

District Disaster Management Plan of Kolhapur District 2024-2025



**Disaster Management Authority
District Collector's Office, Kolhapur District
Toll-Free No. 1077, Telephone No. 0231-2659232**



**Government of Maharashtra
Disaster Management, Relief and Rehabilitation
Department**

**District Disaster Management Plan of
Kolhapur District
2024-2025**

**Disaster Management Authority
District Collector's Office, Kolhapur District
Toll-Free No. 1077, Telephone No. 0231-2659232**

Shri. Amol Yedage (I.A.S)



**Collector and Chairman,
District Disaster
Management Authority,
Kolhapur, Maharashtra**

Message

Disaster occurs with unfailing regularity in India causing immense loss of life, assets and livelihood. In the present executive structure of the country, the district administration is bestowed with the nodal responsibility of implementing a major portion of all disaster management activities. The increasingly shifting paradigm from a reactive response orientation to a proactive prevention mechanism has put pressure to build a foolproof system, including within its ambit the components of preparedness, prevention, mitigation, response, rescue, relief and rehabilitation.

Pre-disaster planning is crucial for ensuring an efficient response during a disaster. A well-planned and well-rehearsed response system can deal with the exigencies of calamities and also put up a resilient coping mechanism. Optimal utilization of scarce resources for rescue, relief, and rehabilitation during times of crisis is possible only with detailed planning and preparation. Keeping in view the nodal role of the district administration in disaster management and risk reduction, the preparation of the district disaster Management Plan (DDMP) was imperative.

To adhere to the Disaster Management Act of 2005, regular consultations were held between the DDMO and PMU, Palladium. PMU, Palladium's experts spent three months on this project, engaging in detailed scientific research and comprehensive analysis. Their work culminated in the creation of this DDMP, aimed at reducing disaster risks and boosting the resilience of Kolhapur district.

I am delighted to present the Disaster Management Plan for Kolhapur District, Maharashtra. This plan aims to make Kolhapur a safe, adaptive, and disaster-resilient district. Effective implementation requires cooperation from all stakeholders involved in disaster management and risk reduction, including active participation from civil society, community-based organisations, and local communities. This document is the result of organisations commitment to creating a meaningful guide that will facilitate the execution of various functions and duties in a systematic manner during emergencies, aligned with the outlined priorities.

I extend my heartfelt gratitude to all line departments for their vital contributions and collaboration in developing the District Disaster Management Plan. This plan reflects the combined efforts and dedication of each department, ensuring our community is better equipped, more resilient, and safer in the face of potential disasters. Your consistent support and diligent work have been invaluable, and I greatly appreciate the time and effort you have devoted to this plan.

I hope this document serves a meaningful purpose in disaster planning by Integrating Disaster Risk Reduction (DRR) with Climate Change Adaptations (CCA) to make Kolhapur a safe, adaptive, and disaster-resilient district.

**District Collector,
District Disaster Management Authority,
Kolhapur, Maharashtra**

District Disaster Management Plan of Kolhapur District 2024

Prepared By

District Disaster Management Authority,
Office of the District Collector
Kolhapur, Govt. Of Maharashtra

Knowledge partner

Palladium, India
PMU for Technical Support and Implementation of Comprehensive Disaster Planning,
Management & Response for Disaster Management, Relief and Rehabilitation Department,
Government of Maharashtra

The District Disaster Management Authority has taken all reasonable precautions to verify the information and ensure stakeholder consultation and input prior to its publication. The publisher welcomes suggestions for improving future editions.

List of Abbreviations

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BDO	Block Development Officer
CAP	Common Alerting Protocol
CBDM	Community-Based Disaster Management
CBDRM	Community-Based Disaster Risk Management
CBDRR	Community-based Disaster Risk Reduction
CBOs	Community-Based Organizations
CBOS	Community Based Organization
CC	Climate Change
CCA	Climate Change Adaptations
CEO	Chief Executive Officer
CHC	Community Health Centres
CoR	Commissioner of Relief
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
CWC	Central Water Commission
D.G.	Director General
D.G.P.	Director General of Police
D.H.O.	District Health Officer
D.S.P.	Deputy Superintendent of Police
DBT	Direct Benefit Transfer
DC	District Collector
DDMA	District Disaster Management Authority
DDMAs	District Disaster Management Authorities
DDMC	District Disaster Management Committee
DDMO	District Disaster Management Officer
DDMP	District Disaster Management Plan
DDRCS	District Disability Rehabilitation Centres
DEOC	District Control Room
DHO	District Health Officer
DIC	District Industries Centre
DIO	District Information Officer
DISH	Directive of Industrial Safety and Health
DM	Disaster Management
DMA	Disaster Management Act
DMATs	Disaster Medical Assistance Teams
DMPs	Disaster Management Plans
DMU	Disaster Management Unit
DPs	Diversification of Power units
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EOC	Emergency Operations Centre
ERCs	Emergency Response Centres
ESF	Emergency Support Function
ESG	Environmental, Social and Governance
ESR	Emergency Stabilization and Rehabilitation
ESRI	Environmental Systems Research Institute

ESSO	Earth System Science Organization
EWDS	Early Warning Dissemination System
EWS	Early Warning System
FHTC	Functional Household Tap Connection
GBT	Global Business Towers
GIS	Geographic Information Systems
GO	government organisations
GoI	Government of India
GP	Gram panchayat
GPS	Global Positioning System
GSI	Geological Survey of India
HEPP	Hospital Emergency Preparedness Programme
HQ	Head Quater
HRVCA	Hazard Risk Vulnerability Capacity Assessment
IC	Incident Commander
ICS	Incident Command System
ICTs	Incident Command Teams
IDRN	India Disaster Resource Network
IEC	Information, Education, and Communication
IIT	Indian Institute of Technology
IMD	Indian Meteorological Department
IRS	Incident Response System
ISO	International Organization for Standardization
IT	Information Technology
ITI	Industrial Training Institute
JJM	Jal Jeevan Mission
LGBTQ	Lesbian, Gay, Bisexual, Transgender and Queer
LULC	Land Use / Land Cover
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIDC	Maharashtra Industrial Development Corporation
MJP	Maharashtra Jeevan Pradhikaran
MSEDCL	Maharashtra State Electricity Distribution Company Limited
MSMEs	Micro, Small, and Medium Enterprises
NASA	National Aeronautics and Space Administration
NCC	National Cadet Corps
NCRMP	national Cyclone Risk Mitigation Project
NDMA	National Disaster Management Authority
NDMF	National Disaster Mitigation fund
NDMP	National Disaster Management Plan
NDRF	National Disaster Response Force
NDRMF	National Disaster Risk Management Fund
NGOs	Non-Governmental Organisations
NH	National Highway
NIC	National Informatics Centre
NIDM	National Institute of Disaster Management
NOC	No Objection Certificate
NPDM	National Policy on Disaster Management
NRDWP	National Rural Drinking Water Programme
NRLM	National Rural Livelihoods Mission

NSS	National Service Scheme
NYKS	National Youth Corps
ONGC	Oil and Natural Gas Corporation Limited Company
P.W.D.	Public Work Department
PDNA	Post-Disaster Needs Assessment
PESA	Panchayats Extension in Scheduled Areas
PHC	Primary Health Centres
PMGSY	Pradhan Mantri Gram Sadak Yojana
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PMU	Project Management Unit
PPPs	Public-Private Partnerships
PRED	Panchayat Raj and Rural Development
PSU	Public Sector Unit
RCC	Reinforced Cement Concrete
RDC	Residential Deputy Collector
RLBs	Rural Local Bodies
RTO	Regional Transport Officer
SAR	Search and Rescue
SC	Scheduled Castes
SDGs	Sustainable Development Goals
SDMA	State Disaster Management Authority
SDMF	State Disaster Mitigation Fund
SDO	Sub Divisional Officer
SDPO	Sub Divisional Police Officer
SDRF	State Disaster Response Fund
SDRMF	State Disaster Risk Management Fund
SEC	State Executive Committees
SFDRR	Sendai Framework for Disaster Risk Reduction
SHGs	Self-help groups
SIDM	State Institute of Disaster Management
SOPs	Standard Operating Procedures
ST	Scheduled Tribes
SWOTs	Strengths, Weaknesses, opportunities and Threats
ToT	Training of Trainer Training of trainers
UGC	Under Ground Cabling
ULBs	Urban Local Bodies
UN	United Nations
UN-ECLAC	UN Economic Commission for Latin America and the Caribbean
UNCRPD	UN Convention on the Rights of Persons with Disabilities
UNESCO	United Nation Scientific and Cultural Organization
USGS	United State Geological Survey
VCA	Vulnerability and Capacity Assessments
VCP	Village Contingency Planning
VSAT	Very Small Aperture Terminal
WASH	Water, Sanitation, and Hygiene
Z.P.	Zilla Parishad

Table of Contents

1. INTRODUCTION.....	1
1.1. RATIONALE.....	1
1.2. VISION	1
1.3. AIM AND OBJECTIVE	1
1.4. TERMINOLOGY OF DISASTER MANAGEMENT	2
1.5. REALIGNING THE PLAN.....	2
2. DISTRICT PROFILE.....	4
2.1. DISTRICT PROFILE	4
2.2. HISTORICAL BACKGROUND AND TERRITORIAL CHANGES	4
2.3. AREA AND ADMINISTRATIVE DIVISIONS	5
2.4. DEMOGRAPHIC PROFILE OF DISTRICT	5
2.5. AGRICULTURE AND LIVESTOCK.....	8
2.6. HEALTH PROFILE.....	10
2.7. CLIMATE AND RAINFALL	10
2.8. HISTORICAL AND RELIGIOUS CENTRES	16
2.9. RIVER SYSTEM AND DAMS.....	17
2.10. LAND USE LAND COVER PATTERNS	20
2.11. POWER STATIONS AND ELECTRICITY INSTALLATIONS	23
2.12. TRANSPORT AND COMMUNICATION NETWORK.....	23
3. HAZARD RISK ASSESSMENT AND VULNERABILITY ANALYSIS.....	26
3.1. HAZARD HISTORY AND IMPACT IN THE LAST 15 YEARS	26
3.1.1. Flood:.....	26
3.1.2. Earthquakes:	27
3.1.3. Landslide:	28
3.1.4. Cyclone:.....	31
3.2. SEASONALITY OF DISASTERS	32
3.3. HAZARD PROFILE OF THE DISTRICT	33
3.4. Hazard Mapping.....	34
3.4.1. Flood	34
3.4.2. Landslide.....	36
3.4.3. Lightning.....	45
3.4.4. Heatwave	47
3.5. RANKING AND PROBABILITY OF DISASTERS IN THE DISTRICT	49
3.6. SOCIAL, ECONOMIC, AND ENVIRONMENTAL VULNERABILITY ANALYSIS	53
3.6.1. SOCIAL VULNERABILITY.....	53
3.6.2. ENVIRONMENTAL VULNERABILITY	54
3.6.3. ECONOMIC VULNERABILITY	55
3.7. ELEMENT AT RISK.....	57
3.7.1. Human Habitat.....	57
3.7.2. Health Facilities	58
3.7.3. Transport and Administrative Facilities.....	58

3.7.4.	Public Utilities	59
3.7.5.	Educational Facilities.....	59
3.7.6.	Agriculture and Livelihoods	60
3.8.	CAPACITY ASSESSMENT	61
3.8.1.	Assessment of Existing Capacity.....	61
3.8.2.	Gap Assessment.....	67
4.	INSTITUTIONAL ARRANGEMENT FOR DISASTER MANAGEMENT	69
4.1.	DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)	69
4.1.1.	Nodal departments for various hazards.....	69
4.2.	DISTRICT DISASTER MANAGEMENT COMMITTEE (DDMC)	70
4.3.	COORDINATION STRUCTURE AT DISTRICT LEVEL	71
4.4.	AGENCIES COMPETENT FOR DISSEMINATING WARNINGS OR ALERTS ISSUED	72
4.4.1.	The warning or occurrence of disaster will be communicated to	72
5.	PREVENTION AND MITIGATION MEASURES	73
5.1.	PREVENTION MEASURES	73
5.2.	Flood Prevention and Preparedness Measures:.....	73
5.3.	MITIGATION MEASURES.....	74
5.3.1.	Structural measure	74
5.3.2.	Non-Structural measure	75
5.4.	MITIGATION STRATEGY	76
5.5.	DISASTER-SPECIFIC MITIGATION MEASURES	76
5.5.1.	Flood	76
5.5.2.	Landslide.....	77
5.5.3.	Cyclone	78
5.6.	RISK INSURANCE AND FINANCING	79
6.	PREPAREDNESS STRATEGIES.....	81
6.1.	RELIABLE COMMUNICATION SYSTEMS.....	81
6.1.1.	Communication and Media.....	82
6.1.2.	Mass Media.....	82
6.1.3.	Administrative Preparedness:	83
6.2.	INVENTORY AND EVALUATION OF RESOURCES.....	83
6.3.	COMMUNITY AWARENESS AND EDUCATION	84
6.4.	DISTRICT-WISE IEC PLAN BASED ON HAZARD CALENDAR.....	84
6.4.1.	Key Focus Areas for the effectiveness of IEC material.....	84
6.4.2.	Vulnerable Individuals/Groups and Alternative IEC.....	85
6.4.3.	Important Days in Maharashtra when disaster-related and relevant IEC interventions can be conducted	85
6.4.4.	Fiesta: Fostering Fortitude- A campaign to implement IEC interventions on festivals, reducing the risk of disasters.	87
6.4.5.	Special events can be organized on significant dates	87
6.5.	GO-NGO COORDINATION	88
6.5.1.	GO-NGO Coordination Strategy	88
6.5.2.	GO-NGO Communication Protocol During Emergencies.....	89
6.5.3.	List of NGOs/CBOs.....	90

7.	CAPACITY BUILDING AND TRAINING MEASURES	91
7.1.	TRAINING AND CAPACITY BUILDING	91
7.1.1.	Roles and Responsibilities of the Departments for Capacity Building.....	92
7.2.	INSTITUTIONAL CAPACITY BUILDING AND TRAINING NEED ASSESSMENT	95
7.2.1.	COMMUNITY CAPACITY BUILDING.....	96
7.2.2.	TRAINING OF TRAINER.....	97
7.2.3.	Disaster Management Education	98
7.2.4.	Role of Aapda Mitra in Community-Based Disaster Management and their Capacity Utilization	98
7.2.5.	Skill Upgradation and follow-up training	98
7.2.6.	Training Calendar & stakeholders to be trained	99
8.	RESPONSE AND RELIEF MEASURES.....	101
8.1.	LEVELS OF EMERGENCY	101
8.2.	RESPONSE STRUCTURE AND FUNCTIONS	101
8.2.1.	Incident Command System (ICS)	102
8.2.2.	Incident Command Organisation Chart.....	103
8.2.3.	Response Structure	103
8.3.	EMERGENCY SUPPORT FUNCTIONS BY LINE DEPARTMENTS IN PRIMARY AND SECONDARY ROLES	106
8.3.1.	Health department.....	106
8.3.2.	Police and Civil Defence	107
8.3.3.	Revenue Department.....	107
8.3.4.	Irrigation and Water Supply Department.....	108
8.3.5.	Transport Department.....	108
8.3.6.	Role of NDRF.....	108
8.4.	DISTRICT EMERGENCY OPERATION CENTRE.....	109
8.4.1.	Role of Emergency Operation Centre in Normal Time	109
8.4.2.	Role of Emergency Operation Centre during Disaster	110
8.4.3.	Trigger Mechanism.....	111
8.4.4.	Trigger Mechanism for Kolhapur District	111
8.5.	INCIDENT RESPONSE SYSTEM (IRS) APPLICATION AND MODULES	112
8.6.	PREPAREDNESS MEASURES FOR EFFECTIVE RESPONSE	113
8.7.	USE OF EWDS	113
8.7.1.	CAP SACHET.....	113
8.7.2.	Damini	113
9.	REHABILITATION, RECONSTRUCTION AND RECOVERY MEASURES	114
9.1.	POST-DISASTER REHABILITATION AND RECONSTRUCTION STRATEGIES.....	114
9.1.1.	Strategy	114
9.2.	POST-DISASTER DAMAGE AND NEEDS ASSESSMENT	115
9.2.1.	PDNA District Committee members	115
9.3.	PDNA FORMAT	115
9.4.	KEY TIMELINE.....	119
9.5.	SOPs FOR TRAINING DISTRICT OFFICIALS AND STAKEHOLDERS ON PDNA.....	120
9.6.	INFRASTRUCTURE RESTORATION AND RECONSTRUCTION	121

9.6.1.	Short-term Recovery Programs	121
9.6.2.	Long-term recovery programs: Sustainable livelihood.....	122
9.6.3.	Matrix of short-term and long-term Recovery Program	122
9.7.	SOCIAL AND PSYCHOLOGICAL SUPPORT.....	122
10.	SOCIAL INCLUSION IN DISASTER RISK REDUCTION	123
10.1.	GENDER PERSPECTIVE AND DRR.....	123
10.2.	SCHEDULED CASTES AND SCHEDULED TRIBES	123
10.3.	CHILDREN	124
10.4.	ELDERLY	124
10.5.	PERSONS WITH DISABILITIES (PWD).....	125
11.	FINANCIAL ARRANGEMENTS/RESOURCES	126
11.1.	RECOMMENDATION BY XV FINANCE COMMISSION	126
11.2.	SDRF & SDMP GUIDELINES	128
11.3.	FUND OUTLAY AND YEAR-WISE STATUS OF UTILISATION.....	129
11.4.	CENTRALLY SPONSORED SCHEMES SUPPORTING DRR AND STATE SCHEMES	130
11.5.	OTHER FINANCING OPTIONS.....	131
12.	MONITORING EVALUATION, UPDATION MAINTENANCE AND DISSEMINATION OF DDMP	133
12.1.	PLAN EVALUATION	133
12.2.	POST-DISASTER EVALUATION.....	134
12.3.	PLAN UPDATE	134
12.4.	DESKTOP REVIEW	134
12.5.	CONSULTATION WITH KEY OFFICIALS.....	135
12.6.	FIELD/OBSERVATION STUDY	135
12.7.	GUIDANCE FOR DDMP REVIEW.....	135
12.8.	DDMP REVIEW, NDMA-2014 AND NDMP 2019 SHARING THE REPORT FOR THE FEEDBACK AND FINALIZATION	136
13.	DISASTER RISK GOVERNANCE	138
13.1.	MAINSTREAMING DRR IN DEVELOPMENTAL PLANNING	138
13.2.	INTER-AGENCY COORDINATION	138
13.3.	ROLES AND RESPONSIBILITIES OF THE LINE DEPARTMENTS IN PREPAREDNESS, RESPONSE AND RECOVERY.....	139
13.3.1.	Phase 1: Preparedness.....	139
13.3.2.	Phase 2: Response.....	140
13.3.3.	Phase 3: Recovery.....	140
13.4.	ESTABLISHING COHERENCE AMONG DRR, CLIMATE CHANGE AND DEVELOPMENTAL GOALS.....	141
13.4.1.	Coherence and Mutual Reinforcement	143
14.	STANDARD OPERATING PROCEDURES & CHECKLISTS.....	144
14.1.	SOP FOR REVENUE DEPARTMENT	144
14.2.	SOP FOR POLICE DEPARTMENT.....	145
14.3.	SOP FOR IRRIGATION & WATER RESOURCE DEPARTMENT	146
14.4.	SOP FOR NAGARPALIKA.....	146
14.5.	SOP FOR HEALTH DEPARTMENT.....	147

14.6. SOP FOR ZILA PARISHAD HEALTH DEPARTMENT	148
14.7. SOP FOR PUBLIC WORKS DEPARTMENT	148
14.8. SOP FOR TELECOMMUNICATION DEPARTMENT	149
14.9. SOP FOR RAILWAY DEPARTMENT	149
14.10.SOP FOR AGRICULTURE DEPARTMENT.....	149
14.11.SOP FOR DISTRICT INFORMATION OFFICE	150
14.12.SOP FOR STATE TRANSPORT DEPARTMENT	150
14.13.SOP FOR MAHARASHTRA STATE ELECTRICITY BOARD.....	151
15. Annexure:.....	153
15.1. Important Contact Details	153

List of figures

Fig. 1: Geographical Location of Kolhapur	4
Fig. 2: Village wise Population Distribution of Kolhapur	7
Fig. 3: Average Maximum Temperature of Kolhapur (2018 - 2022)	11
Fig. 4: Year wise Average Rainfall of Kolhapur	14
Fig. 5: Tehsil wise Rainfall Distribution of Kolhapur (1998 - 2023)	14
Fig. 6: Average Annual Rainfall of Kolhapur (2011-2020)	15
Fig. 7: Average Annual Rainfall of Kolhapur (2023)	16
Fig. 8: River and Canal System and Dams of Kolhapur	18
Fig. 9: LULC Map of Kolhapur (2023)	21
Fig. 10: Tehsil wise LULC Distribution	22
Fig. 11: Transportation Network of Kolhapur	24
Fig. 12: Historical Earthquake Intensity Distribution and Faults in Kolhapur	28
Fig. 13: Historical Landslide Events and Triggering Factors in Kolhapur	31
Fig. 14: Observed and Forecasted Track of Cyclone Around Kolhapur	32
Fig. 15: Flood Inundated Area in Kolhapur (1984 - 2019)	35
Fig. 16: Tehsil wise Flood Affected Villages	36
Fig. 17: Tehsil Wise Flood Affected Area	36
Fig. 18: Tehsil wise Landslide Susceptibility Area	37
Fig. 19: Landslide Susceptibility Zonation of Kolhapur as per IIT, Delhi	38
Fig. 20: Area wise Landslide Susceptibility Area Coverage	38
Fig. 21: Landslide Susceptibility Zonation of Kolhapur as per GSI	39
Fig. 22: Tehsil wise Landslide Susceptible area as per GSI	40
Fig. 23: Area wise Landslide Susceptibility Coverage as per GSI	40
Fig. 24: Landslide Priority Villages of Kolhapur	41
Fig. 25: Tehsil wise Landslide Priority Area distribution	42
Fig. 26: Tehsil wise Landslide Priority Villages Distribution	42
Fig. 27: earthquake Risk Zonation of Kolhapur	44
Fig. 28: Tehsil wise Earthquake Risk Area Distribution	45
Fig. 29: Lightning Flash Density of Kolhapur (2014 - 2022)	46
Fig. 30: Average Heat Index of Kolhapur (2018-2022)	47
Fig. 31: WetBulb Global Temperature of Kolhapur (2018-2022)	48
Fig. 32: Exposed Human Habitat of Kolhapur	57
Fig. 33: Exposed Health Facilities in Kolhapur	58
Fig. 34: Exposed Transport and Admin Facilities in Kolhapur	59

Fig. 35: Exposed Education Facilities in Kolhapur	60
Fig. 36: District Level Coordination Structure in Kolhapur	71
Fig. 37: Effectiveness of IEC Strategy in Kolhapur	84
Fig. 38: Response Structure and Function in Kolhapur	102
Fig. 39: Structure of Incident Command System in Kolhapur	102
Fig. 40: Structure of Incident Commanding Organization in Kolhapur	103
Fig. 41: Structure of District Emergency Operation Centre in Kolhapur	109
Fig. 42: Structure of Emergency Trigger Mechanism in Kolhapur.....	111
Fig. 43: Dashboard of IRS-Maha.....	112
Fig. 44: Dashboard of CAP Sachet	113
Fig. 45: Dashboard of Damini Application	113
Fig. 46: Steps of PDNA as per NDMA.....	119
Fig. 47: Fund Outlay and Year-Wise Status of Utilization	129
Fig. 48: Fund Distribution Structure.....	129
Fig. 49: Relation Between Climate Change and DRR	142
Fig. 50: Coherence and Mutual Reinforcement within National Efforts	143

