA and PDMA.
5. Shall prepare awareness and capacity development proposals and training programs and follow-up with TDMC, DDMA and PDMA for arranging such events at grass root level.

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## **FUNCTION OF UCDMC**

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



### 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 and flooding period
- Aware and sensitize public and private departments on main streaming disaster risk reduction in developing planning
- Ensure availability and functioning of provincial emergency operation center
- Provide and report high risk population and infrastructure in anticipated hazard areas.
- Capacity building of line and stakeholder department on disaster risk reduction and management.

### ***During-Disaster***

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

- Coordinate with individual donors, donor organizations, NGOs and INGOs and ensure distribution of relief among disaster affectees

#### ***Post-Disaster***

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

### **DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)**

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

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

### ***During-Disaster***

- Mobilization of man and material resources
- For rescue and evacuation of people, provide and manage temporary shelter and life restoration equipment in disaster affected regions
- Coordinate with TDMC and line departments
- The DDMA shall lead the evacuation of people to safer places with the assistance of PDMA. DDMA shall also ensure safety, security, supply chain, life commodities and management of relief camps
- Only authorized officials of DDMA shall brief media on disaster situation and the response activities.

### ***Post-Disaster***

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

## **CIVIL DEFENSE**

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

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

### ***During-Disaster***

- Fire fighting
- Rescue and evacuation
- Assign volunteers in coordination with PDMA and DDMA
- Communicate to DEOC about details of all activities
- Communicate to DEOC any additional resources required for performing the above tasks
- Facilitate line departments as per demand in disaster response

### ***Post-Disaster***

- Assist in rehabilitation process if required

## **EDUCATION DEPARTMENT**

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

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

### ***During-Disaster***

- Mobilize human resources for intervention during disaster
- Inform schools situated in high risk areas about hazard and hazard forecast
- Assist in arrangement of relief and shelter camps in educational institutes for the disaster affectees



- Facilitate Health department and other relevant entities in arranging medical camps, blood donations and provision of medical aid during disaster and emergencies
- Coordinate with PDMA and DDMA in assigning volunteers for emergency response

#### ***Post-Disaster***

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

### **FINANCE DEPARTMENT**

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

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

#### ***During-Disaster***

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

#### ***Post-Disaster***

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

## HEALTH DEPARTMENT

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

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

### ***During-Disaster***

- Provide emergency treatment for the seriously injured
- Ensure emergency supplies of medicines and first-aid
- Supervise food, water supplies, sanitation and disposal of waste

- Assess and co-ordinate provision of ambulances and hospitals where they could be sent (public and private);
- Provide special information required regarding precautions for epidemics
- Set-up an information Centre to organize sharing of information for public information purposes
- Conduct disaster impact assessment on health
- Intervene in case of disease outbreak
- Medical camps and vaccination
- Ongoing surveillance with regard to health issues and disease outbreaks

#### ***Post-Disaster***

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

### **IRRIGATION DEPARTMENT**

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

- Inspection and identification of vulnerable embankments
- Monitoring and dissemination of river water levels
- Implementation of SOPs defined by Bund Manual
- Ensure readiness of equipment and machinery before monsoon and flooding season
- Monitor and disseminate flood level information to DDMA and PDMA

- Initiate necessary embankments reinforcing interventions for vulnerable embankments
- Initiate interventions for river training where necessary
- Introduce and ensure water harvesting and modern water management interventions in likely drought affected areas
- Ensure safety and compactness of irrigation channels, canals, branches, etc. before start of monsoon season to avoid breaches in irrigation system during heavy rains
- Ensure removal of congestion from storm water and draining channels before monsoon

#### ***During-Disaster***

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

#### ***Post-Disaster***

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

### **INFORMATION DEPARTMENT**

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

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

- Ensure media coverage and publication of PDMA and DDMA meetings for pre disaster preparations

#### ***During-Disaster***

- Coordination with PDMA and DDMA for announcement of warnings and updates on disasters
- Publication of bulletins on government actions, facilities, relief and rescue efforts
- Publication of camp management and relief distribution announcements
- Publication of safety measures during disasters to minimize disaster domino effects
- Communicate voice of affectees to concerned departments

#### ***Post-Disaster***

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

### **PAKISTAN METEOROLOGICAL DEPARTMENT (PMD)**

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

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

#### ***During-Disaster***

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

### ***Post-Disaster***

- Technical assistance in rescue and rehabilitation process

## **POLICE DEPARTMENT**

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

- Coordinate with the DDMA in the pre-disaster planning
- Participate in DDMA meetings
- Capacity building of Police department regarding disaster risk management
- Information dissemination through 15 helpline service to local residents
- Prepare team for emergency intervention
- Prepare plan for shifting to safer places and early warning system

