MHVRA

INFORMED DISASTER MANAGEMENT PLAN 2023-2032

DISTRICT THARPARKAR

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DEVELOPED BY
PDMA SINDH

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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 Tharparkar 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 Tharparkar 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 Tharparkar 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.

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- - 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.

INTRODUCTION TO DISASTER MANAGEMENT PLAN OF DISTRICT THARPARKAR

INTRODUCTION

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

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

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

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

VISION

Vision of MHVRA Informed Disaster Management Plan is;

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

OBJECTIVES

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

1. Building disaster resilience capacity at UC level to minimize the loss of lives, livelihood, assets and environment.

2. Improved understanding of disaster risk, hazard and vulnerabilities to strengthen disaster governance from local level to provincial level.

3. Enhanced preparedness to improve disaster response at grass-root level.

4. Promote and facilitate Disaster Risk Reduction (DRR) in planning and implementation of development projects to increase resilience.

5. Provide clarity on roles and responsibilities of various departments and stakeholders involved in different aspects of disaster management.

6. Promote "Build Back Better" principle in recovery, rehabilitation and reconstruction.

7. Promote social inclusion and communities as partners to reduce and manage disaster risk.

8. Promote disaster prevention and mitigation culture at local level.

REVIEW OF MHVRA INFORMED DISASTER MANAGEMENT PLAN

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

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

1. Planning is a dynamic process, therefore, disaster management plan must be reviewed periodically to incorporate changes according to the emergence of new eminent disasters and situations.

2. Climate is a dynamic driver of changing hazard risks, therefore, it is important to review disaster management plan in changing disaster scenarios.

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

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

Table 1: Recommended Committee for Reviewing Disaster Management Plan

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

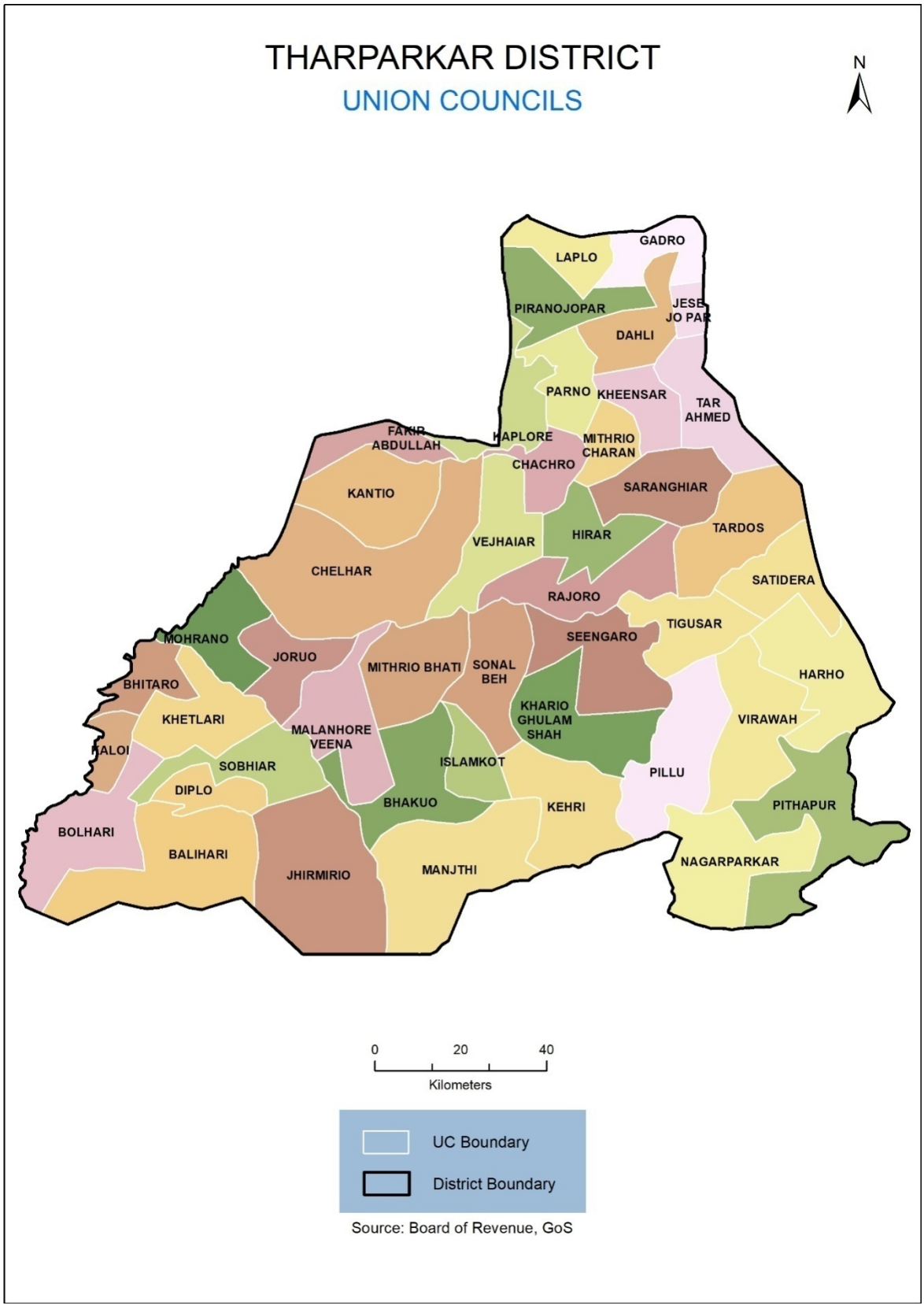
MODES OF REVIEW

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 THARPARKAR

DISTRICT THARPARKAR AT A GLANCE



GEOGRAPHY

District area in Sq. Km	19,994	
Coordinates	69◦ 3' 35" to 71◦ 7' 47" East Longitudes Latitude 24◦ 9' 35" to 25◦ 43' 6"North	
Surrounding Districts	Umerkot in North Rann of Kutch Lake in South India in East Badin and Mirpurkhas in West	
Climate Conditions	Hot desert and Semi-Arid	
Coldest Month **Hottest Month**	January May	
Seasonal Temperatures	**Max Mean (◦C)**	**Min Mean (◦C)**
Spring (March and April)	38.03	21.05
Dry Summer (May and June)	40.35	27.51
Wet Summer (July to September)	37.18	26.41
Autumn (October to November)	35.19	19.83
Winter (December to February)	28.42	12.34
Average Rainfall	237.47 mm/year	
Physiographic Features	Shakoor Lake, Rann of Kutch Lake, Kajal Jheel, Thar Desert, Karoonjhar Mountains	

DEMOGRAPHY

	Year-1998	**Year-2017**
Population	914,291	1,647,036
Urban	39,827	132,534
Rural	874,464	1,514,502
No. of Household	-	301,625
Average Annual Growth Rate 1998-2017	3.14 %	

ECONOMY

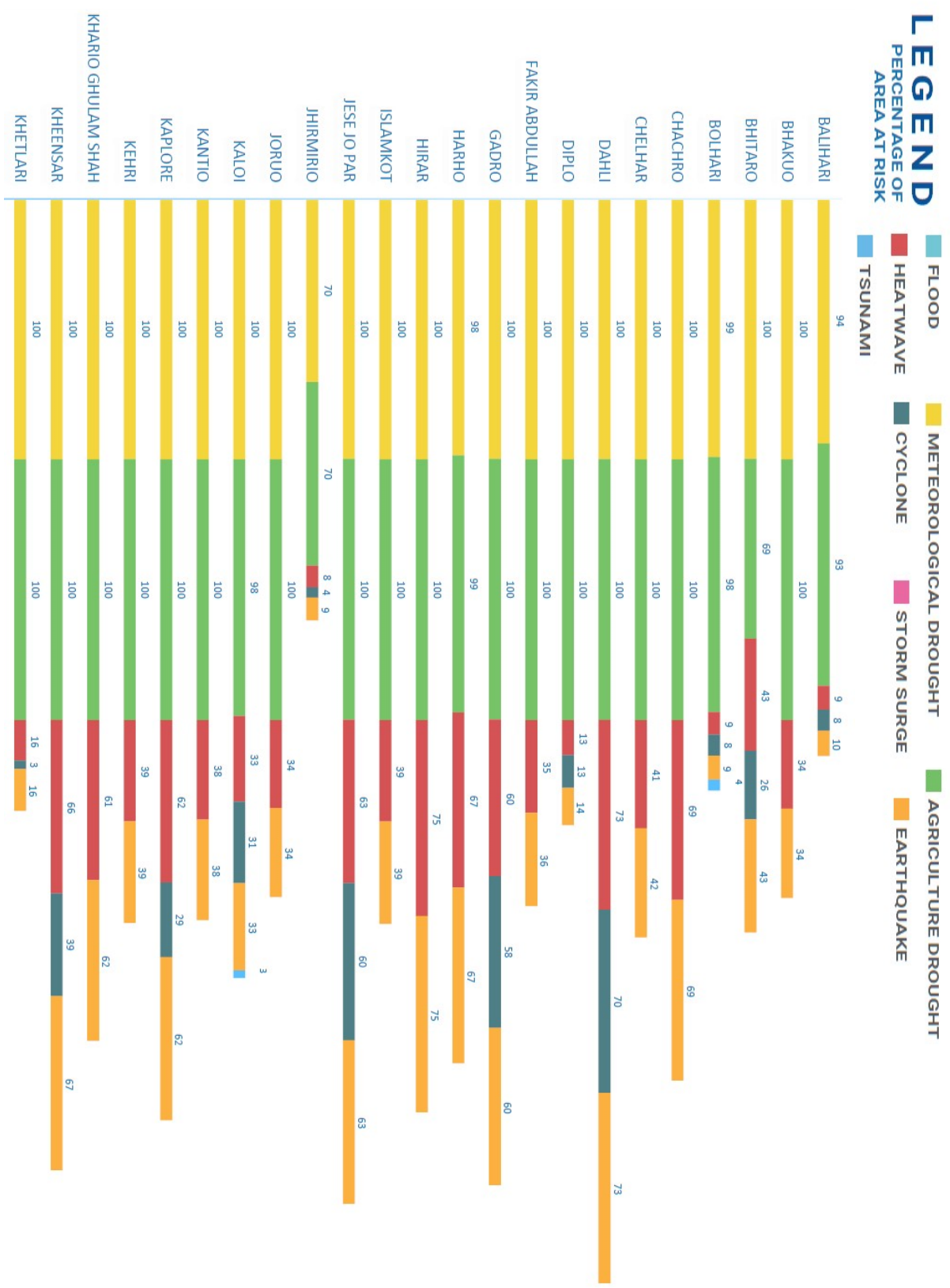
Agriculture	Production in M.tons as per (2016-17)
Major Crops	
Sugarcane	16,309
Cotton	749
Wheat	6,524
Minor Crops	
Bajra	20,744
Rapeseed And Mustard	825
Sesame	1,354

ADMINISTRATIVE SYSTEM

TALUKA NAMES	UC NAMES
1. Chachro Taluka 2. Dahli Taluka 3. Diplo Taluka 4. Islamkot Taluka 5. Kaloi Taluka 6. Mithi Taluka 7. Nagar Parkar Taluka	1. Balihari 2. Bhakuo 3. Bhitaro 4. Bolhari 5. Chachro 6. Chelhar 7. Dahli 8. Diplo 9. Fakir Abdullah 10. Gadro 11. Harho 12. Hirar 13. Islamkot 14. Jese Jo Par 15. Jhirmirio 16. Joruo 17. Kaloi 18. Kantio 19. Kaplore 20. Kehri 21. Khario Ghulam Shah 22. Kheensar 23. Khetlari 24. Laplo 25. Malanhore Veena 26. Manjthi 27. Mithrio Bhati 28. Mithrio Charan 29. Mohrano 30. Nagarparkar 31. Parno 32. Pillu 33. Piranojopar 34. Pithapur

	35. Rajoro 36. Saranghiar 37. Satidera 38. Seengaro 39. Sobhiar 40. Sonal Beh 41. Tar Ahmed 42. Tardos 43. Tigusar 44. Vejhaiar 45. Virawah

THARPARKAR DISTRICT MULTI-HAZARD RISK PROFILES




LAPLO
99 99 62 48 62
MALANHORE VEENA
100 100 43 43
MANJTHI
91 91 10 10
MITHRIO BHATI
100 100 53 53
MITHRIO CHARAN
100 100 68 8 68
MOHRANO
100 96 24 25
NAGARPARKAR
92 87 63 63
PARNO
100 100 69 57 70
PILLU
100 100 60 61
PIRANOJOPAR
100 100 68 66 68
PITHAPUR
75 74 59 59
RAJORO
100 100 67 67
SARANGHIAR
100 100 71 71
SATIDERA
100 100 65 65
SEENGARO
100 100 57 58
SOBHIAR
100 100 25 12 26
SONAL BEH
100 100 64 65
TAR AHMED
100 100 65 51 65
TARDOS
100 100 67 68
TIGUSAR
100 100 68 68
VEJHAIAR
100 100 66 66
VIRAWAH
98 98 71 71

UC WISE RISK PROFILE

BALIHARI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	63.428 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Unplanned Area	8.263 sq km
		Education Facilities	12
		Health Facilities	3
		Mobile Towers	3
		Petrol Pumps	1
		Police Stations	1
		Settlements	108
		Road Network	132.941 km
		Population	67481
		Household	14844
Meteorological Drought	Medium - Extreme	Settlements	108
		Agriculture Area	65.582 sq km
		Bare Area with sparse Natural Vegetation	627.652 sq km
		Natural Vegetation in Wet Areas	1.54 sq km
		Range Land	10.612 sq km
		Water Body	16.56 sq km
		Wet Area	34.803 sq km
		Population	68834
		Household	15151
Agricultural Drought	Low - Extreme	Settlements	108
		Population	82958
		Household	18261
		Agriculture Area	78.999 sq km
		Bare Area with sparse Natural Vegetation	756.176 sq km
		Natural Vegetation in Wet Areas	1.855 sq km
		Range Land	12.766 sq km
		Water Body	19.947 sq km
		Wet Area	31.856 sq km
Heatwave	Low - Extreme	Agriculture Area	63.079 sq km
		Pakka Unplanned Area	8.283 sq km
		Population	67650

		Household	14884
		Settlements	69
Cyclone	Low	Agriculture Area	63.413 sq km
		Natural Vegetation in Wet Areas	0.002 sq km
		Pakka Unplanned Area	0.525 sq km
		Settlements	108
		Road Network	6.984 km
		Population	4557
		Household	1007
Tsunami	Low-Medium	Agriculture Area	0.277 sq km
		Natural Vegetation in Wet Areas	0.194 sq km
		Pakka Unplanned Area	0.015 sq km
		Range Land	1.276 sq km
		Road Network	0.467 km
		Population	140
		Household	30
Storm Surge	Low-Medium	Agriculture Area	0.082 sq km
		Range Land	1.949 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

