MHVRA

INFORMED DISASTER MANAGEMENT PLAN 2023-2032

DISTRICT UMERKOT

SOURCE: (HTTPS://WWW.GLOBALRISKINDEX.ORG/CASE-STUDIES/2017-PAKISTAN.HTML)

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 Umerkot 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 Umerkot 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 Umerkot 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 UMERKOT

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, Riverine Flood, heatwave, and tsunami at UC level.

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

VISION

Vision of MHVRA Informed Disaster Management Plan is;

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

OBJECTIVES

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

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

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

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

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

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

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

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

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

REVIEW OF MHVRA INFORMED DISASTER MANAGEMENT PLAN

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

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

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

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

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

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

Table 1: Recommended Committee for Reviewing Disaster Management Plan

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

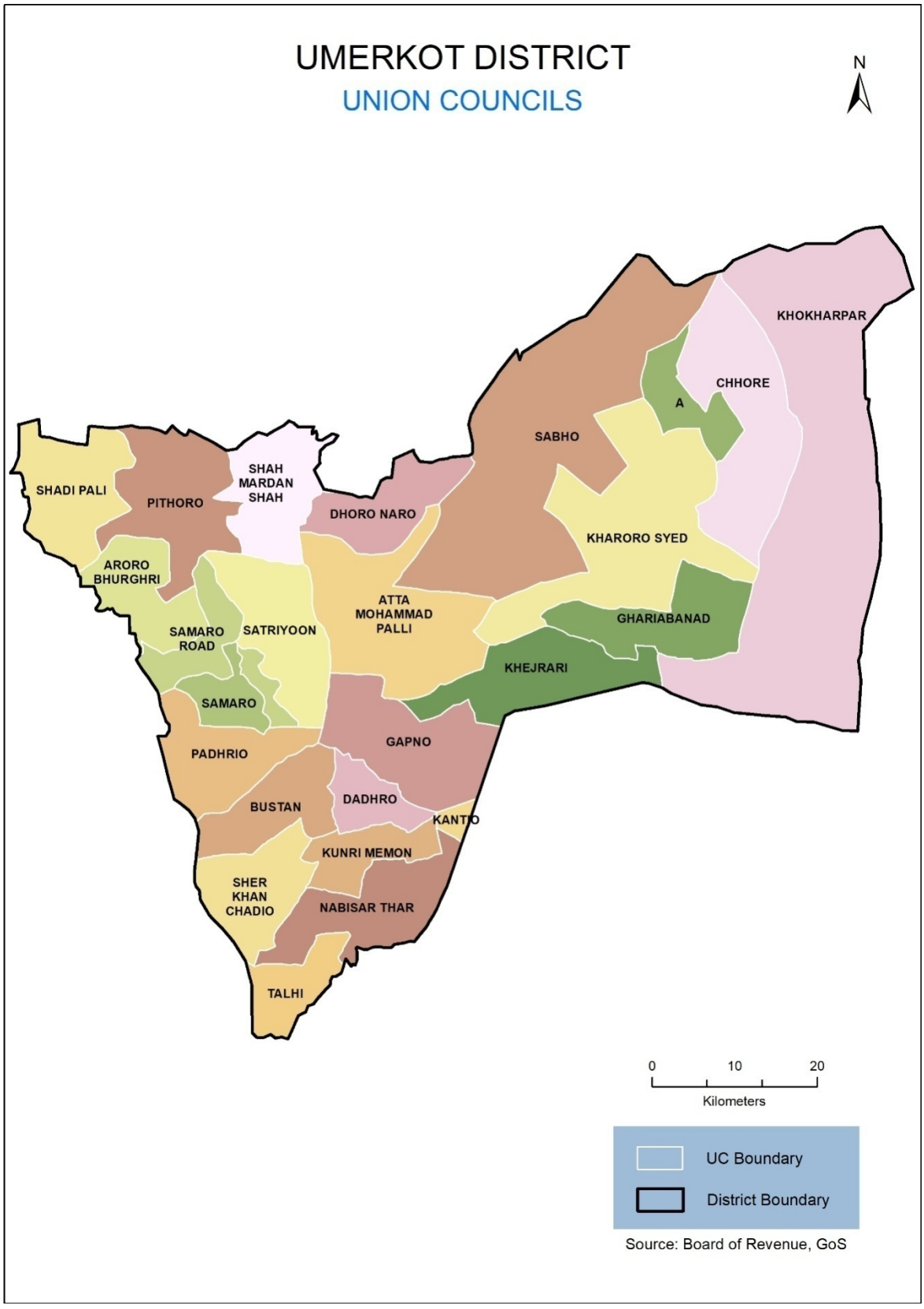
MODES OF REVIEW

Preferred modes of review of plan are;

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

DISASTER RISK PROFILE OF DISTRICT UMERKOT

DISTRICT UMERKOT AT A GLANCE



GEOGRAPHY

District area in Sq. Km	5,047	
Coordinates	Longitude 69° 10' 08" to 70° 15' 44" East Latitude 24° 52' 54" to 25° 47' 59" North	
Surrounding Districts	Sanghar in North Tharparkar in the East and South Mirpurkhas in West	
Climate Conditions	Hot and Semi-Arid	
Coldest Month Hottest Month	January May	
Seasonal Temperatures	Max Mean (°C)	Min Mean (°C)
Spring (March and April)	38.19	21.01
Dry Summer (May and June)	42.85	27.70
Wet Summer (July to September)	38.56	26.92
Autumn (October to November)	35.45	19.85
Winter (December to February)	28.06	12.01
Average Rainfall	179.3 mm/year	
Physiographic Features	Kalankar Lake	

DEMOGRAPHY

	Year-1998	**Year-2017**
Population	664,797	1,073,469
Urban	111,464	243,537
Rural	553,333	829,932
No. of Household	-	212,356
Average Annual Growth Rate 1998-2017	2.55 %	