List of Table

Table 1: Administrative Division of Kolhapur	5
Table 2: Demographic Profile of Kolhapur.....	5
Table 3: Rural and Urban Population distribution	6
Table 4: Male and Female Population Distribution	6
Table 5: Religion Distribution of Kolhapur	7
Table 6: Work wise Population Distribution of Kolhapur	8
Table 7: Estimate of Area, Production & Productivity of Principal Crops During 2022-23 of Kolhapur; Source: Dept. Of Agriculture, Maharashtra	8
Table 8: Tehsil wise Agricultural Farms Distribution	9
Table 9: Health Profile of Kolhapur	10
Table 10: Month wise Temperature Distribution of Kolhapur	11
Table 11: Rainfall Distribution of Kolhapur	12
Table 12: Rainfall Distribution of Kolhapur	13
Table 13: Details of Historical/Religious Center and Yatra of Kolhapur	17
Table 14: Location of Religious Place in Kolhapur	17
Table 15: Tehsil wise LULC Distribution in Kolhapur	22
Table 16: Flood Affected Villages of Kolhapur.....	26
Table 17: Earthquake History of Kolhapur.....	27
Table 18: Landslide History of Kolhapur.....	29
Table 19: details of human and animal deaths due to natural disaster during the financial years 2023-2024.....	32
Table 20: Seasonality of Disaster.....	32
Table 21: Hazard Profile of Kolhapur	33
Table 22: Ranking and Probability of Natural Hazard in Kolhapur	49
Table 23: Ranking Probability of Technological Hazard in Kolhapur	50
Table 24: Ranking Probability of Human-Related Hazard in Kolhapur.....	51
Table 25: Ranking Probability of Hazard Involving Hazardous Materials in Kolhapur	52
Table 26: existing Search and Rescue Equipment of Kolhapur	61
Table 27: Structure of DDMA in Kolhapur	69
Table 28: Structure of District Disaster Management Committee in Kolhapur	70
Table 29: List of Agencies competent for Disseminating Warnings or Alert in Kolhapur	72
Table 30: List of Equipment in DEOC of Kolhapur.....	81
Table 31: List of Departments Responsible for Monitoring, Predicting, and Warning System for Specific Disaster in Kolhapur	82

Table 32: List of Mass Media in Kolhapur	82
Table 33: List of Vulnerable Individuals/Groups and Alternative IEC for Kolhapur	85
Table 34: List of Important Days for IEC intervention	85
Table 35: List of Festival and Suitable IEC	87
Table 36: List of NGOs Available in Kolhapur	90
Table 37: List of Training Method and Approaches for Capacity Building	96
Table 38: Annual Training Calendar of District Disaster Management Authority, Kolhapur, (2024-25)	99
Table 39: List of Important Contacts Responsible for Response Mechanism	104
Table 40: List of Stakeholders Responsible of Emergency Planning	105
Table 41: Damage Assessment Matrix for Power Supply Department	116
Table 42: Damage assessment matrix for Health Department	116
Table 43: Damage Assessment Matrix for Irrigation Department	116
Table 44: Damage Assessment Matrix For PWD	117
Table 45: Damage Assessment Matrix For Agriculture Department	118
Table 46: Damage Assessment Matrix For Livestock/Animal Husbandry Department	118
Table 47: Damage Assessment Matrix For Education Department	118
Table 48: Damage Assessment Matrix For Women And Child Development Department.....	119
Table 49: Damage Assessment Matrix for Food Supply Department	119
Table 50: Survey Timeline for PDNA.....	120
Table 51: Short-Term and Long-Term Recovery Program Matrix.....	122
Table 52: Allocation of State Disaster Response Fund (SDRF) for the Award period 2021-26 for Maharashtra.....	130
Table 53: Contact details of Neighbors District Collector's Office	153
Table 54: Contact Details of Cabinet 2024.....	153
Table 55: Contact Details of Senior Administrative Officer at Government Level.....	155
Table 56: Contact Details of Senior Administrative Officer at Departmental level	155
Table 57: Contact Details of Hon'ble Khasdar and MLA.....	155
Table 58: Contact List of Branches to Board Level Officers of General Distribution (Department Level).....	156
Table 59: Contact Details of Superintendent Engineer/Executive Eng. and Deputy Engineers....	162
Table 60: Contact Details of Agriculture Officers at Kolhapur District	165
Table 61: Contact Details of Head of Department of Kolhapur Zilla Parishad	169
Table 62: Contact Details of Group Development Officer and Assistant Group Development Officer	171
Table 63: Contact Details of Senior Administrative Officer and Police Department	172

Table 64: Contact Details of Water Resources/Dams Department	174
Table 65: Contact Details of Superintendent Engineer Mechanical Board Kolhapur.....	176
Table 66: Contact Details of Soil and Water Resources Department Kolhapur	177
Table 67: Contact Details of Maharashtra Life Authority Department, Kolhapur	177
Table 68: Contact Details of Maharashtra State Road Transport Corporation, Kolhapur Division	177
Table 69: Contact Details of Head of Depots in Kolhapur.....	178
Table 70: Location and Contact Details of Bus stand	178
Table 71: Contact Details of Traffic Control Centre	179
Table 72: Contact Details of National Highway Department, Kolhapur	179
Table 73: Contact Details of Kolhapur City Disaster Management Committee	179
Table 74: Contact Details of Municipal Officer.....	180
Table 75: Contact Details of Municipal Corporation.....	180
Table 76: Contact Details of Municipal Corporation Public Works Department / Efficiency Path Departmental Office No.-1 Gandhi Maidan.....	181
Table 77: Contact Details of Departmental Office No.-1 Gandhi Maidan Medilak Path.....	181
Table 78: Contact Details of Departmental Office No.-1 Gandhi Maidan Health Inspector Path ..	181
Table 79: Contact Details of Departmental Office No.-1 Gandhi Maidan Electrical Corridor	181
Table 80: Contact Details of Kolhapur Municipal Corporation Public Works Department / Efficiency Path Departmental Office No.-2 G. Shivaji Market	181
Table 81: Contact Details of Departmental Office No.-2 Ch.Shivaji Market Medical Path	182
Table 82: Contact Details of Departmental Office No.-2 Ch.Shivaji Market, Health Inspector	182
Table 83: Contact Details of Departmental Office No.-2 Ch.Shivaji Market, Vidyut Pathak.....	182
Table 84: Contact Details of Kolhapur Municipal Corporation Public Works Department / Efficiency Path Departmental Office No.-3 Rajarampuri	182
Table 85: Contact Details of Departmental Office No.-3 Rajarampuri Medical Corps	182
Table 86: Contact Details of Departmental Office No.-3 Rajarampuri Pathak, Health Inspector ..	182
Table 87: Contact Details of Departmental Office No.-3 Rajarampuri Electrical Circle	183
Table 88: Contact Details of Kolhapur Municipal Corporation Public Works Department / Efficiency Path Departmental Office No.-4 G. Tararani Market.....	183
Table 89: Contact Details of Departmental Office No.-4 G. Tararani Market Medical Path	183
Table 90: Contact Details of Departmental Office No.-4 G. Tararani Market Path, Health Inspector	183
Table 91: Contact Details of Departmental Office No.-4 G. Tararani Market Electrical Path.....	183
Table 92: Contact Details of Kolhapur Municipal Health Department - Pharmacies and Medical Officers	183
Table 93: Contact Details of Tanker Supplier	184
Table 94: Contact Details of Senior Administrative Officer at District Level	184

Table 95: Contact Details of Sub-Forest Conservation-Forest Enhancement Building, Bawda Opposite Post Office Kolhapur	187
Table 96: Contact Details of Other government offices	188
Table 97: Contact Details of Department of Public Relations and Information	189
Table 98: Contact Details of Maharashtra Emergency Medical Services.....	190
Table 99: Contact Details of Chief Executive Officer /Municipality.....	194
Table 100: Contact Details of Regional Transport Officer Kolhapur	195
Table 101: Contact Details of District level flood control room.....	195
Table 102: Contact Details of Senior Geologist Ground Water Survey and Development Agency Kolhapur	195
Table 103: Contact Details of Kolhapur Railway Station.....	195

1. INTRODUCTION

1.1. RATIONALE

The District Disaster Management Plan (DDMP) for Kolhapur is designed to address the district's susceptibility to various natural and man-made disasters, such as cyclones, floods, landslides, and industrial accidents. Kolhapur's extensive coastline, mountainous regions, and dependence on agriculture, and tourism heighten its risk profile, posing significant threats to both its residents and economy. The DDMP seeks to bolster preparedness, ensure effective responses, and enable rapid recovery to protect lives, property, and livelihoods. By incorporating risk assessments, preventive strategies, community education, and coordinated response efforts, the DDMP promotes sustainable development, aligns with national and state policies, and encourages stakeholder collaboration, ultimately creating a resilient and secure district.

1.2. VISION

The vision is to build a disaster-resilient community by prioritising effective mitigation, preparedness, and response to any disaster or hazard while continuously advancing in disaster risk reduction and risk financing endeavours.

1.3. AIM AND OBJECTIVE

The District Disaster Management Plan (DDMP) aims to bolster the resilience of district administration and local communities in facing the escalating frequency and intensity of disasters attributed to global climate change. This plan also seeks to establish a robust institutional framework and Standard Operating Procedures (SOPs) at the district level to mitigate the impact of disasters effectively.

The primary objective of the DDMP, Kolhapur, is to assist the District Disaster Management Authority (DDMA) in fulfilling its responsibilities as specified in sections 30(1) and (2) of the Disaster Management Act of 2005. As per the provisions outlined in section 31(3) of the same Act, the District Plan encompasses the following objectives:

- To evaluate the nature, severity, and repercussions of all disasters and hazards prevalent in the district.
- To develop micro-level vulnerability assessments and mapping exercises.
- To identify vulnerable villages and communities for rehabilitation, as well as safe routes and locations.
- To evaluate social and economic vulnerabilities at the village level and propose appropriate mitigation measures.
- To implement efficient mechanisms for disaster risk reduction.
- To incorporate cost-effective nature-based solutions for disaster risk reduction strategies.
- To enhance preparedness, prevention, and mitigation measures at the district level.
- To assign responsibilities to government departments at the district level and local authorities within the district.
- To evaluate and enhance the capacity of government departments, civil society, NGOs, and community members for disaster risk reduction.
- To analyse the adequacy and procurement of essential resources and ensure regular upgradation in Disaster Response Networks.
- To strengthen the District Emergency Operations Centre (DEOC) for early warnings, effective communication, search & rescue operations, and efficient recovery efforts.
- To develop an effective strategy for disseminating Information, Education, and Communication (IEC) materials.

- To promote social inclusivity in mainstreaming disaster risk reduction.
- To integrate Disaster Risk Reduction (DRR) into developmental planning processes.
- To develop possible SOPs to reduce fatalities.

1.4. TERMINOLOGY OF DISASTER MANAGEMENT

Disaster: A severe disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability, and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

Disaster Risk: The potential loss of life, injury, or destroyed or damaged assets that could occur to a system, society, or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity.

Disaster Risk Reduction (DRR): Disaster risk reduction is aimed at preventing new and reducing existing disaster risks and managing residual risk, all of which contribute to strengthening resilience and, therefore, achieving sustainable development.

Early warning system: An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities, systems and processes that enable individuals, communities, governments, businesses, and others to take timely action to reduce disaster risks in advance of hazardous events.

Hazard: A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption, or environmental degradation.

Mitigation: Measures taken to reduce or prevent the adverse effects of hazards, including structural and non-structural interventions.

Preparedness: Refers to the level of readiness to manage an impending disaster situation or disaster and its associated effects.

Response: The activities and measures are taken to address the immediate impacts of a disaster, including search and rescue, emergency medical care, shelter provision, and humanitarian assistance.

Recovery: The restoring or improving livelihoods and health, as well as economic, physical, social, cultural, and environmental assets, systems, and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and “build back better”, to avoid or reduce future disaster risk.

Resilience: The ability of individuals, communities, and systems to withstand, adapt to, and recover from the impacts of disasters while maintaining essential functions and minimising disruption and loss.

Rehabilitation refers to restoring or regaining the physical, mental, social, or economic well-being of individuals or communities affected by a disaster or other adverse event.

Vulnerability: The conditions determined by physical, social, economic, and environmental factors or processes that increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

1.5. REALIGNING THE PLAN

According to the Maharashtra State Disaster Management Plan (MSDMP 2023), Sendai Framework, Sustainable Development Goals (SDGs), COP 21, and the Prime Minister's 10-Point Agenda, the DDMP is essential for enhancing disaster resilience and sustainable development.

Incorporating the principles and goals outlined in the frameworks and agendas will offer a comprehensive and unified strategy for efficient disaster risk reduction, response, and recovery initiatives. Moreover, it will enable us to prioritise disaster risk reduction, response, recovery, and rehabilitation and effectively mitigate the impact of climate change. Furthermore, it will facilitate integrating disaster risk reduction and climate change adaptation efforts, enhancing overall resilience.

Additionally, by section 30(2)(i) of the National Disaster Management (DM) Act and the State DM plan of 2023, it is mandated that the district formulate a Disaster Management Plan, inclusive of a District Response Plan, aligned with the guidelines set forth by the National and State Authorities, respectively. The district administration shall coordinate and monitor the implementation of the national policy, state policy, national plan, and district plan.

2. DISTRICT PROFILE

2.1. DISTRICT PROFILE

Kolhapur district is situated in the extreme southern part of Maharashtra state. It lies between 15°43' and 17°17' North latitude and 73°40' and 74°42' East longitude. It is surrounded by Sangali district to the north, Belgaum district of Karnataka state to the east and south, and Ratanagiri and Sindhudurg districts to the west. The Sahyadri ranges to the west and the Wama River to the north form the natural boundaries.

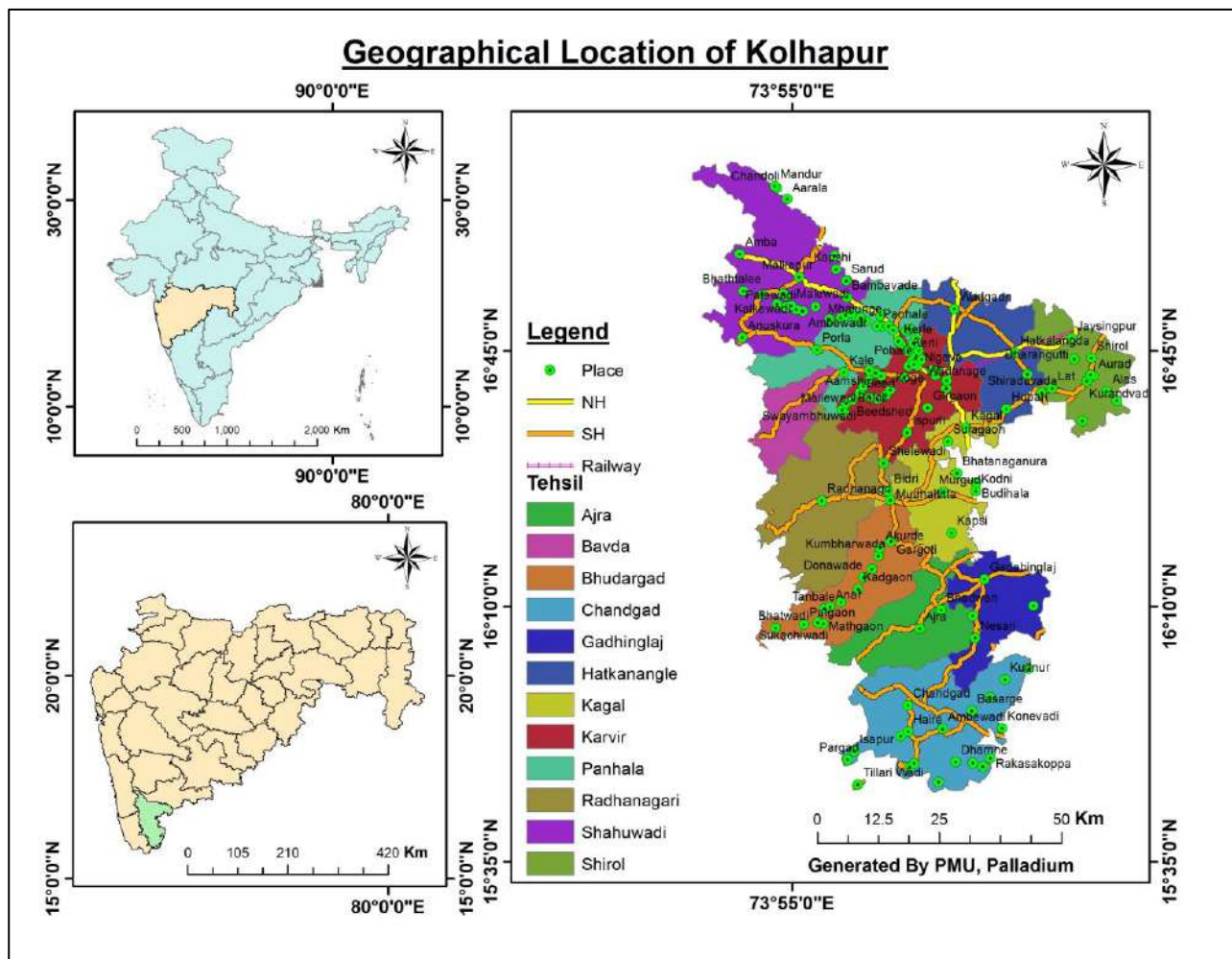


FIG. 1: GEOGRAPHICAL LOCATION OF KOLHAPUR

2.2. HISTORICAL BACKGROUND AND TERRITORIAL CHANGES

Kolhapur is one of the oldest cities in the country. It derives its importance from its past political associations and its position as a great commercial, religious, and educational center. As a religious center, Kolhapur derives its application of Kashi of the south from the imposing ancient temple of Mahalaxmi.

The history of Kolhapur can be broadly divided into three periods, viz., the early Hindu period (about A.D. 1347), the Muslim period (from A.D. 1347 to about A.D. A.D. 1700), and the Maratha period (1700). In the year 1948, Kolhapur state was merged with the Indian nation. In 1949, 956 villages, together with five villages from the former state of Kurundwad, one village from the state of Miraj, and seven villages from Belagum district, were formed into the new district of Kolhapur; Raybag and Katkol were transferred to Belgaum.

The new district consisted of Shahuwadi, Hatkanangale, Shirol, Karvir, Radhanagari, Kagal, Bhudhargad, and Gadhingalaj talukas, Panhala, Bavda, and Ajra mahals. In 1956 Chandgad taluka was transferred from Belgum with the reorganization of states; it was included in Bombay state in 1956. It has been a part of Maharashtra since 1960. Census 1961 has recorded 9 talukas and 3 mahals with 1086 villages and 11 towns. During the 1961-71 decade, the Mahals were upgraded, and accordingly, 12 tahsils with 1093 villages and 11 towns were recorded in 1971 census. For the 1981 census, 12 tahsils, 1208 villages, and 12 towns, including one newly created town were recorded.

During the 1981-91 decade, two villages from Chandgad tahsil were transferred to Sawantwadi tahsil, and 53 villages from Bavada tahsil were transferred to the newly created Vaibhavvadi tahsil of Sindhudurg district. In the 1991 census, 12 tahsils with 1203 villages (including 15 uninhabited) and 12 towns were recorded. As per the 2001 census, 12 tahsils were recorded in the Kolhapur district.

2.3. AREA AND ADMINISTRATIVE DIVISIONS

The district has an area of 8420 sq. km., which is about 2.50% of the total area of the state. The height of the region is between 390 and 600 meters above mean sea level. There are 12 tehsil, 18 towns, and 1217 villages, of which 21 are uninhabited as per the 2001 census. For administrative and revenue purposes, the twelve tahsils of the district are divided into six revenue sub-divisions.

TABLE 1: ADMINISTRATIVE DIVISION OF KOLHAPUR

Sr. no.	Revenue sub-division	Tahsils
1	Karvir	Karveer and Gaganbavada
2	Ichalkaranii	Hatkanangale and Shirol
3	Gadhinglaj	Gadhingalaj and Chandgad
4	Radhanagari	Radhanagri and Kagal
5	Panhala	Panhala and Shahuwadi
6	Bhudhargad	Bhudhargad and Ajara

2.4. DEMOGRAPHIC PROFILE OF DISTRICT

Kolhapur district of Maharashtra has a total population of 3,876,001 as per the Census 2011. Out of which 1,980,658 are males while 1,895,343 are females. In 2011 there were a total 840,240 families residing in Kolhapur district. The Average Sex Ratio of Kolhapur district is 957.

TABLE 2: DEMOGRAPHIC PROFILE OF KOLHAPUR

Taluka	Population	Literacy	Sex Ratio
Ajra	1,20,265	66.80%	1,095
Bavda	35,772	61.60%	937
Bhudargad	1,50,368	70%	983
Chandgad	1,87,220	65.30%	1,019
Gadhinglaj	2,25,734	68.90%	1,039
Hatkanangle	8,07,751	74.80%	932
Kagal	2,75,372	70.50%	948
Karvir	10,37,713	77.80%	937
Panhala	2,59,417	71.10%	915

Taluka	Population	Literacy	Sex Ratio
Radhanagari	1,99,713	69.50%	935
Shahuwadi	1,85,661	64.40%	1,021
Shirol	3,91,015	74.70%	957

As per Census 2011 out of total population, 31.7% people live in Urban areas while 68.3% live in the Rural areas. The average literacy rate in urban areas is 88.3% while that in rural areas is 78.4%. Also, the Sex Ratio of Urban areas in Kolhapur district is 947 while that of Rural areas is 962.

The population of Children of age 0-6 years in Kolhapur district is 408942 which is 11% of the total population. There are 219521 male children and 189421 female children between the age 0-6 years. Thus, as per the Census 2011 the Child Sex Ratio of Kolhapur is 863 which is less than Average Sex Ratio (957) of Kolhapur district.

The total literacy rate of Kolhapur district is 81.51%. The male literacy rate is 78.75% and the female literacy rate is 66.8% in Kolhapur district.

TABLE 3: RURAL AND URBAN POPULATION DISTRIBUTION

Type	Total	Rural	Urban
Population	38,76,001	26,45,992	12,30,009
Male population	1980658	13,48,815	6,31,843
Female population	1895343	12,97,177	5,98,166
Children (0-6 years)	4,08,942	2,79,956	1,28,986
Literacy	81.51%	78.35%	88.28%
Sex Ratio	957	962	947
Scheduled Caste	13%	13.40%	12.10%
Scheduled Tribe	0.80%	0.80%	0.60%
Literates	2825845	18,53,869	9,71,976
Average literacy	83.32%	78.35%	88.28%
Male literacy	89.58%	86.75%	92.42%
Female literacy	76.84%	69.73%	83.95%

The Sex Ratio of Kolhapur district is 957. Thus, for every 1000 men there were 957 females in Kolhapur district. Also, as per Census 2011, the Child Sex Ratio was 863 which is less than Average Sex Ratio (957) of Kolhapur district.

The total literacy rate of Kolhapur district was 81.51% in 2011 which is less than average literacy rate 82.34% of Maharashtra. Population-wise, out of total 2,825,845 literates, males were 1,559,760 while females were 1,266,085. Also, the male literacy rate was 88.57% and the female literacy rate was 74.22% in Kolhapur district.