### ***During-Disaster***

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

### ***Post-Disaster***

- Assist in relief and rehabilitation process

## REVENUE DEPARTMENT

### *Pre-Disaster*

- Assign representatives for DDMA, and participate in meetings
- Information sharing regarding capacities and needs of Revenue department regarding disaster risk management
- Capacity building of Revenue department regarding disaster risk management
- Assessment of high prone areas and estimation of possible damage and needs for recovery in case of emergency
- Arrangement of financial resources
- Facilitate getting tax exemptions to institutions/NGOs/INGOs focus on disaster risk management
- Collect and update population data at village level

### *During-Disaster*

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

### *Post-Disaster*

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

## ARMED FORCES

### *Pre-Disaster*

- Coordinate with the DDMA in the pre-disaster planning

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

#### ***During-Disaster***

- Maintain liaison with the DEOC for vital inputs during response
- Collect information and warn appropriate Army units for engagement in safety, rescue and evacuation activities
- Establish communication infrastructure and supplement the civil communication set-up if required
- Coordinate all military activity required by the civil administration
- Provision of medical care with the help of the medical teams, including treatment at the nearest armed forces hospital
- Transportation of relief material
- Provision of logistic back-up (aircrafts, helicopters, boats)
- Assist in establishment of Relief Camps
- Assist in evacuation of people to safe places during the disaster
- Installation of temporary Bridges, Bunds

#### ***Post-Disaster***

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

### **SOCIAL WELFARE AND COMMUNITY DEVELOPMENT**

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

- Coordination with NGOs and civil society organizations working for disaster risk management



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

#### ***During-Disaster***

- Provide information on the situation of the disaster to the DEOC
- Coordinate all NGOs / INGOs and civil society organizations working during the emergency response
- Monitor progress of relief operations in the affected areas
- In coordination with PDMA, Health, Revenue and other line departments, ensure delivery of relief to most vulnerable segments of society such as children, orphans, widows, destitute
- Assist and facilitate Damage and Needs Assessment teams from NGOs
- Share human resources with DDMA

#### ***Post-Disaster***

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

### **NGOs / INGOs**

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

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

- Resource mobilization at local and international level

#### ***During-Disaster***

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

#### ***Post-Disaster***

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

## **DISASTER MANAGEMENT GUIDELINES**

## INTRODUCTION

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

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

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

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

<b>Drought</b>	<ol style="list-style-type: none"> <li>1. Hyderabad is a moderately populated district with closely spaced 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 <b>132.78</b> mm. Agriculture is practiced in the district which is mainly dependent on canal irrigation and rainfall.</li> <li>2. Drought is also forecastable hazard and can be predicted well in advance. Though drought does not bring any prominent or famine like conditions in the districts, however, it causes reduction in agricultural production and some extent disturb food supply for the animals and livestock. The best practice to manage drought related impacts is storage of food supplies for both humans and animals.</li> <li>3. The situation of drought may vary in future due to climate change effects, therefore, introduction of drought resilient crops is need of the time. Additionally, efficient use of available water resources and introduction of efficient irrigation systems in agriculture sector is also required.</li> </ol>
<b>Cyclone</b>	According to MHVRA Study 2022, there is no Cyclone Hazard in Hyderabad district.
<b>Tsunami</b>	According to MHVRA Study 2022, there is no Tsunami Hazard in Hyderabad district.