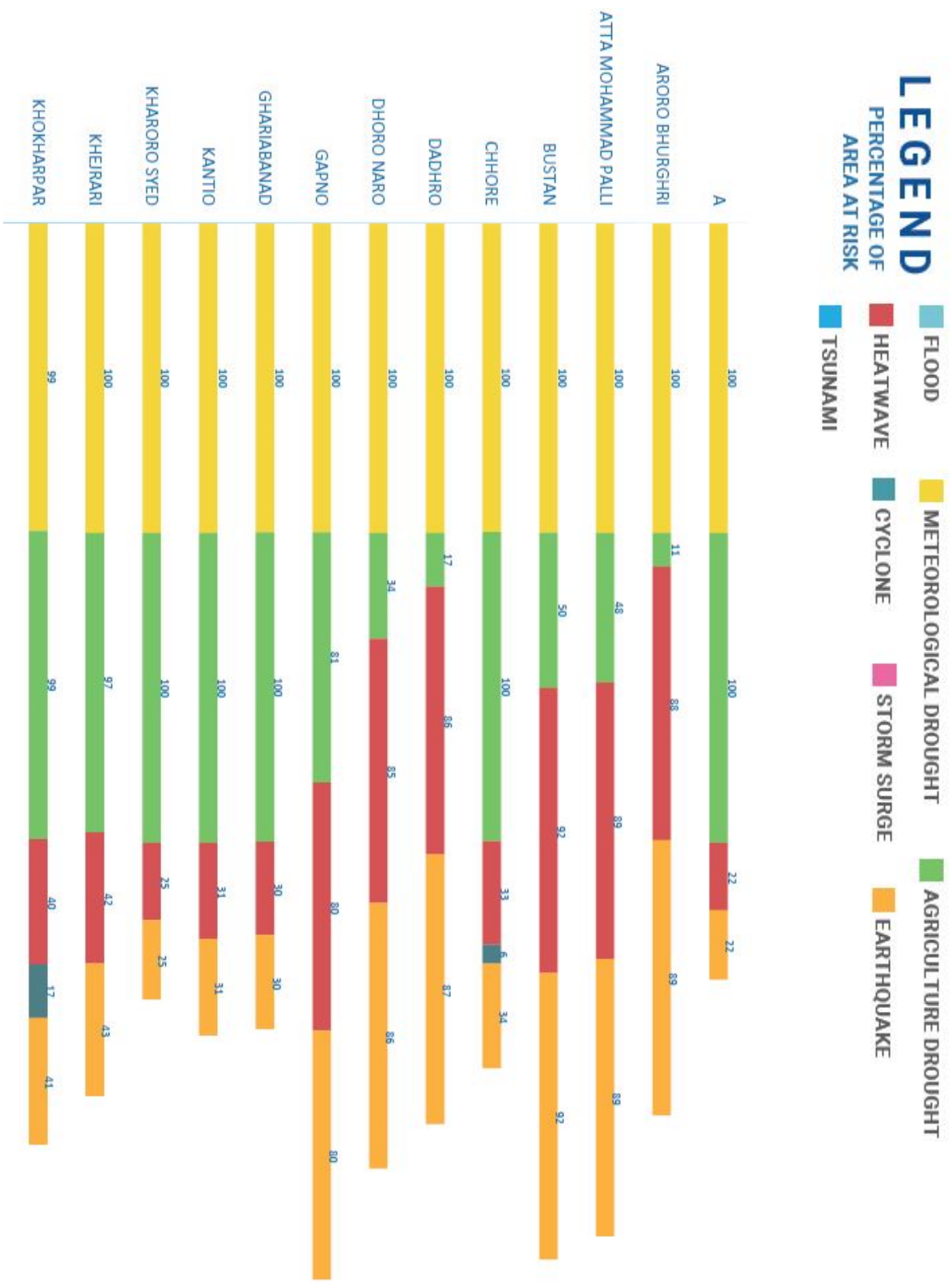
ECONOMY

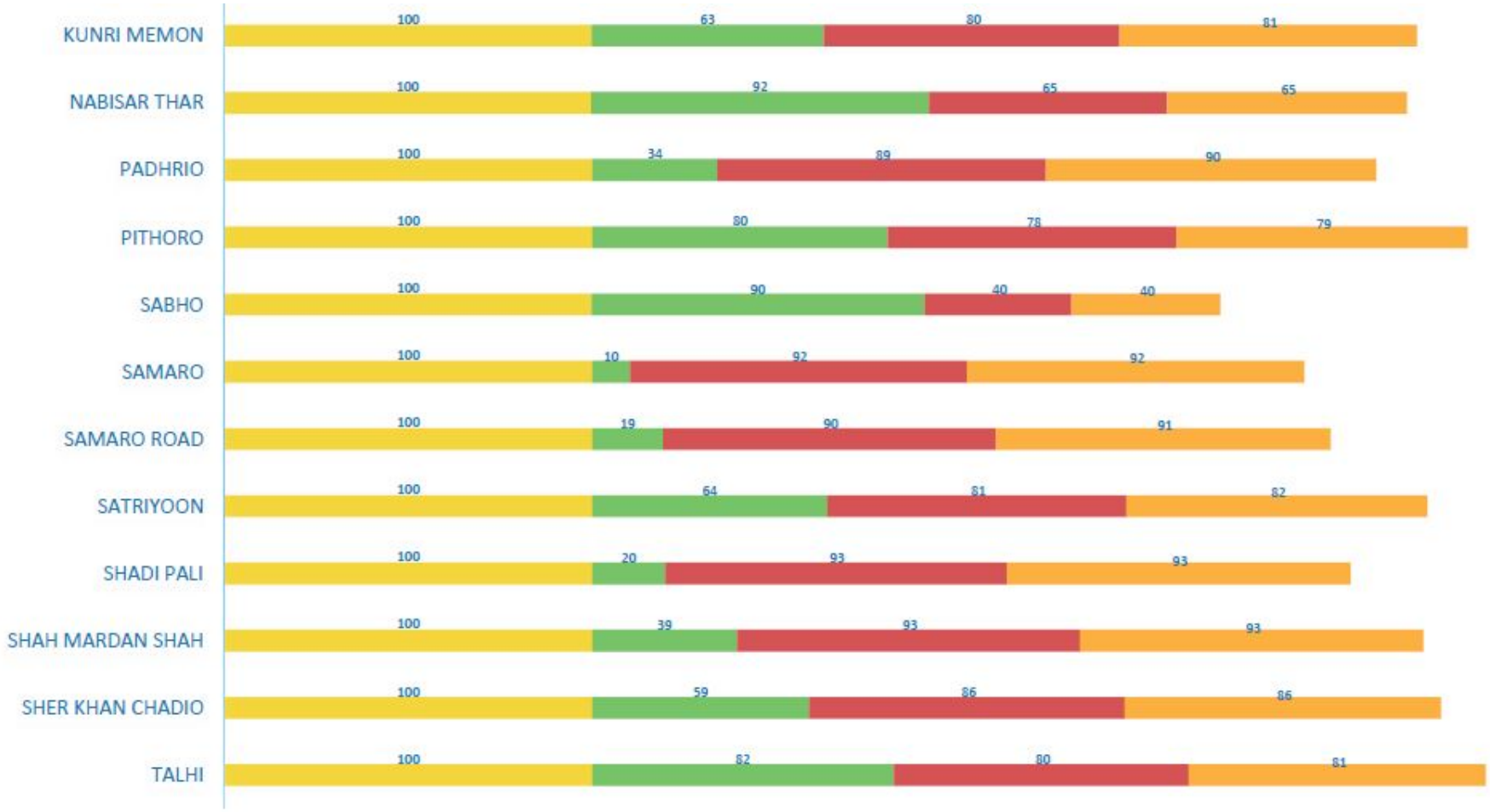
Agriculture	Production in M.tons as per (2016-17)
Major Crops	
Sugarcane	181,142
Cotton	26,605
Wheat	142,673
Minor Crops	
Bajra	252
Rapeseed And Mustard	1,563
Maize	133
Jowar	260

ADMINISTRATIVE SYSTEM

TALUKA NAMES	UC NAMES
1. Kunri Taluka 2. Pithoro Taluka 3. Samaro Taluka 4. Umer Kot Taluka	1. A 2. AroroBhurghri 3. Atta Mohammad Palli 4. Bustan 5. Chhore 6. Dadhro 7. Dhoro Naro 8. Gapno 9. Ghariabanad 10. Kantio 11. Kharoro Syed 12. Khejrari 13. Khokharpar 14. Kunri Memon 15. Nabisar Thar 16. Padhrio 17. Pithoro 18. Sabho 19. Samaro 20. Samaro Road 21. Satriyoon 22. Shadi Pali 23. Shah Mardan Shah 24. Sher Khan Chadio 25. Talhi

UMERKOT DISTRICT MULTI-HAZARD RISK PROFILES




KUNRI MEMON
100
63
80
81
NABISAR THAR
100
92
65
65
PADHRIO
100
34
89
90
PITHORO
100
80
78
79
SABHO
100
90
40
40
SAMARO
100
10
92
92
SAMARO ROAD
100
19
90
91
SATRIYOON
100
64
81
82
SHADI PALI
100
20
93
93
SHAH MARDAN SHAH
100
39
93
93
SHER KHAN CHADIO
100
59
86
86
TALHI
100
82
80
81