TABLE 4: MALE AND FEMALE POPULATION DISTRIBUTION

Types	Total	Male	Female
Children (Age 0-6)	4,08,942	2,19,521	1,89,421
Literacy	81.51%	78.75%	66.80%
Scheduled Caste	5,04,461	2,53,390	2,51,071
Scheduled Tribe	30,206	15,478	14,728
Illiterate	10,50,156	4,20,898	6,29,258

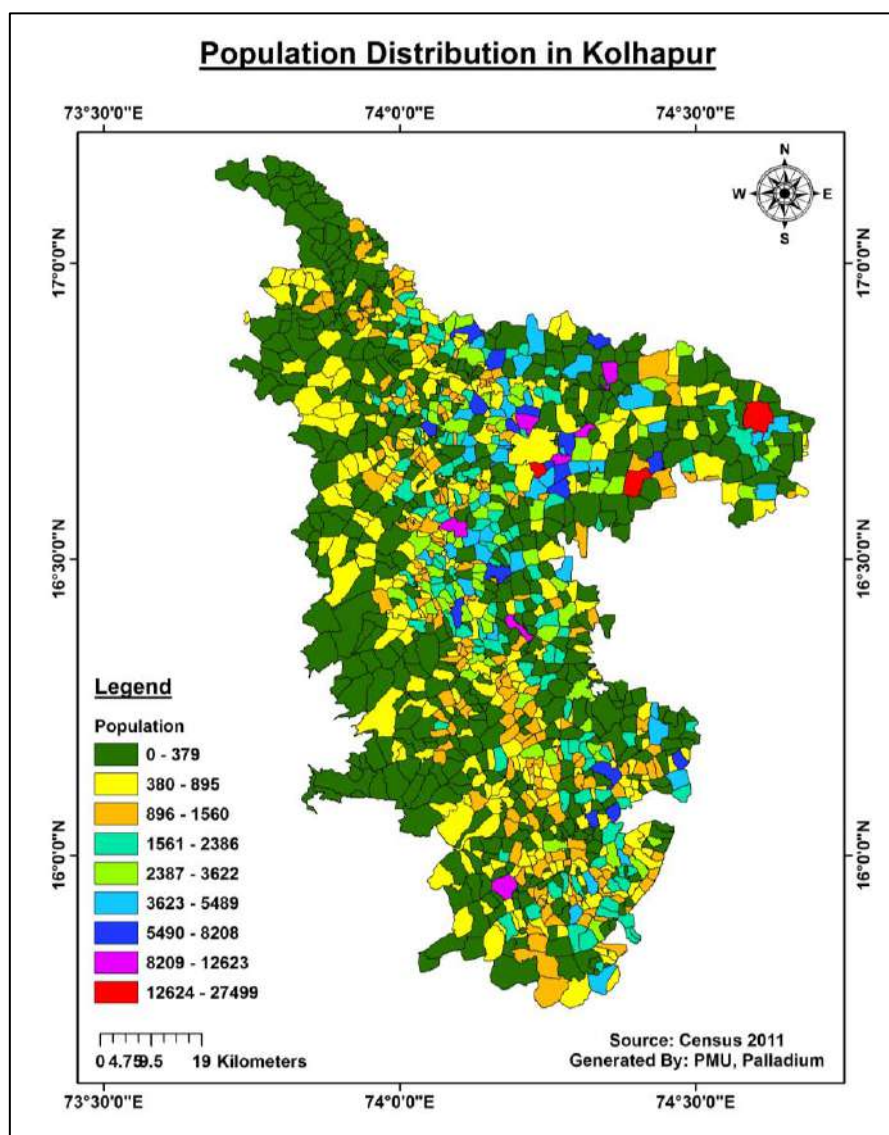


FIG. 2: VILLAGE WISE POPULATION DISTRIBUTION OF KOLHAPUR

The total area of Kolhapur district is 7,685 km². Thus, the density of Kolhapur district is 504 people per square kilometre. As per the initial provisional data of Census 2011, around 340 sq. km. area is under urban region while 7,345 sq. km. is under rural region.

As per the Census 2011 out of total population of Kolhapur, 31.73% people lived in urban regions while 68.27% in rural areas. The total urban population was 1,230,009 out of which 631,843 were males while the remaining 598,166 were females. In rural areas of Kolhapur, male population was 1,348,815 while the female population was 1,297,177.

The average sex ratio in urban regions of Kolhapur was 947 females per 1000 males. Also, the Child (0-6 age) sex ration of urban areas in Kolhapur was 865 girls per 1000 boys. Thus, the total children (0-6 age) living in urban areas of Kolhapur were 128,986 which is 10.49% of total urban population. Similarly, the average sex ratio in rural areas of Kolhapur was 962 females per 1000 males. The Child sex ratio of rural areas in Kolhapur was 862 girls per 1000 boys.

TABLE 5: RELIGION DISTRIBUTION OF KOLHAPUR

Religion	Total		Male	Female
Hindu	33,79,906	-1	17,28,058	16,51,848
Muslim	2,86,558	0	1,44,947	1,41,611

Religion	Total		Male	Female
Christian	15,573	-0.40%	7,709	7,864
Sikh	1,570	-0.04%	828	742
Buddhist	29,766	-0.77%	15,142	14,624
Jain	1,54,882	-4%	80,024	74,858
Other Religion	1,274	-0.03%	667	607
No Religion Specified	6,472	-0.17%	3,283	3,189

In Kolhapur district out of total population, 1,704,054 were engaged in work activities. 88.5% of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 11.5% were involved in Marginal activity providing livelihood for less than 6 months. Of 1,704,054 workers engaged in Main Work, 594,056 were cultivators (owner or co-owner) while 207,790 were Agricultural labourers.

TABLE 6: WORK WISE POPULATION DISTRIBUTION OF KOLHAPUR

Types	Total	Male	Female
Main Workers	15,08,563	10,50,072	4,58,491
Cultivators	5,94,056	3,73,932	2,20,124
Agriculture Laborer	2,07,790	1,06,326	1,01,464
Household Industries	48,004	31,710	16,294
Other Workers	6,58,713	5,38,104	1,20,609
Marginal Workers	1,95,491	75,132	1,20,359
Non-Working	21,71,947	8,55,454	13,16,493

2.5. AGRICULTURE AND LIVESTOCK

Kolhapur's agriculture is diversified with a variety of crops grown throughout the year. The primary crops can be categorized into food grains (cereals and pulses), cash crops, oilseeds, and horticultural crops.

- Major cereals include rice, jowar, and bajra. These are mainly grown in tehsils like Karvir, Panhala, and Shirol, where the soil and irrigation facilities are well-suited for such crops.
- Pulses such as tur (pigeon pea), gram, and urad (black gram) are also cultivated, albeit on a smaller scale compared to cereals. These are distributed across tehsils like Shahuwadi, Kagal, and Radhanagari.
- Sugarcane is the most prominent cash crop, with Kolhapur being one of the leading producers in Maharashtra. The tehsils of Hatkanangale, Shirol, and Karvir have extensive sugarcane fields. Other cash crops include groundnut and soybean.
- Sunflower, groundnut, and soybean are the major oilseed crops. These are cultivated in tehsils like Gadhinglaj, Ajra, and Bhudargad.
- Fruits like mango, banana, and pomegranate, along with vegetables such as tomatoes, brinjals, and cucumbers, are grown extensively in the region. Panhala and Radhanagari are notable for their horticultural produce.

TABLE 7: ESTIMATE OF AREA, PRODUCTION & PRODUCTIVITY OF PRINCIPAL CROPS DURING 2022-23 OF KOLHAPUR; SOURCE: DEPT. OF AGRICULTURE, MAHARASHTRA

District	Area (ha)	Production (Tones)	Productivity (Kg/Ha)
Kh Rice	941.5	2839.41	3015.84
Kh Jowar	8.81	11.61	1317.37

District	Area (ha)	Production (Tones)	Productivity (Kg/Ha)
Bajra	0	0	0
Ragi	165.54	315.72	1907.23
Kh Maize	6.7	16.6	2477.08
Other Kh Cereals	3.62	1.63	450
Tur	7.98	7.98	999.42
Mung	7.59	3.11	410
Ddid	9.01	9.42	1045
Other Kh Pulses	14.49	7.68	530
Kh Gr.Nut	342.84	508.49	1483.17
Kh Sesamum	0.07	0.02	238.73
Nigerseed	3.07	1.15	375
Kharif Sunflower	0	0	0
Kh Soyabean	434.07	880.02	2027.37
Sugarcane (Crushing)	1755.6	158179.6	90.1
Cotton (Lint)	0	0	0
Rabi Jowar	122.1	167.44	1371.3
Wheat	16.62	44.35	2668.7
Tobacco	5.42	8.87	1636.38
Summer rice	2.42	7.5	3100
Summer Maize	7.74	19.74	2550
Summer Moong	1.02	0.51	500
Summer Udid	0.66	0.3	450
Other Su. Pulses	0.07	0.04	588.4

Livestock farming is an integral part of Kolhapur's rural economy, providing supplementary income to farmers. The district is renowned for its dairy farming, poultry, and goat farming.

- Kolhapur is famous for its milk production, particularly the high-quality buffalo milk used in making the renowned Kolhapuri chappal (a type of leather sandal) and other dairy products. Tehsils like Karvir and Shirol are major contributors.
- Poultry farming is prevalent across the district, with significant activity in tehsils like Hatkanangale and Gadhinglaj. The poultry industry includes both broilers and layers.

Goat farming is common in tehsils like Shahuwadi and Radhanagari, contributing to the meat and dairy supply in the region.

TABLE 8: TEHSIL WISE AGRICULTURAL FARMS DISTRIBUTION

Tehsil	Dairy Farms	Poultry Farms	Goat Farms
Karvir	120	80	40
Panhala	100	70	35
Hatkanangale	110	75	37
Shirol	105	72	36
Shahuwadi	90	60	30
Kagal	95	65	32
Gadhinglaj	80	50	27
Ajra	60	40	22

Tehsil	Dairy Farms	Poultry Farms	Goat Farms
Bhudargad	55	38	21
Radhanagari	70	45	25
Chandgad	48	32	18

2.6. HEALTH PROFILE

The health profile of Kolhapur district, Maharashtra, reflects a diverse and robust healthcare infrastructure spread across its various tehsils. The district is equipped with numerous Primary Health Centres (PHCs), Community Health Centres (CHCs), and other hospitals that collectively provide substantial bed and doctor facilities. Key tehsils like Karveer and Hatkanangle lead with a higher number of healthcare establishments, beds, and medical professionals, ensuring comprehensive health services for their populations. In contrast, smaller tehsils such as Ajara and Bhudargad have relatively fewer resources, indicating potential areas for development. Overall, the health profile of Kolhapur demonstrates a commendable effort towards providing accessible healthcare, though disparities across tehsils highlight the need for targeted improvements to achieve balanced healthcare delivery throughout the district.

TABLE 9: HEALTH PROFILE OF KOLHAPUR

Tehsil	PHCs	CHCs	Other Hospitals	Total Beds	Total Doctors
Karveer	12	3	15	300	80
Hatkanangle	10	4	20	250	75
Panhala	8	2	10	200	60
Shahuwadi	6	1	8	150	50
Gaganbawada	5	1	5	100	40
Radhanagari	7	2	12	180	55
Kagal	9	3	15	220	70
Bhudargad	4	1	7	110	35
Ajara	3	1	6	90	30
Chandgad	5	2	9	140	45
Gadhinglaj	8	3	18	230	65

2.7. CLIMATE AND RAINFALL

The climate of the Kolhapur district is generally temperate. The western part of the district, near the Sahyadries, it is always cooler than the eastern part which is liable to hot winds during April and May. The nights over the entire districts are generally cool.

The year in respect of Kolhapur district may be divided into three periods, hot weather from March to May, rainy period from June to October and cold weather from November to February.

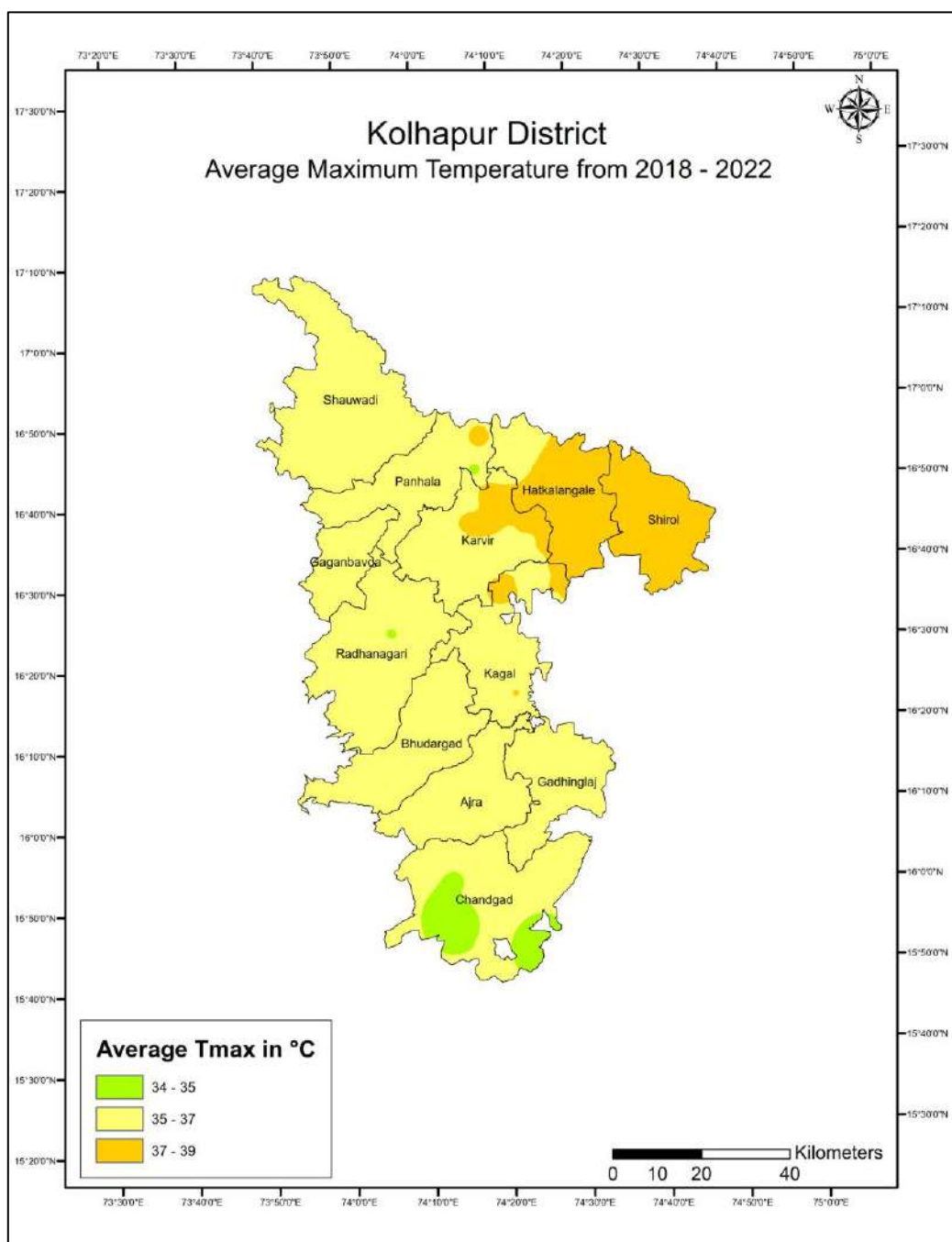


FIG. 3: AVERAGE MAXIMUM TEMPERATURE OF KOLHAPUR (2018 - 2022)

TABLE 10: MONTH WISE TEMPERATURE DISTRIBUTION OF KOLHAPUR

Sr. No.	Months	Maximum Temperature	Minimum Temperature	Range of the Temperature
1	January	31.2	14.4	16.8
2	February	31.0	14.6	16.4
3	March	35.7	17.9	17.8
4	April	38.3	22.0	16.3
5	May	34.3	22.5	11.8
6	June	29.9	22.4	7.5
7	July	26.7	21.4	5.3
8	August	28.0	21.3	6.7
9	September	29.9	20.5	9.4
10	October	30.7	20.5	10.2

Sr. No.	Months	Maximum Temperature	Minimum Temperature	Range of the Temperature
11	November	31.1	16.9	14.2
12	December	29.9	13.3	16.6

The tehsil-wise annual average rainfall distribution in Kolhapur district, Maharashtra, showcases significant variability, influenced by its geographical features and monsoon patterns. The western tehsils like Gaganbawada, Radhanagari, and Chandgad experience the highest rainfall, often exceeding 3000 mm annually, due to their proximity to the Western Ghats. In contrast, eastern tehsils such as Hatkanangle and Shirol receive comparatively less rainfall, around 1500-2000 mm per year. The monsoon season, spanning from June to September, brings the majority of the rainfall, with July and August being the peak months. This intense monsoon rainfall impacts agriculture positively by providing essential water for crops, yet it can also cause flooding and soil erosion in some areas. The variability in rainfall distribution necessitates efficient water management and flood control measures to mitigate adverse effects while maximizing agricultural productivity. Month-wise, June marks the onset of the monsoon with moderate rainfall, intensifying in July and August, and gradually tapering off by September, with occasional post-monsoon showers in October.

However, three broad divisions may be defined as follows.

- The western zone receiving heavy and assured rainfall.
- The middle zone receiving moderate but fairly regular rainfall.
- The eastern zone receiving low, irregular and uncertain rainfall.

The south-west monsoon commences by about the first week of June and last till about the end of September. With the onset of the south-west monsoon there is a rapid fall in the day temperatures.

TABLE 11: RAINFALL DISTRIBUTION OF KOLHAPUR

Year	Karveer	Kagal	Panhala	Shahuwadi	Hatkanangle	Shirol
1998	896.3	2051	1373.2	1590.3	652	933
1999	1012.80	932.60	1753.90	2046.80	668.00	534.00
2000	690.60	776.20	1379.50	1654.80	651.90	582.00
2001	684.50	500.80	1616.60	1452.80	500.00	632.00
2002	692.40	734.00	1360.00	1493.30	456.00	446.00
2003	396.20	411.80	1272.00	1602.00	364.10	285.00
2004	923.50	737.00	1858.00	240.00	707.00	563.00
2005	1673.30	1831.20	2444.00	3315.30	1214.00	976.00
2006	1058.90	1223.20	2543.00	2895.00	1097.60	735.00
2007	1028.90	834.60	2629.80	2337.00	897.00	654.00
2008	1001.70	748.40	1819.00	1808.00	940.70	362.00
2009	1495.80	816.30	1418.00	1822.00	879.00	666.00
2010	837.60	780.00	1418.00	1870.00	950.00	487.00
2011	912.40	836.00	1405.00	1819.00	737.00	272.00
2012	691.00	523.00	1302.00	1799.00	760.00	440.00
2013	806.90	945.00	1274.70	2446.70	622.10	317.80
2014	728.80	959.30	1429.10	2404.50	605.40	493.70
2015	426.50	492.90	772.20	1082.70	245.80	259.10

Year	Karveer	Kagal	Panhala	Shahuwadi	Hatkangale	Shirol
2016	972.90	1115.30	1638.90	2140.70	557.50	519.50
2017	826.00	1068.50	1033.65	1846.60	608.90	640.60
2018	882.90	1118.60	1237.50	2497.10	485.90	354.30
2019	1939.50	1797.60	2589.50	3137.20	1234.00	882.10
2020	1387.70	1382.30	1888.00	1835.90	778.50	771.10
2021	1310.20	1294.40	1535.40	2264.50	824.50	580.10
2022	1284.80	1178.90	1618.20	2206.90	893.10	719.60
2023	736.10	712.10	948.00	1427.00	454.10	432.20
Average	973.01	992.35	1598.35	1962.89	722.47	559.12

TABLE 12: RAINFALL DISTRIBUTION OF KOLHAPUR

Year	Radhanagari	Gaganbawada	Bhudargad	Gadhingalaj	Ajara	Chandgad
1998	3031	5749	1380.9	850.3	1605.4	2497.4
1999	3553.00	5689.40	1464.50	1035.00	1876.80	3734.00
2000	2622.00	5502.70	1388.50	754.20	1326.30	2774.30
2001	2800.00	4699.00	1028.80	621.80	1336.10	1936.40
2002	3153.00	5338.00	679.90	679.70	1546.50	1953.50
2003	2804.00	4664.00	1166.00	567.00	1247.10	1976.70
2004	2520.00	5294.20	1447.00	839.00	1391.00	2356.60
2005	5031.00	6799.60	2505.00	1383.00	2927.00	3216.00
2006	5255.00	6782.00	2134.00	1085.00	2501.00	3229.40
2007	4593.00	6254.00	1684.00	949.00	2191.00	2365.00
2008	3628.00	6110.00	1584.00	1021.90	1673.00	2754.00
2009	4867.00	4482.00	1597.00	910.00	1883.00	2476.00
2010	2871.00	6003.80	1610.00	1160.00	2056.50	2446.00
2011	4405.00	7077.00	1680.00	1012.00	1598.00	3277.00
2012	3065.00	5829.00	1289.00	1197.00	1370.00	2584.00
2013	1950.10	5865.50	1795.20	809.70	1925.60	1925.60
2014	1741.60	4819.60	1604.60	838.30	1704.60	1972.20
2015	917.20	2655.20	965.20	437.40	853.30	1157.50
2016	1700.10	3784.70	1346.10	738.50	1709.70	1716.30
2017	1792.30	3248.00	1359.20	730.00	1502.70	1678.50
2018	2163.50	2762.60	1813.00	760.00	1791.00	2198.80
2019	3110.80	5768.70	2978.70	1694.70	2586.40	3274.50
2020	2363.50	4263.50	1913.00	1264.20	1985.10	1680.80
2021	2334.40	4722.10	1928.60	1279.90	1748.30	1924.90
2022	2097.40	4286.00	2190.10	1047.90	1837.20	2109.50
2023	1294.50	3429.40	1684.70	631.30	1311.00	1397.00
Average	2910.13	5072.27	1623.73	934.49	1749.37	2331.23

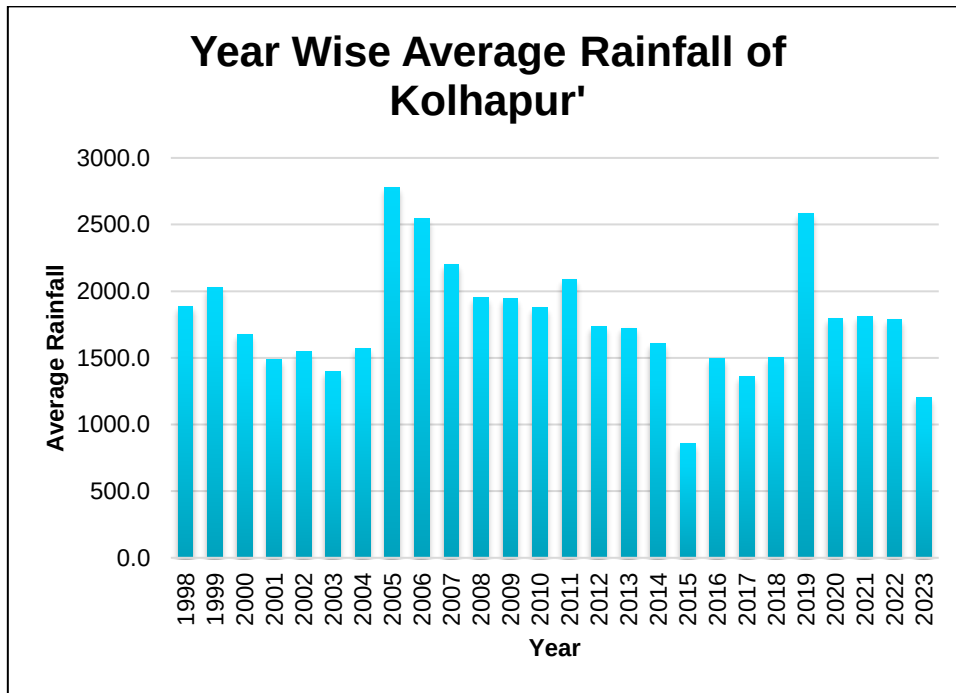


FIG. 4: YEAR WISE AVERAGE RAINFALL OF KOLHAPUR

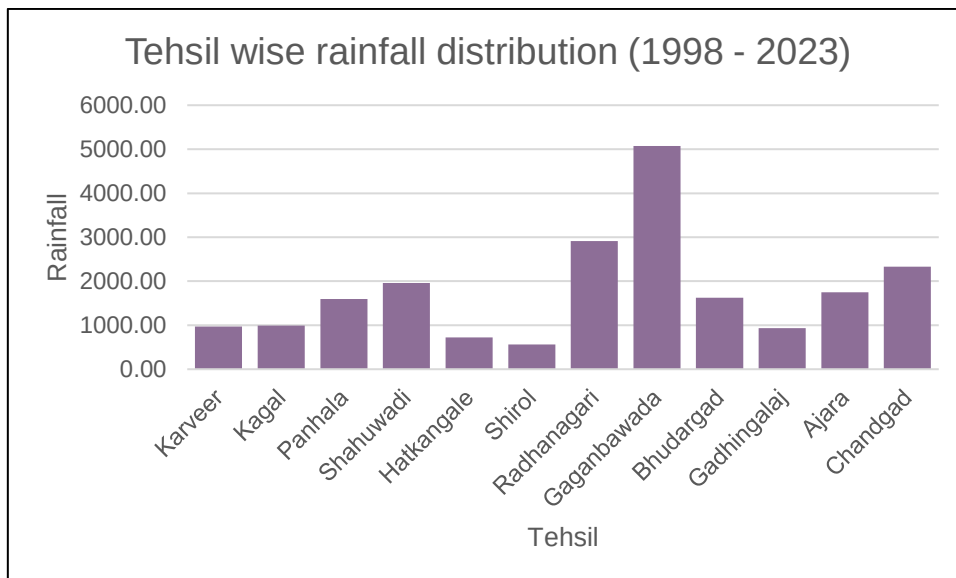


FIG. 5: TEHSIL WISE RAINFALL DISTRIBUTION OF KOLHAPUR (1998 - 2023)