## **STANDARD OPERATING PROCEDURES**



## INTRODUCTION

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

## ACTION PLAN FOR FLOOD

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

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

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

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

## ACTION PLAN FOR FORECASTABLE DISASTERS

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

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

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

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

**Table 7: Action Plan for Drought Hazard Management**

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

## ACTION PLAN FOR UNFORECASTABLE HAZARDS

### Earthquake

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

**Table 8: Action Plan for Earthquake Hazard Management**

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

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

### SOP FOR PEOC AND DEOCs

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

- For localized emergencies, the situation shall be dealt within the regular operating mode of the emergency management services in the district.
- DDMA shall activate the DEOC and take the operational lead for the district government response.
- The DEOC will serve as the center for receiving early warning and issuing information to public at village level, taking measures to evacuate people, updating relevant departments, response agencies, and media etc.
- The DEOC will lead the coordination and management of relief operations in affected areas in the district with the assistance of PEOC.
- DEOC will coordinate with all concerned departments and humanitarian agencies at district level.
- DEOC will coordinate for early recovery with the assistance of PDMA and other concerned departments.
- In standby position, PEOC and DEOC shall be alert and ready to start emergency operations. The PEOC shall coordinate with concerned departments like NDMA, PMD, etc. for regular updates on likely disaster events. Once the threat is established, the PDMA shall approve the alert and activate response mechanism of PEOC and DEOC.
- Once PEOC and DEOC activation is approved or issued, both centers will remain fully operational on 24/7 basis and coordination shall be established with all concerned departments.
- PEOC and DEOC will collect regular updates on disaster situation and after normalization of situation and with mutual consultation shall inform PDMA to issue stand down or disaster deactivation call and final report on emergency operations will be circulated to stakeholders.
- The operationalization of PEOC and DEOC means complete activation of centers during disaster situation. Management of PDMA shall ensure full functionalities of PEOC including stock for emergency food, office supplies, communication system with backup support, electricity generators, computers, screens, multimedia projectors and other necessary equipment. While Deputy Commissioner Hyderabad 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 (12)	A, Hatri, Latifabad 1, Latifabad 10, Latifabad 11, Latifabad 25, Latifabad 3, Latifabad 4, Latifabad 8, Latifabad 9, Masu Bhurgari, Qasimabad 4
UCs Not At Risk (17)	Haji Sawan Khan Gopang, Husri, Latifabad 2, Latifabad -20, Latifabad -21, Latifabad -22, Latifabad -23, Latifabad -32, Latifabad 5, Latifabad 6, Latifabad 7, Moolan, Muso Khatian, Seri, Tando Fazal, Tando Hyder, Tando Qaisar
General Description	<ol style="list-style-type: none"> <li>1. Flooding has been one of the recurring occurred natural disasters that inflict irrecoverable and detrimental impacts on humans, property and environment.</li> <li>2. Hyderabad is located on the east bank of the Indus River. It was hit by 2011 floods. Overall, 20% of the population was affected due to these floods in 24 union councils of three talukas of the district.</li> <li>3. The entire district is prone to urban flooding due to natural low gradient slope.</li> <li>4. During torrential rains, the water floods into the river system and it often results in breaches at vulnerable points.</li> <li>5. 20% of the population in Hyderabad lives in low-lying areas. The ground water table in these areas remains very high; consequently, runoff rain water accumulates in a very short time to make these places flood-prone.</li> <li>6. According to MHVRA study 2022, Flood hazard in the district is of intensity “<b>Low to Very High</b>”.</li> <li>7. According to MHVRA study 2022, Flood risk in the district is “<b>Low to Extreme</b>”</li> </ol>
Disaster Management Measures	
Preparedness	
1. Recording of daily river discharge at barrages in Sindh, and regular dissemination among	



stakeholders.

2. In case of high discharge, dissemination of warnings and alerts to masses living in flood plain.
3. Identification and inspection of vulnerable embankments likely to be affected due to flooding during pre-monsoon season, as per “Bund Manual” of irrigation department.
4. Inspection and readiness of flood fighting equipment available with district government departments prior to flooding season.
5. Readiness of flood camps in high riverine flood and breaching risk areas.
6. Maintenance and strengthening of identified weak embankments.
7. In case of embankment breach risk at identified location, issuance of warning to population likely to be affected.
8. Readiness of community-based volunteers and other related organizations / NGOs.
9. Regular community-based flood fighting trainings through government departments or any other appropriate platforms.
10. Regular awareness campaigns on flood precautions and safe evacuations using various media platform.
11. Conduct of satellite imagery based study for identification of vulnerable embankments before each monsoon and flooding period.
12. Collection and management of contact information of area/village influential for alert and warning dissemination.

#### Long Term Strategy

13. Relocation of human settlements out of flood plains.
14. Installation of digital flood level gauges along embankments and dissemination of real-time flow level measurements to concerned authorities.
15. Inclusion and implementation of disaster risk reduction (DRR) measures in development projects at planning stage for building flood resilient infrastructure.
16. Awareness and motivation campaigns on construction of flood resilient buildings and infrastructures

#### Response

1. Mobilization of rescue services, relevant NGOs, scouts and volunteers.
2. Evacuation of people and livestock to shelters/camps.
3. Camp management as per standard practices.

<ol style="list-style-type: none"> <li>4. Relief distribution.</li> <li>5. Precautionary measures for communicable diseases.</li> <li>6. Activation of mobile health and education services for flood affectees.</li> <li>7. Arrangements for early recovery including flood de-watering and early restoration of communication and essential services.</li> <li>8. Repairing of flood defense structures</li> </ol>
<b>Recovery and Rehabilitation</b>
<ol style="list-style-type: none"> <li>1. Damage assessment of flood affected areas.</li> <li>2. Resettlement of population on build back better basis.</li> <li>3. Complete restoration of communication and essential services</li> </ol>

Earthquake	
UCs At Risk	All UCs
General Description	<ol style="list-style-type: none"> <li>1. An earthquake in the 10th century reportedly destroyed the town of Brahmanabad, approximately 80 km northeast of Hyderabad.</li> <li>2. The occurrence of two damaging earthquakes NE of Hyderabad in the past millennium suggests that the structures beneath the Indus sediments must be considered active.</li> <li>3. According to scientific and historical sources, a massive earthquake measuring 7.5 hit Debal east of present day Karachi in the Indus Delta in 894 AD.</li> <li>4. To the north of Debal, near present-day Hyderabad, the towns of Brahmanabad and Mansura were badly affected. They were important cities in the region and suddenly disappeared from the historical record.</li> <li>5. On June 16, 1819, an earthquake measuring 7.5 on the Richter scale hit parts of western India and present-day Sindh. Its epicenter was 185 miles east-southeast of Karachi in the Rann of Kutch. Over 1,500 were believed to have died in the quake. The earthquake resulted in the</li> </ol>