BHAKUO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	165.998 sq km
		Pakka Unplanned Area	6.169 sq km
		Education Facilities	12
		Health Facilities	3
		Settlements	84
		Road Network	119.549 km
		Population	30878
		Household	6324
Meteorological Drought	Medium - Extreme	Settlements	84
		Agriculture Area	169.216 sq km
		Bare Area with sparse Natural Vegetation	342.165 sq km
		Forest Area	0.093 sq km
		Wet Area	0.009 sq km
		Population	31483
		Household	6447

Agricultural Drought	Low - Extreme	Settlements	84
		Population	38017
		Household	7786
		Agriculture Area	204.426 sq km
		Bare Area with sparse Natural Vegetation	413.167 sq km
		Forest Area	0.112 sq km
		Wet Area	0.011 sq km
Heatwave	Low - Extreme	Agriculture Area	165.175 sq km
		Pakka Unplanned Area	6.195 sq km
		Population	31010
		Household	6352
		Settlements	69
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

BHITARO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	88.231 sq km
		Forest Area	0.055 sq km
		Natural Vegetation in Wet Areas	0.019 sq km
		Pakka Unplanned Area	5.974 sq km
		Range Land	0.18 sq km
		Education Facilities	1
		Health Facilities	1
		Settlements	111
		Irrigation and Drainage Network	20.153 km
		Road Network	128.33 km
		Population	34866
		Household	7405
Meteorological Drought	Medium - Extreme	Settlements	111
		Agriculture Area	89.003 sq km
		Bare Area with sparse Natural Vegetation	110.073 sq km

		Forest Area	1.958 sq km
		Natural Vegetation in Wet Areas	0.529 sq km
		Range Land	6.273 sq km
		Water Body	4.026 sq km
		Wet Area	3.237 sq km
		Population	35447
		Household	7524
Agricultural Drought	Low - High	Settlements	41
		Population	19423
		Household	4112
		Agriculture Area	39.953 sq km
		Bare Area with sparse Natural Vegetation	124.059 sq km
		Forest Area	2.346 sq km
		Natural Vegetation in Wet Areas	0.632 sq km
		Range Land	7.532 sq km
		Water Body	4.876 sq km
		Wet Area	2.363 sq km
Heatwave	Low - Extreme	Agriculture Area	88.033 sq km
		Pakka Unplanned Area	5.995 sq km
		Population	34994
		Household	7427
		Settlements	104
Cyclone	Low	Agriculture Area	57.337 sq km
		Forest Area	0.025 sq km
		Natural Vegetation in Wet Areas	0.019 sq km
		Pakka Unplanned Area	0.556 sq km
		Range Land	0.073 sq km
		Settlements	72
		Irrigation and Drainage Network	16.311 km
		Road Network	57.443 km
		Population	3318
		Household	709
Tsunami	Low - High	Agriculture Area	0.404 sq km
		Forest Area	0.027 sq km
		Natural Vegetation in Wet Areas	0.032 sq km
		Pakka Unplanned Area	0.008 sq km
		Range Land	0.072 sq km

		Road Network	0.352 km
		Population	48
		Household	11
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

BOLHARI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	42.879 sq km
		Kachcha Area	0.756 sq km
		Pakka Unplanned Area	4.242 sq km
		Range Land	0.017 sq km
		Settlements	67
		Road Network	144.209 km
		Population	35136
		Household	7599
Meteorological Drought	Medium - Extreme	Settlements	67
		Agriculture Area	44.406 sq km
		Bare Area with sparse Natural Vegetation	473.815 sq km
		Forest Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.559 sq km
		Range Land	3.64 sq km
		Water Body	9.665 sq km
		Wet Area	26.492 sq km
		Population	35930
		Household	7771
Agricultural Drought	Low - Extreme	Settlements	67
		Population	43325
		Household	9369
		Agriculture Area	53.539 sq km
		Bare Area with sparse Natural Vegetation	571.172 sq km
		Forest Area	0.001 sq km
		Natural Vegetation in Wet Areas	0.673 sq km
		Range Land	4.382 sq km
		Water Body	11.653 sq km
		Wet Area	23.089 sq km

Heatwave	Low - Extreme	Agriculture Area	42.676 sq km
		Kachcha Area	0.758 sq km
		Pakka Unplanned Area	4.254 sq km
		Population	35240
		Household	7619
		Settlements	48
Cyclone	Low	Agriculture Area	42.857 sq km
		Kachcha Area	0.756 sq km
		Pakka Unplanned Area	0.283 sq km
		Range Land	0.016 sq km
		Settlements	67
		Road Network	6.271 km
		Population	7028
		Household	1511
Tsunami	Low-Medium	Agriculture Area	3.608 sq km
		Kachcha Area	0.006 sq km
		Natural Vegetation in Wet Areas	0.317 sq km
		Pakka Unplanned Area	0.083 sq km
		Range Land	0.882 sq km
		Road Network	5.433 km
		Population	566
		Household	120
Storm Surge	Low-Medium	Agriculture Area	0.025 sq km
		Natural Vegetation in Wet Areas	0.426 sq km
		Range Land	0.643 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

CHACHRO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	150.607 sq km
		Kachcha Area	1.786 sq km
		Pakka Unplanned Area	4.237 sq km
		Education Facilities	10
		Health Facilities	2
		Mobile Towers	4
		Petrol Pumps	1
		Police Stations	1
		Post Offices	2
		Settlements	39

		Road Network	78.552 km
		Population	39629
		Household	6663
Meteorological Drought	Medium - Extreme	Settlements	39
		Agriculture Area	151.95 sq km
		Bare Area with sparse Natural Vegetation	71.316 sq km
		Population	40080
		Household	6732
Agricultural Drought	Medium - Extreme	Settlements	39
		Population	48878
		Household	8209
		Agriculture Area	185.417 sq km
		Bare Area with sparse Natural Vegetation	87.006 sq km
Heatwave	Low - Extreme	Agriculture Area	150.322 sq km
		Kachcha Area	1.794 sq km
		Pakka Unplanned Area	4.245 sq km
		Population	39713
		Household	6673
		Settlements	33
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

CHELHAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	474.21 sq km
		Kachcha Area	0.269 sq km
		Pakka Unplanned Area	13.23 sq km
		Education Facilities	20
		Health Facilities	3
		Mobile Towers	3
		Petrol Pumps	1
		Settlements	104
		Road Network	326.711 km
		Population	60933

		Household	11425
Meteorological Drought	Medium - Extreme	Settlements	104
		Agriculture Area	481.369 sq km
		Bare Area with sparse Natural Vegetation	700.167 sq km
		Water Body	0.008 sq km
		Population	61790
		Household	11590
Agricultural Drought	Low - Extreme	Settlements	104
		Population	75199
		Household	14100
		Agriculture Area	585.592 sq km
		Bare Area with sparse Natural Vegetation	851.708 sq km
		Water Body	0.01 sq km
Heatwave	Low - Extreme	Agriculture Area	473.24 sq km
		Kachcha Area	0.27 sq km
		Pakka Unplanned Area	13.269 sq km
		Population	61102
		Household	11459
		Settlements	87
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

DAHLI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	227.028 sq km
		Pakka Unplanned Area	8.434 sq km
		Education Facilities	3
		Settlements	80
		Road Network	131.279 km
		Population	50791
		Household	6992
Meteorological Drought	Medium - Extreme	Settlements	80
		Agriculture Area	228.802 sq km

		Bare Area with sparse Natural Vegetation	89.051 sq km
		Forest Area	0.031 sq km
		Population	51747
		Household	7122
Agricultural Drought	Low - Extreme	Settlements	80
		Population	63452
		Household	8732
		Agriculture Area	280.512 sq km
		Bare Area with sparse Natural Vegetation	109.18 sq km
		Forest Area	0.038 sq km
Heatwave	Low - High	Agriculture Area	226.766 sq km
		Pakka Unplanned Area	8.473 sq km
		Population	51027
		Household	7017
		Settlements	71
Cyclone	Low	Agriculture Area	226.991 sq km
		Pakka Unplanned Area	0.498 sq km
		Education Facilities	1
		Settlements	80
		Road Network	82.723 km
		Population	2995
		Household	405
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

DIPLO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	23.909 sq km
		Pakka Unplanned Area	1.874 sq km
		Education Facilities	1
		Grid Stations	1
		Petrol Pumps	1
		Settlements	34
		Road Network	73.386 km
		Population	14488
		Household	3167

Meteorological Drought	Medium - Extreme	Settlements	34
		Agriculture Area	24.737 sq km
		Bare Area with sparse Natural Vegetation	170.502 sq km
		Water Body	1.253 sq km
		Wet Area	0.452 sq km
		Population	14775
		Household	3232
Agricultural Drought	Low - Extreme	Settlements	34
		Population	17839
		Household	3900
		Agriculture Area	29.87 sq km
		Bare Area with sparse Natural Vegetation	205.866 sq km
		Water Body	1.513 sq km
		Wet Area	0.546 sq km
Heatwave	Low - Extreme	Agriculture Area	23.766 sq km
		Pakka Unplanned Area	1.878 sq km
		Population	14518
		Household	3176
		Settlements	22
Cyclone	Low	Agriculture Area	23.899 sq km
		Pakka Unplanned Area	0.169 sq km
		Education Facilities	1
		Settlements	34
		Road Network	4.565 km
		Population	1222
		Household	265
Tsunami	Low – Medium	Agriculture Area	0.05 sq km
		Road Network	1.123 km
		Population	1
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

FAKIR ABDULLAH			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	71.187 sq km
		Pakka Unplanned Area	1.25 sq km

		Education Facilities	14
		Settlements	29
		Road Network	53.224 km
		Population	7129
		Household	1096
Meteorological Drought	Medium - Extreme	Settlements	29
		Agriculture Area	72.758 sq km
		Bare Area with sparse Natural Vegetation	134.696 sq km
		Population	7288
		Household	1120
Agricultural Drought	Low - Extreme	Settlements	29
		Population	8904
		Household	1369
		Agriculture Area	88.869 sq km
		Bare Area with sparse Natural Vegetation	164.525 sq km
Heatwave	Low - Extreme	Agriculture Area	70.883 sq km
		Pakka Unplanned Area	1.256 sq km
		Population	7161
		Household	1100
		Settlements	23
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

GADRO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	151.671 sq km
		Kachcha Area	0.05 sq km
		Pakka Unplanned Area	4.839 sq km
		Education Facilities	3
		Health Facilities	2
		Settlements	61
		Road Network	83.054 km
		Population	29421
		Household	4050

Meteorological Drought	Medium - Extreme	Settlements	61
		Agriculture Area	153.111 sq km
		Bare Area with sparse Natural Vegetation	105.203 sq km
		Natural Vegetation in Wet Areas	0.141 sq km
		Water Body	0.104 sq km
		Wet Area	0.087 sq km
		Population	29982
		Household	4126
Agricultural Drought	Low - Extreme	Settlements	61
		Population	36844
		Household	5074
		Agriculture Area	188.205 sq km
		Bare Area with sparse Natural Vegetation	129.816 sq km
		Natural Vegetation in Wet Areas	0.173 sq km
		Water Body	0.128 sq km
		Wet Area	0.106 sq km
Heatwave	Low - High	Agriculture Area	151.514 sq km
		Kachcha Area	0.05 sq km
		Pakka Unplanned Area	4.865 sq km
		Population	29574
		Household	4067
		Settlements	50
Cyclone	Low	Agriculture Area	151.647 sq km
		Kachcha Area	0.05 sq km
		Pakka Unplanned Area	0.397 sq km
		Health Facilities	1
		Settlements	61
		Road Network	43.54 km
		Population	2665
		Household	364
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

HARHO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	405.137 sq km
		Kachcha Area	0.235 sq km
		Pakka Unplanned Area	5.814 sq km
		Range Land	0.004 sq km
		Education Facilities	3
		Settlements	174
		Road Network	167.057 km
		Population	24812
		Household	4915
Meteorological Drought	Medium - Extreme	Settlements	174
		Agriculture Area	412.697 sq km
		Bare Area with sparse Natural Vegetation	185.645 sq km
		Forest Area	0.212 sq km
		Range Land	0.013 sq km
		Wet Area	0.886 sq km
		Population	25289
		Household	4997
Agricultural Drought	Medium - Extreme	Settlements	174
		Population	30636
		Household	6048
		Agriculture Area	499.917 sq km
		Bare Area with sparse Natural Vegetation	225.176 sq km
		Forest Area	0.277 sq km
		Range Land	0.016 sq km
		Wet Area	1.072 sq km
Heatwave	Low - Extreme	Agriculture Area	404.686 sq km
		Kachcha Area	0.236 sq km
		Pakka Unplanned Area	5.839 sq km
		Population	24920
		Household	4938
		Settlements	163
Tsunami	Nil	Agriculture Area	0.009 sq km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

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

HIRAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	241.465 sq km
		Kachcha Area	0.225 sq km
		Pakka Unplanned Area	7.652 sq km
		Education Facilities	4
		Health Facilities	1
		Petrol Pumps	1
		Settlements	65
		Road Network	125.829 km
		Population	44925
		Household	6894
Meteorological Drought	Medium - Extreme	Settlements	65
		Agriculture Area	242.449 sq km
		Bare Area with sparse Natural Vegetation	83.708 sq km
		Population	45628
		Household	7004
Agricultural Drought	Medium - Extreme	Settlements	65
		Population	55541
		Household	8524
		Agriculture Area	295.178 sq km
		Bare Area with sparse Natural Vegetation	101.898 sq km
Heatwave	Low - Extreme	Agriculture Area	241.388 sq km
		Kachcha Area	0.226 sq km
		Pakka Unplanned Area	7.678 sq km
		Population	45080
		Household	6921
		Settlements	57
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

ISLAMKOT			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	78.57 sq km
		Pakka Unplanned Area	2.531 sq km
		Settlements	31
		Road Network	50.707 km
		Population	13849
		Household	2821
Meteorological Drought	Medium - Extreme	Settlements	31
		Agriculture Area	79.859 sq km
		Bare Area with sparse Natural Vegetation	129.782 sq km
		Forest Area	0.018 sq km
		Population	14086
		Household	2868
Agricultural Drought	Low - Extreme	Settlements	31
		Population	17023
		Household	3465
		Agriculture Area	96.504 sq km
		Bare Area with sparse Natural Vegetation	156.79 sq km
		Forest Area	0.022 sq km
Heatwave	Low - Extreme	Agriculture Area	78.259 sq km
		Pakka Unplanned Area	2.54 sq km
		Population	13897
		Household	2828
		Settlements	26
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