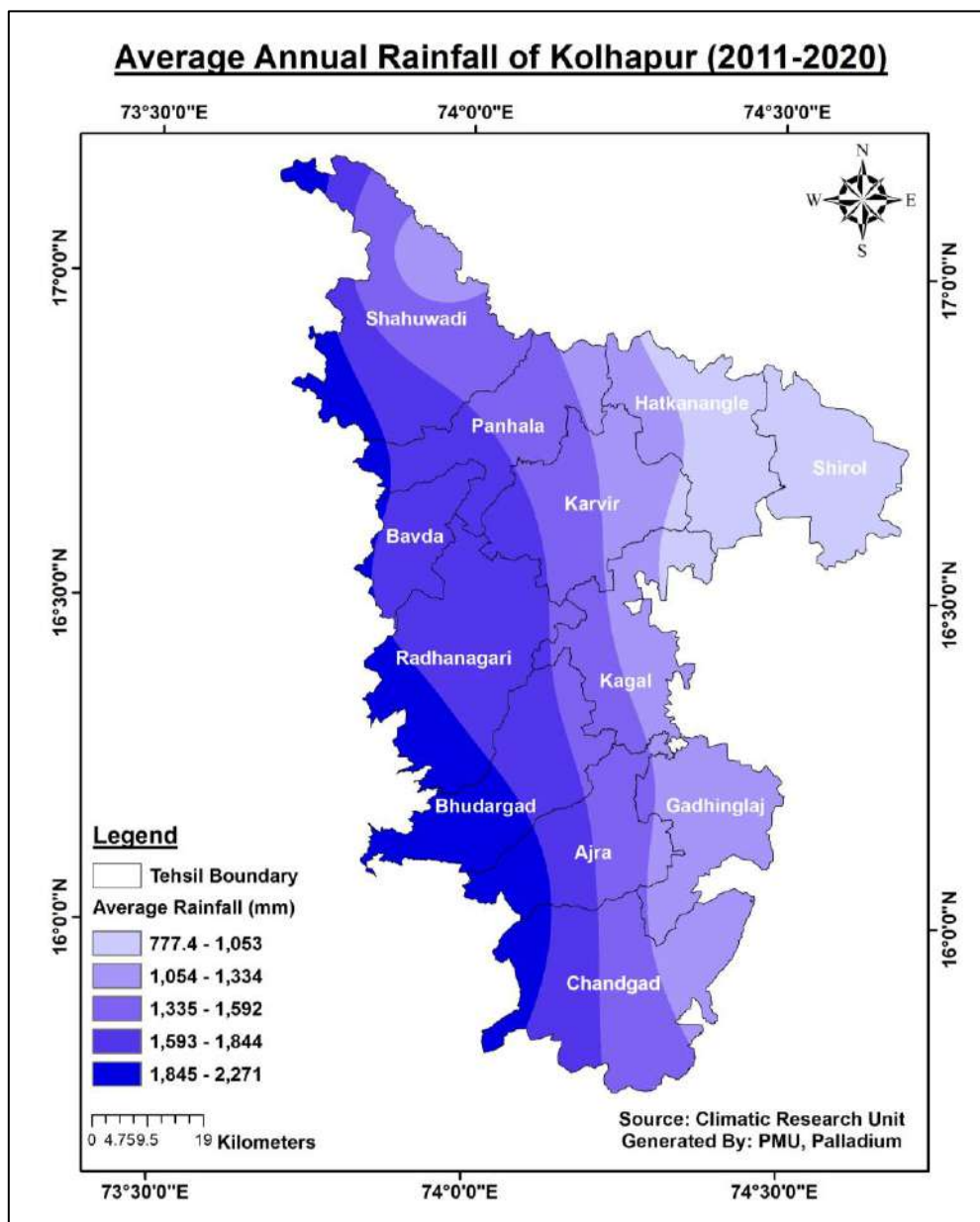


FIG. 6: AVERAGE ANNUAL RAINFALL OF KOLHAPUR (2011-2020)

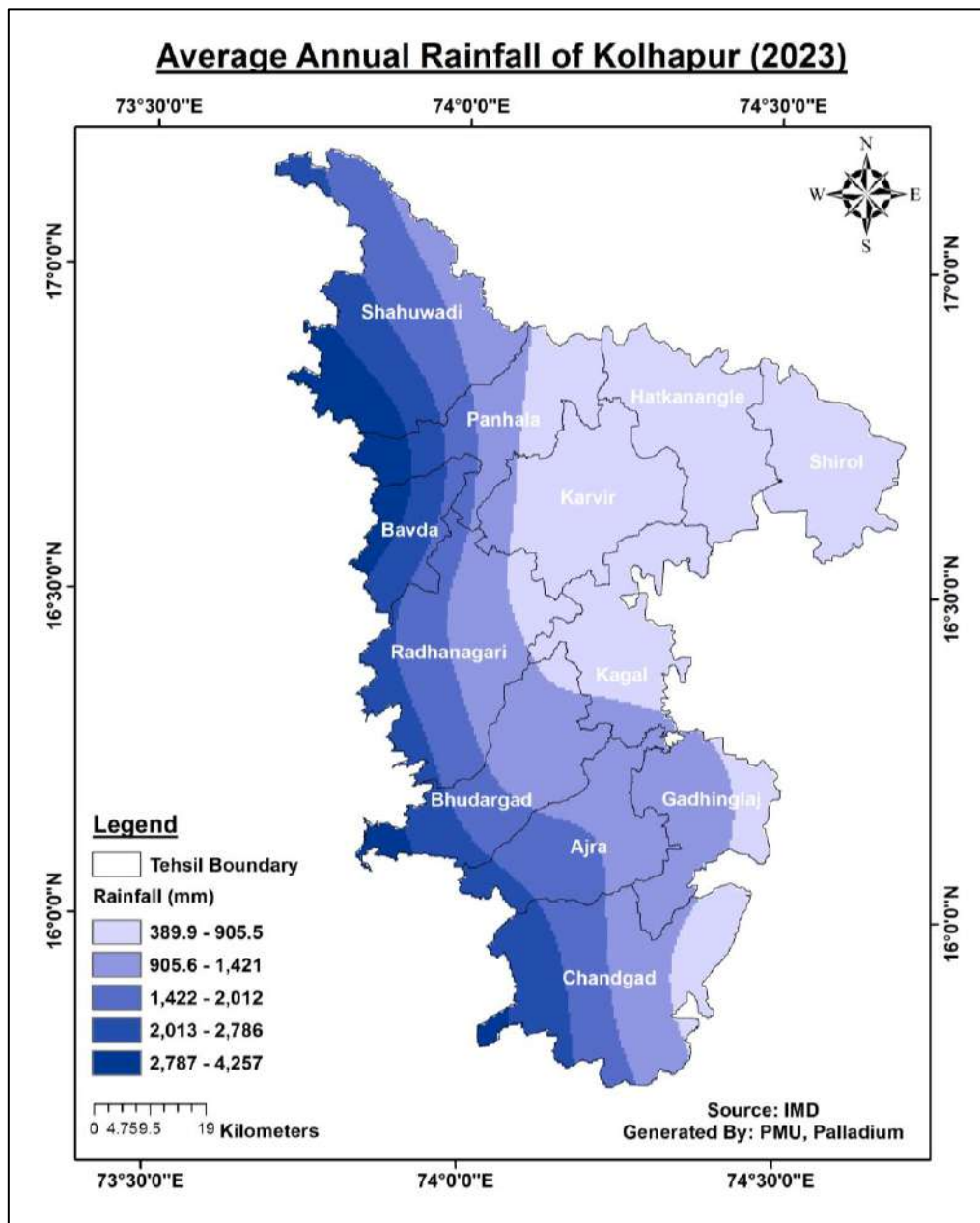


FIG. 7: AVERAGE ANNUAL RAINFALL OF KOLHAPUR (2023)

2.8. HISTORICAL AND RELIGIOUS CENTRES

Kolhapur district in Maharashtra is rich in historical and religious heritage, with numerous centers of cultural significance spread across its talukas. Notably, the Mahalaxmi Temple in Kolhapur city is a major pilgrimage site, drawing around 500,000 devotees annually during the Mahalaxmi Yatra in September. Panhala's Jyotiba Temple and its yatra in April attract around 100,000 visitors. Other significant sites include the Ramling Temple in Gadhinglaj, the Ravalnath Temple in Ajara, and the Narsinhwadi Temple in Kagal, each with their respective yatras drawing thousands of devotees. Chandgad is home to the Mahalaxmi Temple in Jangamwadi, while Radhanagari features the historic Khidrapur Temple. The Pargad Fort in Bhudargad, Vishalgad Fort in Shahuwadi, Panchganga Ghat in Hatkanangle, and Rankala Lake in Karveer also host annual festivals, contributing to the district's vibrant cultural tapestry. These events not only hold religious significance but also enhance the socio-economic fabric of the region by attracting large numbers of pilgrims and tourists.

TABLE 13: DETAILS OF HISTORICAL/RELIGIOUS CENTER AND YATRA OF KOLHAPUR

Taluka	Historical/Religious Center	Yatra Name	Yatra Date	Expected Yatris	Duration (Days)
Kolhapur	Mahalaxmi Temple	Mahalaxmi Yatra	23 Sep	2500000	9
Panhala	Jyotiba Temple	Jyotiba Yatra	7 April	700000	2
Gadhinglaj	Ramling Temple	Ramling Yatra	14 Jan	50000	2
Ajara	Ravalnath Temple	Ravalnath Yatra	1 March	20000	1
Chandgad	Mahalaxmi Temple, Jangamwadi	Mahalaxmi Yatra	12 Dec	30000	2
Shirol	Narsinhwadi Temple	Narsinhwadi Yatra	15 Aug	200000	1
Radhanagari	Khidrapur Temple	Khidrapur Yatra	20 Nov	10000	1
Bhudargad	Pargad Fort	Pargad Yatra	5 May	8000	1
Shahuwadi	Vishalgad Fort	Vishalgad Yatra	10 Oct	15000	1
Hatkanangale	Panchganga Ghat	Panchganga Yatra	15 July	18000	2
Karveer	Rankala Lake	Rankala Utsav	30 June	12000	1

TABLE 14: LOCATION OF RELIGIOUS PLACE IN KOLHAPUR

Religious Place	Location	Latitude	Longitude
Mahalaxmi Temple	Kolhapur	16.7049° N	74.2433° E
Jyotiba Temple	Panhala	16.8206° N	74.1410° E
Ramling Temple	Gadhinglaj	16.0562° N	74.3741° E
Ravalnath Temple	Ajara	16.1084° N	74.2094° E
Mahalaxmi Temple	Jangamwadi, Chandgad	15.9555° N	74.2018° E
Narsinhwadi Temple	Kagal	16.5941° N	74.5871° E
Khidrapur Temple	Radhanagari	16.6036° N	74.6765° E
Pargad Fort	Bhudargad	15.9823° N	74.1244° E
Vishalgad Fort	Shahuwadi	16.8781° N	73.8226° E
Panchganga Ghat	Kolhapur	16.6890° N	74.2240° E
Rankala Lake	Kolhapur	16.6869° N	74.2187° E

2.9. RIVER SYSTEM AND DAMS

A succession of river valleys draining the district towards the east characteristics the landscape of the districts from the Warana valley in the north to the upper tributaries of the Gataprabhain in the south. The Krishna basin is located in the northern part of the district and covers the entire tahsil of Shirol and parts of Hatkanangale and Panhala.

This region has a height of about 600 meters with gradual slopes towards east and south-east. Near the course of the Krishna, the surface is relatively smooth. From the human point of view, these are the most important areas of the district and have fertile soils. The area is well cultivated and densely populated. Therefore, the large settlements are located in this part. The lowland region or plain has only 23.83 percent of the total geographical area and is confined to Shirol, Hatkangle, Karveer, Kagal, and parts of Gadhinglaj tahasils.

The district has a well-developed drainage pattern. The drainage pattern of the district is mostly dendretic and subdendritic. Drainage is the most important single factor that influences the landscape and lives of the people in any region. At some places, major irrigation darns were constricted; a darn on the river Warana and another on Bhogawati, south of Kolhapur, are the major irrigation works.

The Warana

The Warana, which takes its rise in the Sahyadris, about 21 km north of Kolhapur limits, forms the northern boundary of Kolhapur for about 128 km. It flows with a fairly straight south-east course along the border of Malakapur, Panhala, Alate, and Shirol and falls into the Krishna at Haripur, about 1.6 km south-west of Sangli. The sloping banks of the Varna yield good cold-weather crops. It has two chief feeders, the Kansa and Kadavi, in the tahsils of Malkapur and Panahala, respectively. In the fair season, the Varna and its chief feeder, the Kadavi, are fordable, but during the rains, boats ply at five places on the Varna and at three on the Kadavi.

The Panchganga

The Panchganga is formed from north to south of four streams: the Kasari, the Kurnbhi, the Tulshi, and Bhogavati. The fifth stream is the underground Saraswati.

The Kasari is an important stream. It rises in the Sahyadris near the village of Gajapur in Malakapur and flows east for about 80 km till it joins the united waters of the Kurnbhi and the Tulashi at Padli, about 5 km west of Kolhapur. During its course of 80 kms, the Kasari receives several minor streams, of which the chief are the Mangar, the Jarnbhali, and the Gadavali.

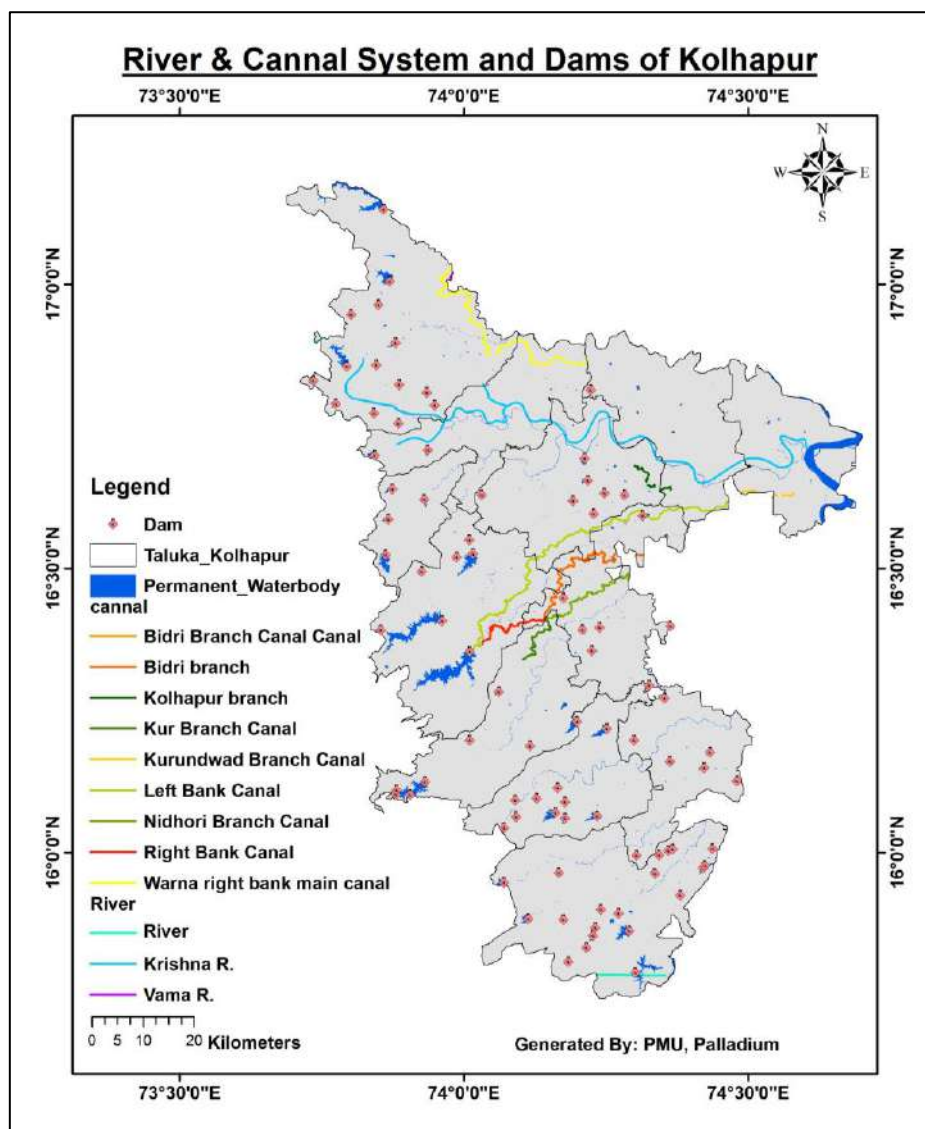


FIG. 8: RIVER AND CANAL SYSTEM AND DAMS OF KOLHAPUR

The Kumbhi rises near Bavada, flows about 24 km north-east, and then, with a winding course, turns east and joins the united Tulashi and Bhogavati near Bahireshtar, about 13 km south-west of Kolhapur.

The Tulshi rises about 8 km east of the Kumbhi and, after a north-easterly course of about 24 km, falls into the Bhogavati about 13 km south-west of Kolhapur.

The Bhogavati, which is the chief of the four streams, takes its rise in the Sahyadris a few kilometers south of the Fonda pass, and after a nearly northerly course of about 45 kilometers, almost parallel to the Phonda road, it joins the Tulsi River near the historical village of Bid. About 3 km north-west of Bid, the Bhogavati receives the Kumbhi, and about 13 km further north, they are joined from the left by the Kasari, about 5 km west of Kolhapur.

From Kolhapur, the Panchganga, as the river is now called, winds about east for about 48 km till it falls into the Krishna at Kurundwad. In the 48 km of its course, to the east of Kolhapur, the Panchganga receives only one considerable stream, the Hatkalangada or Kabnur, which, rising from the Alata hills and passing Hatakalangada and Korochi, joins the Panchganga near Kabnur about 24 km below Kolhapur.

The waters of all these streams, which join to form the Panchganga, are much used for growing sugarcane. In October towards the close of the south-west rains, a series of fair-weather earthen dams are built across the riverbeds, and the water is raised by lift irrigation systems.

The meeting of the Bhogavati and Kasari has much local sanctity, being like Allahabad, known as Prayag or Triveni, and being visited by large numbers of pilgrims during the cold months. The valley of the panchaganga is reckoned the most fertile in Kolhapur and is famous for its hay. The bed of the river is shallow, and its sloping banks yield rich crops during the cold weather.

At Kolhapur, the Panchaganga is crossed by two beautiful idges, one near the Brahamapuri hill on the north side of Kolhapur town on the road leading to the Amba pass, and the other a few kilometers to the east on the Pune Road. The Panchaganga and its feeders are fordable in the hot season. In the rainy season, large and small boats ply twenty-three fords.

The Dudhganga

The Dhudhganga has its source in the Sahyadris near the Nardava pass in the Bhudargad sub-division, about 56 km south-west of Kolhapur. After a course of about 32 km to the north and east near Kagal, where it is bridged, it flows east for about 10 km and about 1.5 km before it receives the Vedganga from the south. It enters Belgaum and flows east about 24 km till it falls into the Krishna near Kallol. The riverbed is shallow and muddy, and in the fair weather, crops are grown on its eastern banks. In Budargad, its water is used for watering sugarcane. Except in the rainy season, the river is at all times fordable. In the rainy season, it is crossed by ferryboats at ten places.

The Vedganga

The Vedganga rises a few kilometers north of Rangana and, after a course of about 61 kilometers to the north-east, joins the Dudhganga in the Chikodi sub-division of Belgaum. Its chief feeder is the Chikotra, which flows through the Kapasi valley and joins it near Chikhali about six kilometers to the south of its meeting with the Dudhganga.

The bed of the Vedganga is shallow and muddy. In Kagal, its banks yield rich crops during the cold season, and in Bhudargad, a large area is watered. The river is bridged near Yamgami on the Poona-Belgaum Road. It is fordable except during the rains, when it is crossed by ferries in nine places.

The Hiranyakeshi

The Hiranyakeshi takes its rise in the Amboli Pass in the extreme south-west of the district. It has an irregular north-east course of about 64 km to near Sankeshvar, where it enters Belgaum, and after a south-easterly course of about 24 km, joins the Ghatprabha about 8 km south-east of Hukeri.

Its bed is shallow, and its banks yield good crops, though not so rich as those grown on the Panchganga. Its chief tributary is the Chitri, which takes its rise near the village of Aundi in the Ajara petty division and, after a northerly course of about 16 km, joins the main streams near the town of Ajara. Two first-class ferries cross these streams, one at Ajara on the Hiranyakeshi on the Amboli road and the other across the Chitri on the Nesri road. First-class ferry boats are also kept at Hitni, Harli, Bhadgaon, and Jarli on the Hiranyakeshi, carrying fifty to seventy passengers and half tons of luggage.

The Ghatprabha

The Ghatprabha takes its rise on the south slopes of the Parpoli pass in the south of the district. It flows about 40 km north-east through the south of the district and about 32 km further to the north-east and joins the Hiranyakeshi about 8 km south-east of Hukeri. During the 40 km of its course through Kolhapur, its banks and bed are rocky. During the rainy season, a small boat carrying eight passengers is kept at Nesri in Gadhinglaj.

The Tamraparni

The river Tamraparni takes its rise in the south-western part of the Chandgad tahasil. It has a very small watercourse and flows from the south-west to the north-east through the southern portion of the tehsil.

The areas of river valleys are economically most important because they have created fertile flood plains and terraces, which are useful for the cultivation of cereals and cash crops in the district.

Moreover, the physical setting of the area is favorable for the construction of Kolhapur-type badharas known as K.T. Weirs. They are well-known in the field irrigation of agriculture that provides facilities of irrigation to the peasants in the respected areas.

The Radhanagari dam (Laxmi Tank), one of the hydroelectric schemes, was constructed on the river Bhogavati. It was started by the former Kolhapur Chhatrapati Shahu Maharaj mainly for the purpose of irrigation and generation of electricity.

2.10. LAND USE LAND COVER PATTERNS

Land Use and Land Cover (LULC) are crucial components in understanding the dynamics of the Earth's surface. Land Use refers to the human utilization of land for various purposes such as agriculture, urban development, forestry, and recreation. It encompasses how land is managed and modified for activities that provide goods and services to society. On the other hand, Land Cover denotes the physical and biological cover over the earth's surface, including vegetation, water bodies, bare soil, and artificial structures.

The study of LULC is essential for numerous applications including environmental management, urban planning, agriculture, forestry, and climate change mitigation. It helps in assessing the impacts of human activities on natural ecosystems and in devising strategies for sustainable development. Accurate LULC data supports decision-making processes by providing insights into patterns and trends over time, enabling effective resource management and conservation efforts. Understanding LULC changes is vital for addressing global challenges such as deforestation, urban sprawl, loss of biodiversity, and water scarcity.

The analysis presents a detailed summary of Land Use and Land Cover (LULC) classifications across various tehsils, measured in hectares (Ha). The LULC classes include Bare Ground, Built-up, Crops, Flooded Vegetation, Rangeland, Tree, and Water.

The land use/land cover (LULC) derived from ESA Sentinel-2 imagery at 10m resolution. Each year is generated from Impact Observatory's deep learning AI land classification model used a massive training dataset of billions of human-labelled image pixels developed by the National Geographic Society. The global maps were produced by applying this model to the Sentinel-2 scene collection on Microsoft's Planetary Computer, processing over 400,000 Earth observations per year.