	<p>raising by 4.3 meters of an approximately 90-kilometre long stretch of land. A tributary flowing into the Indus was also thought to have dried up as a result and the tremor was strongly felt in Hyderabad, Sindh.</p> <p>6. The Gujarat earthquake of 2001 which killed thousands in India was strongly felt in Karachi and Hyderabad (where a seven- story building collapsed).</p> <p>7. According to MHVRA study 2022, Earthquake hazard in the district is of intensity “<b>Low</b>”.</p> <p>8. According to MHVRA study 2022, Earthquake risk in the district is “<b>Low</b>”.</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</li> </ol>	

like hospitals, control Rooms, etc. on priority basis.
<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	
<b>UCs At Risk</b>	All UCs
<b>General Description</b>	<ol style="list-style-type: none"> <li>1. The climate of district Hyderabad is Hot and Semi-Arid. (Climate Classification of Pakistan (Khan et al., 2010)) with warm conditions year-round. The period from mid-April to late June (before the onset of the monsoon) is the hottest of the year. During this time, winds that blow usually bring along clouds of dust, and people prefer staying indoors in the daytime.</li> <li>2. The hottest month is May and coldest remain January during a year.</li> <li>3. Average maximum temperature during May remain 43.23oC and average minimum temperature during January remain 10.28oC.</li> <li>4. Dry summer season comprises months of May and June and wet summer (monsoon season) starts in July and end till September each year (M. Zahid et. al, "Thermal Classification of Pakistan")</li> <li>5. In Recent years, the district has seen consistent episodes of heatwaves, jeopardizing the daily lives.</li> <li>6. The 2015 high-intensity heatwave resulted in death of 15 people in Hyderabad.</li> <li>7. The annual average rainfall across the district is about 132.78 mm.</li> <li>8. According to MHVRA study 2022, Heatwave hazard in the district is of intensity "<b>Severe to Extreme</b>".</li> <li>9. According to MHVRA study 2022, Heatwave risk in the district is "<b>Low to Extreme</b>".</li> </ol>
<b>Disaster Management Measures</b>	
<b>Preparedness</b>	
<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</li> </ol>	

and human dwellings.
2. Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings.
3. Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients.
4. Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations.
5. Arrangements for uninterrupted supply of electricity and water in vulnerable areas.
<b>Response</b>
1. Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas.
2. Local radio FM broadcasts to disseminate heatstroke safety and precautions.
3. Mobilize mobile medical teams for first-aid and other medical emergency support in affected area.
4. Record keeping of heatwave patients and fatalities.
<b>Recovery and Rehabilitation</b>
1. Post event review of heatwave plan and modifications if required.

Cyclone	
<b>UCs At Risk</b>	Nil
<b>General Description</b>	According to MHVRA study 2022, there is no risk of Cyclone in Hyderabad district