UC WISE RISK PROFILE

A			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	16.672 sq km
		Pakka Unplanned Area	0.199 sq km
		Education Facilities	3
		Mobile Towers	1
		Settlements	16
		Railway Line	4.73 km
		Road Network	26.307 km
		Population	1355
		Household	268
Meteorological Drought	Medium - Extreme	Settlements	16
		Agriculture Area	17.269 sq km
		Bare Area with sparse Natural Vegetation	63.294 sq km
		Population	1410
		Household	278
Agricultural Drought	Low - Extreme	Settlements	16
		Agriculture Area	21.215 sq km
		Bare Area with sparse Natural Vegetation	77.772 sq km
		Population	1731
		Household	340
Heatwave	Low - High	Agriculture Area	16.486 sq km
		Pakka Unplanned Area	0.2 sq km
		Population	1362
		Household	267
		Settlements	13
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

AroroBhurghri			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	108.038 sq km
		Kachcha Area	0.498 sq km
		Pakka Unplanned Area	1.283 sq km
		Range Land	0.242 sq km
		Education Facilities	38
		Settlements	71
		Irrigation and Drainage Network	39.906 km
		Road Network	132.924 km
		Population	29303
		Household	5876
Meteorological Drought	Medium - Extreme	Settlements	71
		Agriculture Area	108.251 sq km
		Range Land	3.678 sq km
		Wet Area	10.708 sq km
		Population	29613
		Household	5936
Agricultural Drought	Low - High	Settlements	3
		Agriculture Area	14.181 sq km
		Range Land	1.718 sq km
		Wet Area	0.675 sq km
		Population	42
		Household	8
Heatwave	Low - High	Agriculture Area	107.97 sq km
		Kachcha Area	0.501 sq km
		Pakka Unplanned Area	1.286 sq km
		Population	29399
		Household	5894
		Settlements	70
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Atta Mohammad Palli			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	249.515 sq km
		Kachcha Area	0.129 sq km
		Pakka Planned Area	0.832 sq km
		Pakka Unplanned Area	12.96 sq km
		Range Land	0.54 sq km
		Ambulance Services	1
		Bridges	4
		Bus Stops	4
		Education Facilities	199
		Grain Mandi	1
		Grid Stations	1
		Health Facilities	13
		Mobile Towers	20
		Petrol Pumps	24
		Police Stations	2
		Post Offices	3
		Power Plants	1
		Settlements	109
		Tourist Places	5
		Irrigation and Drainage Network	62.644 km
		Road Network	327.701 km
		Population	109339
		Household	21757
Meteorological Drought	Medium - Extreme	Settlements	109
		Agriculture Area	250.021 sq km
		Bare Area with sparse Natural Vegetation	4.81 sq km
		Range Land	11.362 sq km
		Wet Area	13.664 sq km
		Population	110111
		Household	21909
Agricultural Drought	Low - High	Settlements	55
		Agriculture Area	128.014 sq km
		Bare Area with sparse Natural Vegetation	5.885 sq km
		Range Land	13.832 sq km
		Wet Area	12.483 sq km
		Population	98031
		Household	19598
Heatwave	Low - High	Agriculture Area	249.387 sq km

		Kachcha Area	0.129 sq km
		Pakka Planned Area	0.833 sq km
		Pakka Unplanned Area	12.98 sq km
		Population	109513
		Household	21793
		Settlements	102
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Bustan			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	115.23 sq km
		Kachcha Area	0.168 sq km
		Pakka Planned Area	0.671 sq km
		Pakka Unplanned Area	3.905 sq km
		Range Land	0.15 sq km
		Bridges	1
		Education Facilities	41
		Health Facilities	2
		Industries	1
		Mobile Towers	1
		Petrol Pumps	6
		Settlements	150
		Irrigation and Drainage Network	40.902 km
		Road Network	140.183 km
		Population	48638
		Household	9606
Meteorological Drought	Medium – Extreme	Settlements	150
		Agriculture Area	115.483 sq km
		Range Land	2.938 sq km
		Water Body	0.039 sq km
		Wet Area	6.562 sq km
		Population	49246
		Household	9720
Agricultural Drought	Low – High	Settlements	63

		Agriculture Area	68.113 sq km
		Range Land	3.555 sq km
		Water Body	0.048 sq km
		Wet Area	4.977 sq km
		Population	27559
		Household	5442
Heatwave	Low - Extreme	Agriculture Area	115.124 sq km
		Kachcha Area	0.168 sq km
		Pakka Planned Area	0.672 sq km
		Pakka Unplanned Area	3.922 sq km
		Population	48832
		Household	9643
		Settlements	144
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Chhore			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	89.925 sq km
		Pakka Unplanned Area	0.877 sq km
		Education Facilities	14
		Settlements	45
		Railway Line	11.635 km
		Road Network	35.006 km
		Population	5985
		Household	1177
Meteorological Drought	Medium – Extreme	Settlements	43
		Agriculture Area	92.293 sq km
		Bare Area with sparse Natural Vegetation	186.283 sq km
		Population	6155
		Household	1211
Agricultural Drought	Low - Extreme	Settlements	43
		Agriculture Area	113.281 sq km
		Bare Area with sparse Natural Vegetation	228.872 sq km

		Population	7558
		Household	1487
Heatwave	Low - High	Agriculture Area	89.315 sq km
		Pakka Unplanned Area	0.883 sq km
		Population	6026
		Household	1183
		Settlements	30
Cyclone	Low	Agriculture Area	17.238 sq km
		Pakka Unplanned Area	0.007 sq km
		Settlements	1
		Population	48
		Household	9
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Dadhro			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	52.497 sq km
		Pakka Planned Area	2.166 sq km
		Pakka Unplanned Area	4.57 sq km
		Range Land	0.273 sq km
		Ambulance Services	1
		Bridges	3
		Bus Stops	2
		Education Facilities	60
		Grain Mandi	1
		Health Facilities	4
		Industries	1
		Mobile Towers	9
		Petrol Pumps	9
		Police Stations	1
		Post Offices	1
		Settlements	80
		Irrigation and Drainage Network	30.199 km
		Road Network	64 km
		Population	72895
		Household	14216

Meteorological Drought	Medium - Extreme	Settlements	80
		Agriculture Area	52.736 sq km
		Bare Area with sparse Natural Vegetation	0.966 sq km
		Range Land	3.974 sq km
		Water Body	0.009 sq km
		Wet Area	3.969 sq km
		Population	73510
		Household	14335
Agricultural Drought	Low - Medium	Settlements	4
		Agriculture Area	6.027 sq km
		Bare Area with sparse Natural Vegetation	1.178 sq km
		Range Land	4.761 sq km
		Water Body	0.01 sq km
		Wet Area	0.926 sq km
		Population	11424
		Household	2238
Heatwave	Low - Extreme	Agriculture Area	52.403 sq km
		Pakka Planned Area	2.167 sq km
		Pakka Unplanned Area	4.587 sq km
		Population	73084
		Household	14255
		Settlements	79
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Dhoro Naro			
Hazard Type	Risk	**Elements at Risk**	
Earthquake	Low	Agriculture Area	104.293 sq km
		Kachcha Area	0.02 sq km
		Pakka Unplanned Area	3.971 sq km
		Range Land	0.172 sq km
		Bridges	2
		Education Facilities	96
		Health Facilities	1