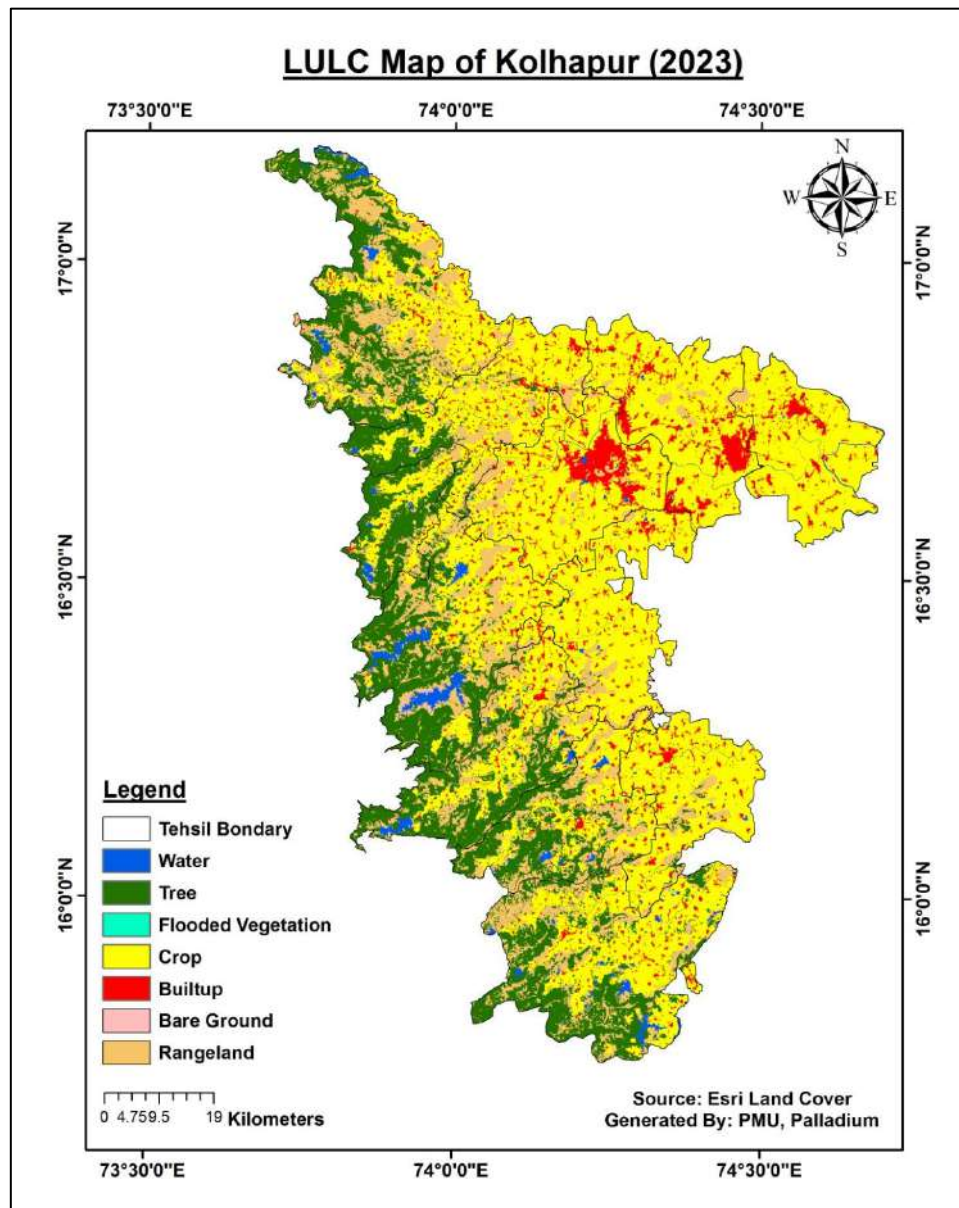


FIG. 9: LULC MAP OF KOLHAPUR (2023)

Overall Observations:

1. Total Area Distribution:

- a. The total area covered by all LULC classes across the tehsils is 767,829.98 hectares.
- b. Crops (393,374.19 Ha) and Trees (168,060.19 Ha) account for the largest portions of land use.

2. Bare Ground and Built-up Areas:

- a. The total area under Bare Ground is minimal at 880.37 hectares.
- b. Built up areas cover 53,838.19 hectares, with Karvir (12,312.58 Ha) having the highest Built-up area among the tehsils.

3. Crops:

- a. Crops dominate the land use, with significant areas in Karvir (47,589.52 Ha), Hatkanangle (48,409.75 Ha), and Shahuwadi (29,801.69 Ha).
- 4. Flooded Vegetation:**
 - a. Flooded Vegetation is negligible, with a total area of only 2.13 hectares spread across various tehsils.
- 5. Rangeland:**
 - a. Rangeland covers a total of 134,688.50 hectares, with the highest area in Shahuwadi (32,010.21 Ha).
- 6. Trees:**
 - a. Tree-covered areas are substantial, with significant areas in Karvir (33,724.95 Ha), Bhudargad (24,628.84 Ha), and Shahuwadi (35,279.08 Ha).
- 7. Water:**
 - a. Water bodies cover a total of 16,986.41 hectares, with the highest area in Shahuwadi (2,565.77 Ha).

TABLE 15: TEHSIL WISE LULC DISTRIBUTION IN KOLHAPUR

Tehsli	Bare Ground Area (Ha)	Built-up Area (Ha)	Crops Area (Ha)	Flooded Vegetation Area (Ha)	Rangeland Area (Ha)	Tree Area (Ha)	Water Area (Ha)
Shahuwadi	4	3367	29802		32010	35279	2566
Chandgad	5	3378	38462		20756	30093	2278
Radhanagari	802	2569	25494	1	20669	33725	4794
Karvir	1	12313	47590	0	5434	402	855
Bhudargad	46	2396	19177	1	15601	24629	1401
Hatkanangle	0	10090	48410		2189	79	566
Panhala	2	3994	33018		8243	10504	552
Kagal	0	4305	44481		4827	420	447
Ajra	6	2088	18396		15513	17006	1197
Shirol	0	5039	43182		765	20	1038
Gadhinglaj	0	3698	37950		4276	1071	569
Bavda	13	601	7413	0	4405	14832	725
Grand Total	880.37	53838.19	393374.19	2.13	134688.50	168060.19	16986.41

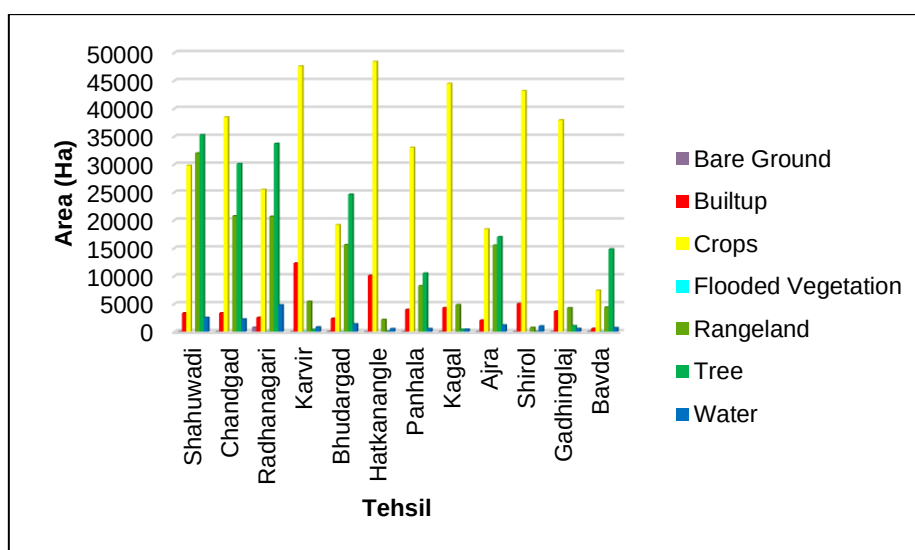


FIG. 10: TEHSIL WISE LULC DISTRIBUTION

Key Insights

- The analysis indicates that agriculture (Crops) and forested areas (Trees) are the predominant land uses across most tehsils, reflecting a strong agricultural economy and significant forest cover.
- Builtup areas, although smaller compared to Crops and Trees, show considerable urbanization, especially in tehsils like Karvir and Chandgad.
- Flooded Vegetation is virtually absent, suggesting limited wetland areas or seasonal flooding.
- Rangeland usage is significant in several tehsils, providing insights into grazing and natural vegetation areas.

2.11. POWER STATIONS AND ELECTRICITY INSTALLATIONS

Kolhapur district's power stations and electricity installations have seen significant development over the years, yet they face several critical challenges. The district relies on both hydroelectric and thermal power plants, with key projects like the Radhanagari and Koyna hydroelectric stations playing crucial roles. However, the increasing demand for electricity, driven by industrial growth and urban expansion, has put substantial pressure on these installations.

For household consumption, which constitutes about 35% of the district's total electricity use, reliable and consistent power supply is crucial. The district has made strides in reducing outages and improving the quality of electricity supplied to residential areas.

The industrial sector is the largest consumer, accounting for approximately 45% of the district's electricity consumption. Kolhapur's robust industrial base, including foundries, textiles, and sugar industries, demands a significant portion of the energy produced. This sector's high energy needs necessitate continuous upgrades and efficient power management to avoid disruptions that could impact productivity.

Agriculture, an essential part of Kolhapur's economy, consumes around 20% of the district's electricity. The region's farms rely heavily on electric pumps for irrigation, especially during the dry season. Ensuring an uninterrupted power supply to agricultural installations is vital for maintaining crop yields and supporting the livelihood of many farmers.

Despite the district's efforts to diversify its energy sources, including the addition of solar installations, the overall capacity still falls short during peak demand periods. Statistics reveal that while the district has an installed capacity of approximately 500 MW, the peak demand often exceeds 600 MW, leading to periodic load shedding and power outages. Moreover, the aging infrastructure of some of the older thermal power plants hampers efficiency and reliability, necessitating urgent upgrades and maintenance.

Furthermore, the hydroelectric projects, while significant, are susceptible to fluctuations in water availability due to seasonal variations and climate change, affecting their output. The integration of renewable energy sources, such as solar power, is progressing but not at a pace sufficient to offset the district's growing energy needs. To address these issues, Kolhapur district must focus on modernizing its power infrastructure, enhancing the capacity of renewable energy installations, and implementing robust energy management systems to ensure a stable and sustainable power supply.

2.12. TRANSPORT AND COMMUNICATION NETWORK

The transportation system is essential for the development of agro-based industries. It has an important role in the movement of people and goods from one place to another. Raw materials and fuel are brought to the factory site by quick transport.

The location of manufacturing is greatly influenced by the availability of transportation facilities. Railways and roads are the nerves and veins of the region. The development of the region in all the fields depends upon the transportation facilities available within the region. For industrial development, infrastructure of means of transportation is pre-requisite.

The district headquarters, i.e., Kolhapur, has been joined to Mumbai by a broad-gauge railway line of the south-central division of Indian railways. There are six railway stations with 37.68 km. of railway line. Daily train services are available from Mumbai and many other important places to Kolhapur. The district enjoys a good system of communication facilities by bus routes. The district had 7876 km of Road length. The classes of roads have been shown: the national highway, state highway, district road, other roads, and rural road network. These provide infrastructure facilities for the quick and efficient transportation of goods, passengers, customers, and trades, within and outside the district.

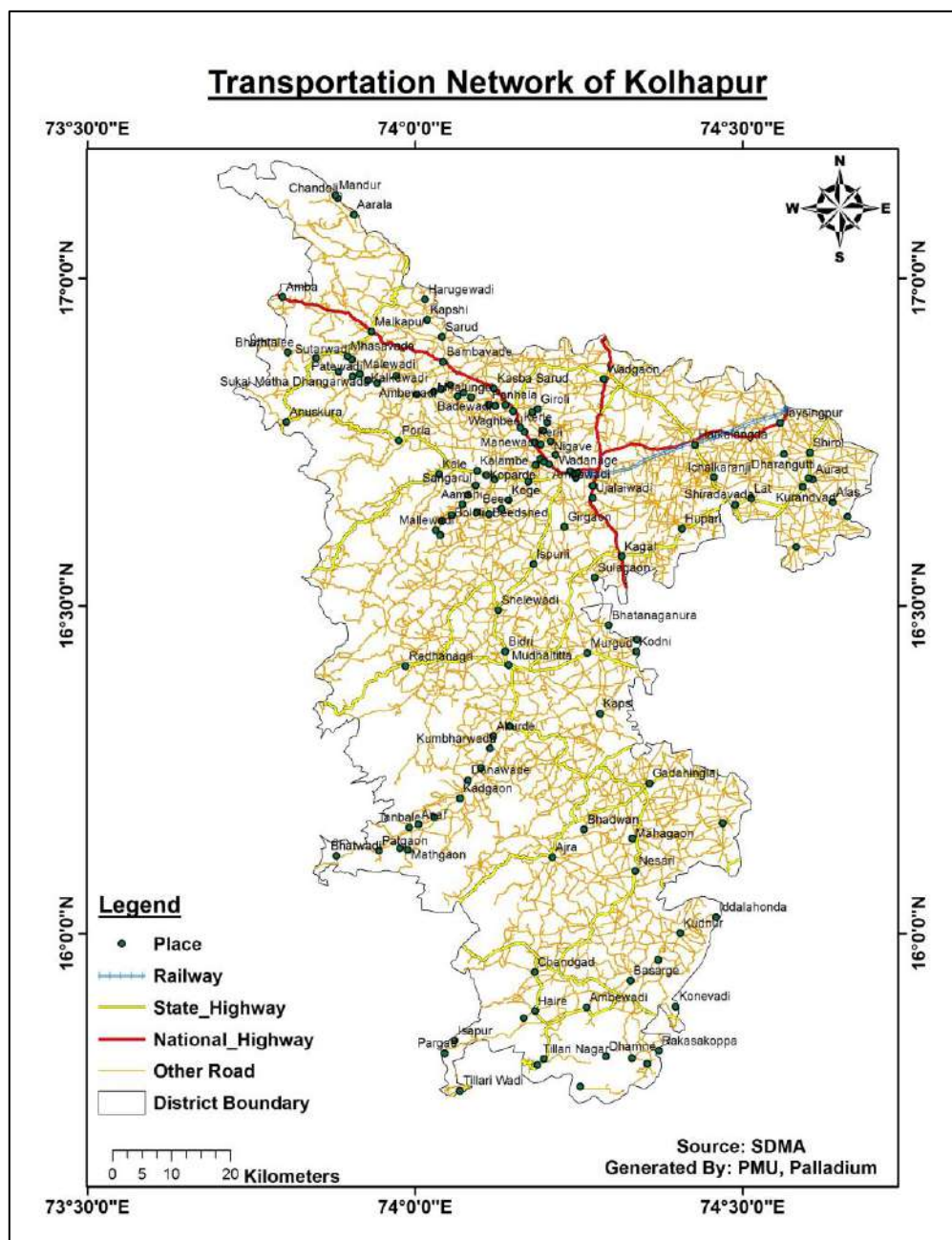


FIG. 11: TRANSPORTATION NETWORK OF KOLHAPUR

➤ **National Highways**

The national highway (NH4), i.e., Pune-Bangalore Road, passes through the region. The total length of the national highway within the district is about 131 km.

➤ **State Highway**

The total length of the state highway within the jurisdiction of the district is about 824 Kms. They run between Kolhapur-Ratnagiri, Kolhapur-Phonda-Sawatwadi, Kolhapur-Sawantwadi, and Kolhapur-Sangli.

➤ **Major District roads**

District roads provide transportation facilities within the district. The total length of the district roads is about 1645 km.

➤ **Other roads**

They are approach roads connecting villages and towns in the district. They are designed to serve the tools and marketplaces. This category of roads has 2163 km. Length in the district.

➤ **Village and other roads**

There are 1139 villages joined with pucca approach roads in the rural area of the district. Village roads are 3104 Kms. in length and are the rural lifeline of the rural landscape in the district.

3. HAZARD RISK ASSESSMENT AND VULNERABILITY ANALYSIS

3.1. HAZARD HISTORY AND IMPACT IN THE LAST 15 YEARS

3.1.1. Flood:

Kolhapur district has a history of significant flood events, largely due to its geographical positioning along major rivers like the Panchganga, Warna, and Krishna. The district is prone to monsoonal flooding, often exacerbated by heavy rainfall in the Western Ghats and the release of water from upstream dams. Notable flood events, such as those in 2005 and 2019, caused widespread damage to agriculture, infrastructure, and livelihoods, affecting thousands of people. The 2019 floods, in particular, were among the worst in recent history, with large parts of Kolhapur inundated for days, leading to severe economic losses and displacement. These recurring floods have highlighted the need for improved water management, flood forecasting, and infrastructural resilience in the district.

TABLE 16: FLOOD AFFECTED VILLAGES OF KOLHAPUR

Sr.No.	Taluka	River	Villages	Total
1	Radhanagari	Bhogavati	1. Fejivade 2. Padali 3. Radhanagri 4. Gudal 5. Gudalwadi 6. Anaje 7. Avalibudruk 8. Ghotavade	8
		Dudhganga	1. Titave 2. Saravade 3. Kasabavalave	3
2	Karveer	Bhogavati	1. Haladi 2. Arye 3. Balinga, 4. Nagadevwadi 5. Sabalewadi 6. Khupire 7. Shindewadi 8. Hanamantwadi	8
		Kumbhi	1. Padalikhurd	1
		Kasari	1. Nitawade 2. Kerle 3. Karlye, 4. Waranage	4
		Panchaganga	1. Ckikali 2. Shiganapur 3. Kolhapur city, 4. Vadanage 5. Nigave 6. Kasaba bavada, 7. Bhuye 8. Ambewadi 9. Sheye 10. Valevade	10
3	Panhala	Kasari	1. Bajarbhogaon	1
		Kumbhi	1. Kale 2. Malharpeth 3. Savarde, 4. Bhamate 5. Tandulwadi 6. Akarde 7. Gate 8. Aajgaon 9. Parkhandle 10. Gahrpan	10
4	Gaganbavada	Kumbhi	1. Andur 2. Khokurle 3. Margewadi, 4. Nivade 5. Salavan 6. Mandulkali-padaulwadi 7. Vetavade	7
5	Kagal	Dudhganga	1. Vandur 2. Siddhernerli 3. Salkud 4. Bamani 5. Karnur 6. Sharkarwadi 7. Yekunde	7
		Vedganga	1. Nidhori 2. Kurukali 3. Banage, 4. Chikali	4
6	Shirol	Dudhganga	1. Duddawad 2. Danwad	2
		Warana	1. Kavathesar 2. Danoli 3. Ganeshwadi	3
		Panchaganga	1. Shirai 2. Herwad 3. Ghalwad 4. Bastwad 5. Ganeshwadi 6. Takavade 7. Nadani, 8. Shirdwad 9. Shirdhon 10. Abdullat, 11. Terwad 12. Rendal	12
		Krushna	1. Ghalwad 2. Bastwad 3. Ganeshwadi 4. Khothali 5. Akkiwad 6. Shelshal 7. Alas 8. Dharngutthi 9. Umalwad 10. Kanwad 11. Rajapur 12. Kawathebulund 13. Udgaon 14. Hassur 15. Khidrapur 16. Gaurwad 17. Chinchwad 18. Shirti 19. Majarewadi 20. Aurwad 21. Arjunwad 22. Narshinwadi 23. Kuthwad	23
7	Bhuradgad	Vedganga	1. Patgaon 2. Shengaon 3. Khanapur	3
8	Shahuwadi	Warna	1. Sondoli 2. Thergaon	2
		Kadavi	1. Malakapur 2. Patane	2
		Kasari	1. Karanifen	1

Sr.No.	Taluka	River	Villages	Total
9	Hatkanalange	Warana	1. Nilewadi 2. Pargaon 3. Chavare 4. Ghunaki 5. Keni 6. Bhadole 7. Latavade 8. Bhendavade 9. Kochi 10. Wathar-udgaon 11. Kumbhoj 12. Hingangaon	12
		Panchaganga	1. Shirol-pulachi 2. Ingali 3. Rui 4. Chandur 5. Rangoli 6. Hupari 7. Ichalkaranji 8. Halondi	8
Total				129

3.1.2. Earthquakes:

Kolhapur district in Maharashtra, while not being in one of India's most seismically active zones, has experienced several notable earthquakes throughout its history. The region lies in a moderate seismic zone (Zone III), which means that it is susceptible to earthquakes of moderate intensity. Historical records show that the district has experienced tremors, particularly linked to the seismic activity in the Western Ghats and the Deccan Plateau. One of the significant earthquakes that impacted Kolhapur was the Koyna earthquake in 1967, which had a magnitude of 6.5 on the Richter scale. Although the epicentre was near the Koyna Dam, the effects were felt across the district, causing damage to infrastructure and minor casualties. The earthquake highlighted the seismic vulnerability of the region and led to increased awareness and implementation of earthquake-resistant construction practices in Kolhapur. Overall, while the district has not faced catastrophic seismic events frequently, its historical experiences underline the importance of preparedness and resilience against potential future quakes.