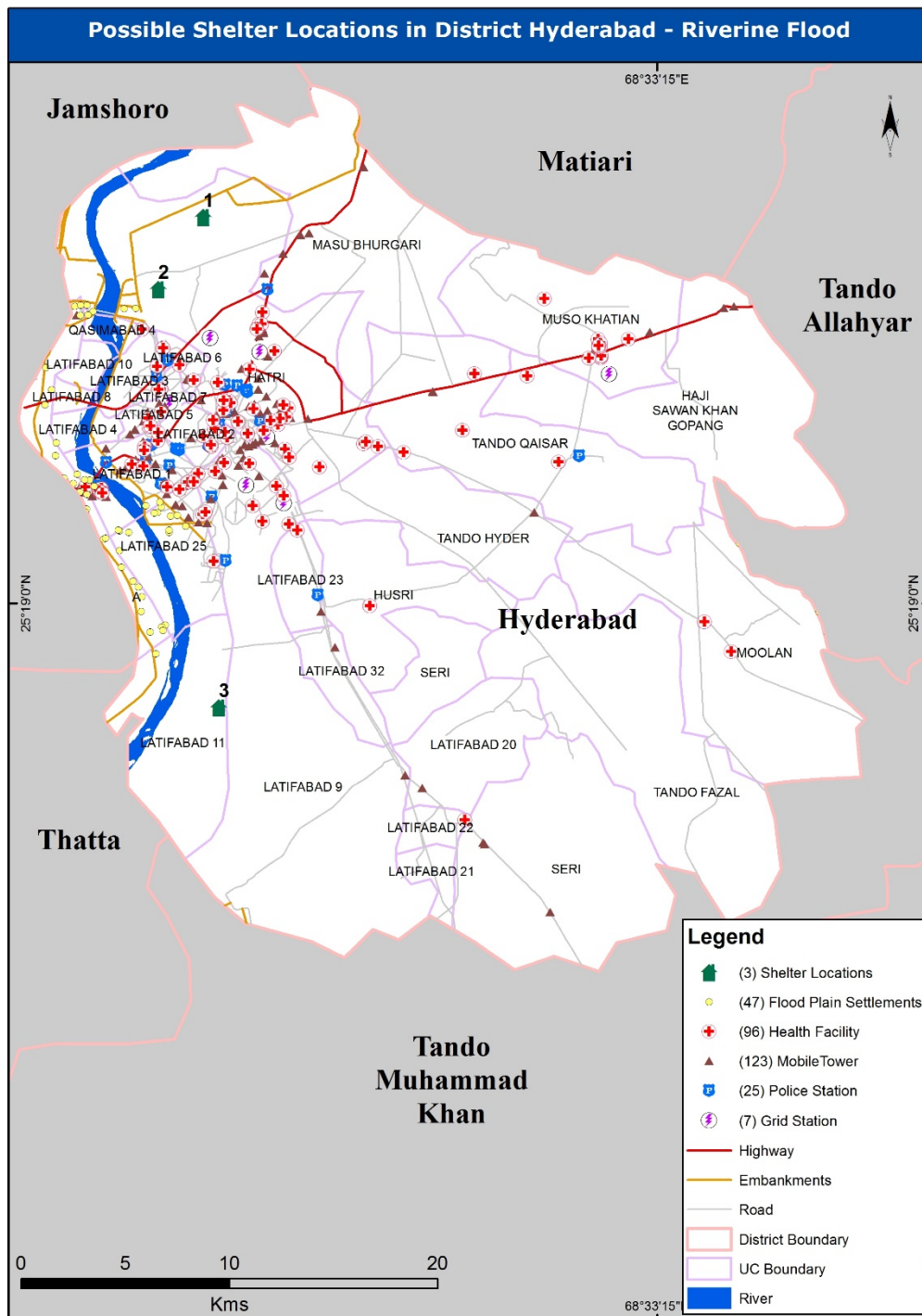
Drought	
<b>UCs At Risk</b>	All UCs
<b>General Description</b>	<ol style="list-style-type: none"> <li>1. Like other districts in Sindh, majority of the economy of Hyderabad is based on agriculture and pastoral farming but it also has a well-established industrial base.</li> <li>2. Most of its buildup area is situated in the west along River Indus, Bare areas with sparse natural vegetation is found along built-up area, which extends towards south.</li> <li>3. Irrigated crop lands with orchards are mostly found across the district.</li> <li>4. Climatic condition of the district can be categorized as Hot and Semi-Arid. Most of the agricultural water needs are being catered through</li> </ol>

	canal irrigation system.
	5. River Indus that flows along the western boundary plays an important role in irrigation through irrigation canals, crops in flood plain found beside the River bed.
	6. Natural vegetation found in north and across whole western boundary beside river bed.
	7. Average annual rainfall received during a year across the district is 132.78 mm.
	8. 2004-05, 2014-15 and 2018-19 were the drought years in Hyderabad of mild to moderate intensities.
	9. According to MHVRA Study 2022,
	10. Meteorological drought hazard for district Hyderabad is “ <b>Extreme</b> ”
	11. Meteorological drought risk for district Hyderabad is “ <b>Medium to Extreme</b> ”
	12. Agricultural drought hazard for district Hyderabad is “ <b>Mild to Severe</b> ”
	13. Agricultural drought risk for district Hyderabad is “ <b>Low to High</b> ”.
	<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>