JESE JO PAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	54.703 sq km
		Pakka Unplanned Area	2.133 sq km
		Education Facilities	2
		Settlements	14

		Road Network	19.215 km
		Population	12849
		Household	1768
Meteorological Drought	Medium - Extreme	Settlements	14
		Agriculture Area	55.044 sq km
		Bare Area with sparse Natural Vegetation	34.115 sq km
		Population	13012
		Household	1790
Agricultural Drought	Low - Extreme	Settlements	14
		Population	15962
		Household	2194
		Agriculture Area	67.525 sq km
		Bare Area with sparse Natural Vegetation	42.026 sq km
Heatwave	Low - High	Agriculture Area	54.641 sq km
		Pakka Unplanned Area	2.14 sq km
		Population	12892
		Household	1773
		Settlements	14
Cyclone	Low	Agriculture Area	54.694 sq km
		Pakka Unplanned Area	0.104 sq km
		Settlements	14
		Road Network	10.952 km
		Population	628
		Household	85
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

JHIRMIRIO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	72.863 sq km
		Forest Area	0.013 sq km
		Kachcha Area	0.035 sq km
		Natural Vegetation in Wet Areas	0.038 sq km
		Pakka Unplanned Area	4.61 sq km

		Range Land	0.006 sq km
		Education Facilities	7
		Settlements	83
		Road Network	81.929 km
		Population	42968
		Household	9512
Meteorological Drought	Medium - Extreme	Settlements	83
		Agriculture Area	75.273 sq km
		Bare Area with sparse Natural Vegetation	513.86 sq km
		Forest Area	0.331 sq km
		Natural Vegetation in Wet Areas	8.957 sq km
		Range Land	14.975 sq km
		Water Body	5.465 sq km
		Wet Area	45.746 sq km
		Population	43799
		Household	9695
Agricultural Drought	Low - Extreme	Settlements	83
		Population	52783
		Household	11684
		Agriculture Area	90.718 sq km
		Bare Area with sparse Natural Vegetation	619.158 sq km
		Forest Area	0.399 sq km
		Natural Vegetation in Wet Areas	10.777 sq km
		Range Land	18.01 sq km
		Water Body	6.578 sq km
		Wet Area	53.438 sq km
Heatwave	Low - Extreme	Agriculture Area	72.245 sq km
		Kachcha Area	0.035 sq km
		Pakka Unplanned Area	4.631 sq km
		Population	43164
		Household	9555
		Settlements	51
Cyclone	Low	Agriculture Area	35.891 sq km
		Kachcha Area	0.035 sq km
		Natural Vegetation in Wet Areas	0.016 sq km
		Pakka Unplanned Area	0.197 sq km
		Range Land	0.002 sq km
		Settlements	41

		Road Network	3.283 km
		Population	2143
		Household	472
Tsunami	Low-Medium	Agriculture Area	0.04 sq km
		Kachcha Area	0.001 sq km
		Natural Vegetation in Wet Areas	1.156 sq km
		Pakka Unplanned Area	0.002 sq km
		Range Land	2.179 sq km
		Settlements	1
		Population	28
		Household	6
Storm Surge	Low-Medium	Agriculture Area	0.001 sq km
		Kachcha Area	0.018 sq km
		Natural Vegetation in Wet Areas	1.627 sq km
		Range Land	3.487 sq km
		Settlements	1
		Population	168
		Household	37
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

JORUO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	99.797 sq km
		Pakka Planned Area	0.031 sq km
		Pakka Unplanned Area	4.381 sq km
		Education Facilities	4
		Mobile Towers	4
		Petrol Pumps	3
		Police Stations	1
		Settlements	40
		Tourist Places	1
		Road Network	109.677 km
		Population	16020
		Household	3283
Meteorological Drought	Medium - Extreme	Settlements	40
		Agriculture Area	101.877 sq km
		Bare Area with sparse Natural Vegetation	210.015 sq km
		Population	16254

		Household	3328
Agricultural Drought	Low - Extreme	Settlements	40
		Population	19708
		Household	4032
		Agriculture Area	123.529 sq km
		Bare Area with sparse Natural Vegetation	254.653 sq km
Heatwave	Low - Extreme	Agriculture Area	99.399 sq km
		Pakka Planned Area	0.031 sq km
		Pakka Unplanned Area	4.395 sq km
		Population	16075
		Household	3293
		Settlements	33
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KALOI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	44.581 sq km
		Forest Area	0.05 sq km
		Kachcha Area	0.014 sq km
		Natural Vegetation in Wet Areas	0.045 sq km
		Pakka Unplanned Area	2.888 sq km
		Range Land	0.345 sq km
		Bus Stops	1
		Education Facilities	9
		Grid Stations	1
		Health Facilities	2
		Mobile Towers	1
		Settlements	69
		Irrigation and Drainage Network	9.311 km
		Road Network	96.16 km
		Population	17342
		Household	3689

Meteorological Drought	Medium - Extreme	Settlements	69
		Agriculture Area	45.108 sq km
		Bare Area with sparse Natural Vegetation	75.307 sq km
		Forest Area	1.316 sq km
		Natural Vegetation in Wet Areas	1.479 sq km
		Range Land	11.757 sq km
		Water Body	0.585 sq km
		Wet Area	7.723 sq km
		Population	17608
		Household	3744
Agricultural Drought	Low - High	Settlements	64
		Population	21048
		Household	4475
		Agriculture Area	54.26 sq km
		Bare Area with sparse Natural Vegetation	88.585 sq km
		Forest Area	1.592 sq km
		Natural Vegetation in Wet Areas	1.787 sq km
		Range Land	14.215 sq km
		Water Body	0.702 sq km
		Wet Area	9.321 sq km
Heatwave	Low - Extreme	Agriculture Area	44.46 sq km
		Kachcha Area	0.013 sq km
		Pakka Unplanned Area	2.892 sq km
		Population	17369
		Household	3697
		Settlements	63
Cyclone	Low	Agriculture Area	44.537 sq km
		Forest Area	0.032 sq km
		Kachcha Area	0.014 sq km
		Natural Vegetation in Wet Areas	0.025 sq km
		Pakka Unplanned Area	0.45 sq km
		Range Land	0.163 sq km
		Bus Stops	1
		Settlements	69
		Irrigation and Drainage Network	6.789 km
		Road Network	50.588 km
		Population	2774
		Household	593

Tsunami	Low - High	Agriculture Area	2.088 sq km
		Forest Area	0.021 sq km
		Natural Vegetation in Wet Areas	0.124 sq km
		Pakka Unplanned Area	0.071 sq km
		Range Land	0.802 sq km
		Settlements	5
		Road Network	3.174 km
		Population	425
		Household	91
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KANTIO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	194.436 sq km
		Pakka Unplanned Area	5.471 sq km
		Education Facilities	10
		Health Facilities	2
		Mobile Towers	3
		Settlements	41
		Road Network	159.321 km
		Population	30463
		Household	4741
Meteorological Drought	Medium - Extreme	Settlements	41
		Agriculture Area	197.321 sq km
		Bare Area with sparse Natural Vegetation	329.232 sq km
		Population	30902
		Household	4814
Agricultural Drought	Low - Extreme	Settlements	41
		Population	37679
		Household	5869
		Agriculture Area	240.566 sq km
		Bare Area with sparse Natural Vegetation	401.485 sq km
Heatwave	Low - Extreme	Agriculture Area	194.079 sq km
		Pakka Unplanned Area	5.485 sq km
		Population	30536
		Household	4756

		Settlements	30
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KAPLORE			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	168.803 sq km
		Kachcha Area	0.427 sq km
		Pakka Unplanned Area	3.707 sq km
		Range Land	0.004 sq km
		Education Facilities	25
		Mobile Towers	1
		Settlements	49
		Road Network	61.507 km
		Population	24629
		Household	3466
Meteorological Drought	Medium - Extreme	Settlements	49
		Agriculture Area	171.784 sq km
		Bare Area with sparse Natural Vegetation	106.746 sq km
		Range Land	0.084 sq km
		Population	25147
		Household	3540
Agricultural Drought	Low - Extreme	Settlements	49
		Population	30760
		Household	4330
		Agriculture Area	210.055 sq km
		Bare Area with sparse Natural Vegetation	130.543 sq km
		Range Land	0.103 sq km
Heatwave	Low - Extreme	Agriculture Area	168.075 sq km
		Kachcha Area	0.43 sq km
		Pakka Unplanned Area	3.727 sq km
		Population	24768
		Household	3489
		Settlements	39

Cyclone	Low	Agriculture Area	79.163 sq km
		Pakka Unplanned Area	0.127 sq km
		Education Facilities	2
		Settlements	22
		Road Network	18.844 km
		Population	765
		Household	105
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KEHRI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	204.227 sq km
		Forest Area	0.015 sq km
		Kachcha Area	1.907 sq km
		Pakka Unplanned Area	5.376 sq km
		Health Facilities	2
		Settlements	105
		Road Network	94.428 km
		Population	41618
		Household	8461
Meteorological Drought	Medium - Extreme	Settlements	105
		Agriculture Area	206.635 sq km
		Bare Area with sparse Natural Vegetation	288.646 sq km
		Forest Area	1.068 sq km
		Wet Area	47.845 sq km
		Population	42257
		Household	8591
Agricultural Drought	Low - Extreme	Settlements	105
		Population	50991
		Household	10367
		Agriculture Area	249.305 sq km
		Bare Area with sparse Natural Vegetation	348.211 sq km
		Forest Area	1.289 sq km
		Wet Area	57.93 sq km

Heatwave	Low - Extreme	Agriculture Area	203.868 sq km
		Kachcha Area	1.912 sq km
		Pakka Unplanned Area	5.395 sq km
		Population	41758
		Household	8488
		Settlements	88
Tsunami	Low	Agriculture Area	0.236 sq km
Storm Surge	Nil	The UC falls out of vulnerable zone for Strom Surge	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KHARIO GHULAM SHAH			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	310.678 sq km
		Forest Area	0.004 sq km
		Kachcha Area	0.711 sq km
		Pakka Planned Area	0.787 sq km
		Pakka Unplanned Area	9.931 sq km
		Education Facilities	7
		Health Facilities	3
		Power Plants	1
		Settlements	74
		Road Network	128.991 km
		Population	60818
		Household	12364
Meteorological Drought	Medium - Extreme	Settlements	74
		Agriculture Area	312.339 sq km
		Bare Area with sparse Natural Vegetation	203.354 sq km
		Forest Area	0.397 sq km
		Population	61607
		Household	12529
Agricultural Drought	Medium - Extreme	Settlements	74
		Population	74526
		Household	15157
		Agriculture Area	377.826 sq km
		Bare Area with sparse Natural Vegetation	245.975 sq km

		Forest Area	0.48 sq km
Heatwave	Low - Extreme	Agriculture Area	310.369 sq km
		Kachcha Area	0.715 sq km
		Pakka Planned Area	0.789 sq km
		Pakka Unplanned Area	9.955 sq km
		Population	60966
		Household	12396
		Settlements	68
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KHEENSAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	159.795 sq km
		Kachcha Area	1.282 sq km
		Pakka Unplanned Area	2.931 sq km
		Education Facilities	2
		Health Facilities	3
		Settlements	43
		Road Network	51.047 km
		Population	25324
		Household	3497
Meteorological Drought	Medium - Extreme	Settlements	43
		Agriculture Area	161.343 sq km
		Bare Area with sparse Natural Vegetation	83.525 sq km
		Range Land	0.046 sq km
		Population	25706
		Household	3552
Agricultural Drought	Medium - Extreme	Settlements	43
		Population	31432
		Household	4341
		Agriculture Area	197.232 sq km
		Bare Area with sparse Natural Vegetation	102.133 sq km
		Range Land	0.057 sq km

Heatwave	Low - High	Agriculture Area	159.518 sq km
		Kachcha Area	1.29 sq km
		Pakka Unplanned Area	2.938 sq km
		Population	25413
		Household	3513
		Settlements	36
Cyclone	Low	Agriculture Area	96.962 sq km
		Kachcha Area	0.116 sq km
		Pakka Unplanned Area	0.073 sq km
		Settlements	19
		Road Network	10.733 km
		Population	1135
		Household	157
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

KHETLARI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	59.285 sq km
		Pakka Unplanned Area	6.281 sq km
		Range Land	0.001 sq km
		Education Facilities	11
		Settlements	75
		Road Network	113.727 km
		Population	29302
		Household	6131
Meteorological Drought	Medium - Extreme	Settlements	75
		Agriculture Area	61.147 sq km
		Bare Area with sparse Natural Vegetation	367.733 sq km
		Range Land	0.216 sq km
		Water Body	0.353 sq km
		Population	29907
		Household	6255

Agricultural Drought	Low - High	Settlements	75
		Population	36194
		Household	7569
		Agriculture Area	74.038 sq km
		Bare Area with sparse Natural Vegetation	445.158 sq km
		Range Land	0.261 sq km
		Water Body	0.427 sq km
Heatwave	Low - Extreme	Agriculture Area	58.983 sq km
		Pakka Unplanned Area	6.304 sq km
		Population	29403
		Household	6146
		Settlements	64
Cyclone	Low	Agriculture Area	13.144 sq km
		Pakka Unplanned Area	0.201 sq km
		Settlements	32
		Road Network	1.886 km
		Population	1040
		Household	219
Tsunami	Low-Medium	Agriculture Area	0.082 sq km
		Pakka Unplanned Area	0.001 sq km
		Range Land	0.073 sq km
		Road Network	0.099 km
		Population	6
		Household	1
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

LAPLO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	136.513 sq km
		Pakka Unplanned Area	5.118 sq km
		Education Facilities	6
		Health Facilities	1
		Settlements	60
		Road Network	92.267 km

		Population	30732
		Household	4208
Meteorological Drought	Medium - Extreme	Settlements	58
		Agriculture Area	137.96 sq km
		Bare Area with sparse Natural Vegetation	86.068 sq km
		Range Land	0.007 sq km
		Population	31254
		Household	4281
Agricultural Drought	Low - Extreme	Settlements	58
		Population	38415
		Household	5257
		Agriculture Area	169.623 sq km
		Bare Area with sparse Natural Vegetation	106.091 sq km
		Range Land	0.008 sq km
Heatwave	Low - High	Agriculture Area	136.252 sq km
		Pakka Unplanned Area	5.143 sq km
		Population	30886
		Household	4230
		Settlements	49
Cyclone	Low	Agriculture Area	110.694 sq km
		Pakka Unplanned Area	0.294 sq km
		Settlements	45
		Road Network	47.187 km
		Population	1769
		Household	243
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