TABLE 17: EARTHQUAKE HISTORY OF KOLHAPUR

Tehsil	Village	Date	Time	Magnitude
Karvir	Parite	2011/02/05	19:27:49	3.1
Karvir	Ganeshwadi	2021/09/04	23:49:34	4.0
Shauwadi	Nivale	2000/09/06	16:39:20	3.2
Shauwadi	Nivale	2005/06/15	16:44:00	3.1
Shauwadi	Nivale	1984/09/25	13:15:35	4.2
Shauwadi	Chandel	2000/04/28	04:51:43	3.9
Shauwadi	Dhakale	2007/01/21	12:36:02	3.5
Shauwadi	Chandel	2000/09/05	09:44:25	3.0
Shauwadi	Chandel	2007/11/24	18:05:27	3.9
Shauwadi	Chandel	2000/09/05	08:29:11	3.4
Shauwadi	Dhakale	2009/11/14	18:33:34	4.8
Shauwadi	Dhakale	2007/12/30	16:41:56	3.0
Shauwadi	Tanali	2009/12/12	17:21:25	5.0
Shauwadi	Karde	2000/07/01	22:31:28	3.5
Shauwadi	Dhakale	2007/11/24	19:41:27	3.2
Shauwadi	Dhakale	2011/04/01	20:06:49	3.2
Shauwadi	Dhakale	2000/09/29	02:00:53	3.0
Shauwadi	Chandel	2007/08/21	00:45:53	4.3
Shauwadi	Chandel	2000/05/25	11:32:16	3.3
Shauwadi	Chandel	2005/04/18	06:30:35	3.2
Shauwadi	Durgawadi	2000/03/12	23:33:53	5.3
Shauwadi	Durgawadi	2000/03/13	00:19:17	3.3
Shauwadi	Sonarli	2006/04/17	22:10:00	4.5
Shauwadi	Sonarli	2015/08/25	15:47:04	3.9
Shauwadi	Sonarli	2005/11/13	09:26:08	3.8

Tehsil	Village	Date	Time	Magnitude
Shahuwadi	Sonarli	2004/06/20	07:15:12	3.0
Shahuwadi	Sonarli	2009/12/23	09:19:29	3.8

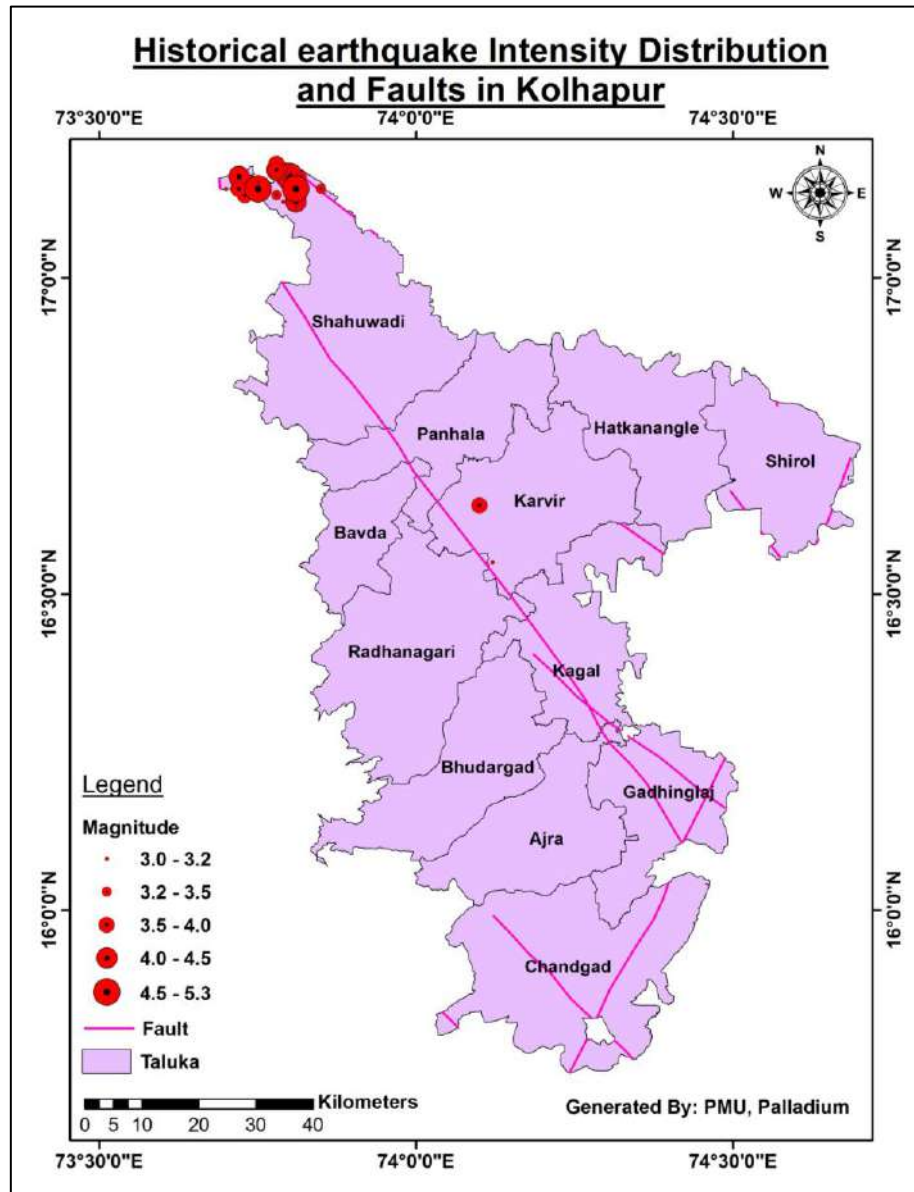


FIG. 12: HISTORICAL EARTHQUAKE INTENSITY DISTRIBUTION AND FAULTS IN KOLHAPUR

3.1.3. Landslide:

Kolhapur has a history of landslides, especially in its hilly and mountainous regions. The talukas most affected by landslides include Gaganbawada, Panhala, Shahuwadi, and Chandgad. These areas, characterized by steep slopes and heavy monsoon rainfall, are prone to frequent landslides. Gaganbawada taluka, located in the Sahyadri range, is particularly susceptible due to its rugged terrain and the presence of loose soil. Panhala and Shahuwadi talukas have also witnessed landslides, often triggered by deforestation and unplanned construction activities. Chandgad, being close to the Western Ghats, experiences landslides during intense monsoon seasons, leading to road blockages and damage to infrastructure. The landslide history in these talukas has prompted local authorities to implement various preventive measures, though the risk remains significant due to the district's geographical features and climate conditions.

TABLE 18: LANDSLIDE HISTORY OF KOLHAPUR

Longitude	Latitude	Year	Triggering Factor	Activity	Slide Materials	Move ment
73.866665	17.021181	2017	Anthropogenic & Rainfall	Suspended	Debris	Fall
73.868439	17.021994	2017	Anthropogenic & Rainfall	Active	Debris	Slide
73.868611	17.021389	2017	Anthropogenic	Dormant	Debris	Slide
73.870172	17.019539	2017	Anthropogenic & Rainfall	Dormant	Debris	Slide
73.887741	17.091453	2017	Anthropogenic & Rainfall	Dormant	Debris	Slide
73.942703	17.062010	2017	Anthropogenic & Rainfall	Active	Debris	Slide
73.946716	17.034441	2017	Anthropogenic & Rainfall	Active	Debris	Slide
73.951036	17.050057	2017	Anthropogenic & Rainfall	Suspended	Debris	Fall
73.783264	16.984481	2017	Anthropogenic & Rainfall	Suspended	Rock	Fall
73.789842	16.974944	2017	Anthropogenic & Rainfall	Suspended	Debris	Slide
73.855544	17.042582	2017	Anthropogenic & Rainfall	Active	Debris	Fall
73.859669	16.992642	2017	Rainfall	Active	Soil	Creep
73.858692	17.023869	2017	Anthropogenic & Rainfall	Suspended	Debris	Slide
73.860713	17.032956	2017	Anthropogenic & Rainfall	Suspended	Debris	Fall
73.861928	17.023726	2017	Anthropogenic	Suspended	Soil	Fall
73.861919	17.025375	2017	Anthropogenic & Rainfall	Active	Debris	Slide
73.862000	17.027600	2017	Anthropogenic & Rainfall	Active	Debris	Slide
73.864444	17.022500	2017	Anthropogenic	Suspended	Soil	Slide
73.866188	16.991083	2017	Anthropogenic & Rainfall	Suspended	Soil	Slide
73.866512	16.992226	2017	Rainfall	Suspended	Soil	Slide
73.866012	17.021713	2017	Anthropogenic & Rainfall	Suspended	Soil	Fall
73.799639	16.860222	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide
73.801528	16.868667	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide
73.825000	16.543000	2017	Rainfall	Dormant	Debris	Slide
73.843022	16.966550	2017	Rainfall	Suspended	Debris	Slide
73.843339	16.965475	2017	Rainfall	Active	Soil	Creep
73.867760	16.884945	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide
73.892000	16.560000	2016	Rainfall	Dormant	Debris	Slide
73.942333	16.949944	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Fall
73.958000	16.657000	2016	Rainfall	Dormant	Earth	Slump
74.011000	16.586000	2015	Rainfall	Active	Earth	Creep
74.017000	16.650000	2015	Rainfall	Active	Debris	Slide
74.034000	16.600000	2015	Rainfall	Dormant	Earth	Creep
74.064000	16.633000	2015	Rainfall	Active	Debris	Slide
74.136556	16.872083	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide
74.035000	16.433000	2015	Rainfall	Reactivated	Debris	Slide
74.079000	16.460000	2015	Rainfall	Active	Debris	Slide
73.959000	16.469000	2015	Rainfall	Active	Debris	Slide
73.956000	16.470000	2015	Rainfall	Active	Debris	Slide
73.909000	16.521000	2016	Rainfall	Dormant	Debris	Slide
73.847000	16.540000	2016	Rainfall	Reactivated	Debris	Slide

Longitude	Latitude	Year	Triggering Factor	Activity	Slide Materials	Move ment
74.038000	16.251000	2015	Rainfall	Reactivated	Debris	Slide
74.137000	16.256000	2015	Rainfall	Reactivated	Debris	Slide
74.136000	16.256000	2015	Rainfall	Reactivated	Debris	Slide
74.038000	16.254000	2015	Rainfall	Reactivated	Earth	Slide
74.039000	16.255000	2015	Rainfall	Reactivated	Debris	Slide
73.892000	16.343000	2015	Rainfall	Dormant	Debris	Slide
74.043000	16.375000	2015	Rainfall	Active	Debris	Slide
73.870000	16.396000	2015	Rainfall	Suspended	Debris	Slide
73.875000	16.399000	2015	Rainfall	Suspended	Debris	Fall
74.040000	16.420000	2015	Rainfall	Active	Debris	Slide
74.078611	16.149444	2017	Anthropogenic & Rainfall	Active	Debris	Slide
74.078889	16.188056	2017	Anthropogenic & Rainfall	Active	Debris	Slide
74.081667	16.190556	2017	Anthropogenic & Rainfall	Active	Debris	Slide
74.048056	15.824444	2017	Rainfall	Stabilized	Rock cum debris	Slide
74.049444	15.824722	2017	Rainfall	Stabilized	Rock cum debris	Slide
74.056389	15.825472	2017	Anthropogenic & Rainfall	Stabilized	Debris	Slide
74.057500	15.825556	2017	Anthropogenic & Rainfall	Suspended	Debris	Slide
74.062778	15.844722	2017	Anthropogenic & Rainfall	Active	Rock cum debris	Subsidence
74.154167	15.948889	2017	Anthropogenic & Rainfall	Active	Debris	Slide
74.156944	15.955556	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide
74.246667	15.961667	2017	Rainfall	Active	Rock cum debris	Fall
74.167222	15.802500	2017	Anthropogenic	Stabilized	Rock	Fall
74.162500	15.804167	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide
74.160556	15.804722	2017	Anthropogenic & Rainfall	Stabilized	Rock cum debris	Slide
74.165000	15.806667	2017	Anthropogenic & Rainfall	Suspended	Rock cum debris	Slide

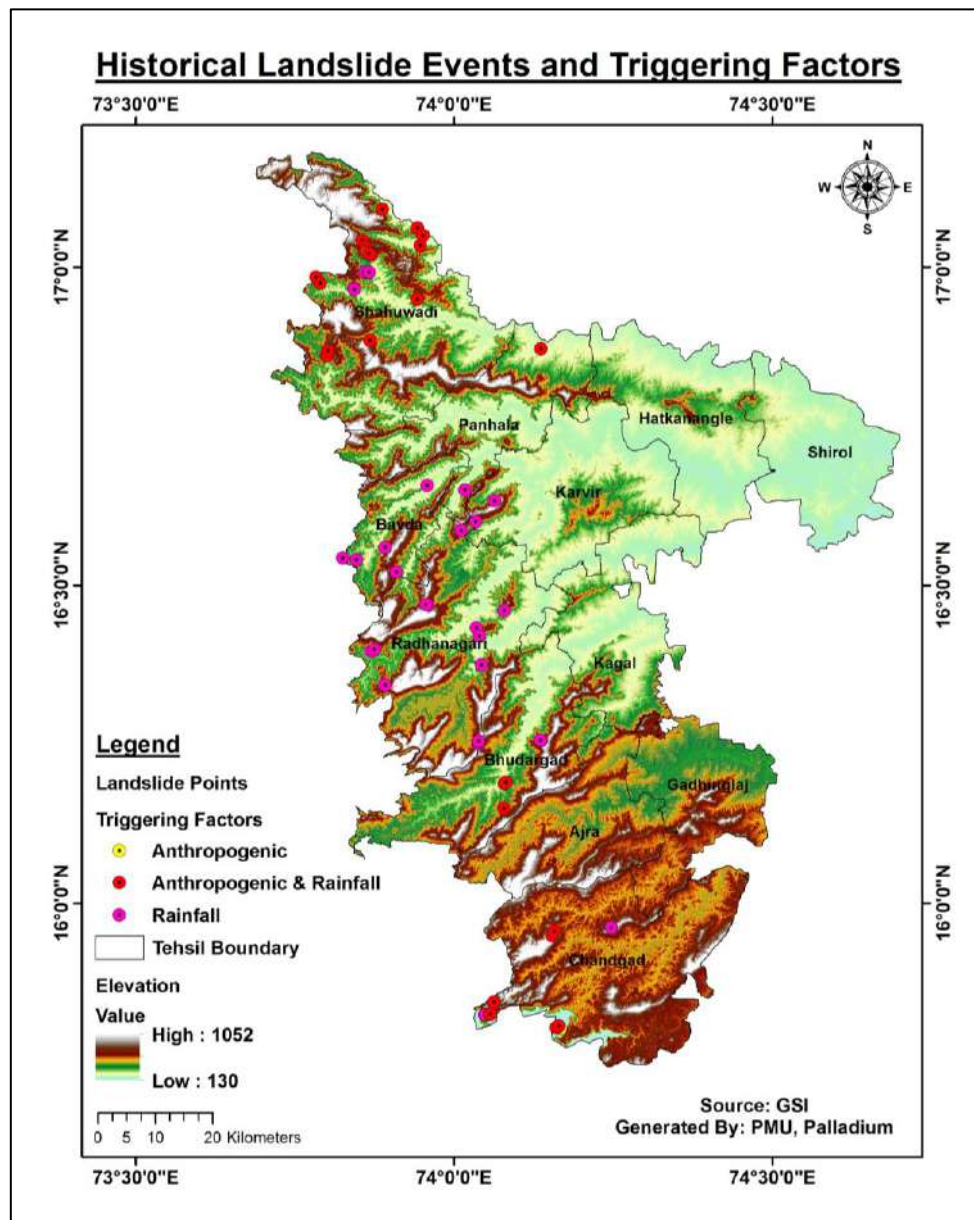


FIG. 13: HISTORICAL LANDSLIDE EVENTS AND TRIGGERING FACTORS IN KOLHAPUR

3.1.4. Cyclone:

Kolhapur has a relatively limited history of direct cyclone impact compared to coastal regions. However, it has experienced the effects of cyclones that have made landfall on the western coast of India, particularly in recent years. Cyclones like Nisarga (2020) and Tauktae (2021) impacted Kolhapur indirectly, bringing heavy rainfall, strong winds, and flooding. These cyclones disrupted daily life, causing damage to crops, homes, and infrastructure, especially in vulnerable talukas like Shahuwadi and Gaganbawada, which are closer to the Western Ghats. While Kolhapur is not directly in the path of most cyclones, the increasing intensity of these storms due to climate change has heightened the district's vulnerability to secondary effects like torrential rains and floods, which can lead to significant agricultural losses and displacement of residents.

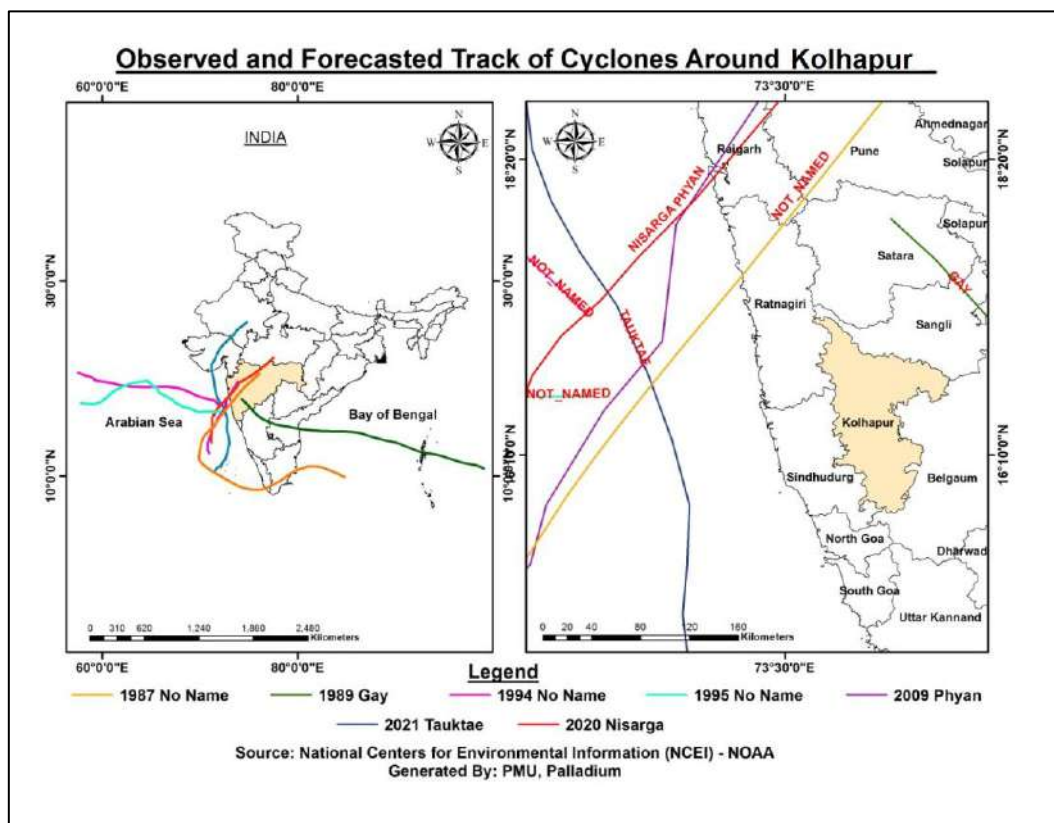


FIG. 14: OBSERVED AND FORECASTED TRACK OF CYCLONE AROUND KOLHAPUR

The details of human and animal deaths due to natural disaster during the financial years 2023-2024 are as follows:

TABLE 19: DETAILS OF HUMAN AND ANIMAL DEATHS DUE TO NATURAL DISASTER DURING THE FINANCIAL YEARS 2023-2024

Name of the Disaster	Human deaths	Animal deaths
Flood	0	10
Landslide	0	0
Lightning	2	1
Cyclone	1	1
Earthquake	0	0
Cloudburst	0	0
Hailstorm	0	0

3.2. SEASONALITY OF DISASTERS

TABLE 20: SEASONALITY OF DISASTER

Disaster	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Earthquake												
Floods												
Cyclones												

Disaster	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Landslide												
Heatwave												
Epidemics												
Industrial and chemical accidents												
Fires												
Road accidents												
Lightning												
Drought												

3.3. HAZARD PROFILE OF THE DISTRICT

TABLE 21: HAZARD PROFILE OF KOLHAPUR

Hazard	Frequency (Years)	Probability Rank	Probability Level
Natural Hazard			
Flood	1	3	Almost Certain
Cyclone	5	2	Possible
Landslide	5	2	Possible
Earthquake	34	1	Rare
Heatwave	0	0	Rare
Drought	50	1	Rare
Wildfire	5	2	Possible
Storm Surge	0	0	Rare
Tsunami	0	0	Rare
Epidemic	5	2	Possible
Cloud Burst	1	3	Almost Certain
Lightning	1	3	Almost Certain
Pest Attack	0	0	Rare
Hailstorm	5	2	Possible
Wild Animal Attack	1	3	Almost Certain
Technological Hazards			
Electrical Failure	1	3	Almost Certain
Generator Failure	1	3	Almost Certain
Transportation Failure	1	3	Almost Certain
Fuel Shortage	0	0	Rare
Communications Failure	1	3	Almost Certain
Information Systems Failure	3	2	Possible
Fire	1	3	Almost Certain
Hazmat Exposure	5	2	Possible
Supply Shortage Failure	0	0	Rare
Structural Damage	1	3	Almost Certain
Human Hazard			

Hazard	Frequency (Years)	Probability Rank	Probability Level
Stampede	0	0	Rare
Drowning	1	3	Almost Certain
Mass Casualty Incident (trauma)	1	3	Almost Certain
Mass Casualty Incident (medical/infectious)	1	3	Almost Certain
Biological	1	3	Almost Certain
VIP Situation	0	0	Rare
Hostage Situation	0	0	Rare
Civil Disturbance	0	0	Rare
Missing Resident	0	0	Rare
Bomb Threat	0	0	Rare
Hazardous Materials			
Mass Casualty Hazmat Incident (<i>From historic events at your LTC with >= 5 victims</i>)	1	3	Almost Certain
Small Casualty Hazmat Incident (<i>From historic events at your LTC with < 5 victims</i>)	1	3	Almost Certain
Chemical Exposure	1	3	Almost Certain
Terrorism, Chemical	0	0	Rare
Radiologic Exposure, External	0	0	Rare
Terrorism, Radiologic	0	0	Rare

3.4. Hazard Mapping

3.4.1. Flood

Flood Impact on Villages:

- Panhala, Hatkanangale, and Radhanagari are the most significantly affected tehsils, with Panhala alone accounting for 73 affected villages. This suggests a high concentration of flood-prone areas within these tehsils, indicating possible geographical vulnerabilities, such as proximity to rivers or low-lying areas prone to flooding.
- Gaganbavda stands out as the least affected with only 4 villages impacted, possibly due to geographical advantages like higher elevation or effective flood management systems.

Flood Impact on Area:

- The flood has affected a total of 18,846.42863 hectares across the tehsils, with Shirol bearing the brunt, having 4,832.47167 hectares submerged or otherwise impacted. This could imply that Shirol has large tracts of agricultural land or other areas highly susceptible to flooding, which could have severe implications for the local economy, particularly agriculture.
- In contrast, Gaganbavda has the smallest affected area (148.642935 hectares), correlating with the low number of affected villages, further emphasizing its relative resilience to flooding.

Key Insights:

- The disparity between the number of affected villages and the area affected suggests that some tehsils, like Shirol, experience more extensive flood damage over larger areas, while others like Panhala may have more affected villages but over smaller or concentrated areas.

- The graph highlights the need for targeted flood mitigation strategies, particularly in heavily affected tehsils like Shirol and Panhala, to reduce future vulnerabilities.