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

## SHELTER LOCATION MAP

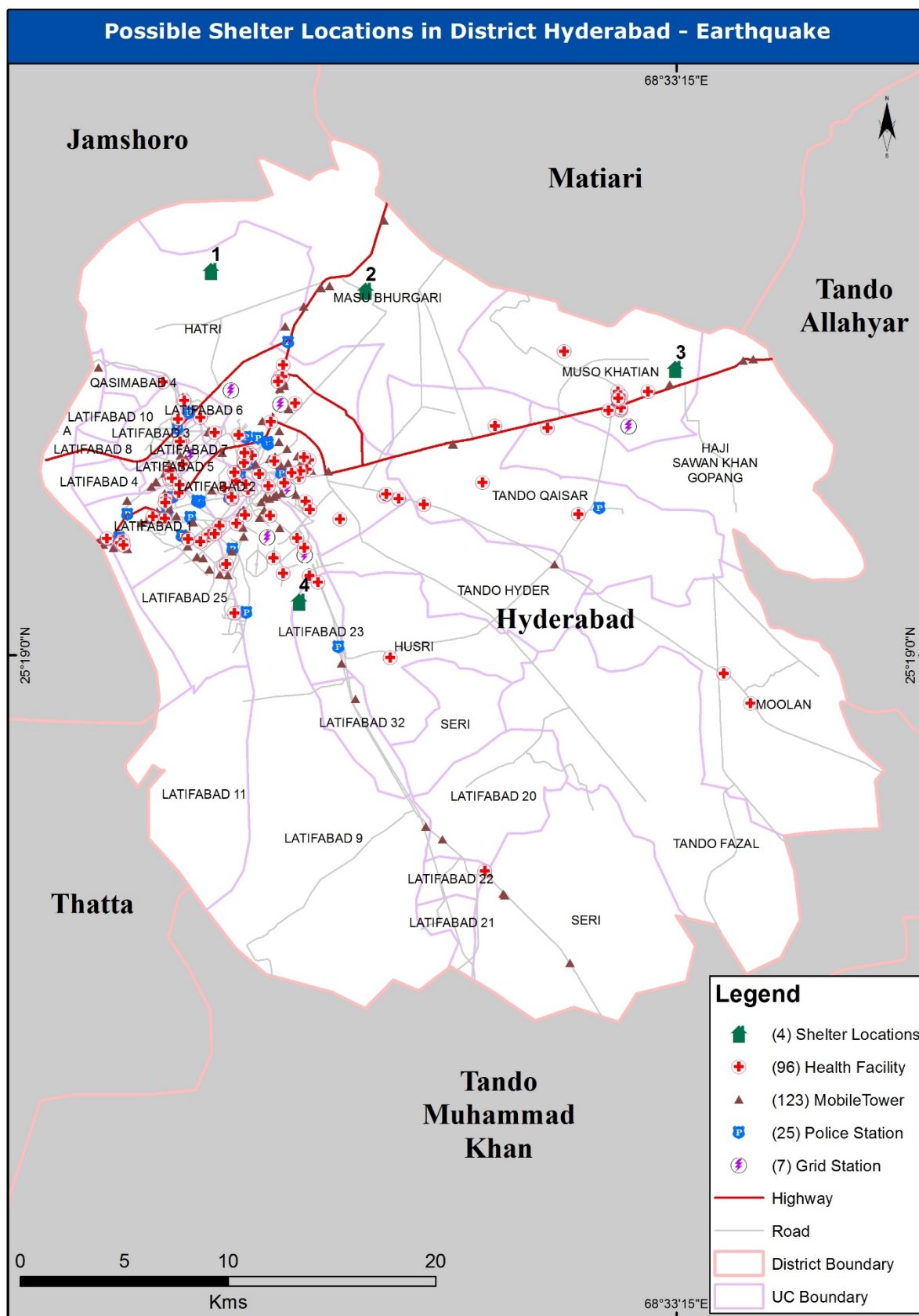
As part of preparedness, response, and rehabilitation against hazards, shelter places are integral. These are necessary to relocate, evacuate, or replenish the population that may be affected from hazards. Proposed shelters are illustrated in the maps.



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

\*Annex-B details the list of flood shelter locations





\*Annex-C details the list of earthquake shelter locations

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

## INTRODUCTION

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

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

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

## **COST BENEFIT ANALYSIS**

## INTRODUCTION

1. Cost Benefit Analysis (CBA) is a key analytical tool that can provide quantitative information regarding the prioritization of risk reduction based on comparing benefits of an actual or planned intervention with its costs.
2. Cost Benefit Analysis (CBA) can play a pivotal role in advocacy and decision-making on Disaster Risk Reduction (DRR) by demonstrating the financial and economic value of incorporating DRR initiatives into planning.
3. In an age of austerity, cost-benefit analysis continues to be an important tool for prioritizing efficient DRM measures but with a shifting emphasis from infrastructure-based options (hard resilience) to preparedness and systemic interventions (soft resilience), other tools such as cost-effectiveness analysis, multi-criteria analysis and robust decision-making approaches deserve more attention.
4. Studies categorize interventions into hard and soft type of measures. Hard resilience refers to the strengthening of structures and physical components of systems in order to brace against shocks imposed by extremes such as earthquakes, storms and 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 – HYDERABAD DISTRICT

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

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

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

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



## ANNEX – A – VULNERABLE SETTLEMENTS PRONE TO RIVERINE FLOOD

### List of Vulnerable Settlements (47) within flood Plains Prone to Riverine Flood

S.#	Name	Latitude	Longitude	Area (acres)
1	Shah Latif Colony	25.364	68.308	106.35
2	Railo Mian	25.441	68.305	106.30
3	Muhajir Colony	25.367	68.312	106.43
4	Kotri	25.372	68.304	106.25
5	Hamza Mallah	25.304	68.335	107.02
6	Goth Wadira Lakha Dino	25.418	68.290	105.92
7	Goth Sajan Shoro	25.339	68.322	106.70
8	Goth Mohammad Shoro	25.320	68.332	106.94
9	Goth Mian Mohammad Salim	25.380	68.295	106.02
10	Goth Luqman Shoro	25.326	68.328	106.84
11	Goth Kara Kho	25.306	68.340	107.15
12	Goth Jurial	25.295	68.338	107.09
13	Goth Jan Muhammad	25.402	68.290	105.91
14	Goth Isa Shoro	25.332	68.323	106.72
15	Goth Haji Siddiq Shoro	25.313	68.332	106.93
16	Goth Haji Jan Mohammad	25.409	68.293	105.98
17	Goth Fazal Laghari	25.350	68.351	107.41
18	Goth Allah Bachaio Shoro	25.324	68.330	106.90
19	Abbasi Mohalla	25.365	68.305	106.28
20	Untitled Settlement	25.307	68.342	107.18