MALANHORE VEENA			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	187.909 sq km
		Pakka Planned Area	7.763 sq km
		Pakka Unplanned Area	8.402 sq km
		Ambulance Services	2
		Bus Stops	2

		Education Facilities	20
		Health Facilities	16
		Mobile Towers	9
		Petrol Pumps	5
		Police Stations	1
		Post Offices	3
		Power Plants	2
		Settlements	63
		Tourist Places	2
		Road Network	144.92 km
		Population	77487
		Household	16228
Meteorological Drought	Medium - Extreme	Settlements	63
		Agriculture Area	191.797 sq km
		Bare Area with sparse Natural Vegetation	277.599 sq km
		Population	77337
		Household	16193
Agricultural Drought	Low - Extreme	Settlements	63
		Population	93647
		Household	19607
		Agriculture Area	232.099 sq km
		Bare Area with sparse Natural Vegetation	335.893 sq km
Heatwave	Low - Extreme	Agriculture Area	186.954 sq km
		Pakka Planned Area	7.771 sq km
		Pakka Unplanned Area	8.424 sq km
		Population	77607
		Household	16250
		Settlements	54
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

MANJTHI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	79.648 sq km

		Forest Area	0.004 sq km
		Kachcha Area	0.67 sq km
		Natural Vegetation in Wet Areas	0.024 sq km
		Pakka Unplanned Area	3.408 sq km
		Education Facilities	7
		Health Facilities	3
		Settlements	94
		Road Network	117.317 km
		Population	24077
		Household	4926
Meteorological Drought	Medium - Extreme	Settlements	94
		Agriculture Area	81.734 sq km
		Bare Area with sparse Natural Vegetation	514.013 sq km
		Forest Area	0.765 sq km
		Natural Vegetation in Wet Areas	1.636 sq km
		Range Land	0.294 sq km
		Water Body	28.65 sq km
		Wet Area	148.804 sq km
		Population	24545
		Household	5024
Agricultural Drought	Low - Extreme	Settlements	94
		Population	29586
		Household	6055
		Agriculture Area	98.499 sq km
		Bare Area with sparse Natural Vegetation	619.216 sq km
		Forest Area	0.922 sq km
		Natural Vegetation in Wet Areas	1.97 sq km
		Range Land	0.354 sq km
		Water Body	34.583 sq km
		Wet Area	179.362 sq km
Heatwave	Low - Extreme	Agriculture Area	79.199 sq km
		Kachcha Area	0.673 sq km
		Pakka Unplanned Area	3.424 sq km
		Population	24188
		Household	4947
		Settlements	61
Tsunami	Low - Medium	Agriculture Area	0.162 sq km
		Natural Vegetation in Wet	0.098 sq km

		Areas	
		Pakka Unplanned Area	0.005 sq km
		Range Land	0.01 sq km
		Road Network	0.244 km
		Population	47
		Household	10
Storm Surge	Low-Medium	Agriculture Area	0.005 sq km
		Range Land	0.056 sq km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

MITHRO BHATI			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	242.625 sq km
		Pakka Unplanned Area	7.924 sq km
		Health Facilities	1
		Mobile Towers	1
		Settlements	65
		Road Network	150.162 km
		Population	29787
		Household	5984
Meteorological Drought	Medium - Extreme	Settlements	65
		Agriculture Area	245.531 sq km
		Bare Area with sparse Natural Vegetation	225.809 sq km
		Population	30254
		Household	6077
Agricultural Drought	Low - Extreme	Settlements	65
		Population	36677
		Household	7366
		Agriculture Area	297.653 sq km
		Bare Area with sparse Natural Vegetation	273.715 sq km
Heatwave	Low - Extreme	Agriculture Area	242.108 sq km
		Pakka Unplanned Area	7.944 sq km
		Population	29863
		Household	6002
		Settlements	56

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

MITHRO CHARAN			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	127.563 sq km
		Kachcha Area	2.571 sq km
		Pakka Unplanned Area	0.947 sq km
		Education Facilities	2
		Health Facilities	2
		Settlements	37
		Road Network	50.494 km
		Population	20097
		Household	3081
Meteorological Drought	Medium - Extreme	Settlements	37
		Agriculture Area	128.828 sq km
		Bare Area with sparse Natural Vegetation	62.057 sq km
		Population	20468
		Household	3139
Agricultural Drought	Medium - Extreme	Settlements	37
		Population	24995
		Household	3833
		Agriculture Area	157.306 sq km
		Bare Area with sparse Natural Vegetation	75.775 sq km
Heatwave	Low - Extreme	Agriculture Area	127.293 sq km
		Kachcha Area	2.584 sq km
		Pakka Unplanned Area	0.952 sq km
		Population	20195
		Household	3094
		Settlements	30
Cyclone	Low	Agriculture Area	16.044 sq km
		Road Network	2.941 km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

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

MOHRANO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	78.482 sq km
		Forest Area	0.014 sq km
		Kachcha Area	0.061 sq km
		Pakka Planned Area	0.402 sq km
		Pakka Unplanned Area	3.694 sq km
		Range Land	0.12 sq km
		Bridges	1
		Education Facilities	3
		Grid Stations	1
		Mobile Towers	3
		Petrol Pumps	4
		Settlements	86
		Tourist Places	1
		Irrigation and Drainage Network	2.592 km
		Road Network	169.188 km
		Population	15406
		Household	3189
Meteorological Drought	Medium - Extreme	Settlements	86
		Agriculture Area	80.174 sq km
		Bare Area with sparse Natural Vegetation	257.488 sq km
		Forest Area	1.267 sq km
		Range Land	4.432 sq km
		Water Body	0.062 sq km
		Wet Area	1.192 sq km
		Population	15701
		Household	3250
Agricultural Drought	Low - Extreme	Settlements	62
		Population	10855
		Household	2225
		Agriculture Area	84.205 sq km
		Bare Area with sparse Natural Vegetation	310.86 sq km
		Forest Area	1.511 sq km
		Range Land	5.354 sq km

		Water Body	0.072 sq km
		Wet Area	1.45 sq km
Heatwave	Low - Extreme	Agriculture Area	78.074 sq km
		Kachcha Area	0.061 sq km
		Pakka Planned Area	0.403 sq km
		Pakka Unplanned Area	3.71 sq km
		Population	15471
		Household	3200
		Settlements	68
Tsunami	Low – Medium	Agriculture Area	0.003 sq km
		Range Land	0.003 sq km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

NAGARPARKAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	382.974 sq km
		Forest Area	0.224 sq km
		Kachcha Area	6.461 sq km
		Natural Vegetation in Wet Areas	0.219 sq km
		Pakka Unplanned Area	1.211 sq km
		Range Land	0.183 sq km
		Bridges	4
		Education Facilities	5
		Health Facilities	4
		Police Stations	1
		Settlements	84
		Tourist Places	5
		Road Network	65.034 km
		Population	38503
		Household	7690
Meteorological Drought	Medium - Extreme	Settlements	82
		Agriculture Area	384.158 sq km
		Bare Area with sparse Natural Vegetation	98.827 sq km
		Forest Area	5.217 sq km
		Natural Vegetation in Wet	13 sq km

		Areas	
		Range Land	15.784 sq km
		Water Body	0.673 sq km
		Wet Area	49.292 sq km
		Population	38904
		Household	7765
Agricultural Drought	Low - Extreme	Settlements	79
		Population	41491
		Household	8258
		Agriculture Area	462.352 sq km
		Bare Area with sparse Natural Vegetation	78.329 sq km
		Forest Area	6.274 sq km
		Natural Vegetation in Wet Areas	15.651 sq km
		Range Land	18.988 sq km
		Water Body	0.81 sq km
		Wet Area	59.649 sq km
Heatwave	Low - Extreme	Agriculture Area	382.792 sq km
		Kachcha Area	6.483 sq km
		Pakka Unplanned Area	1.213 sq km
		Population	38609
		Household	7710
		Settlements	74
Tsunami	Low-Medium	Agriculture Area	0.174 sq km
		Range Land	0.002 sq km
Storm Surge	Low-Extreme	Agriculture Area	0.984 sq km
		Forest Area	0.014 sq km
		Range Land	0.013 sq km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

PARNO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	**Low**	Agriculture Area	182.58 sq km
		Kachcha Area	0.441 sq km
		Pakka Unplanned Area	4.193 sq km
		Education Facilities	3
		Petrol Pumps	1

		Settlements	57
		Road Network	93.271 km
		Population	27910
		Household	3842
Meteorological Drought	Medium - Extreme	Settlements	57
		Agriculture Area	184.448 sq km
		Bare Area with sparse Natural Vegetation	83.331 sq km
		Population	28506
		Household	3923
Agricultural Drought	Low - Extreme	Settlements	57
		Population	34893
		Household	4803
		Agriculture Area	225.672 sq km
		Bare Area with sparse Natural Vegetation	101.967 sq km
Heatwave	Low - High	Agriculture Area	182.188 sq km
		Kachcha Area	0.444 sq km
		Pakka Unplanned Area	4.214 sq km
		Population	28058
		Household	3863
		Settlements	50
Cyclone	Low	Agriculture Area	153.184 sq km
		Kachcha Area	0.073 sq km
		Pakka Unplanned Area	0.317 sq km
		Settlements	51
		Road Network	35.13 km
		Population	2350
		Household	324
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

PILLU			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	352.667 sq km
		Kachcha Area	0.731 sq km
		Pakka Unplanned Area	8.261 sq km

		Range Land	0.029 sq km
		Education Facilities	4
		Settlements	145
		Tourist Places	2
		Road Network	137.863 km
		Population	40948
		Household	8167
Meteorological Drought	Medium - Extreme	Settlements	145
		Agriculture Area	354.98 sq km
		Bare Area with sparse Natural Vegetation	205.105 sq km
		Forest Area	0.009 sq km
		Range Land	0.753 sq km
		Wet Area	32.396 sq km
		Population	41593
		Household	8291
Agricultural Drought	Low - Extreme	Settlements	145
		Population	50242
		Household	10017
		Agriculture Area	428.976 sq km
		Bare Area with sparse Natural Vegetation	247.71 sq km
		Forest Area	0.01 sq km
		Range Land	0.909 sq km
		Wet Area	39.15 sq km
Heatwave	Low - Extreme	Agriculture Area	352.258 sq km
		Kachcha Area	0.734 sq km
		Pakka Unplanned Area	8.287 sq km
		Population	41077
		Household	8189
		Settlements	128
Tsunami	Low	Agriculture Area	0.049 sq km
		Range Land	0.002 sq km
Storm Surge	Low - Extreme	Agriculture Area	0.415 sq km
		Road Network	0.203 km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

PIRANOJOPAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	246.685 sq km
		Kachcha Area	0.505 sq km
		Pakka Unplanned Area	9.046 sq km
		Education Facilities	21
		Health Facilities	7
		Settlements	81
		Tourist Places	1
		Road Network	149.753 km
		Population	57439
		Household	7888
Meteorological Drought	Medium - Extreme	Settlements	81
		Agriculture Area	249.408 sq km
		Bare Area with sparse Natural Vegetation	121.475 sq km
		Population	57872
		Household	7944
Agricultural Drought	Low - Extreme	Settlements	81
		Population	71024
		Household	9750
		Agriculture Area	306.077 sq km
		Bare Area with sparse Natural Vegetation	149.051 sq km
Heatwave	Low - High	Agriculture Area	246.089 sq km
		Kachcha Area	0.508 sq km
		Pakka Unplanned Area	9.09 sq km
		Population	57720
		Household	7917
		Settlements	69
Cyclone	Low	Agriculture Area	246.641 sq km
		Kachcha Area	0.504 sq km
		Pakka Unplanned Area	0.525 sq km
		Education Facilities	4
		Settlements	81
		Tourist Places	1
		Road Network	81.749 km
		Population	6203
		Household	849
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

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

PITHARPUR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	**Low**	Agriculture Area	422.875 sq km
		Forest Area	0.008 sq km
		Kachcha Area	8.944 sq km
		Natural Vegetation in Wet Areas	0.315 sq km
		Pakka Unplanned Area	0.064 sq km
		Range Land	0.103 sq km
		Bridges	3
		Education Facilities	5
		Health Facilities	1
		Settlements	104
		Road Network	124.945 km
		Population	36958
		Household	7294
Meteorological Drought	Medium - Extreme	Settlements	104
		Agriculture Area	427.526 sq km
		Bare Area with sparse Natural Vegetation	83.591 sq km
		Forest Area	1.016 sq km
		Natural Vegetation in Wet Areas	20.089 sq km
		Range Land	5.378 sq km
		Wet Area	0.567 sq km
		Population	37421
		Household	7386
Agricultural Drought	Low - Extreme	Settlements	104
		Population	45026
		Household	8888
		Agriculture Area	515.214 sq km
		Bare Area with sparse Natural Vegetation	95.57 sq km
		Forest Area	1.221 sq km
		Natural Vegetation in Wet Areas	24.155 sq km
		Range Land	6.477 sq km
		Wet Area	0.705 sq km

Heatwave	Low - Extreme	Agriculture Area	422.433 sq km
		Kachcha Area	8.974 sq km
		Pakka Unplanned Area	0.064 sq km
		Population	37086
		Household	7321
		Settlements	100
Tsunami	Low-Medium	Agriculture Area	0.368 sq km
		Forest Area	0.018 sq km
		Natural Vegetation in Wet Areas	0.621 sq km
		Range Land	0.001 sq km
Storm Surge	Low-Extreme	Agriculture Area	0.924 sq km
		Forest Area	0.116 sq km
		Natural Vegetation in Wet Areas	0.86 sq km
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

RAJORO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	307.834 sq km
		Kachcha Area	0.191 sq km
		Pakka Unplanned Area	11.182 sq km
		Health Facilities	1
		Petrol Pumps	1
		Settlements	69
		Road Network	111.785 km
		Population	59967
		Household	9757
Meteorological Drought	Medium - Extreme	Settlements	69
		Agriculture Area	309.645 sq km
		Bare Area with sparse Natural Vegetation	157.329 sq km
		Range Land	0.007 sq km
		Population	60775
		Household	9891
Agricultural Drought	Medium - Extreme	Settlements	69
		Population	73868
		Household	12020

		Agriculture Area	376.32 sq km
		Bare Area with sparse Natural Vegetation	191.198 sq km
		Range Land	0.009 sq km
Heatwave	Low - Extreme	Agriculture Area	307.67 sq km
		Kachcha Area	0.192 sq km
		Pakka Unplanned Area	11.214 sq km
		Population	60146
		Household	9789
		Settlements	62
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

SARANGHIAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	295.646 sq km
		Kachcha Area	0.644 sq km
		Pakka Unplanned Area	5.958 sq km
		Education Facilities	12
		Health Facilities	2
		Settlements	96
		Road Network	113.749 km
		Population	37794
		Household	5764
Meteorological Drought	Medium - Extreme	Settlements	96
		Agriculture Area	297.753 sq km
		Bare Area with sparse Natural Vegetation	122.885 sq km
		Population	38546
		Household	5875
Agricultural Drought	Medium - Extreme	Settlements	96
		Population	46981
		Household	7160
		Agriculture Area	362.998 sq km
		Bare Area with sparse Natural Vegetation	149.795 sq km

Heatwave	Low - Extreme	Agriculture Area	295.198 sq km
		Kachcha Area	0.648 sq km
		Pakka Unplanned Area	5.98 sq km
		Population	37947
		Household	5786
		Settlements	85
Cyclone	Low	Agriculture Area	3.173 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

SATIDERA			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	226.524 sq km
		Kachcha Area	0.228 sq km
		Pakka Unplanned Area	5.348 sq km
		Health Facilities	1
		Settlements	75
		Road Network	21.457 km
		Population	23070
		Household	4520
Meteorological Drought	Medium - Extreme	Settlements	75
		Agriculture Area	230.303 sq km
		Bare Area with sparse Natural Vegetation	121.734 sq km
		Population	23424
		Household	4588
Agricultural Drought	Medium - Extreme	Settlements	75
		Population	28463
		Household	5571
		Agriculture Area	280.042 sq km
		Bare Area with sparse Natural Vegetation	147.992 sq km
Heatwave	Low - Extreme	Agriculture Area	226.305 sq km
		Kachcha Area	0.229 sq km
		Pakka Unplanned Area	5.364 sq km
		Population	23135

		Household	4533
		Settlements	71
Cyclone	Low	Agriculture Area	3.173 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

SEENGARO			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	299.645 sq km
		Kachcha Area	0.18 sq km
		Pakka Planned Area	2.45 sq km
		Pakka Unplanned Area	9.762 sq km
		Education Facilities	11
		Health Facilities	2
		Power Plants	2
		Settlements	81
		Road Network	115.498 km
		Population	51604
		Household	10082
Meteorological Drought	Medium - Extreme	Settlements	81
		Agriculture Area	301.421 sq km
		Bare Area with sparse Natural Vegetation	230.936 sq km
		Population	52352
		Household	10230
Agricultural Drought	Medium - Extreme	Settlements	81
		Population	63469
		Household	12401
		Agriculture Area	365.377 sq km
		Bare Area with sparse Natural Vegetation	279.917 sq km
Heatwave	Low - Extreme	Agriculture Area	299.447 sq km
		Kachcha Area	0.181 sq km
		Pakka Planned Area	2.45 sq km
		Pakka Unplanned Area	9.787 sq km
		Population	51745
		Household	10110

		Settlements	68
Cyclone	Nil	The UC falls out of vulnerable zone for Tsunami	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

SOBHIAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	**Low**	Agriculture Area	87.256 sq km
		Forest Area	0.003 sq km
		Pakka Unplanned Area	8.461 sq km
		Education Facilities	4
		Health Facilities	2
		Mobile Towers	1
		Settlements	66
		Road Network	83.682 km
		Population	43520
		Household	9217
Meteorological Drought	Medium - Extreme	Settlements	66
		Agriculture Area	89.832 sq km
		Bare Area with sparse Natural Vegetation	286.873 sq km
		Forest Area	0.811 sq km
		Range Land	0.052 sq km
		Water Body	1.13 sq km
		Wet Area	0.078 sq km
		Population	44217
		Household	9368
Agricultural Drought	Low - Extreme	Settlements	66
		Population	53439
		Household	11319
		Agriculture Area	108.567 sq km
		Bare Area with sparse Natural Vegetation	346.663 sq km
		Forest Area	0.981 sq km
		Range Land	0.063 sq km
		Water Body	1.365 sq km
		Wet Area	0.095 sq km

Heatwave	Low - Extreme	Agriculture Area	86.706 sq km
		Pakka Unplanned Area	8.486 sq km
		Population	43656
		Household	9249
		Settlements	54
Cyclone	Low	Agriculture Area	44.231 sq km
		Pakka Unplanned Area	0.208 sq km
		Settlements	35
		Road Network	7.457 km
		Population	1322
		Household	288
Tsunami	Low-Medium	Agriculture Area	0.146 sq km
		Forest Area	0.027 sq km
		Pakka Unplanned Area	0.065 sq km
		Range Land	0.029 sq km
		Road Network	0.787 km
		Population	429
		Household	94
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

SONAL BEH			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	269.989 sq km
		Pakka Planned Area	0.199 sq km
		Pakka Unplanned Area	10.172 sq km
		Ambulance Services	1
		Education Facilities	16
		Grid Stations	1
		Health Facilities	9
		Mobile Towers	3
		Petrol Pumps	5
		Police Stations	1
		Post Offices	2
		Settlements	64
		Road Network	111.492 km
		Population	59475
		Household	11449
Meteorological	Medium - Extreme	Settlements	64

Drought		Agriculture Area	271.921 sq km
		Bare Area with sparse Natural Vegetation	156.538 sq km
		Population	60112
		House Hold	11571
Agricultural Drought	Low - Extreme	Settlements	64
		Population	72845
		Household	14019
		Agriculture Area	329.586 sq km
		Bare Area with sparse Natural Vegetation	189.685 sq km
Heatwave	Low - Extreme	Agriculture Area	269.677 sq km
		Pakka Planned Area	0.199 sq km
		Pakka Unplanned Area	10.197 sq km
		Population	59610
		Household	11477
		Settlements	57
Cyclone	Nil	The UC falls out of vulnerable zone for Tsunami	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

TAR AHMED			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	243.427 sq km
		Kachcha Area	6.102 sq km
		Pakka Unplanned Area	2.164 sq km
		Education Facilities	2
		Health Facilities	1
		Petrol Pumps	1
		Settlements	80
		Road Network	105.778 km
		Population	49265
		Household	6909
Meteorological Drought	Medium - Extreme	Settlements	80
		Agriculture Area	245.925 sq km
		Bare Area with sparse Natural Vegetation	138.815 sq km

		Wet Area	0.47 sq km
		Population	50052
		Household	7020
Agricultural Drought	Medium - Extreme	Settlements	80
		Population	61155
		Household	8579
		Agriculture Area	300.664 sq km
		Bare Area with sparse Natural Vegetation	170.078 sq km
		Wet Area	0.575 sq km
Heatwave	Low - Extreme	Agriculture Area	242.943 sq km
		Kachcha Area	6.122 sq km
		Pakka Unplanned Area	2.171 sq km
		Population	49434
		Household	6931
		Settlements	65
Cyclone	Low	Agriculture Area	192.668 sq km
		Kachcha Area	4.211 sq km
		Pakka Unplanned Area	0.233 sq km
		Settlements	65
		Road Network	58.252 km
		Population	26523
		Household	3707
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

TARDOS			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	343.227 sq km
		Kachcha Area	0.102 sq km
		Pakka Unplanned Area	10.702 sq km
		Education Facilities	7
		Health Facilities	4
		Settlements	79
		Road Network	61.047 km
		Population	52308
		Household	9077

Meteorological Drought	Medium - Extreme	Settlements	79
		Agriculture Area	345.485 sq km
		Bare Area with sparse Natural Vegetation	171.651 sq km
		Population	53007
		Household	9200
Agricultural Drought	Medium - Extreme	Settlements	79
		Population	64508
		Household	11195
		Agriculture Area	420.699 sq km
		Bare Area with sparse Natural Vegetation	209.073 sq km
Heatwave	Low - Extreme	Agriculture Area	342.819 sq km
		Kachcha Area	0.103 sq km
		Pakka Unplanned Area	10.732 sq km
		Population	52454
		Household	9109
		Settlements	68
Cyclone	Low	Agriculture Area	3.363 sq km
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

TIGUSAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	250.29 sq km
		Kachcha Area	0.009 sq km
		Pakka Unplanned Area	7.318 sq km
		Education Facilities	4
		Health Facilities	6
		Settlements	55
		Road Network	56.904 km
		Population	30065
		Household	5933
Meteorological Drought	Medium - Extreme	Settlements	55
		Agriculture Area	251.415 sq km
		Bare Area with sparse Natural Vegetation	120.47 sq km

		Population	30556
		Household	6030
Agricultural Drought	Medium - Extreme	Settlements	55
		Population	37072
		Household	7315
		Agriculture Area	305.012 sq km
		Bare Area with sparse Natural Vegetation	146.168 sq km
Heatwave	Low - Extreme	Agriculture Area	250.173 sq km
		Kachcha Area	0.009 sq km
		Pakka Unplanned Area	7.345 sq km
		Population	30170
		Household	5950
		Settlements	51
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

VEJHIAR			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	291.867 sq km
		Pakka Unplanned Area	8.578 sq km
		Education Facilities	8
		Grid Stations	1
		Health Facilities	3
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	58
		Road Network	120.304 km
		Population	45288
		Household	7496
Meteorological Drought	Medium - Extreme	Settlements	58
		Agriculture Area	293.587 sq km
		Bare Area with sparse Natural Vegetation	154.006 sq km
		Population	45900
		Household	7603

Agricultural Drought	Medium - Extreme	Settlements	58
		Population	55879
		Household	9254
		Agriculture Area	357.439 sq km
		Bare Area with sparse Natural Vegetation	187.46 sq km
Heatwave	Low - Extreme	Agriculture Area	291.627 sq km
		Pakka Unplanned Area	8.603 sq km
		Population	45426
		Household	7526
		Settlements	48
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

VIRAWAH			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	408.576 sq km
		Forest Area	0.028 sq km
		Kachcha Area	1.303 sq km
		Natural Vegetation in Wet Areas	0.004 sq km
		Pakka Unplanned Area	5.377 sq km
		Range Land	0.008 sq km
		Education Facilities	5
		Health Facilities	3
		Mobile Towers	1
		Post Offices	1
		Settlements	135
		Road Network	149.476 km
		Population	27404
		Household	5416
Meteorological Drought	Medium - Extreme	Settlements	134
		Agriculture Area	410.548 sq km
		Bare Area with sparse Natural Vegetation	141.739 sq km
		Forest Area	0.387 sq km

		Natural Vegetation in Wet Areas	0.078 sq km
		Range Land	0.783 sq km
		Wet Area	17.716 sq km
		Population	27855
		Household	5500
Agricultural Drought	Low - Extreme	Settlements	134
		Population	33669
		Household	6646
		Agriculture Area	496.367 sq km
		Bare Area with sparse Natural Vegetation	171.408 sq km
		Forest Area	0.467 sq km
		Natural Vegetation in Wet Areas	0.094 sq km
		Range Land	0.945 sq km
		Wet Area	21.372 sq km
Heatwave	Low - Extreme	Agriculture Area	408.202 sq km
		Kachcha Area	1.308 sq km
		Pakka Unplanned Area	5.401 sq km
		Population	27524
		Household	5447
		Settlements	124
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	
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	

ORGANIZATION STRUCTURE FOR DISASTER MANAGEMENT AT DISTRICT LEVEL

INTRODUCTION

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

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

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

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

Table 2: District Disaster Management Authority

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

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

Table 3: TDMC Taluka Disaster Management Committee

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

Table 4: UCDMC Union Council Disaster Management Committee

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

RESPONSIBILITY OF DISTRICT DISASTER MANAGEMENT AUTHORITY

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

FUNCTION OF DDMA

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

- To facilitate community training and awareness programs with the support of local authorities, government and non-government organizations

- To set up, maintain, review and upgrade the mechanism for early warning and dissemination of accurate information to concerned authorities and the general public

- To review development plans prepared by the government departments, statutory or local authorities with a view that disaster management plan has been integrated into the development activities and projects of the plan

- To coordinate with, and give guidelines to, local authorities in the district to ensure that pre-disaster and post-disaster management activities in the district are carried out promptly and effectively

- To prepare, review and update district level response and contingency plans.

- To identify buildings and places which could, in the event of disaster situation be, used as relief centers and camps and make arrangements for water supply and sanitation in such buildings or places

- To distribute relief and facilitate rescue or ensure disaster preparedness and response

- To ensure operationalization of District Emergency Operation Centre (DEOC) equipped with all necessary gadgets

- To activate the District Emergency Operations Centre (DEOC) and ensure its uninterrupted operation during and after disaster events

- To carry out rapid damage and needs assessment and develop a report for assisting PDMA and other relevant stakeholders

- To coordinate and monitor early recovery and rehabilitation activities with the support of PDMA or relevant local and international stakeholders

- To prepare and continuously update databases of external agency projects, future priority areas, funding framework, available resources, areas of operations/expertise etc.

- To perform other functions as deemed necessary by the provincial government or provincial authority for disaster management in the district

RESPONSIBILITY OF TALUKA DISASTER MANAGEMENT COMMITTEE

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

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.

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, and other development activities.
5. To coordinate with the village and neighborhood UCs in case of emergency in order to get quick information about the severity and extent of a disaster impact and report it to the TDMC and DDMA.
6. To report cases of handicapped, destitute and socially excluded groups to TDMC, DDMA and PDMA in order to streamline their special needs in relief and response operation.
7. Mobilizing and coordinating work of volunteers and ensuring community participation.
8. Conduct of search and rescue operations in coordination with the rescue teams and Police.
9. To provide assistance to other agencies for mobility/transport of staff, including rescue parties, relief personnel and relief materials. To communicate with the TDMC, DDMA or PDMA for required additional resources.