		Mobile Towers	2
		Police Stations	1
		Settlements	70
		Irrigation and Drainage Network	58.05 km
		Railway Line	10.347 km
		Road Network	149.028 km
		Population	43756
		Household	8778
Meteorological Drought	Medium - Extreme	Settlements	70
		Agriculture Area	104.396 sq km
		Bare Area with sparse Natural Vegetation	13.003 sq km
		Range Land	4.079 sq km
		Wet Area	0.918 sq km
		Population	44061
		Household	8835
Agricultural Drought	Low - High	Settlements	23
		Agriculture Area	29.161 sq km
		Bare Area with sparse Natural Vegetation	15.938 sq km
		Range Land	4.997 sq km
		Wet Area	0.046 sq km
		Population	16203
		Household	3183
Heatwave	Low - High	Agriculture Area	104.274 sq km
		Kachcha Area	0.02 sq km
		Pakka Unplanned Area	3.979 sq km
		Population	43799
		Household	8787
		Settlements	70
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Gapno			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	162.351 sq km
		Forest Area	0.013 sq km
		Pakka Unplanned Area	8.61 sq km
		Range Land	0.389 sq km
		Bridges	3
		Bus Stops	3
		Education Facilities	84
		Health Facilities	2
		Mobile Towers	3
		Petrol Pumps	2
		Power Plants	1
		Settlements	113
		Irrigation and Drainage Network	45.028 km
		Road Network	187.493 km
		Population	59672
		Household	11728
Meteorological Drought	Medium – Extreme	Settlements	113
		Agriculture Area	162.891 sq km
		Bare Area with sparse Natural Vegetation	16.915 sq km
		Forest Area	1.647 sq km
		Range Land	14.374 sq km
		Water Body	0.074 sq km
		Wet Area	8.12 sq km
		Population	60241
		Household	11839
Agricultural Drought	Low - High	Settlements	73
		Agriculture Area	151.084 sq km
		Bare Area with sparse Natural Vegetation	20.65 sq km
		Forest Area	2.01 sq km
		Range Land	17.545 sq km
		Water Body	0.09 sq km
		Wet Area	9.653 sq km
		Population	60903
		Household	11962
Heatwave	Low - Extreme	Agriculture Area	162.206 sq km
		Pakka Unplanned Area	8.628 sq km
		Population	59805
		Household	11754

		Settlements	107
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Ghariaband			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	46.405 sq km
		Pakka Unplanned Area	1.05 sq km
		Education Facilities	10
		Petrol Pumps	1
		Settlements	39
		Road Network	33.638 km
		Population	7162
		Household	1407
Meteorological Drought	Medium – Extreme	Settlements	38
		Agriculture Area	47.937 sq km
		Bare Area with sparse Natural Vegetation	113.923 sq km
		Population	7368
		Household	1448
Agricultural Drought	Low - Extreme	Settlements	38
		Agriculture Area	58.668 sq km
		Bare Area with sparse Natural Vegetation	139.427 sq km
		Population	9018
		Household	1772
Heatwave	Low - High	Agriculture Area	46.016 sq km
		Pakka Unplanned Area	1.058 sq km
		Population	7211
		Household	1415
		Settlements	29
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	

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

Kanto			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	4.332 sq km
		Road Network	1.711 km
Meteorological Drought	Medium - Extreme	Agriculture Area	4.397 sq km
		Bare Area with sparse Natural Vegetation	9.799 sq km
Agricultural Drought	Low - High	Agriculture Area	5.359 sq km
		Bare Area with sparse Natural Vegetation	11.943 sq km
Heatwave	Low	Agriculture Area	4.315 sq km
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Kharoro Syed			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	86.369 sq km
		Pakka Planned Area	0.352 sq km
		Pakka Unplanned Area	8.944 sq km
		Education Facilities	59
		Health Facilities	4
		Mobile Towers	7
		Petrol Pumps	7
		Settlements	56
		Railway Line	6.793 km
		Road Network	109.953 km
		Population	93252
		Household	18778
Meteorological Drought	Medium - Extreme	Settlements	56
		Agriculture Area	89.57 sq km

		Bare Area with sparse Natural Vegetation	298.338 sq km
		Range Land	0.019 sq km
		Wet Area	0.005 sq km
		Population	93788
		Household	18885
Agricultural Drought	Low - Extreme	Settlements	56
		Agriculture Area	109.819 sq km
		Bare Area with sparse Natural Vegetation	365.744 sq km
		Range Land	0.023 sq km
		Wet Area	0.006 sq km
		Population	114824
		Household	23121
Heatwave	Low - High	Agriculture Area	85.482 sq km
		Pakka Planned Area	0.352 sq km
		Pakka Unplanned Area	8.945 sq km
		Population	93233
		Household	18772
		Settlements	40
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Khejrari			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	72.975 sq km
		Pakka Unplanned Area	3.238 sq km
		Range Land	0.048 sq km
		Education Facilities	34
		Health Facilities	1
		Settlements	37
		Irrigation and Drainage Network	3.782 km
		Road Network	94.489 km
		Population	22082
		Household	4340

Meteorological Drought	Medium - Extreme	Settlements	37
		Agriculture Area	74.022 sq km
		Bare Area with sparse Natural Vegetation	101.759 sq km
		Range Land	1.673 sq km
		Wet Area	1.768 sq km
		Population	22303
		Household	4384
Agricultural Drought	Low - Extreme	Settlements	36
		Agriculture Area	83.248 sq km
		Bare Area with sparse Natural Vegetation	124.442 sq km
		Range Land	2.04 sq km
		Wet Area	1.944 sq km
		Population	25787
		Household	5068
Heatwave	Low - High	Agriculture Area	72.726 sq km
		Pakka Unplanned Area	3.243 sq km
		Population	22119
		Household	4347
		Settlements	28
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Khokhrapar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	327.309 sq km
		Pakka Unplanned Area	5.446 sq km
		Education Facilities	53
		Petrol Pumps	1
		Settlements	127
		Railway Line	19.422 km
		Road Network	244.268 km
		Population	37138
		Household	7293

Meteorological Drought	Medium – Extreme	Settlements	126
		Agriculture Area	334.986 sq km
		Bare Area with sparse Natural Vegetation	496.767 sq km
		Range Land	0.027 sq km
		Population	38113
		Household	7489
Agricultural Drought	Low - Extreme	Settlements	126
		Agriculture Area	410.611 sq km
		Bare Area with sparse Natural Vegetation	609.669 sq km
		Range Land	0.033 sq km
		Population	46736
		Household	9180
Heatwave	Low - Extreme	Agriculture Area	325.332 sq km
		Pakka Unplanned Area	5.485 sq km
		Population	37407
		Household	7343
		Settlements	100
Cyclone	Low	Agriculture Area	141.635 sq km
		Pakka Unplanned Area	0.267 sq km
		Education Facilities	4
		Settlements	53
		Road Network	43.71 km
		Population	1820
		Household	353
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Kunri Memon			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	66.055 sq km
		Kachcha Area	0.331 sq km
		Pakka Unplanned Area	1.869 sq km
		Range Land	0.401 sq km
		Bridges	1
		Education Facilities	58
		Settlements	66

		Irrigation and Drainage Network	28.078 km
		Road Network	82.153 km
		Population	21551
		Household	4259
Meteorological Drought	Medium – Extreme	Settlements	66
		Agriculture Area	66.283 sq km
		Bare Area with sparse Natural Vegetation	6.885 sq km
		Range Land	6.8 sq km
		Wet Area	2.741 sq km
		Population	21897
		Household	4326
Agricultural Drought	Low - High	Settlements	35
		Agriculture Area	45.563 sq km
		Bare Area with sparse Natural Vegetation	8.394 sq km
		Range Land	8.246 sq km
		Wet Area	1.834 sq km
		Population	14258
		Household	2815
Heatwave	Low - Extreme	Agriculture Area	65.973 sq km
		Kachcha Area	0.332 sq km
		Pakka Unplanned Area	1.877 sq km
		Population	21642
		Household	4275
		Settlements	65
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Nabisar Thar			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	107.741 sq km
		Kachcha Area	1.422 sq km
		Pakka Planned Area	0.545 sq km
		Pakka Unplanned Area	1.451 sq km