S.#	Name	Latitude	Longitude	Area (acres)
21	Untitled Settlement	25.348	68.322	106.70
22	Untitled Settlement	25.357	68.308	106.35
23	Untitled Settlement	25.443	68.311	106.43
24	Untitled Settlement	25.441	68.309	106.38
25	Untitled Settlement	25.386	68.295	106.03
26	Untitled Settlement	25.358	68.340	107.15
27	Untitled Settlement	25.360	68.340	107.13
28	Untitled Settlement	25.355	68.347	107.32
29	Untitled Settlement	25.354	68.344	107.25
30	Untitled Settlement	25.344	68.315	106.53
31	Untitled Settlement	25.345	68.316	106.55
32	Untitled Settlement	25.347	68.326	106.80
33	Untitled Settlement	25.348	68.322	106.69
34	Untitled Settlement	25.368	68.302	106.21
35	Untitled Settlement	25.370	68.310	106.39
36	Untitled Settlement	25.370	68.307	106.33
37	Untitled Settlement	25.445	68.303	106.24
38	Untitled Settlement	25.445	68.308	106.36
39	Untitled Settlement	25.445	68.306	106.30
40	Untitled Settlement	25.305	68.341	107.16
41	Untitled Settlement	25.347	68.344	107.24
42	Untitled Settlement	25.348	68.344	107.23

S.#	Name	Latitude	Longitude	Area (acres)
43	Untitled Settlement	25.359	68.334	106.99
44	Untitled Settlement	25.356	68.339	107.11
45	Untitled Settlement	25.356	68.337	107.08
46	Untitled Settlement	25.444	68.329	106.89
47	Untitled Settlement	25.444	68.324	106.76

## ANNEX – B – SHELTER LOCATIONS DESCRIPTION – FLOOD

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°29'13.09"N 68°21'54.15"E Upper left corner: 25°29'12.29"N 68°21'11.49"E Lower right corner: 25°28'45.36"N 68°21'49.39"E Lower left corner: 25°28'44.34"N 68°21'9.00"E	245	~11000	75
2	Upper right corner: 25°27'22.67"N 68°20'30.07"E Upper left corner: 25°27'20.30"N 68°20'7.72"E Lower right corner: 25°26'53.95"N 68°20'31.73"E Lower left corner: 25°26'51.44"N 68°20'12.96"E	127	~5800	65
3	Upper right corner: 25°16'32.49"N 68°22'11.77"E Upper left corner: 25°16'32.02"N 68°21'35.95"E Lower right corner: 25°16'4.62"N 68°22'12.20"E Lower left corner: 25°16'4.51"N 68°21'37.21"E	211	~9500	170

A total of 3 shelter locations have been selected as Earthquake shelter places across district Hyderabad. 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 26,300 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