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

ESTABLISHMENT OF EMERGENCY OPERATION CENTERS

PROVINCIAL EMERGENCY OPERATION CENTER (PEOC)

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

The functions of PEOC are summarized below;

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

DISTRICT EMERGENCY OPERATION CENTER (DEOC)

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

FUNCTION OF DEOC

The functions of DEOC are appended below;

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

SECTOR WISE ROLES AND RESPONSIBILITIES OF GOVERNMENT FUNCTIONARIES

AGRICULTURE AND LIVESTOCK DEPARTMENT

Pre-Disaster

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

During-Disaster

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

Post-Disaster

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

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

PROVINCIAL DISASTER MANAGEMENT AUTHORITY (PDMA)

Pre-Disaster

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

During-Disaster

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

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

Post-Disaster

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

DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)

Pre-Disaster

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

During-Disaster

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

Post-Disaster

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

CIVIL DEFENSE

Pre-Disaster

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

During-Disaster

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

Post-Disaster

- Assist in rehabilitation process if required

EDUCATION DEPARTMENT

Pre-Disaster

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

During-Disaster

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

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

Post-Disaster

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

FINANCE DEPARTMENT

Pre-Disaster

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

During-Disaster

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

Post-Disaster

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

HEALTH DEPARTMENT

Pre-Disaster

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

During-Disaster

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

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

Post-Disaster

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

INFORMATION DEPARTMENT

Pre-Disaster

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

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

During-Disaster

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

Post-Disaster

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

PAKISTAN METEOROLOGICAL DEPARTMENT (PMD)

Pre-Disaster

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

During-Disaster

- Forecasting for any confluencing disaster
- Issuance of precautionary measures to avoid domino effects of disaster

Post-Disaster

- Technical assistance in rescue and rehabilitation process

POLICE DEPARTMENT

Pre-Disaster

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

During-Disaster

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

Post-Disaster

- Assist in relief and rehabilitation process

REVENUE DEPARTMENT

Pre-Disaster

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

During-Disaster

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

Post-Disaster

- Allocation of funds for recovery and rehabilitation process
- Assessment of damage of crops and livestock and settlement of applicable taxes accordingly in coordination with relevant departments

ARMED FORCES

Pre-Disaster

- Coordinate with the DDMA in the pre-disaster planning

- Prepare necessary equipment, labor, transportation and other materials for emergency interventions
- Assist in evacuation of people to safe places

During-Disaster

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

Post-Disaster

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

SOCIAL WELFARE AND COMMUNITY DEVELOPMENT

Pre-Disaster

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

During-Disaster

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

Post-Disaster

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

NGOs / INGOs

Pre-Disaster

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

During-Disaster

- Collaborate and facilitate in relief operations

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

Post-Disaster

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

DISASTER MANAGEMENT GUIDELINES

INTRODUCTION

Multi-hazard vulnerability Risk Assessment of Tharparkar district reveals that the district is relatively safe in terms of natural disasters. The pertinent hazards to district are meteorological hazards including drought and Heatwave. The risk of geophysical hazards is low in the district. In modern technological era, meteorological hazards can be precisely forecasted and action can be taken well in time to minimize damages and losses. In other words, the vulnerabilities and risks are manageable and losses and damages can be minimized through adoption of best management practices and mobilization of resources.

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

Riverine Flood	According to MHVRA Study 2022, there is no Riverine Flood hazard in district Tharparkar
Earthquake	1. The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karoonjhar Mountains, which is famous for Nagar Parkar Granite. 2. Some of prominent faults situated in Sindh are (a) Karachi-Jati, (b) Surjan-Jhimpir, (c) Pab Fault (d) Hub Fault and (e) Allah Bund-Rann of Kutch faults. 3. Though risk of geophysical hazards in Tharparkar district is low but still some actions must be taken to avoid losses in case of minor jolts. Urban settings are most likely to be affected by jolts. It is highly recommended to identify old and weak buildings in the cities and other urban settings of the district. Local concerned authorities may decide evacuation or retrofitting of such buildings / structures. 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 Tharparkar district is situated. 5. Local government departments must be strengthened to manage situation arisen from earthquake jolts. Strengthening must include capacity building to act as first responder in any likely situation.

Heatwave	1. Historically, Tharparkar district has a desert climate and prone to severe heatwave seasons. However, most of the district is sparsely populated, which significantly lowers the chances of severe heatwave impacts. However, urban centers including cities of Islamkot, and others are vulnerable to heatwave. 2. Heatwaves are forecastable hazards and actions can be taken well before occurrence of heatwaves. The most suitable action is issuance of warnings and alerts in public for precautions and safety. Suitable media for the purpose is social media and SMS. 3. Scientific studies suggest that, frequency and intensity of heatwaves is increased due to climate change. Though climate change is global phenomena, however, its impacts can be minimized through local interventions. The most efferent and cost-effective solution is tree plantation. Tree plantation must be encouraged at levels including government functionaries, NGOs, community and individual levels. 4. Additionally, introduction of reduced Urban Heat Islands (UHI)through policies and implementation in infrastructure development will significantly reduce impacts of heatwaves.
Cyclone	1. The cyclone hazard threat to district Tharparkar is Cat-1 TC. However, the frequency and intensity of cyclone formation in Arabian Sea may further increase due to climate change and global warming. Fortunately, cyclone is forecastable hazard, its intensity, possible landfall, timings etc. can be precisely predicted before landfall. If population to be affected is well aware and already prepared for likely event, then major losses and damages can be minimized. Such example can be seen in regional countries like India, Bangladesh and Philippines etc. 2. It is utmost important to strengthen cyclone detection and warning systems in the coastal belt along entire coast in Sindh. Community based disaster risk management, capacity development of prone communities, establishment of permanent shelters and provision of life support facilities will increase the trust and confidence of communities on government functionaries in early evacuation process.
Drought	1. Geographically, district Tharparkar is desert, with barren tracts of sand

	dunes covered with different kinds of shrubs. Water bodies are scarce, only found at the south-western corner of the district. Climatic condition of the district can be categorized as Hot desert and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010). Range lands, natural herbs, shrubs and forests are mostly found at the south-eastern part and along the south-western part of the district. Rain-fed crops make up most of the agriculture in the district. Irrigated crop fields are very limited, few fields found along south-western boundary. Only few cultivated areas in the district are canal irrigated, mostly, the monsoon rains play vital role for the agriculture in the district. 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. 3. The situation of drought may vary in future due to climate change effects, therefore, introduction of drought resilient crops is need of the time. Additionally, efficient use of available water resources and introduction of efficient agricultural systems is also required. 4. Further, farmers may be encouraged for alternative crops during expected drought seasons. Also policies for compensation of framers must also be introduced to assist and encourage drought hit farmers.
Tsunami	1. The only known tsunami which hit some parts of Sindh coast happened to major earthquake in Makran coast in Balochistan which triggered tsunami in the region. This event happened in November 1945. No authentic record is available on damage and losses caused by tsunami in Tharparkar. The effects of the Tsunami of December, 2004 caused by earthquake in Indonesia were along the coastline of Pakistan in the form of abnormal changes in tide gauge stations placed at Keti Bunder. 2. As tsunami is consequence of major earthquake, hence not forecastable hazard in true sense but once the earthquake is occurred in sea or near coast, special sensors can detect the occurrence of tsunami. Once tsunami is detected little time is left for evacuation. However, installation of tsunami early warning system along the coast may greatly impact losses.

	The best approaches to tsunami response are; ○ Installation of tsunami early warning and dissemination system in coastal settlements ○ Awareness of communities at risk on tsunami precautions and response

STANDARD OPERATING PROCEDURES

INTRODUCTION

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

ACTION PLAN FOR FORECASTABLE DISASTERS

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

Table 5: Action Plan for Cyclone Hazard Management

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

Table 6: Action Plan for Heatwave Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of heatwave	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA
Mobilization of NGOs, INGOs and individuals for arrangement of heat stroke and medical camps within affected areas	During disturbance period	PDMA and DDMA

Table 7: Action Plan for Drought Hazard Management

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

ACTION PLAN FOR UNFORECASTABLE HAZARDS

Earthquake/Tsunami

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

Table 8: Action Plan for Earthquake 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 Tharparkar shall ensure availability of all necessary equipment and supplies at DEOC for 24/7 operations. The deputy commissioner or chairperson DDMA will also ensure

availability and presence of representatives of DDMA in DEOC during emergency operations for liaison and close coordination and smooth emergency response.

- A contact information of relevant government officials, influential personnel, political figures, volunteer groups, social welfare organizations and communities of high disaster risk prone areas shall be collected and maintained by PEOC and DEOC. For establishing quick liaison and coordination this contact information shall be used by both PEOC and DEOC. In addition to these contacts, PEOC will arrange random SMS alerts, robo calls etc. through commercial cellular services.

- The PEOC will establish the direct contact/coordination with district disaster management officer for disaster alerts and warnings and onward dissemination and other immediate actions.

- All warnings and alerts shall be carefully scrutinized by the central body i.e. PDMA and disaster warning alerts shall only be issued through single nodal agency to avoid any circulation of misinformation etc.

- During the disaster, all instructions, guidelines, action plans and advisories on disaster events, evacuation, relief operations etc. shall be issued by PEOC or DEOC in consultation with PEOC.

DISASTER MANAGEMENT PLAN

INTRODUCTION

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

Riverine Flood	
UCs At Risk	Nil
General Description	According to MHVRA Study 2022, there is no risk of Riverine Flood in Tharparkar district.

Earthquake	
UCs At Risk	All UCs
General Description	1. The seismically active Rann of kutch area lies just below the Tharparkar district. Allah Bund fault is a major seismically active fault line that crosses through the district as well. 2. Rann of Kutch has a long history of seismic activity of varying intensities/ magnitudes. Major events took place in 1819, 1845, 1903, 1919,1956 and 2001. 3. The greatest historical event in the stable continental region of India was the Rann of Kutch earthquake (16 June 1819), because of extensive surface deformation. It is the first documented record of 'Surface-Faulting'. It created a spectacular east- west bund across the Kori creek, which was called the "Allah-Bund" or "Mound of God", located close to the border between India and Pakistan. 4. The earthquake hazard intensity for district Tharparkar is "**Low**" 5. The earthquake risk intensity for district Tharparkar is "**Low**".
Disaster Management Measures	
Preparedness	
1. Identifying and inventorying weak buildings and structures especially in urban settings of the district and situation demanding action by concerned departments. 2. Preparation of landuse plans, town plans and implementation of building codes in new residential schemes, schools, public and private offices. 3. Implementation of disaster risk reduction measures in public infrastructure development schemes. 4. Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation. 5. Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings. 6. Availability of necessary material and equipment required for establishing temporary shelters with life support facilities i.e. mobile medical camps, schools, power supply, water and sanitation etc.	

7. Availability of alternative communication system in case if usual communication means are disturbed by earthquake. 8. Preparation of medical emergency plan to manage mass casualties in face of any major earthquake event.
Response
1. Obtain firsthand information on intensity of earthquake and damages; prioritize areas for search and rescue operation. 2. Mobilize community-based volunteers, scouts and other trained personnel to hard hit areas to assess situation and help victims. 3. Establish emergency camps / shelters with necessary life support facilities. 4. Establish medical camps for provision of first aid and possible medical assistance to injured. 5. Evacuate people from damaged houses to safe places and shelters. 6. Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede. 7. Arrangement and conduct of aerial / drone survey of the affected areas. 8. Establish information and help desks for facilitation of affectees. 9. Restore essential services like power, water supply, and telecommunication of critical infrastructure like hospitals, control Rooms, etc. on priority basis.
Recovery and Rehabilitation
1. Detailed damage and need assessment for recovery and rehabilitation. 2. Rehabilitation on Built Back Better principal.

Heatwave	
UCs At Risk	All UCs
General Description	1. Heatwave is a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life. 2. Higher daily peak temperatures of longer duration and more intense heatwaves are becoming increasingly frequent globally due to climate change. Sindh too is feeling the impact of climate change in terms of increased instances of heat wave with each passing year. 3. The district has a tropical desert climate. In the summers, it is extremely hot during the day, but nights are remarkably cooler. 4. April, May and June are the hottest months with mean maximum and minimum temperature 40°C and 27.5°C. 5. December, January and February are the coldest months with mean maximum and minimum temperature during winter is 28°C and 12°C respectively. 6. A severe heatwave, in 2010, engulfed parts of Sindh, including Tharparkar. 7. A severe heat wave with temperatures as high as 49°C struck southern Pakistan in June 2015. It caused the deaths of about 2,000 people from dehydration and heat stroke, mostly in Sindh province including

	Tharparkar. 8. According to MHVRA Study 2022, heatwave hazard intensity for district Tharparkar is "**Severe to Extreme**" 9. According to MHVRA Study 2022, heatwave risk for district Tharparkar is **"Low to Extreme"**.
Disaster Management Measures	
Preparedness	
1. **Consistent future development strategy**: Tree plantation, restoration of natural ecosystem, construction of environment friendly and well planned residential societies, offices, infrastructure and human dwellings. 2. Monitoring for hot weather alerts through local and international sources and issuance of timely Hot Day Advisories, and Hot Day Warnings. 3. Upgradation of major public health care facilities with necessary equipment and medicines to treat heatstroke patients. 4. Heatstroke awareness campaigns and wide public coverage through media, social media, SMS, NGOs and social welfare organizations. 5. Arrangements for uninterrupted supply of electricity and water in vulnerable areas.	
Response	
1. Mobilization of NGOs, social welfare organization and volunteers for arranging heatstroke facilitation camps and distribution of fresh drinking water in affected areas. 2. Local radio FM broadcasts to disseminate heatstroke safety and precautions. 3. Mobilize mobile medical teams for first-aid and other medical emergency support in affected area. 4. Record keeping of heatwave patients and fatalities.	
Recovery and Rehabilitation	
1. Post event review of heatwave plan and modifications if required.	