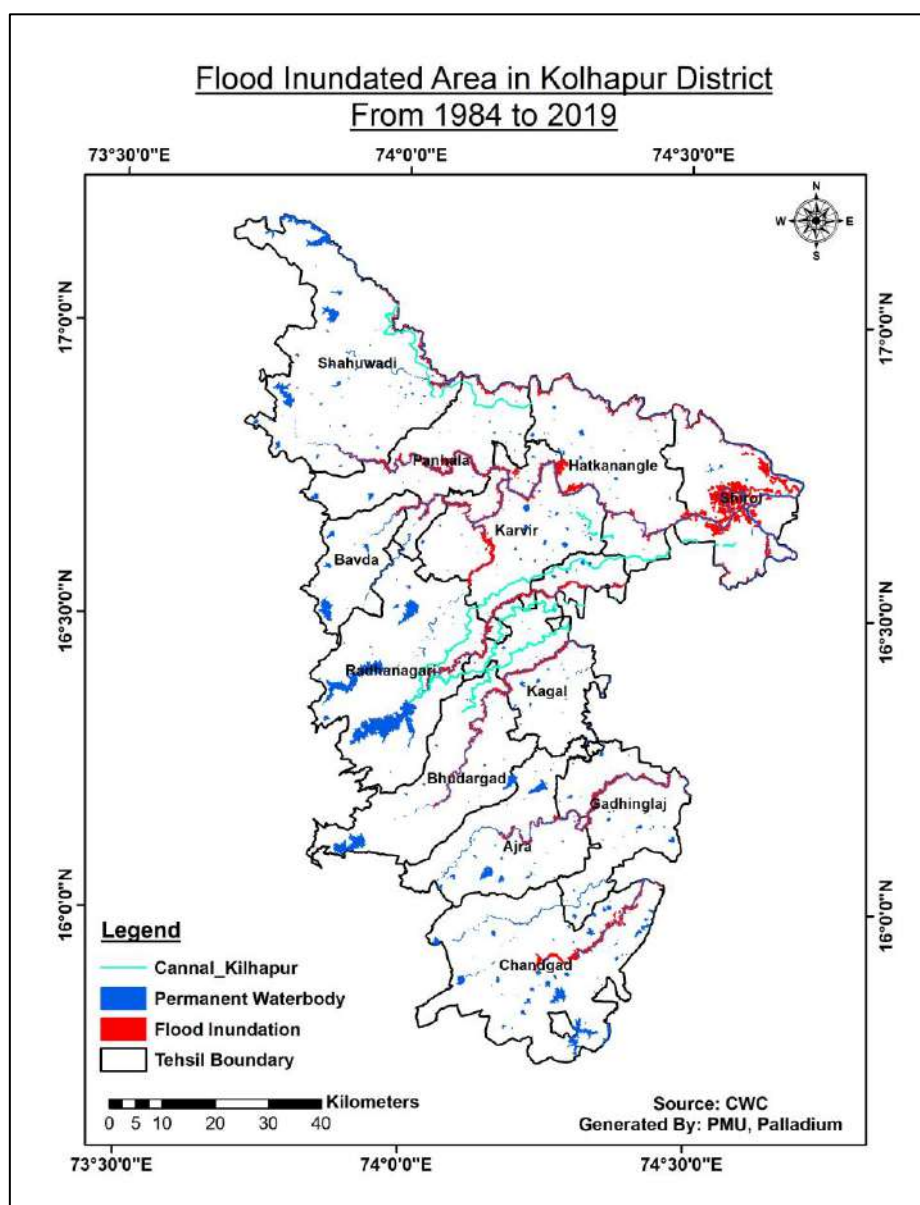


FIG. 15: FLOOD INUNDATED AREA IN KOLHAPUR (1984 - 2019)

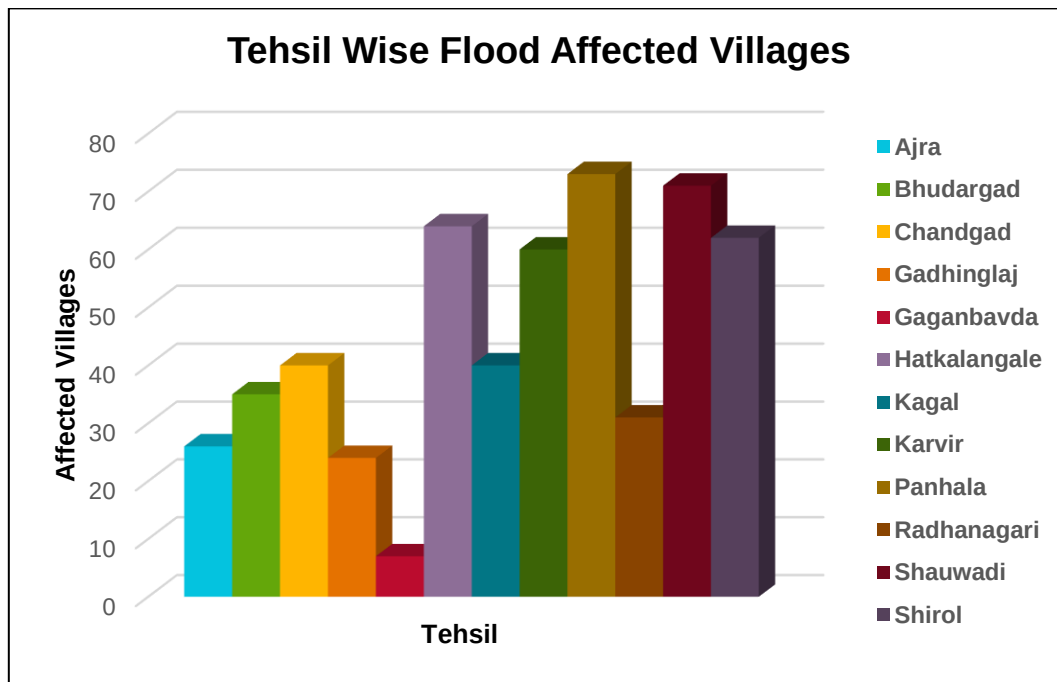


FIG. 16: TEHSIL WISE FLOOD AFFECTED VILLAGES

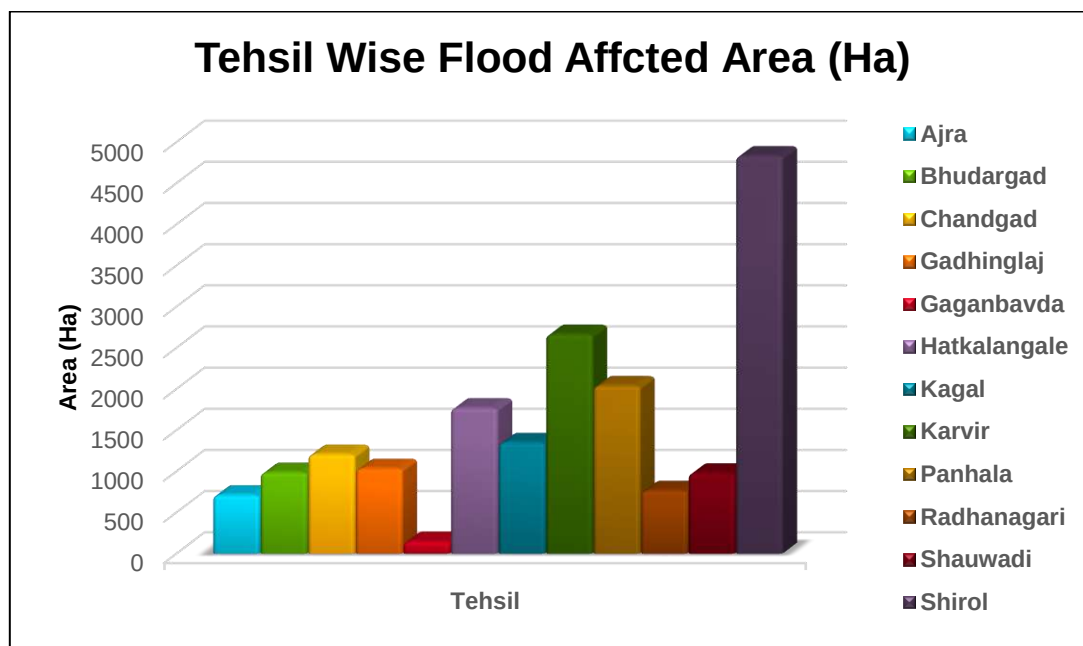


FIG. 17: TEHSIL WISE FLOOD AFFECTED AREA

3.4.2. Landslide

3.4.2.1 Landslide Susceptibility as per IIT Delhi

The landslide susceptibility assessment classified into different susceptibility levels: Safe, Low, Medium, High, and Very High. The key observations are:

Areas with High and Very High Susceptibility:

- Radhanagri and Shahuwadi has the highest area under Very High susceptibility (15,891.23 ha and 13,678.26 ha), indicating a significant risk of landslides in this tehsil.

- Chandgad also has a substantial area under Very High susceptibility (11,772.31 ha), making it another high-risk region.

Areas with Safe Zones:

- Gadhinglaj tehsil has the highest area classified as Safe (34,999.86 hectares).
- Hatkanangale also has a considerable area classified as Safe (60,956.94 hectares), making it one of the safer tehsils in terms of landslide risk.

Areas with Moderate to High Susceptibility:

- Shahuwadi and Radhanagri have large areas classified under High susceptibility (34,586.88 ha and 25,675.92 ha respectively).
- Chandangad have significant portions under medium susceptibility, with 25,937.89 ha.

Smaller Areas Under Very High Risk:

- Tehsils like Hatkalangale (1.2 hectares) and Gadhinglaj (882 hectares) have relatively smaller areas under Very High susceptibility but still present considerable landslide risks.

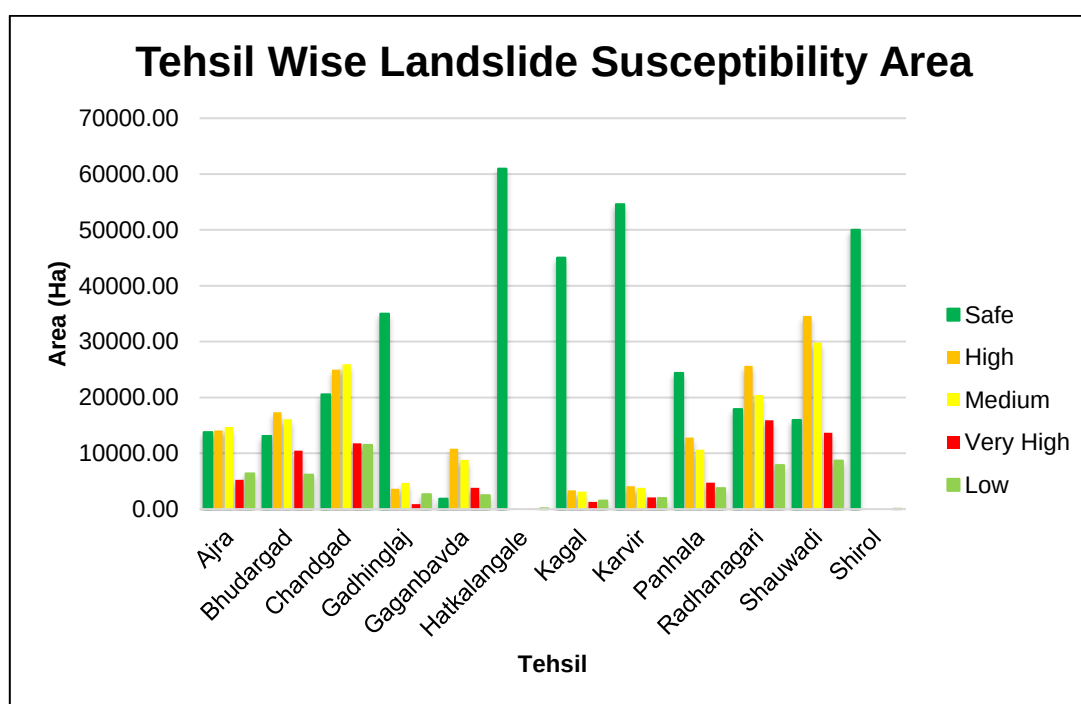


FIG. 18: TEHSIL WISE LANDSLIDE SUSCEPTIBILITY AREA

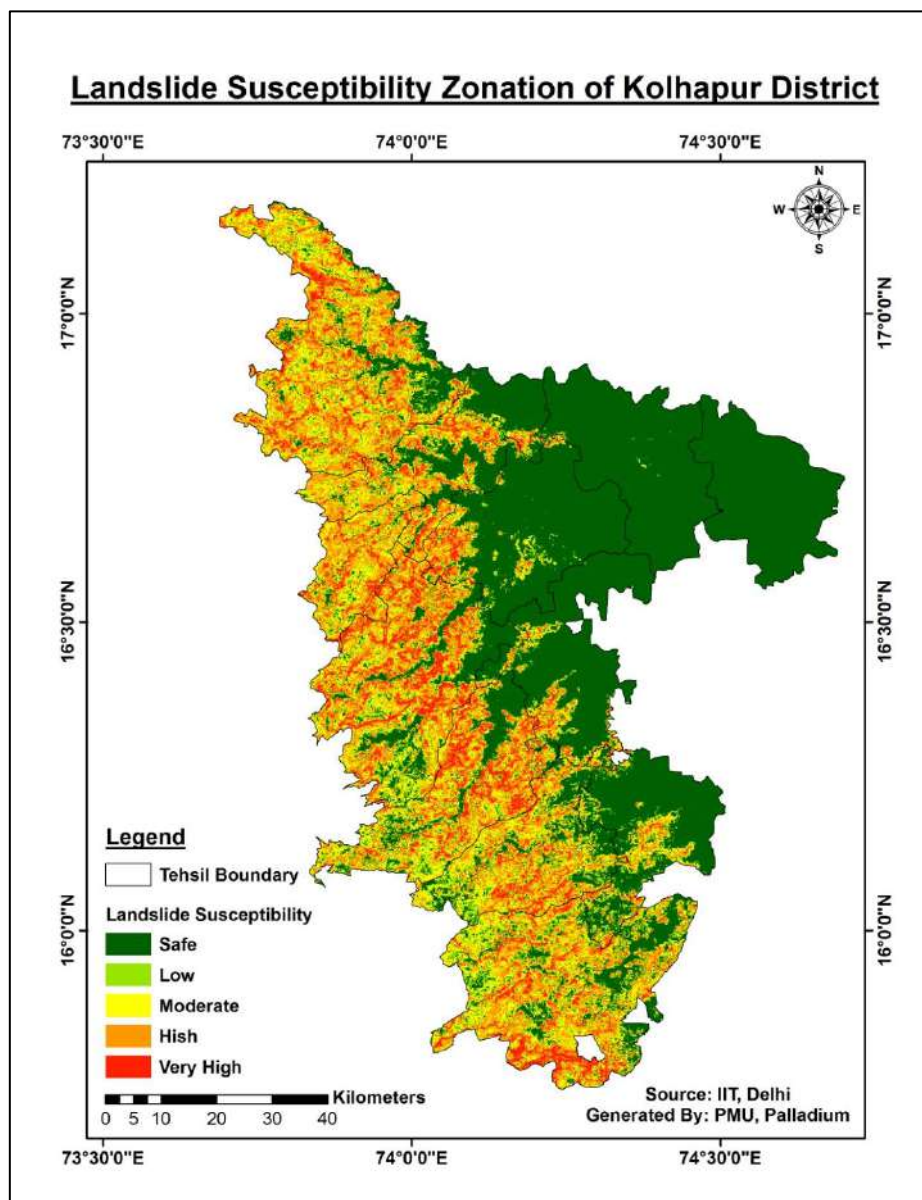


FIG. 19: LANDSLIDE SUSCEPTIBILITY ZONATION OF KOLHAPUR AS PER IIT, DELHI

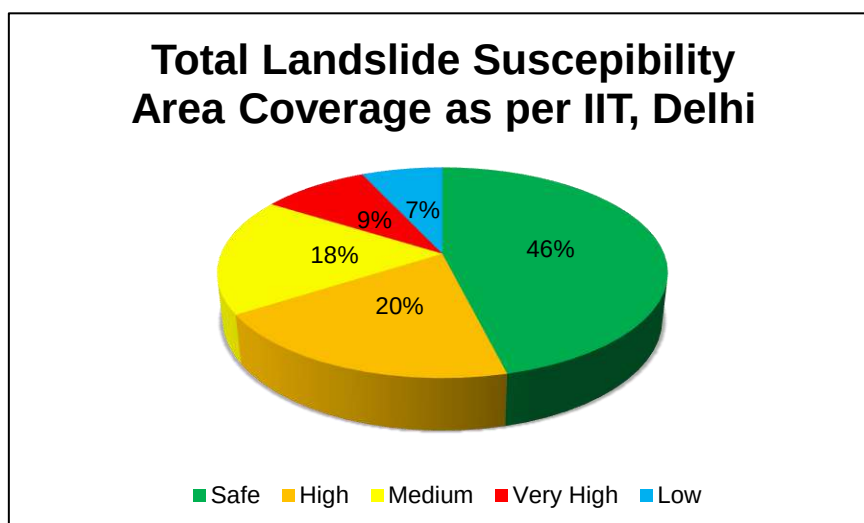


FIG. 20: AREA WISE LANDSLIDE SUSCEPTIBILITY AREA COVERAGE

3.4.2.2 Landslide Susceptibility as per GSI

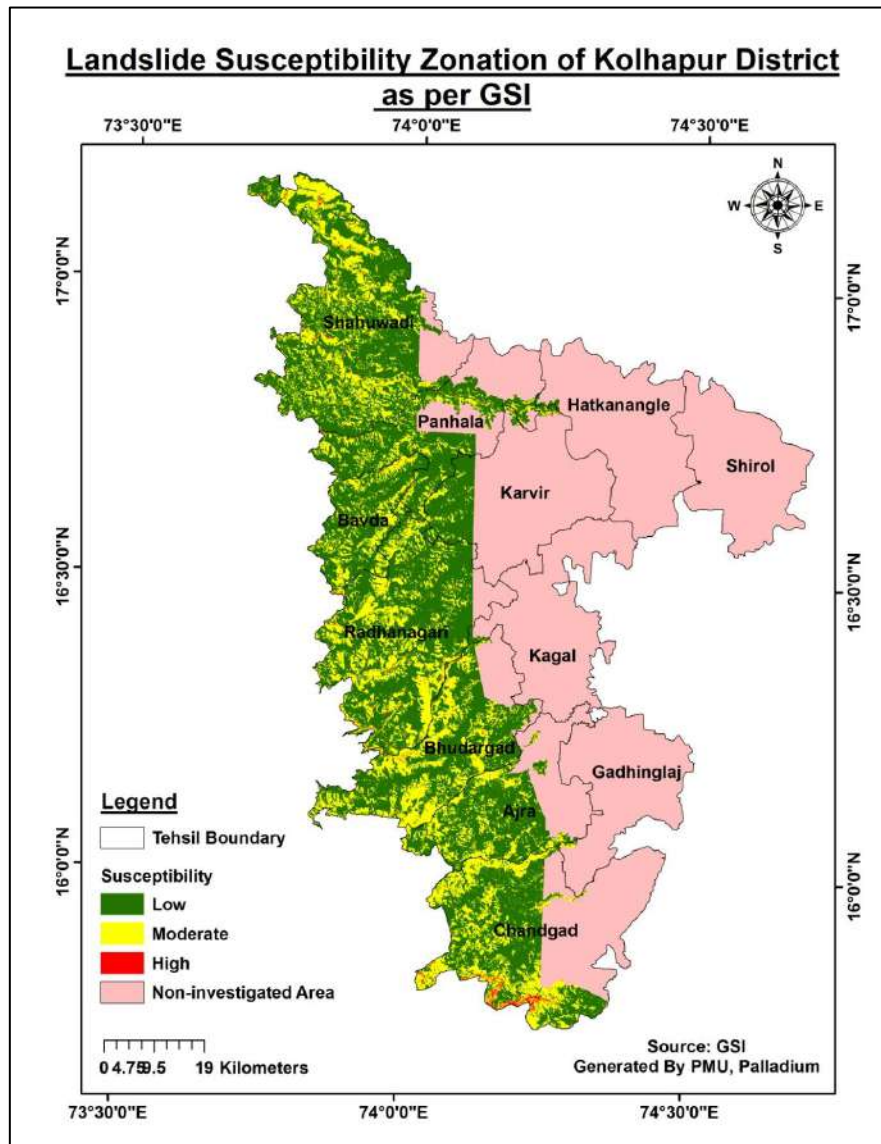


FIG. 21: LANDSLIDE SUSCEPTIBILITY ZONATION OF KOLHAPUR AS PER GSI

This GSI study examines the distribution of land areas in various tehsils, categorized by susceptibility levels: High, Low, and Moderate. The data provides insights into the total hectares (Ha) allocated to each susceptible category, helping to understand regional profiles and inform future land management and policy decisions.

The majority of the land across tehsils falls under the low-susceptible category, suggesting a comparatively safer zone. However, certain regions have substantial areas categorized as moderate or high susceptible, necessitating focused risk management and mitigation strategies.

Tehsils like Shahuwadi and Radhanagari not only have large total areas but also significant portions under moderate and high risk, highlighting the need for tailored interventions in these regions. The study also shows that 1% of investigated area of GSI falls under high landslide susceptibility zone and 32% under moderate and the remaining 67% in low susceptibility zone.

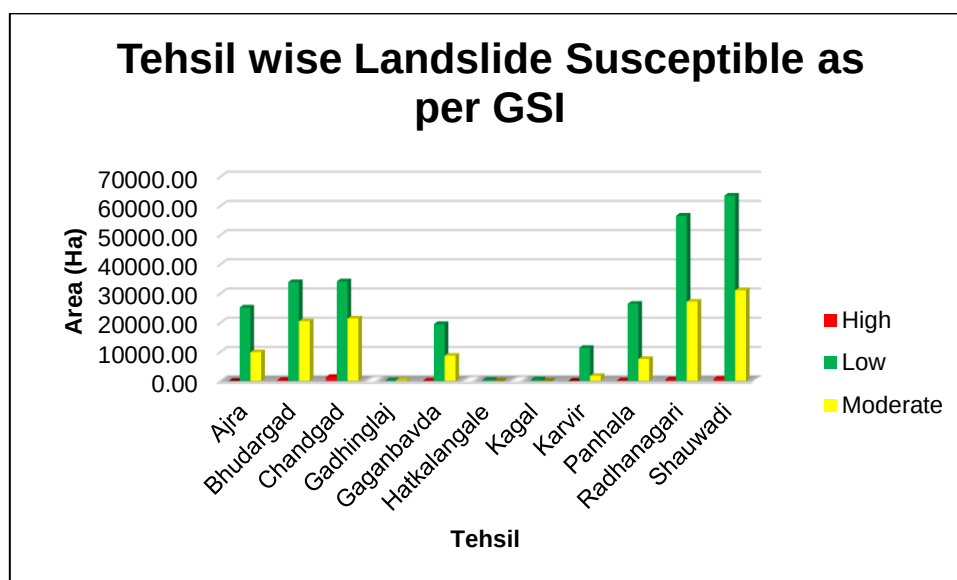


FIG. 22: TEHSIL WISE LANDSLIDE SUSCEPTIBLE AREA AS PER GSI

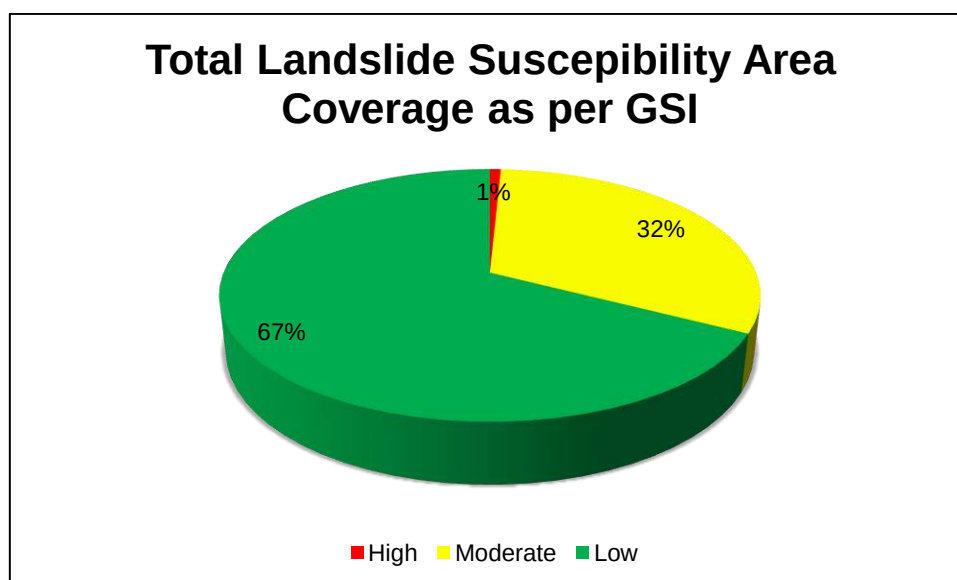


FIG. 23: AREA WISE LANDSLIDE SUSCEPTIBILITY COVERAGE AS PER GSI

3.4.2.3 Landslide Priority Villages and Area

Landslide Priority Area (Ha):

- Radhanagari and Chandangad has the largest area under landslide risk, with 2292175 hectares classified as Very High susceptibility and 1970014 hectares as Very High susceptibility. This makes it the most vulnerable tehsil in terms of area affected.
- Panhala and Bhudargad also have significant areas under High and Very High susceptibility. Panhala has 533,855 hectares under High and 1,025,523 hectares under Very High susceptibility. Bhudargad has 1,125,594 hectares under High and 1,208,964 hectares under Very High susceptibility.

- Gaganbawada is notable for having 410,069 hectares classified as High susceptibility and 699,593 hectares as Very High susceptibility.
- Ajra has a substantial portion of land at risk as well, with 707,536 hectares under High susceptibility and 349,625 hectares under Very High susceptibility.
- On the safer side, Gadhinglaj has the smallest area classified as High susceptibility (6,014 hectares) and no area under Very High susceptibility.
- The total area under “Very High” susceptibility across all tehsils is 8,688,072 hectares, and the total area under “High” susceptibility is 7,873,610 hectares.