## ANNEX – C – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

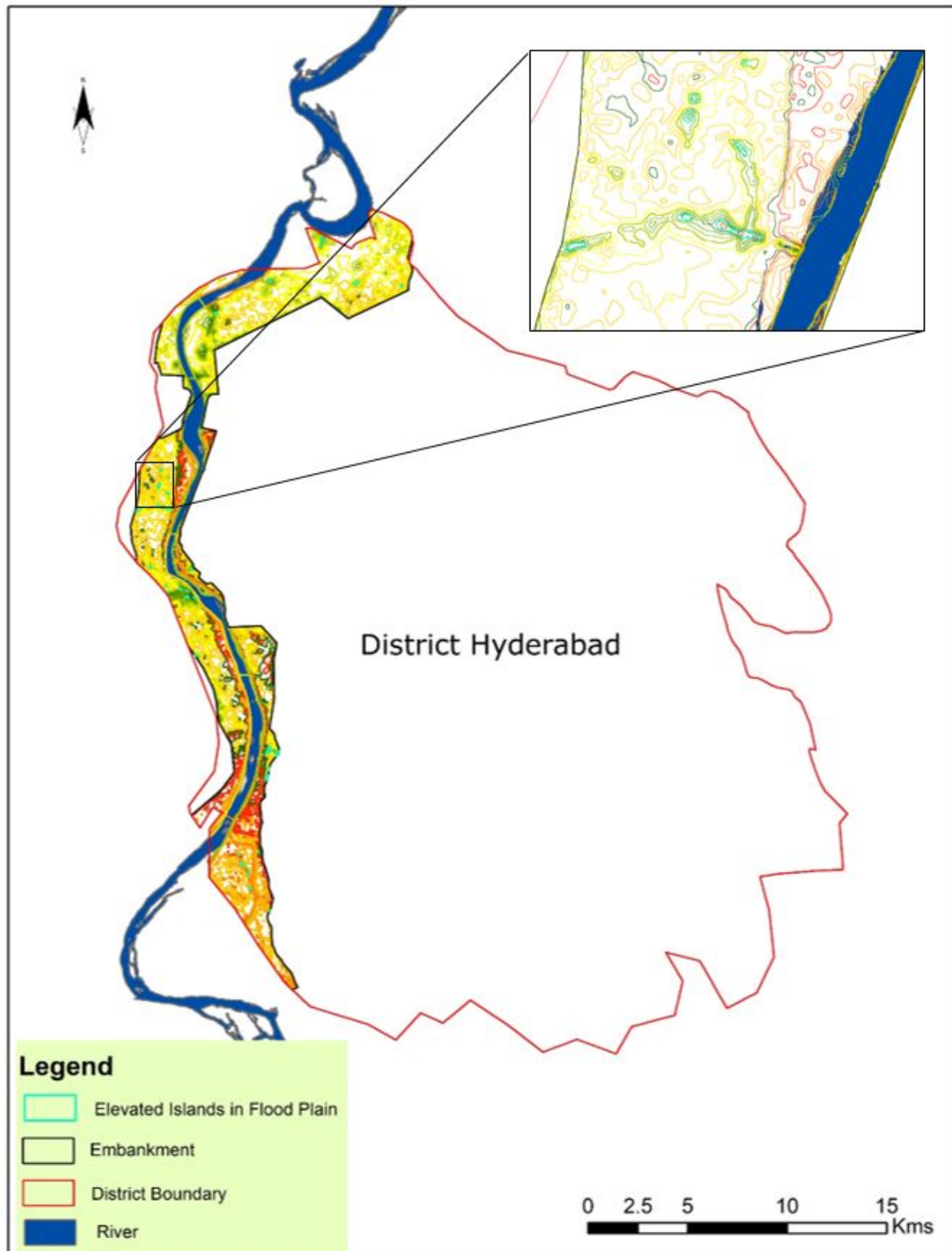
The given shelter locations for riverine flood are proposed on the findings of the MHVRA 2022 study and information obtained through satellite technology and online verifiable sources. It is recommended to conduct on ground physical surveys to evaluate their suitability.

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 25°29'20.41"N 68°21'27.82"E Upper left corner: 25°28'51.89"N 68°20'24.24"E Lower right corner: 25°29'4.79"N 68°21'50.37"E Lower left corner: 25°28'39.63"N 68°21'1.83"E	362	~16200	75
2	Upper right corner: 25°28'27.77"N 68°25'52.95"E Upper left corner: 25°28'56.99"N 68°25'4.55"E Lower right corner: 25°27'56.31"N 68°24'53.56"E Lower left corner: 25°28'3.86"N 68°24'34.04"E	549	~25000	76
3	Upper right corner: 25°26'33.03"N 68°33'21.32"E Upper left corner: 25°26'33.35"N 68°33'3.98"E Lower right corner: 25°26'18.95"N 68°33'22.02"E Lower left corner: 25°26'14.66"N 68°33'4.47"E	61	~2700	72
4	Upper right corner: 25°20'24.77"N 68°23'52.96"E Upper left corner: 25°20'42.89"N 68°23'18.84"E Lower right corner: 25°19'59.80"N 68°23'24.42"E Lower left corner: 25°20'4.77"N 68°23'7.15"E	262	~12000	125

A total of 4 shelter locations have been selected as Flood shelter places across district Hyderabad. The shelter locations are selected based on their proximity to the population vulnerable to flood, distance from area under high flood risk, elevation from the nearby areas, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.) A total of approximately 55,900 tents (tent with size of 45 sq. m each) can be set up within the demarcated shelter places.

## ANNEX – D – ELEVATED ISLANDS WITHIN EMBANKMENTS IN HYDERABAD

Total 17 elevated islands have been identified within the embankments in district Hyderabad, with a cumulative area of approximately 65.15 acres. These elevated islands obstruct the river flow and thereby may be demolished/removed to reinstate the normal river flow within the flood plain.





## ANNEX – E – RIVER TRAINING AND STRAIGHTENING

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

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

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

**Below figure illustrate the concept**



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



## ANNEX – F – LIST OF EQUIPMENT AVAILABLE IN DISTRICT HYDERABAD

Equipment	Quantity
De-watering Machine	308
Dumper	13
Buildozers / Dozers	10
Excavator	8
Fire Brigade / Engine / Tender	11
Tractor / Trolley / Blade	27
Vehicle / Bus/ Van/Truck/	22
Loader	11
Shawal	3
Cess Pool	1
Water Tanker	8
Tralor	2
Ambulances	14
Mech. Street Sweepers	1
Refuge Van	36

Garbage Van	3
Riksha Container	3
Power Generators	3
Bobkit	4

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