		Range Land	0.674 sq km
		Education Facilities	62
		Health Facilities	2
		Mobile Towers	3
		Petrol Pumps	1
		Police Stations	1
		Power Plants	1
		Settlements	74
		Irrigation and Drainage Network	36.257 km
		Road Network	117.998 km
		Population	34284
		Household	6861
Meteorological Drought	Medium – Extreme	Settlements	74
		Agriculture Area	108.512 sq km
		Bare Area with sparse Natural Vegetation	32.753 sq km
		Range Land	15.456 sq km
		Wet Area	12.024 sq km
		Population	34704
		Household	6943
Agricultural Drought	Low - High	Settlements	64
		Agriculture Area	116.752 sq km
		Bare Area with sparse Natural Vegetation	39.892 sq km
		Range Land	18.787 sq km
		Wet Area	13.815 sq km
		Population	39521
		Household	7918
Heatwave	Low - Extreme	Agriculture Area	107.499 sq km
		Kachcha Area	1.428 sq km
		Pakka Planned Area	0.545 sq km
		Pakka Unplanned Area	1.458 sq km
		Population	34402
		Household	6884
		Settlements	69
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	

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

Padhrio			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	130.791 sq km
		Kachcha Area	0.262 sq km
		Pakka Planned Area	0.17 sq km
		Pakka Unplanned Area	3.612 sq km
		Range Land	0.234 sq km
		Bridges	3
		Education Facilities	44
		Health Facilities	2
		Mobile Towers	1
		Settlements	165
		Irrigation and Drainage Network	63.998 km
		Road Network	187.429 km
		Population	59083
		Household	11832
Meteorological Drought	Medium - Extreme	Settlements	165
		Agriculture Area	131.133 sq km
		Natural Vegetation in Wet Areas	0.015 sq km
		Range Land	2.504 sq km
		Wet Area	13.415 sq km
		Population	59889
		Household	11985
Agricultural Drought	Low - Medium	Settlements	33
		Agriculture Area	48.594 sq km
		Natural Vegetation in Wet Areas	0.018 sq km
		Range Land	2.682 sq km
		Wet Area	10.542 sq km
		Population	15245
		Household	3053
Heatwave	Low - Extreme	Agriculture Area	130.661 sq km
		Kachcha Area	0.262 sq km
		Pakka Planned Area	0.17 sq km
		Pakka Unplanned Area	3.628 sq km
		Population	59321
		Household	11877
		Settlements	163

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

Pithoro			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	158.367 sq km
		Kachcha Area	0.468 sq km
		Pakka Unplanned Area	1.768 sq km
		Range Land	0.374 sq km
		Bus Stops	1
		Education Facilities	98
		Health Facilities	2
		Industries	1
		Mobile Towers	7
		Petrol Pumps	5
		Police Stations	1
		Settlements	84
		Irrigation and Drainage Network	42.863 km
		Railway Line	14.09 km
		Road Network	172.353 km
		Population	33775
		Household	6625
Meteorological Drought	Medium - Extreme	Settlements	84
		Agriculture Area	158.89 sq km
		Range Land	13.195 sq km
		Wet Area	30.331 sq km
		Population	34106
		Household	6688
Agricultural Drought	Low - Extreme	Settlements	64
		Agriculture Area	149.381 sq km
		Range Land	16.185 sq km
		Wet Area	34.264 sq km
		Population	33070
		Household	6496

Heatwave	Low - High	Agriculture Area	158.2 sq km
		Kachcha Area	0.469 sq km
		Pakka Unplanned Area	1.77 sq km
		Population	33813
		Household	6630
		Settlements	79
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Sabho			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	227.723 sq km
		Kachcha Area	1.48 sq km
		Natural Vegetation in Wet Areas	0.012 sq km
		Pakka Planned Area	3.085 sq km
		Pakka Unplanned Area	16.208 sq km
		Range Land	0.896 sq km
		Bridges	1
		Education Facilities	132
		Health Facilities	2
		Mobile Towers	5
		Petrol Pumps	5
		Police Stations	1
		Post Offices	1
		Power Plants	1
		Settlements	138
		Tourist Places	3
		Irrigation and Drainage Network	18.85 km
		Railway Line	18.775 km
		Road Network	244.438 km
		Population	141389
		Household	27626
Meteorological Drought	Medium – Extreme	Settlements	137
		Agriculture Area	230.064 sq km
		Bare Area with sparse Natural Vegetation	351.165 sq km

		Natural Vegetation in Wet Areas	0.509 sq km
		Range Land	9.325 sq km
		Wet Area	13.784 sq km
		Population	143092
		Household	27957
Agricultural Drought	Low - Extreme	Settlements	117
		Agriculture Area	217.257 sq km
		Bare Area with sparse Natural Vegetation	429.978 sq km
		Natural Vegetation in Wet Areas	0.624 sq km
		Range Land	11.399 sq km
		Wet Area	16.568 sq km
		Population	139308
		Household	27372
Heatwave	Low - High	Agriculture Area	227.171 sq km
		Kachcha Area	1.484 sq km
		Pakka Planned Area	3.085 sq km
		Pakka Unplanned Area	16.231 sq km
		Population	141566
		Household	27657
		Settlements	115
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Samaro			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	52.036 sq km
		Kachcha Area	0.036 sq km
		Pakka Planned Area	0.695 sq km
		Pakka Unplanned Area	1.168 sq km
		Range Land	0.078 sq km
		Education Facilities	34
		Health Facilities	2
		Mobile Towers	5
		Petrol Pumps	5

		Police Stations	1
		Post Offices	1
		Power Plants	1
		Settlements	43
		Irrigation and Drainage Network	8.687 km
		Road Network	59.672 km
		Population	30591
		Household	6137
Meteorological Drought	Medium - Extreme	Settlements	43
		Agriculture Area	52.161 sq km
		Range Land	1.546 sq km
		Wet Area	3.226 sq km
		Population	30862
		Household	6188
Agricultural Drought	Low - Medium	Settlements	2
		Agriculture Area	5.643 sq km
		Range Land	1.693 sq km
		Wet Area	0.004 sq km
		Population	50
		Household	11
Heatwave	Low - High	Agriculture Area	51.994 sq km
		Kachcha Area	0.036 sq km
		Pakka Planned Area	0.695 sq km
		Pakka Unplanned Area	1.174 sq km
		Population	30682
		Household	6154
		Settlements	41
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Samaro Road			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	93.823 sq km
		Kachcha Area	0.029 sq km