Cyclone	
UCs At Risk (20)	**Balihari, Bhitaro, Bolhari, Dahli, Diplo, Gadro, Jese Jo Par, Jhirmirio, Kaloi, Kaplore, Kheensar, Khetlari, Laplo, Mithrio Charan, Parno, Piranojopar, Saranghiar, Sobhiar, Tar Ahmed, Tardos**
UCs not at Risk (25)	**Bhakuo, Chachro, Chelhar, Fakir Abdullah, Harho, Hirar, Islamkot, Joruo, Kantio, Kehri, Khario Ghulam Shah, Malanhore Veena, Manjthi, Mithrio Bhati, Charan, Mohrano, Nagarparkar, Pillu, Pithapur, Rajoro, Satidera, Seengaro, Sonal Beh, Tigusar, Vejhaiar, Virawah**
General Description	1. Due to its geographical location, District Tharparkar is among districts badly affected by the cyclone surge on several occasions. 2. The cyclones carry 03 major threats i.e. winds, thunderstorm accompanied with heavy rains and storm surge which causes sea intrusion in land areas. 3. Tropical cyclones not only wipe out the human settlements, but it also destroys and badly damages the fishing boats and fish harbors, affecting

	the livelihood of the majority of fisher communities of the district. 4. The cyclone hazard in the district is of **"Tropical Storm to Cat-1 TC"** intensity. 5. According to MHVRA study 2022, Cyclone risk for district Tharparkar is "**Low**".
Disaster Management Measures	
Preparedness	
1. Community based disaster risk reduction measures and inclusion of disaster prone communities in disaster management cycle, specially preparedness, evacuation and resettlement. 2. Establishment of multipurpose permanent shelters with all life support facilities to facilitate safe evacuation of people and livestock. 3. Disaster Risk Reduction mainstreaming in development planning. 4. Strengthening of cyclone detection, forecasting and warning dissemination centres. 5. Launching a series of public awareness campaign in the district by various means including Radio, TV and other media. 6. Training of local administration in warning dissemination and evacuation techniques. 7. Mobilization of NGOs and community based organizations for awareness on construction of houses, billboards, roof tops, and boundary walls, keeping in view effects of high winds. 8. Review/Update emergency response plans and disaster recovery plans. 9. Stocking of key equipment and supplies to carry out immediate response activities including evacuation, shelters, medical camps, water and sanitation, power supply, alternate communication means etc. 10. Design, practice and implementation of evacuation plans with emphasis on self-reliance. 11. Cleaning of water channel, drainage and sewerage before cyclone season in Arabian Sea. 12. Readiness of de-watering machines before start of monsoon and cyclone season.	
Response	
1. Issue early reliable warning through siren or other relevant means to reduce the severity of the cyclone related disasters and save valuable human lives. 2. Identify, involve and mobilize local NGOs which can assist in community awareness and mobilisation for response. 3. Identify and mobilize volunteers' / volunteer organizations which can assist various facets of response like provision of emergency healthcare and relief items. 4. Initiate preliminary damage assessment and run search and rescue operations. 5. Provision of immediate relief including provision of food and potable water to affectees. 6. Deployment of emergency medical support. 7. Provide emergency health care to the affected population, in order to cover risk of spread of epidemic prone diseases like acute watery diarrhea, typhoid fever, malaria and measles, relapsing of fever and acute respiratory illness.	
Recovery and Rehabilitation	
1. Assess damage to buildings across the impacted areas to gather information about the extent and severity of damage. 2. Monitor potential water quality issues. 3. Rehabilitation on built back better principal.	

Drought	
UCs At Risk	All UCs
General Description	1. Climatic condition of the district can be categorized as Hot desert and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010). 2. Average annual rainfall received during a year across the district is 237.47 mm. There are wide fluctuations in the amount of rainfall from year to year. 3. The whole district is desert like, barren tracts of sand dunes covered with different kinds of shrubs. 4. According to the Sindh Relief Department, the district of Tharparkar has been declared calamity-hit in 1968, 1978, 1985, 1986, 1987, 1995, 1996, 1999, 2001, 2004, 2005, 2007 and 2012. 5. Water bodies are scarce, only found at the south-western corner of the district. One relatively bigger water body situated at south. 6. Range lands, natural herbs and shrubs and forests are mostly found at the south-eastern corner and along the south-western boundary. 7. Crops fields that are dependent on rainfall are situated at south-eastern corner of the district. Irrigated crop fields are very limited, few fields found along south-western boundary only. 8. Only few cultivated areas in the district are canal irrigated, mostly, the monsoon rains play vital role for the district's agriculture. 9. The land, although arid, is highly fertile but depends on the July to September rainfall. Rainfall in the desert varies between 100mm and 700mm (Pakistan Water Partnership, 2014), of which the summer monsoon (July to September) accounts for 60% to 70% of the annual rainfall (Pakistan Meteorological Department). 10. Considering Tharparkar is one of the most vulnerable regions to drought in Pakistan, long term measures must be taken in order to increase the resilience of its communities, make the lives of the people sustainable and avoid forced migration. The need to invest in water infrastructure seems to be inevitable, such as establishing water treatment plants or irrigation systems. Improving peoples' 11. Financial resources can also alleviate their hardship in seasons of low rainfall or crop failure, through measures such as low interest rate loans or grants, or conditioned loans that would be returned only if there is no crop failure due to low rainfall; social protection measures such as conditioned cash transfers could also help to increase their means of living as well as human capital (cash transfer dependent upon a medical appraisal and school attendance). Investment in health facilities seems to be necessary in Tharparkar. 12. New sources of income also need to be found, and given that agriculture is the main means of earning income, new varieties of crops that are more resilient to dry areas or suitable for saline water could be promoted 13. According to MHVRA Study 2022, 14. Meteorological drought hazard for district Tharparkar is "**Extreme**"

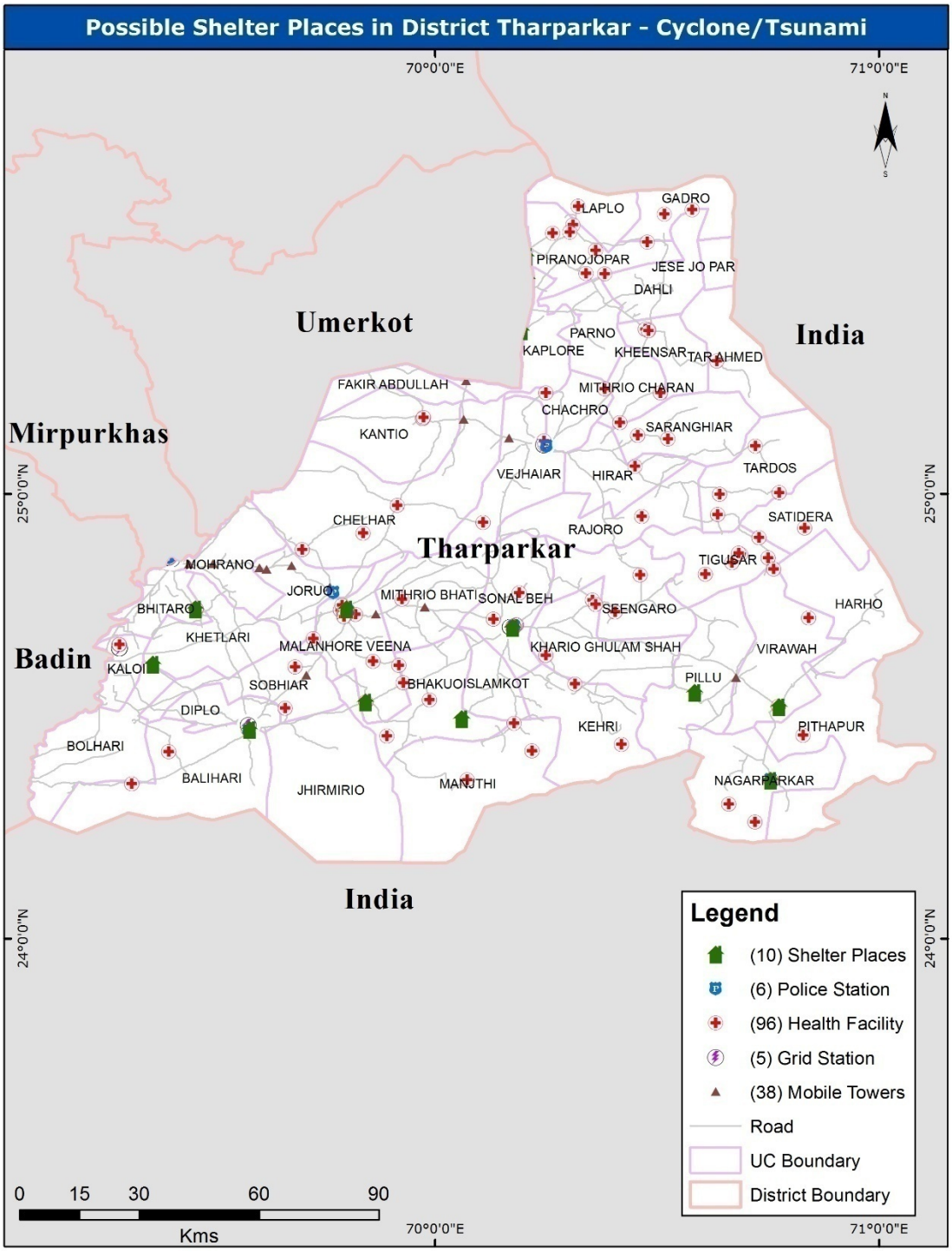
	15. Meteorological drought risk for district Tharparkar is "**Medium to Extreme**" 16. Agricultural drought hazard for district Tharparkar is "**Mild to Extreme**" 17. Agricultural drought risk for district Tharparkar is "**Low to Extreme**".
Disaster Management Measures	
Preparedness	
1. Implement Drought Early Warning System (EWS) at provincial/district level to get clear indications of the impending drought and its consequences, e.g. forecast of impending drought conditions related to changing weather conditions linked to El Nino or La Nina events. 2. Research and implementation of drought resistant agriculture crops. 3. Resilience and improvement of adaptive capacity of farmers. 4. Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, stream flow, groundwater levels, lakes, and reservoirs. 5. Building of small-scale reservoir for rainwater harvesting in vicinity of individual settlements	
Response	
1. Assess data about the nature of drought conditions and their impact. 2. Provision and installation of solar water pumps for availability of clean drinking water. 3. Public information campaign for water management and saving.	
Recovery and Rehabilitation	
1. Awareness and encouragement of farmers on best agricultural practices and water saving.	

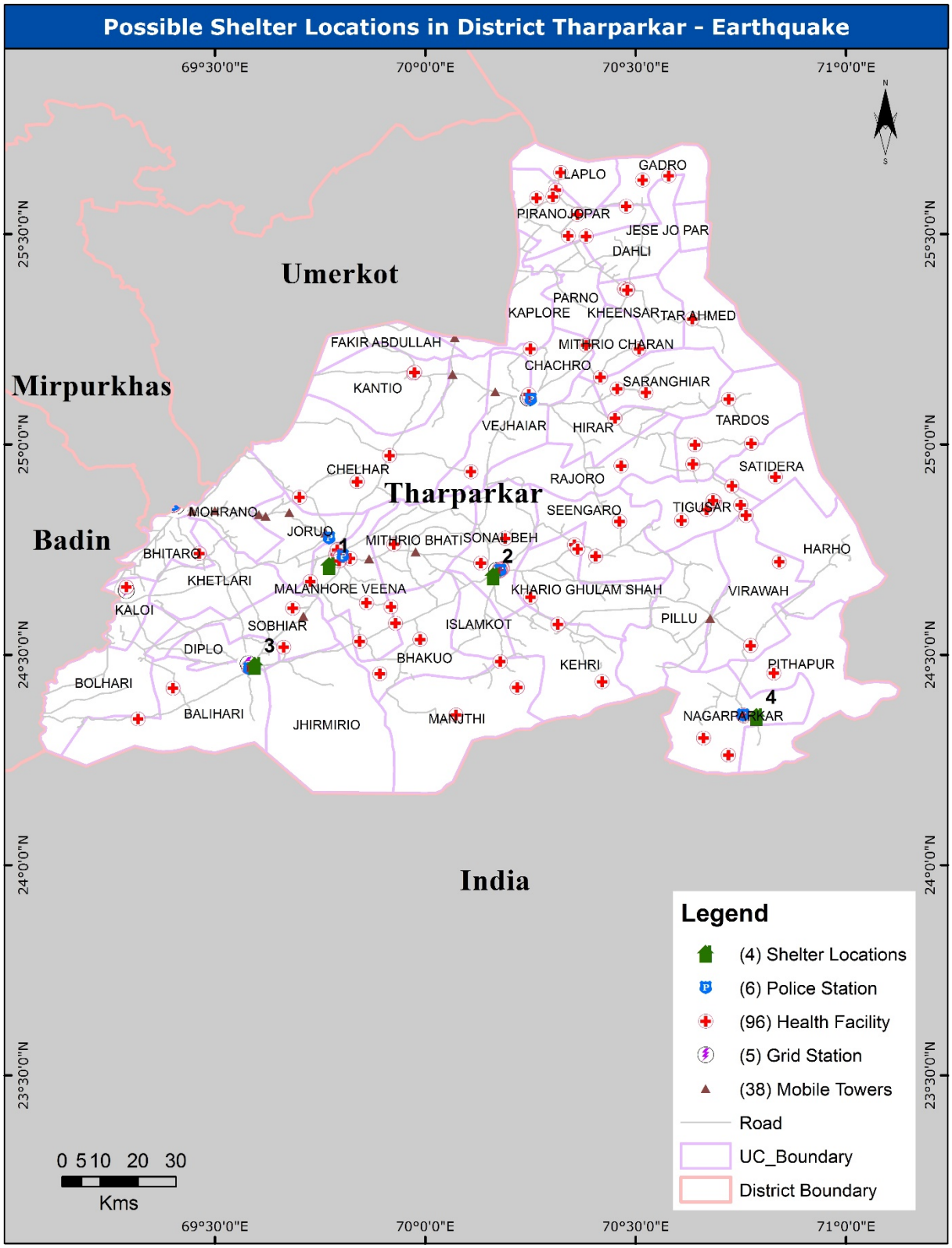
Tsunami	
UCs at Risk (16)	**Balihari, Bhitaro, Bolhari, Diplo, Harho, Jhirmirio, Kaloi, Kehri, Khetlari, Manjthi, Mohrano, Nagarparkar, Pillu, Pithapur, Sobhiar, Virawah**
UCs not at Risk (29)	**Bhakuo, Chachro, Chelhar, Dahli, Fakir Abdullah, Gadro, Hirar, Islamkot, Jese Jo Par, Joruo, Kantio, Kaplore, Kharo Ghulam Shah, Kheensar, Laplo, Malanhore Veena, Mithrio Bhati, Mithrio Charan, Parno, Piranojopar, Rajoro, Saranghiar, Satidera, Seengaro, Sonal Beh, Tar Ahmed, Tardos, Tigusar, Vejhaiar**
General Description	1. Due to geographical location, District Tharparkar can be affected by the Tsunami. 2. The Tsunami hazard intensity for district Tharparkar is "**Medium to Very High**" 3. The Tsunami risk intensity for district Tharparkar is "**Low to High**"
Disaster Management Measures	
Preparedness	
1. Strengthening of tsunami detection, forecasting and warning dissemination centers. 2. Installation of tsunami early warning systems in coastal belt of Sindh. 3. Launching a series of public awareness campaign through NGOs and community development organizations. 4. Training of local administration in warning dissemination and evacuation techniques.	