		Pakka Unplanned Area	2.364 sq km
		Range Land	0.113 sq km
		Bridges	3
		Education Facilities	49
		Health Facilities	1
		Mobile Towers	2
		Petrol Pumps	1
		Police Stations	1
		Settlements	56
		Irrigation and Drainage Network	36.199 km
		Road Network	137.814 km
		Population	39867
		Household	8003
Meteorological Drought	Medium - Extreme	Settlements	56
		Agriculture Area	93.971 sq km
		Range Land	0.965 sq km
		Wet Area	8.834 sq km
		Population	40179
		Household	8063
Agricultural Drought	Low - High	Settlements	6
		Agriculture Area	23.498 sq km
		Range Land	1.162 sq km
		Wet Area	0.187 sq km
		Population	2207
		Household	441
Heatwave	Low - High	Agriculture Area	93.773 sq km
		Kachcha Area	0.029 sq km
		Pakka Unplanned Area	2.369 sq km
		Population	39951
		Household	8017
		Settlements	53
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Satriyoan			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	140.457 sq km
		Pakka Unplanned Area	1.437 sq km
		Range Land	1.252 sq km
		Bridges	2
		Education Facilities	67
		Health Facilities	1
		Police Stations	1
		Settlements	75
		Irrigation and Drainage Network	82.46 km
		Road Network	175.125 km
		Population	20205
		Household	4040
Meteorological Drought	Medium - Extreme	Settlements	75
		Agriculture Area	140.989 sq km
		Range Land	26.362 sq km
		Wet Area	6.496 sq km
		Population	20385
		Household	4078
Agricultural Drought	Low - Extreme	Settlements	44
		Agriculture Area	99.579 sq km
		Range Land	32.147 sq km
		Wet Area	5.023 sq km
		Population	5535
		Household	1108
Heatwave	Low - High	Agriculture Area	140.301 sq km
		Pakka Unplanned Area	1.443 sq km
		Population	20282
		Household	4060
		Settlements	67
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Shadi Pali			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	153.076 sq km
		Kachcha Area	0.444 sq km
		Pakka Unplanned Area	3.269 sq km
		Range Land	0.089 sq km
		Bridges	3
		Bus Stops	2
		Education Facilities	69
		Health Facilities	1
		Mobile Towers	4
		Petrol Pumps	2
		Police Stations	1
		Post Offices	1
		Settlements	130
		Irrigation and Drainage Network	69.433 km
		Railway Line	11.137 km
		Road Network	227.651 km
		Population	47928
		Household	9322
Meteorological Drought	Medium - Extreme	Settlements	130
		Agriculture Area	153.325 sq km
		Range Land	1.334 sq km
		Water Body	1.864 sq km
		Wet Area	7.683 sq km
		Population	48400
		Household	9405
Agricultural Drought	Low - Medium	Settlements	6
		Agriculture Area	37.75 sq km
		Range Land	1.211 sq km
		Water Body	1.588 sq km
		Wet Area	0.212 sq km
		Population	1190
		Household	229
Heatwave	Low - High	Agriculture Area	152.987 sq km
		Kachcha Area	0.444 sq km
		Pakka Unplanned Area	3.275 sq km
		Population	48022
		Household	9342
		Settlements	128

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

Shah Mardan Shah			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	136.015 sq km
		Kachcha Area	1.82 sq km
		Pakka Unplanned Area	1.967 sq km
		Range Land	0.073 sq km
		Bridges	3
		Education Facilities	122
		Health Facilities	3
		Mobile Towers	4
		Petrol Pumps	2
		Settlements	73
		Irrigation and Drainage Network	77.21 km
		Railway Line	13.174 km
		Road Network	216.48 km
		Population	54377
		Household	10657
Meteorological Drought	Medium - Extreme	Settlements	73
		Agriculture Area	136.233 sq km
		Bare Area with sparse Natural Vegetation	0.956 sq km
		Range Land	1.28 sq km
		Water Body	0.01 sq km
		Wet Area	7.039 sq km
		Population	54774
		Household	10732
Agricultural Drought	Low - Extreme	Settlements	26
		Agriculture Area	65.407 sq km
		Bare Area with sparse Natural Vegetation	0.002 sq km
		Range Land	1.545 sq km
		Wet Area	5.067 sq km
		Population	6938
		Household	1339

Heatwave	Low - High	Agriculture Area	135.944 sq km
		Kachcha Area	1.825 sq km
		Pakka Unplanned Area	1.972 sq km
		Population	54506
		Household	10681
		Settlements	73
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Sher Khan Chandio			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	115.792 sq km
		Kachcha Area	0.048 sq km
		Pakka Planned Area	0.045 sq km
		Pakka Unplanned Area	2.72 sq km
		Range Land	0.217 sq km
		Education Facilities	84
		Health Facilities	1
		Mobile Towers	1
		Settlements	84
		Irrigation and Drainage Network	18.941 km
		Road Network	139.289 km
		Population	28534
		Household	5632
Meteorological Drought	Medium - Extreme	Settlements	84
		Agriculture Area	116.125 sq km
		Range Land	7.079 sq km
		Wet Area	12.491 sq km
		Population	28903
		Household	5707
Agricultural Drought	Low - Medium	Settlements	45
		Agriculture Area	75.421 sq km
		Range Land	8.578 sq km
		Wet Area	13.646 sq km

		Population	18591
		Household	3672
Heatwave	Low - Extreme	Agriculture Area	115.663 sq km
		Kachcha Area	0.048 sq km
		Pakka Planned Area	0.045 sq km
		Pakka Unplanned Area	2.732 sq km
		Population	28668
		Household	5662
		Settlements	83
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

Talhi			
Hazard Type	**Risk**	**Elements at Risk**	
Earthquake	Low	Agriculture Area	64.622 sq km
		Kachcha Area	0.15 sq km
		Pakka Planned Area	0.271 sq km
		Pakka Unplanned Area	1.472 sq km
		Range Land	0.323 sq km
		Education Facilities	65
		Mobile Towers	1
		Petrol Pumps	1
		Settlements	61
		Irrigation and Drainage Network	26.05 km
		Road Network	91.913 km
		Population	18920
		Household	3740
Meteorological Drought	Medium - Extreme	Settlements	61
		Agriculture Area	64.9 sq km
		Bare Area with sparse Natural Vegetation	0.518 sq km
		Range Land	8.625 sq km
		Wet Area	7.079 sq km
		Population	19174
		Household	3790

Agricultural Drought	Low - Medium	Settlements	43
		Agriculture Area	62.078 sq km
		Bare Area with sparse Natural Vegetation	0.629 sq km
		Range Land	10.489 sq km
		Wet Area	7.834 sq km
		Population	17632
		Household	3482
Heatwave	Low - Extreme	Agriculture Area	64.515 sq km
		Kachcha Area	0.15 sq km
		Pakka Planned Area	0.272 sq km
		Pakka Unplanned Area	1.48 sq km
		Population	19005
		Household	3759
		Settlements	60
Riverine Flood	Nil	The UC falls out of vulnerable zone for Riverine Flood	
Cyclone	Nil	The UC falls out of vulnerable zone for Cyclone	
Tsunami	Nil	The UC falls out of vulnerable zone for Tsunami	
Storm Surge	Nil	The UC falls out of vulnerable zone for Storm Surge	

ORGANIZATION STRUCTURE FOR DISASTER MANAGEMENT AT DISTRICT LEVEL

INTRODUCTION

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

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

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

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

Table 2: District Disaster Management Authority

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

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

Table 3: TDMC Taluka Disaster Management Committee

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

Table 4: UCDMC Union Council Disaster Management Committee

Sr.#	Committee Representative	Role
1.	UC Administrator	Chairperson
2.	Secretary UC	Secretary
3.	Station House Officer (Police) – Concerned	Member

4.	Two Representatives of NGOs/Civil Society	Members
5.	Representation of Volunteers from Communities at Risk	Members
6.	Representation of Renowned Persons	Members

RESPONSIBILITY OF DISTRICT DISASTER MANAGEMENT AUTHORITY

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

FUNCTION OF DDMA

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

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

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

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

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

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

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

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

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

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

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

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

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

RESPONSIBILITY OF TALUKA DISASTER MANAGEMENT COMMITTEE

- The TDMC shall work as front-line body for disaster management in the district and shall ensure implementation of disaster management measures set by DDMA and PDMA

- The TDMC shall 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.

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 Umerkot 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 Umerkot
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 Umerkot 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 Umerkot 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, Umerkot district has a Hot and Semi-Arid climate and is prone to severe heatwave seasons. However, most of the district is sparsely populated, which significantly lowers the chances of severe heatwave impacts. 2. Heatwaves are forecastable hazards and actions can be taken well before occurrence of heatwaves. The most suitable action is issuance of warnings and alerts in public for precautions and safety. Suitable media for the purpose is social media and SMS. 3. Scientific studies suggest that, frequency and intensity of heatwaves is increased due to climate change. Though climate change is global phenomena, however, its impacts can be minimized through local interventions. The most 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 Umerkot district is **Tropical Storm to Cat-1TC**. 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. 3. The introduction and construction of cyclone resistant human dwellings

	and infrastructure will further ensure minimized damages and losses
Drought	1. Geographically, district Umerkot has Hot and Semi-Arid climate. Average annual rainfall across the district is 179.3 mm. 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	According to MHVRA Study 2022, there is no Tsunami hazard in district Umerkot

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

Heatwave and drought are only forecastable hazards in the district. For such hazards following action plan is recommended:

Table 5: 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 6: Action Plan for Drought Hazard Management

Action	Timelines	Responsibility
Interaction with PMD for forecasting and monitoring of drought	Based on forecast	PDMA
Dissemination of forecast to concerned DDMA and local community	Based on forecast	PDMA

Mobilization of NGOs, INGOs and individuals for stocking of food and life support items to prevent and mitigate famine conditions depending upon severity and spell of drought	During disturbance period	PDMA and DDMA

ACTION PLAN FOR UNFORECASTABLE HAZARDS

Earthquake

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

Table 7: 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	Post disaster	PDMA

and damages/losses)		
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 Umerkot 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 Umerkot district.

Earthquake	
UCs at Risk	**All UCs**
General Description	1. An earthquake is a sudden shaking of the ground caused by two chunks of earth's crust sliding past one another. 2. Although earthquakes are short-lived, usually not lasting more than a minute, they can leave behind incredible damage. 3. Identifying potential hazards ahead of time and advance planning can reduce the dangers of serious injury or loss of life from an earthquake. 4. The earthquake hazard intensity for district Umerkot is **"Low"** 5. The earthquake risk intensity for district Umerkot 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 DRR measures in public infrastructure development schemes. 4. Establishment of search and rescue infrastructure and services which can be mobilized as first responder in post-earthquake situation. 5. Mobilize NGOs, INGOs, community development organizations and volunteers, and conduct earthquake safety awareness campaigns and drills especially in main urban settings. 6. Availability of necessary material and equipment required for establishing temporary shelters with life support facilities i.e. mobile medical camps, schools, power supply, water and sanitation etc. 7. Availability of alternative communication system in case if usual communication means are disturbed by earthquake. 8. Preparation of medical emergency plan to manage mass casualties in case of any major earthquake event.	

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

Heatwave	
UCs at Risk	**All UCs**
General Description	1. Heatwave is a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life. 2. The district can be divided into two unique climatic zones, which differs considerably. In the western irrigated portion, the climate is moderate, being neither extremely hot in summers nor very cold in winters. 3. The eastern portion of the desert area has a tropical climate being more hot and dry, but receives comparatively more rains during monsoon. 4. April, May and June are the hottest months. The mean maximum and minimum temperatures during this period are 43°C and 28°C, respectively. 5. December, January and February are the coldest months. The mean maximum and minimum temperatures during this period are 28°C and 12°C, respectively. 6. According to MHVRA Study 2022, heatwave hazard intensity for district Umerkot is **"Severe to Extreme"** 7. According to MHVRA Study 2022, heatwave risk for district Umerkot 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(02)	**Chhore, Khokharpar**
UCs not at Risk (23)	**A, AroroBhurghri, Atta Mohammad Palli, Bustan, Dadhro, DhoroNaro, Gapno, Ghariabanad, Kantio, Kharoro Syed, Khejrari, Kunri Memon, Nabisar Thar, Padhrio, Pithoro, Sabho, Samaro, Samaro Road, Satriyoon, Shadi Pali, Shah Mardan Shah, Sher Khan Chadio, Talhi**
General Description	1. Cyclones are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation. 2. Cyclones are usually accompanied by violent storms and bad weather. The air circulates inward in an anticlockwise direction in the Northern hemisphere and clockwise in the Southern hemisphere. 3. Though cyclones are rare in the Arabian sea which is a part of North Indian Ocean, cyclones that form in this sea mostly move towards Western India rather than Pakistan. 4. Cyclones in the Arabian sea form mostly from May till June and then from September till October, monsoon season plays a vital role for the formation of cyclone in this basin. 5. According to MHVRA study 2022, the cyclone hazard in the district is of "**Tropical Storm to Cat-1 TC"** intensity. 6. According to MHVRA study 2022, Cyclone risk for district Umerkot is "**Low"**

Disaster Management Measures

Preparedness

1. Identify community based DRR measures and inclusion of disaster prone communities in disaster risk management.
2. Establishment of multipurpose permanent shelters with all life support facilities to facilitate safe evacuation of people and livestock.
3. DRR mainstreaming in development planning.
4. Strengthening of cyclone detection, forecasting and warning dissemination centers.
5. Launching a series of public awareness campaign throughout the coastal area 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.
13. Ensure availability of real-time cyclone hazard map depicting the probable track and landfall impact on PDMA website

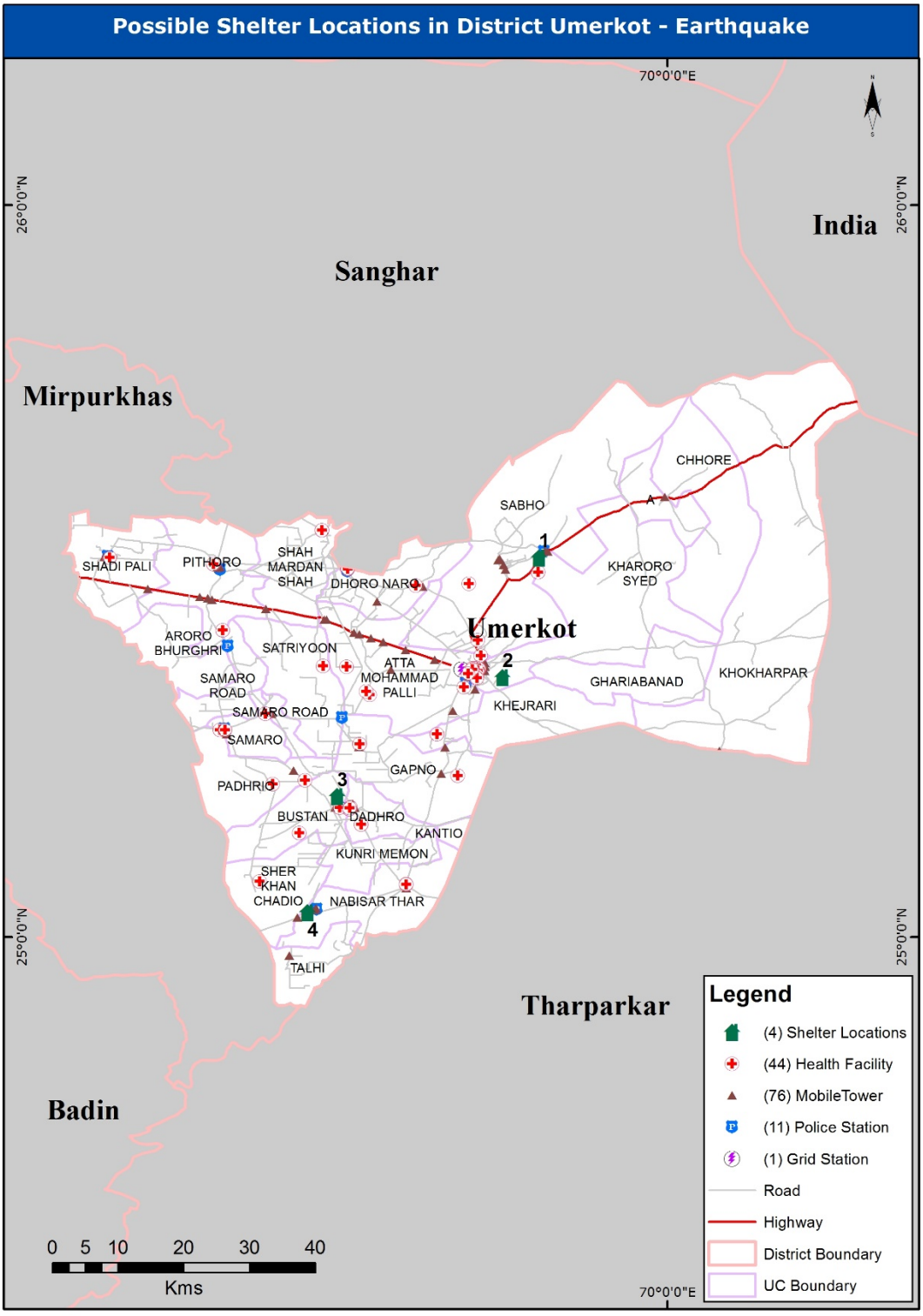
Response
1. Issue early reliable warning through siren or other relevant means to reduce the severity of the cyclone related disasters and save valuable human lives. 2. Establish communications with isolated fishermen / coastal communities for furnishing cyclone early warning. 3. Identify, involve and mobilize local NGOs which can assist in community awareness and mobilization for response. 4. Identify and mobilize volunteers' / volunteer organizations which can assist various facets of response like provision of emergency healthcare and relief items. 5. Initiate preliminary damage assessment and run search and rescue operations. 6. Provision of immediate relief including provision of food and potable water to affectees. 7. Deployment of emergency medical support. 8. Provide emergency health care to the affected population, in order to cover risk of spread of epidemic 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. Rehabilitation on build back better principle.