5. Development of a network of local knowledge centers (rural/urban) along the coast lines to provide necessary training and emergency communication during crisis time. 6. Design, practice and implementation of evacuation plans and shelter sites with emphasis on self-reliance. 7. Plan the timing of initial actions to be taken in the event of a Tsunami. 8. Ensure all communities and response agencies are prepared and ready to respond to a tsunami event.
Response
1. Coordination with Pakistan Meteorological Department as nodal agency for earthquake and tsunami detection service and dissemination of alerts and warnings through dedicated tsunami warning systems along the coastal belt. 2. Arrangement for alternate communication links like satellite phones, HF/ VHF communication, VSAT, etc. 3. Establishment of shelters with all necessary life support facilities 4. Mobilize and deploy resources e.g. search and rescue, medical teams in the Tsunami affected areas. 5. Supply food, drinking water, medical supplies to the affected population. 6. Assess hygiene of affected area and preventing the spread of disease.
Recovery and Rehabilitation
1. Reconstruction of essential infrastructure, such as access to roads, water supply and sanitation, waste water treatment and solid waste disposal. 2. Conduct post-Tsunami damage assessment analysis to provide a clear, and concise picture of post disaster situation, to identify damage caused to different sectors and to develop strategies for rehabilitation, reconstruction and recovery on built back better principal.

SHELTER LOCATION MAP

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





*Annex-A details the list of earthquake shelter locations

PROPOSED PRIORITY DISASTER RISK MANAGEMENT PROJECTS

INTRODUCTION

Following are the recommended disaster risk management projects, which may be initiated to ensure effective disaster management in the district. 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**
Earthquake	
1. Ensure implementation of building codes and standards.	Prepare policy and SOP to ensure new buildings in the district are constructed as per the seismic codes and standard of the area.
2. Identification and retrofitting of weak existing structures and unsafe buildings (schools, hospitals and government offices).	Coordinate with local community regarding unsafe buildings and regularly conduct building safety surveys to check structural integrity of buildings against the seismic risk of the district and take necessary retrofitting measures to strengthen weak structures. Create database of vulnerable and unsafe buildings and retrofitting measures taken to strengthen the structure of such buildings.
3. Preparation of rescue and rehabilitation plan	Coordinate with line departments to create a comprehensive plan with clearly defined roles and responsibilities of first responding departments, as well as, correspond with rescue agencies/NGOs for their role in an event of earthquake. The plan should also details the rescue equipment available with concerned departments.
Drought	
1. Conduct feasibility study for identification of suitable sites for rainwater harvesting and aquifer recharge in the district.	The rainwater harvesting sites should be identified by using geospatial technologies and ancillary data, which can be used as clean water aquifers by communities, which in turn can use it for drinking, and irrigation purposes. Potential rainwater harvesting sites may be identified by using Analytical Hierarchy Process (AHP) and spatial analyst tool, with multiple thematic layers (rain data, population, digital elevation model, soil type, etc.) In order to encourage rain-water harvesting in Tharparkar the construction of tankas (underground storage tanks) be supported by financial means in terms of soft loans/aids. This soft loan scheme maybe continued until 1 to 2 tankas are constructed in each small village. Installation of waste water recycle plants using Soil Aquifer Treatment (SAT) techniques near major cities of Tharparkar such as Mithi and Deplo etc. may be carried out. The treated water may be utilized for agricultural purposes.
2. Provision of internet facilities throughout Thar District	It is a need to connect Thar population with the globe through internet. Skillful labour can be generated by arranging short training courses and providing computer and internet facilities, so that they can earn money as freelancer and generate a handsome / reliable income, independent of the weather conditions. It will increase their food buying capacity.

3. Establishment of Solar Energy Park	To increase the income/employment situation in the area appropriate /feasible development projects such as installation of Solar Energy Park can boost economic situation of the area. Multiple solar energy parks can be established at suitable locations after conducting a feasibility study.
4. Building infrastructure to promote tourism	Thar culture is very rich and attractive, it can be exploited for boosting tourism and improving lives of the local Thar community. Desert sports activities such as desert safari, camping, desert jeep rallies etc. may be promoted. Initiatives may be started to promote tourism by building infrastructure such as big/enterprise scale farmhouses; educating the masses; and promoting the Thar culture through media campaigns.
5. Establishment of camel dairy production plants	Establishment of camel farming and processing plants for manufacturing of camel dairy products for export purposes.
6. Establishment of local grain storage warehouses	Establishment of local storage of wheat/grains warehouses in rainfed areas, keeping in view the El-neno period. Quantitative assessment should be carried out for goods storage keeping in view the requirement of goods during consecutive seven years with less rain.
7. Establishment of ambulance and health facilities	Since, remoteness is an issue in addition to Tharparkar's vast landscape and spread out population, efficient and well distributed ambulance services are required in Thar so that drought effected/mal-nutrient patients from remote areas/villages can be reached to major hospitals in main cities of the district/province. Moreover, it is suggested to initiate an air-ambulance service in Nagarparkar due to its remoteness and dense population. Other than mal-nutrition, major health care facilities required are in terms of gynaecologist and treatment of snake or insect's bites. A selected female from a cluster of villages (5-10 villages) in Thar can be sponsored by Govt./NGOs/INGOs to get medical education/professional courses in major cities of Sindh. These females after getting trainings/education can serve as doctor/lady health workers in their villages.
8. Improve mechanism for declaration of drought	One indicator described in Calamities Act for the declaration of drought is the total rainfall in monsoon season. However besides overall rain falls count the spread of rain (i.e. the number of rains spread over a total period of monsoon) in full monsoon season need to be accounted. It is suggested to use geospatial technology to monitor and assess the cultivated area, type of crop and crop in stress, so that timely distress period can be calculated.
9. Improve grain distribution mechanism during drought	Wheat distribution is the most favoured exercise by the government aimed for disaster relief. Tons of wheat bags are distributed everytime in case of droughts as well as other calamities like Riverine Floods or displacement. However, for fair distribution and to avoid its theft, it is suggested to place video cameras on distribution points/centers. Also, stock count technologies like RFID/barcode scanning may be used to ensure transparency in storing and distribution of grain sacks to the deserving people. Temporarily vehicle tracking device can also be installed on goods distribution trucks for their monitoring.

10. Rain through cloud seedling	Cloud seeding is a weather modification technique aimed at enhancing precipitation from clouds. A program may be initiated under which cloud seeding may be done to clouds due to monsoon or due to western disturbance system at Tharparkar region. This program will greatly help in mitigating the effects of drought in the region.
Cyclone/Tsunami	
1. Establishment of tsunami/cyclone early warning detection and dissemination system using Common Alert Protocol (CAP).	A single emergency alert using Common Alert Protocol (CAP) can trigger a variety of public warning systems, increasing the likelihood that people receive the alert by one or more communication pathways. The CAP is capable to disseminate rich multimedia such as photographs, maps, streaming video and audio. An early warning system based on CAP may be established at suitable location.
2. Construction of permanent multipurpose Cyclone / Tsunami shelters.	Multi-Purpose Shelters are meant to provide refuge to vulnerable populations at the time of a cyclonic storm and otherwise to be used as community centers etc. The Multi-Purpose Cyclone Shelters act as a safe shelter for people living in a cyclone threatened region or meant for those who fail to evacuate due to various reasons. The number of Multi-Purpose Shelters should be proportionate to the population size with due examination of its safety and sustainability aspects.
3. Conduct of District Level Mock Exercise (DLME).	Develop a calendar for mock exercises to assess the preparedness, review the District Disaster Management Plans, Standard Operating Procedures and to evaluate the readiness of various departments to any disaster or emergency.
4. Development of insurance policy for financial risk management	Collaborate with Provincial Govt. and Private Partners to devise a disaster insurance policy for vulnerable communities. Disaster insurance provides a means of covering losses incurred through disasters and catastrophic events and reducing disasters' severe financial impact on individuals and communities. Financial liquidity provided by insurance helps mitigate disasters' effects on food security, health and livelihood assets.

COST BENEFIT ANALYSIS

INTRODUCTION

1. Cost Benefit Analysis (CBA) is a key analytical tool that can provide quantitative information regarding the prioritization of risk reduction based on comparing benefits of an actual or planned intervention with its costs.

2. Cost Benefit Analysis (CBA) can play a pivotal role in advocacy and decision-making on disaster risk reduction (DRR) by demonstrating the financial and economic value of incorporating DRR initiatives into planning.

3. In an age of austerity, cost–benefit analysis continues to be an important tool for prioritizing efficient DRM measures but with a shifting emphasis from infrastructure-based options (hard resilience) to preparedness and systemic interventions (soft resilience), other tools such as cost-effectiveness analysis, multi-criteria analysis and robust decision-making approaches deserve more attention.

4. Studies categorize interventions into hard and soft type of measures. Hard resilience refers to the strengthening of structures and physical components of systems in order to brace against shocks imposed by extremes such as earthquakes, storms and Riverine Floods. In contrast, soft resilience (Behavioural DDR) 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 – THARPARKAR DISTRICT

The existing nature of disaster in Tharparkar district can be categorized as moderate to extreme. The prominent hazards in the district are drought and heatwave. The biggest threat is posed by drought risk ranging from low to extreme throughout the district. Most of the settlements in the district have low to extreme risk of heatwave. Southwestern part of the district that is adjacent to the Rann of Kutch is susceptible to low risk of cyclones. There is a low to medium risk of storm surge due to sparse population and assets in the cyclone hazard prone areas. There is no risk of Riverine Flood in the district. For other hazards like earthquake the risk is low. Based on the results of the MHVRA study the hazards of the district can be managed through soft and enhanced management measures. In this scenario, cost benefit analysis of proposed interventions is appended in table below:

Table9: Cost Benefit Analysis of Disaster Risk Measures in District Tharparkar

S. no.	Soft resilience (Behavioral DRR)	Cost	Benefit
1.	Identification and management of shelters	Identification and management of shelter spaces is a cost-effective way to ensure rapid, and effective management of population at times of crisis. Government schools can serve as ideal cost-effective shelter spaces in district Tharparkar, as these can accommodate large number of people. Gradually, permanent shelters can be established in future to avoid use of education facilities.	Shelter places are highly beneficial at times of disaster as it offers a unified accommodation place for affected people. Shelter place also helps administration in effective management of affectees and provide them with required relief. Shelter serve as centralized facilities where government can concentrate relief efforts including disbursement of relief goods and essential food supplies to affected people. Additionally, hydration stations at these shelters will improve accessibility to drinking water during times of heatwave. Reduction in cases of emergencies due to drought and heatwave can help in reducing burden on the health care facilities and reduce fatalities.
2.	Early warning system for heatwave	Dissemination of forecast of heatwaves from the meteorological department through public radio announcements, print and digital media. Increase the preparedness of local populace against the impending hot climate.	Early warnings give people time to prepare in advance and postpone activities after daytime. Authorities will be able to procure emergency food and water supplies for distribution. Local authorities would get ample time to establish relief centers with provisions of shade and hydration. Hospitals could be prepared to receive more patients and check their inventory for necessary medicine / equipment in advance. An overall reduction in emergency cases would reflect in less mortality and more savings in medical expenditure.
3.	Early warning system for drought	Dissemination of information by meteorological department regarding delays in rainfall season using radio announcements, print and digital media. Warnings to be issued prior to commencing maintenance on headworks and for low flow in channels.	Equipping farmers with knowledge of impending dry season will enable them to procure animal fodder in advance and making arrangements for proper storage. Households can start to store food supplies for the coming days. This shall lead to an overall reduction in cases of malnutrition, dehydration, save medical expenses and possibly save lives.
4.	Awareness campaigns	Public private partnership and use of electronic/print media for raising public awareness is a cost-effective approach to build	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

		society resilience and improved disaster risk management capabilities of vulnerable communities.	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.	Building local rainwater harvesting reservoir	Building of small rainwater harvesting reservoirs through public-private partnerships or in collaboration with NGOs can significantly improve the water scarcity situation of vulnerable communities.	Rainwater harvesting has provided a water source for communities around the world dating back to circa 1500 B.C. This ancient technology continues to serve populations today, mainly in poor, rural or dry regions of the world and island communities. Small reservoirs in semi-arid / arid regions enable local communities to deal with droughts and to improve agricultural productivity.
6.	Enhancement of municipal water system	Establishment of underground water reservoirs shall enable storage of water in times of plenty. This shall also protect water against surface contamination and evaporation which is a major issue in the Tharparkar district. Maintenance of existing distribution system shall help in reducing water losses and contamination.	Consumption of unclean water leads to many health problems including gastric issues, infections and other long term health issues. Ensuring adequate supply of clean water will reduce medical expenditure and prevent loss of life specially among the vulnerable groups like children and elderly.
7.	Strengthening of mobile health care facilities	Setup of temporary health facilities reduce difficulty in patients' transportation to permanent hospital facilities. Mobile health care units are already available with government of Sindh, their mobilization to disaster management will ensure lifesaving.	Mobile health facilities play a very significant role in the mitigation of disaster because of their particular function in providing essential first aid. Ease of access to basic health facilities will reduce burden on hospitals. The systematic organization and easy mobilization of the staff, equipment and medical supplies in a safe environment are crucial if disaster response is to be prompt and effective.

ANNEX – A – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

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

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 24°43'27.46"N 69°47'11.14"E Upper left corner: 24°42'27.88"N 69°45'12.57"E Lower right corner: 24°42'50.29"N 69°47'21.68"E Lower left corner: 24°41'54.75"N 69°45'25.34"E	1,023	~46,000	175
2	Upper right corner: 24°41'58.10"N 70°10'4.04"E Upper left corner: 24°41'23.60"N 70° 9'8.28"E Lower right corner: 24°40'32.32"N 70° 9'52.01"E Lower left corner: 24°40'31.60"N 70° 9'23.84"E	828	~37,000	245
3	Upper right corner: 24°28'57.23"N 69°36'5.68"E Upper left corner: 24°28'32.19"N 69°35'8.26"E Lower right corner: 24°28'23.62"N 69°36'19.25"E Lower left corner: 24°27'57.62"N 69°35'24.30"E	492	~22,000	130
4	Upper right corner: 24°21'42.93"N 70°48'5.66"E Upper left corner: 24°21'25.59"N 70°46'44.34"E Lower right corner: 24°20'34.18"N 70°48'2.72"E Lower left corner: 24°20'46.06"N 70°46'22.18"E	1,051	~47,000	162

A total of 4 shelter locations have been selected as Earthquake shelter places across the district. The shelter locations are selected based on their proximity to the population vulnerable to earthquake, and accessibility to roads and other basic facilities (healthcare, education, police station, etc.). A total of 152,000 tents approximately (tent with size of 45 sq. m each) can be set up within the demarcated shelter places

ANNEX – B – LIST OF EQUIPMENT AVAILABLE IN DISTRICT THARPARKAR

Equipment	Quantity
De-watering Machine	26
Buildozers / dozers	3
Fire Brigade / Engine / Tender	10
Tractor / Trolley / Blade	15
Vehicle / Bus / Van / Truck	1
Water Tanker	7
Ambulances	13
Rickshaw Container	16

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