Tsunami	
UCs at Risk	**Nil**
General Description	1. According to MHVRA Study 2022, there is no risk of Tsunami in Umerkot district.

Drought	
UCs at Risk	**All UCs**
General Description	1. Climatic condition of the district can be categorized as Hot and Semi-Arid (Climate Classification of Pakistan (Khan et al., 2010) 2. Average annual rainfall received during a year across the district is 179.3 mm. 3. 33.6% of the total district area is covered with bare areas with sparse natural vegetation. Eastern side of the district comprises Thar desert; high sand dunes and sandy plain covers 70% of its surface. The region is gifted with a large variety of natural vegetation. 4. Range land with natural herbs are found at western side of the district. Orchards are mostly found at west, in proximity to built-up areas. Few forest fields are found in the south. 5. Crop fields, which are occasionally available for cultivation due to its salinity and are dependent on rainfall are abundantly found in eastern desert areas. 6. Umerkot district is mostly a rain-fed area. Agricultural water needs are catered through canal irrigation system, but due to the insufficiency of water in canals, this district is more drought prone. 7. According to MHVRA Study 2022, a. Meteorological drought hazard for district Umerkot is **"Extreme"** b. Meteorological drought risk for district Umerkot is **"Medium to Extreme"** c. Agricultural drought hazard for district Umerkot is **"Mild to Extreme"** d. Agricultural drought risk for district Umerkot 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. Implementation of water supply and demand management and encouragement of efficient irrigation systems in agriculture. 3. Research and promote drought resistant agriculture crops. 4. Resilience and improvement of adaptive capacity of farmers. 5. Monitoring of temperature, precipitation, potential evapotranspiration, soil moisture, stream flow, groundwater levels, lakes, and reservoirs for drought forecasting. 6. Control ground water extraction from upper and lower aquifers to be within the sustainable yield limits.	
Response	
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. Cash and in-kind support to farmers for next cropping. 2. Awareness and encouragement of farmers on best irrigation practices and water saving.	

SHELTER LOCATION MAP

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



*Annex-A details the list of earthquake shelter locations

PROPOSED PRIORITY DISASTER RISK MANAGEMENT PROJECTS

INTRODUCTION

Following are the recommended disaster risk management projects, which may be initiated to ensure effective disaster management in district Umerkot. 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.)

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 – UMERKOT DISTRICT

The existing nature of disaster in Umerkot district can be categorized as moderate. The prominent hazards in the district are drought and to a certain extent, heatwave. The bigger threat here is posed by drought with risk ranging from low to extreme in the district. Natural pastures for livestock are likely to be affected by low rainfall and prolonged drought may lead to famine. The settlements in the district are having low to extreme risk of heatwave. There is no risk of Riverine Flood in the district. The district is located away from the coast line and there is no risk from hazards like tsunami and storm surge. Cyclone may affect few UCs but the risk is categorized as low. The district also has a low risk of Earthquake. 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:

Table8: Cost Benefit Analysis of Disaster Risk Measures in District Umerkot

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 Umerkot, 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. 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 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 low flow in irrigation channels will enable for better crop water management and reduce loss of the crops as much as possible. Procurement of 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 possible save lives.
3.	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 and save precious lives.	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 / supplements in advance. An overall reduction in emergency cases would reflect in less mortality and more savings in medical expenditure.
4.	Awareness campaigns	Public private partnership and use of electronic/print media for raising public awareness is a cost-effective approach to build	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.	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. 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.
6.	Strengthening of mobile health care facilities	Setup of temporary health facilities reduce difficulty in patients' transportation to permanent hospital facilities. Mobile health care units are already available with government of Sindh, their mobilization to disaster management will ensure lifesaving.	Mobile health facilities play a very significant role in the mitigation of disaster because of their particular function in providing essential first aid. Ease of access to basic health facilities will reduce burden on hospitals. The systematic organization and easy mobilization of the staff, equipment and medical supplies in a safe environment are crucial if disaster response is to be prompt and effective.

ANNEX – A – SHELTER LOCATIONS DESCRIPTION – EARTHQUAKE

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

Shelter location	Co-ordinates	Area (acres)	Estimated Tents (numbers)	Avg. elevation (ft)
1	Upper right corner: 25°31'22.50"N 69°49'34.25"E Upper left corner: 25°31'10.31"N 69°49'5.89"E Lower right corner: 25°31'3.08"N 69°49'52.75"E Lower left corner: 25°30'43.71"N 69°49'9.96"E	225	~11000	90
2	Upper right corner: 25°21'34.03"N 69°46'56.40"E Upper left corner: 25°21'35.23"N 69°46'8.45"E Lower right corner: 25°21'5.93"N 69°46'49.44"E Lower left corner: 25°21'4.57"N 69°46'6.32"E	303	~14000	100
3	Upper right corner: 25°11'46.34"N 69°33'2.81"E Upper left corner: 25°11'46.53"N 69°32'46.62"E Lower right corner: 25°11'14.33"N 69°33'4.05"E Lower left corner: 25°11'15.12"N 69°32'45.16"E	119	~5500	30
4	Upper right corner: 25° 2'16.76"N 69°30'49.77"E Upper left corner: 25° 2'16.53"N 69°30'21.08"E Lower right corner: 25° 1'53.38"N 69°30'39.09"E Lower left corner: 25° 1'43.04"N 69°30'1.54"E	192	~8800	30

A total of 4 shelter locations have been selected as Earthquake shelter places across district Umerkot. 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 39,300 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 UMERKOT

Equipment	Quantity
De-watering Machine	23
Fire Brigade / Engine / Tender	7
Tractor / Trolley / Blade	17
Vehicle / Bus/ Van/Truck/	160
Water Tanker	6
Ambulances	21
Power Generators	9

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