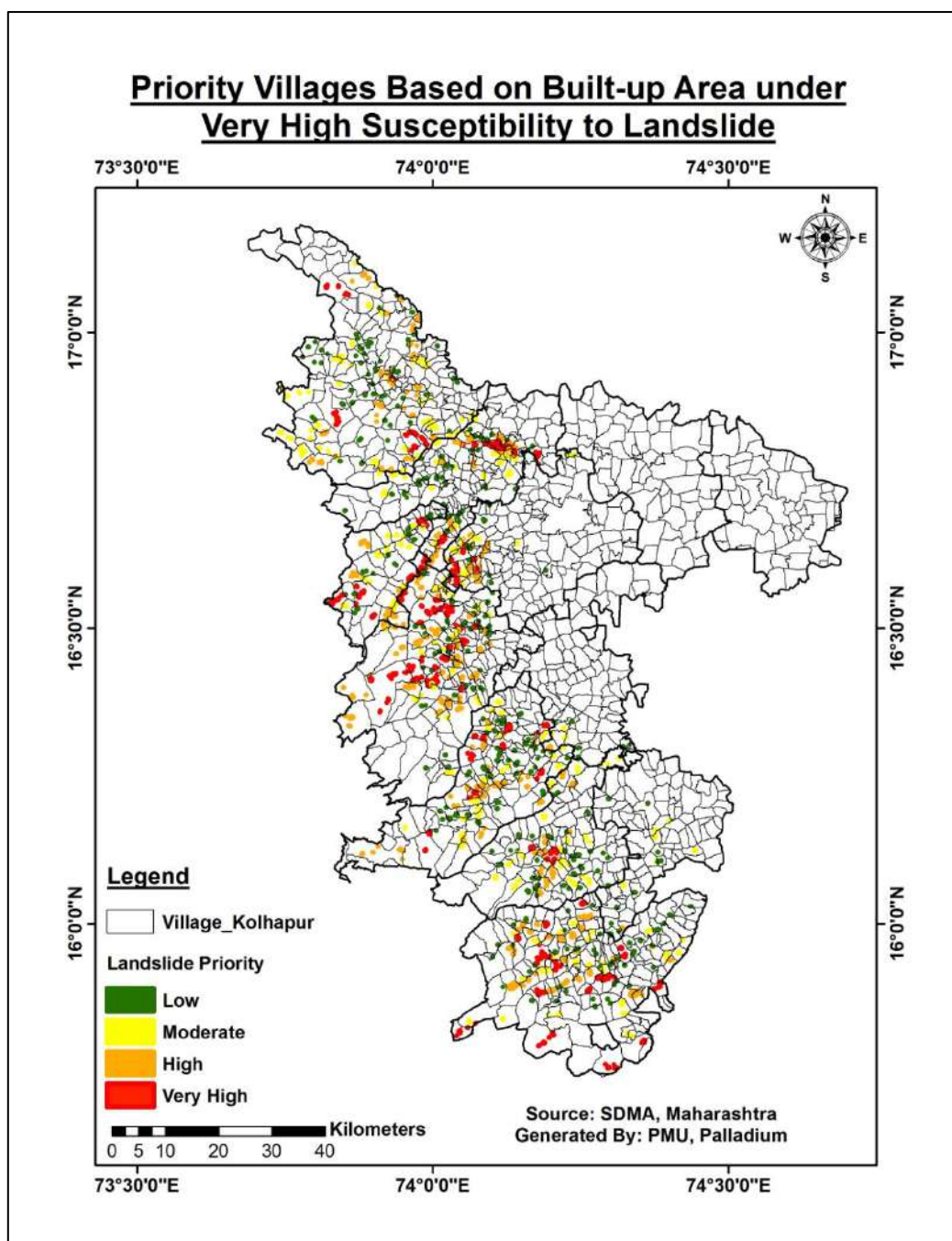


FIG. 24: LANDSLIDE PRIORITY VILLAGES OF KOLHAPUR

Number of Landslide Priority Villages:

- Chandangad again stands out with the highest number of villages (15) under Very High susceptibility and 24 under High susceptibility. It is followed by Radhanagri with 14 villages under Very High susceptibility and 27 under High susceptibility.
- Bhudargad has 8 villages under Very High susceptibility, but Bhudargad has more villages under priority (79 villages) after Chandangad (97 villages)
- Panhal has a significant number of villages (6) under Very High susceptibility.
- Gadhinglaj has a relatively low number of villages affected, with only 5 villages under High susceptibility and none under Very High susceptibility, indicating a lower risk in this tehsil.
- The total number of villages across the district under “Very High” susceptibility are 59, and the total number under “High” susceptibility are 123.

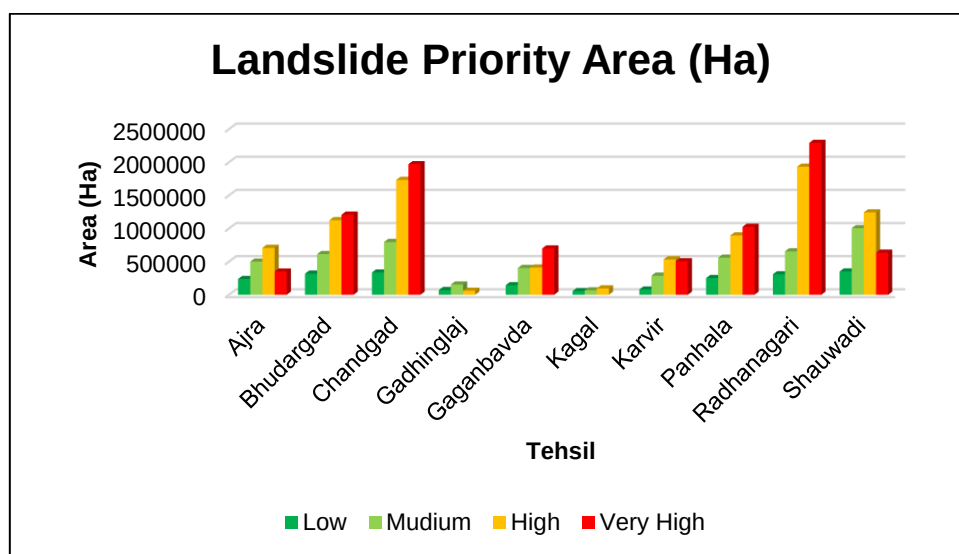


FIG. 25: TEHSIL WISE LANDSLIDE PRIORITY AREA DISTRIBUTION

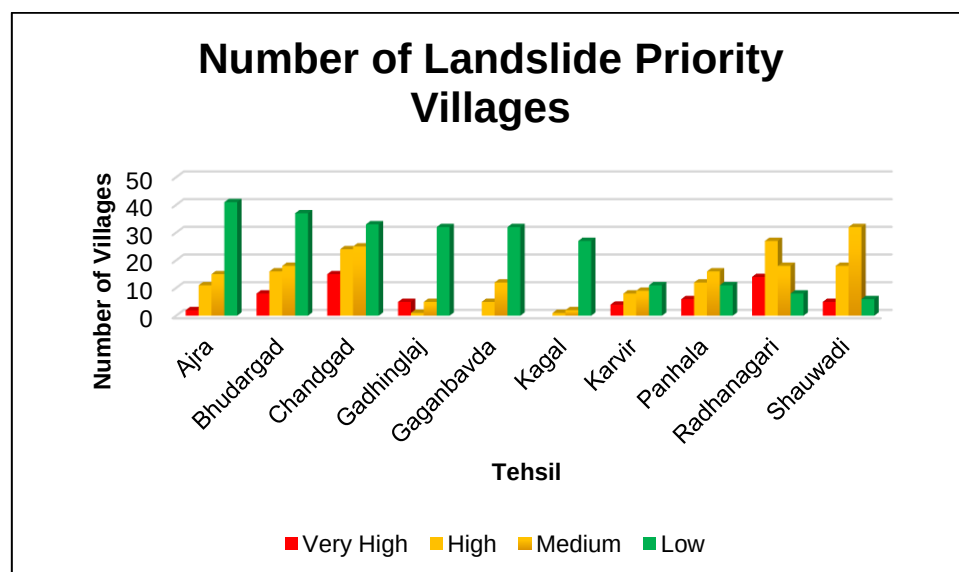


FIG. 26: TEHSIL WISE LANDSLIDE PRIORITY VILLAGES DISTRIBUTION

From the above study, it is clear that Shahuwadi, Panhala, and Bhudargad are the most critical tehsils in Kolhapur district in terms of both the area and number of villages under high landslide susceptibility. These

tehsils should be prioritized for disaster preparedness and mitigation strategies due to their high risk of landslides. Gadhinglaj and Kagal, on the other hand, are relatively safer, with significantly lower areas and fewer villages at high risk.

The data highlights the urgent need for focused interventions in the most vulnerable tehsils, including early warning systems, better land-use planning, and possibly relocation of the most at-risk villages. The significant differences in landslide susceptibility across tehsils suggest that risk management strategies need to be tailored to the specific conditions of each tehsil.

Earthquake:

The analysis summarizes the earthquake risk zones across various tehsils within a specified region. The data categorizes the land area in hectares (Ha) based on the level of earthquake risk: Very Low, Low, Medium, High, and Very High. This analysis aims to interpret the data for effective earthquake disaster management planning.

Overview of Earthquake Risk Distribution:

Total Area Analysis:

- The cumulative area at risk across all tehsils is approximately 754,815.26 Ha.
- The distribution among the risk zones is uneven, with significant areas falling under the Medium and High-risk categories.

Very Low Risk:

- The total area under very low risk is around 94,925.78 Ha.
- Tehsils with the largest area under very low risk include Chandgad (43,435.10 Ha) and Ajra (12,676.81 Ha).

Low Risk:

- The total area under low risk is 338,920.21 Ha.
- Ajra and Kagal tehsils have the highest area under low risk, with Ajra accounting for 50,492.98 Ha and Kagal for 44,459.53 Ha.

Medium Risk:

- Medium-risk areas cover 179,935.29 Ha.
- Radhanagari has the highest area under medium risk (45,451.93 Ha), followed by Panhala (23,162.50 Ha).

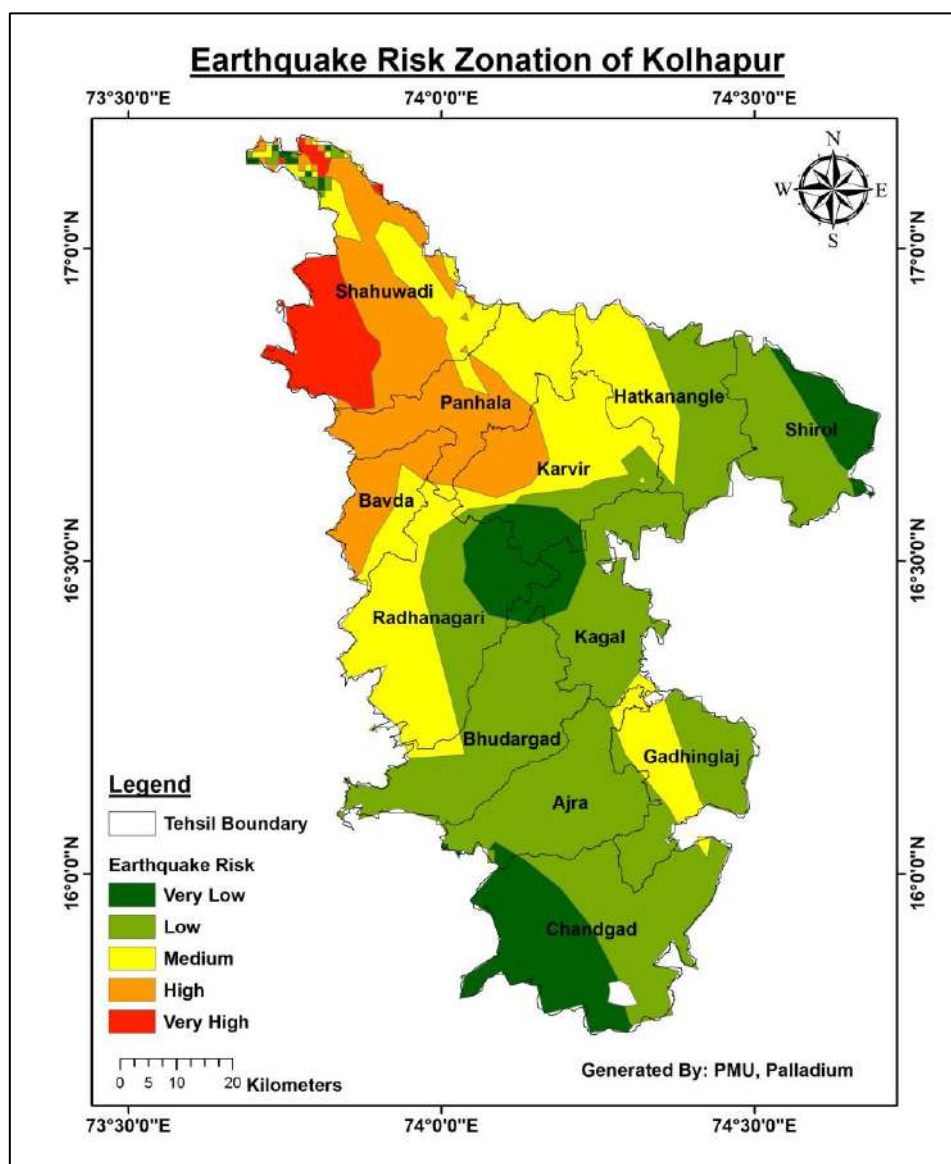


FIG. 27: EARTHQUAKE RISK ZONATION OF KOLHAPUR

High Risk:

- Areas classified as high risk total 109,414.08 Ha.
- Karvir tehsil leads with 14,086.30 Ha in the high-risk category.

Very High Risk:

- The most critical zone, Very High Risk, accounts for 31,619.91 Ha.
- The Shahuwadi tehsil again stands out with the highest area in very high risk (31619.91 Ha), reflecting significant vulnerability.
- The Karvir tehsil again stands out with the highest area (14,086.30 Ha), reflecting significant vulnerability.

Tehsil-wise Analysis:

Chandgad and Ajra:

- These tehsils have the highest areas in very low and low-risk zones, indicating a relatively safer profile in terms of earthquake vulnerability.

Radhanagari:

- With the highest area in the medium risk zone (45,451.93 Ha), this tehsil needs moderate attention in earthquake preparedness.

Karvir:

- This tehsil is particularly concerning with significant areas in high (14,086.30 Ha) and very high-risk zones (14,086.30 Ha).
- Disaster management strategies must prioritize Karvir for risk mitigation and rapid response planning.

Gadhinglaj and Bhudargad:

- Both tehsils show moderate to high risk, necessitating careful planning and resource allocation for effective disaster management.

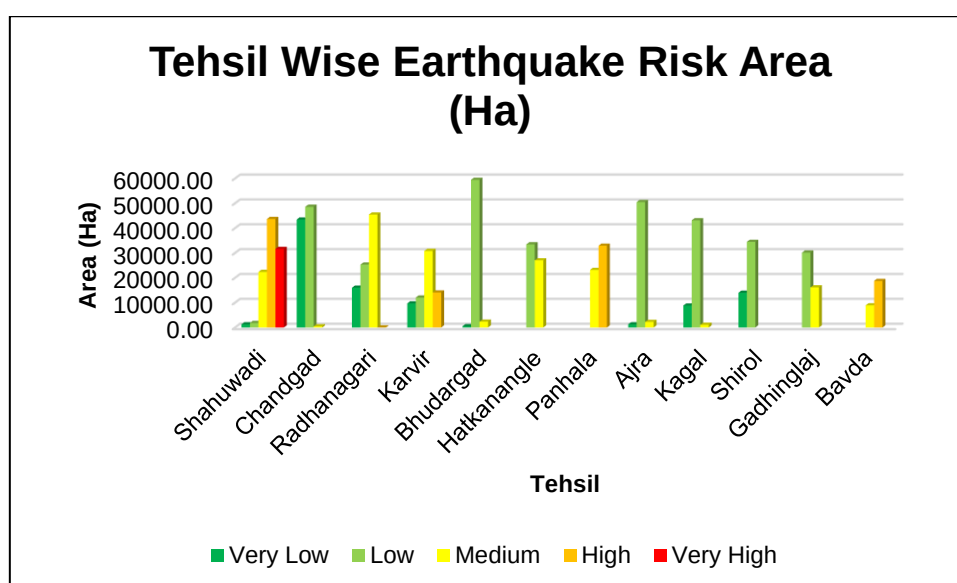


FIG. 28: TEHSIL WISE EARTHQUAKE RISK AREA DISTRIBUTION

3.4.3. Lightning

The provided map illustrates the lightning flash density (LFD) in Kolhapur district from 2014 to 2022. The LFD, measured in the number of flashes per square kilometre per year, highlights areas with varying degrees of lightning activity. This analysis aims to identify regions within Kolhapur that are at higher risk of lightning disasters and to suggest appropriate mitigation strategies.

Key Observations

High-Risk Areas

- The western and southwestern parts of Kolhapur district exhibit the highest lightning flash density, with values up to 2.5 flashes/km²/year.
- Tehsils such as Shahuwadi, Radhanagari, and Gaganbavda fall within these high-risk zones, indicating a higher likelihood of lightning-related incidents.

Moderate-Risk Areas

- Central regions, including parts of Ajra, Bhudargad, and Chandgad, display moderate lightning flash density. These areas have moderate exposure, with flash densities between 1.0 to 2.0 flashes/km²/year.
- These tehsils should implement precautionary measures and public awareness programs to reduce potential lightning hazards.

Low-Risk Areas

- The eastern and northeastern parts of Kolhapur district, encompassing tehsils like Karvir, Hatkalangale, Kagal, and Gadhinglaj, show the lowest lightning flash densities, with values closer to 0 flashes/km²/year.
- While these regions are relatively safer, continued monitoring and basic safety measures are recommended to maintain low-risk levels.

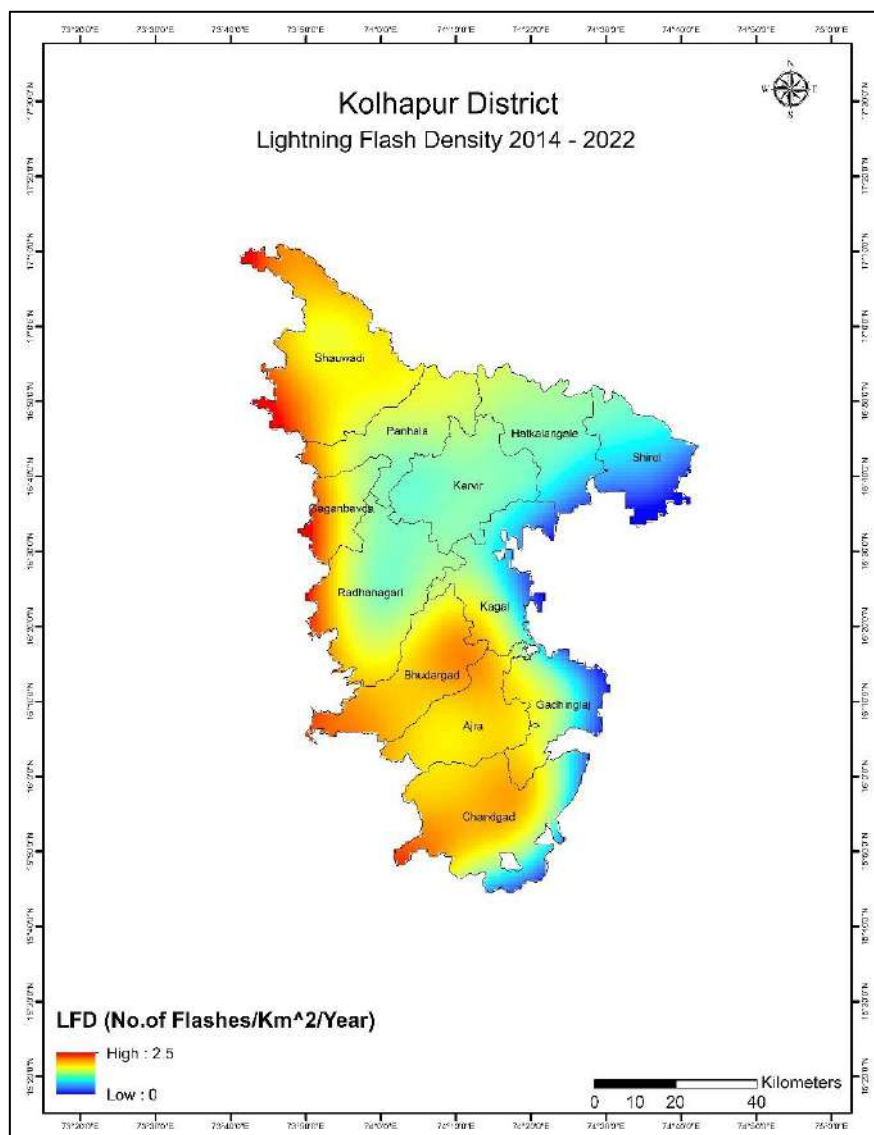


FIG. 29: LIGHTNING FLASH DENSITY OF KOLHAPUR (2014 - 2022)

3.4.4. Heatwave

The heatwave risk in Kolhapur district highlights significant variations in vulnerability across the region. Central and eastern tehsils such as Ajra and Chandgad are particularly high susceptible to heatwaves due to their lower elevation and rapid urbanization, which contribute to higher temperatures. These areas often experience prolonged periods of extreme heat, posing health risks to residents, particularly the elderly and children. Conversely, western tehsils like Shauwadi and Radhanagari, characterized by higher altitudes and dense vegetation, exhibit relatively lower heatwave risk. Nonetheless, increasing deforestation and climate change impacts are gradually heightening their susceptibility. To mitigate heatwave risks, it is essential to implement region-specific strategies, such as enhancing green cover, promoting water conservation, and establishing heat action plans, especially in the more vulnerable central and eastern tehsils.

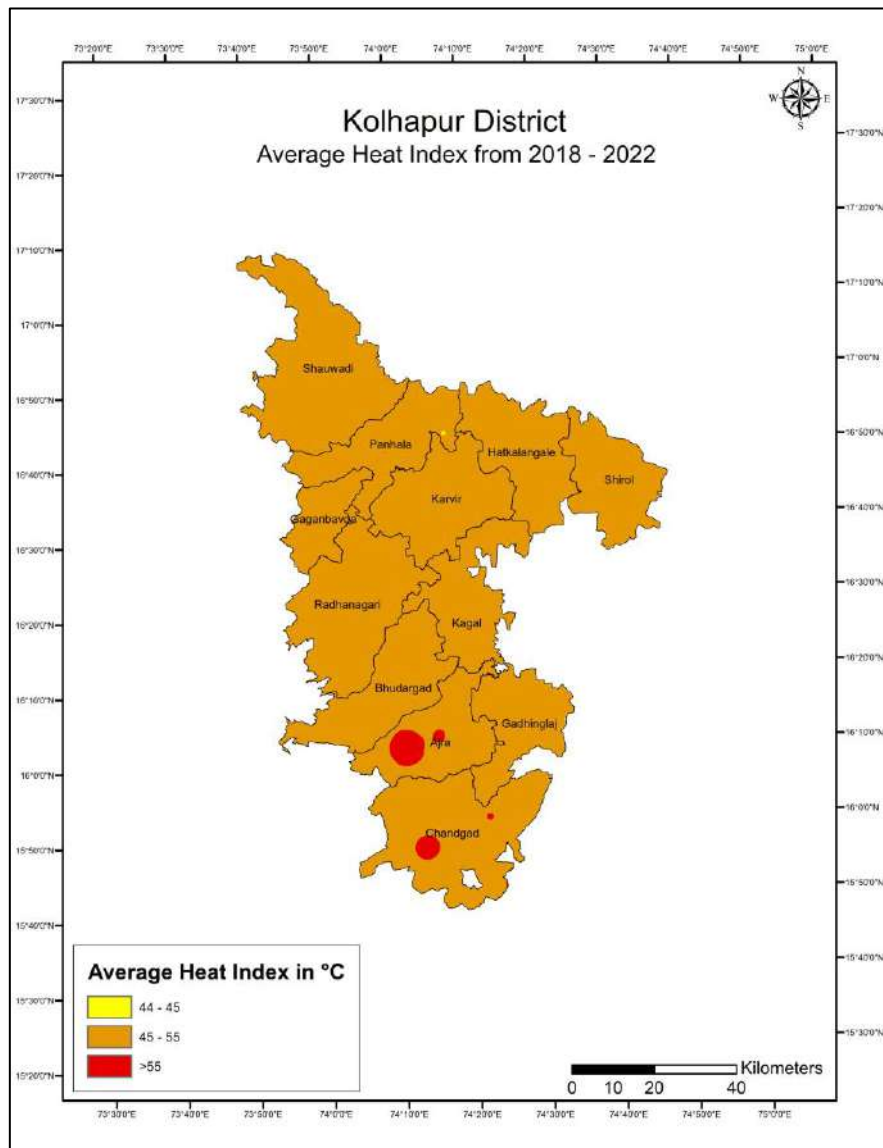


FIG. 30: AVERAGE HEAT INDEX OF KOLHAPUR (2018-2022)

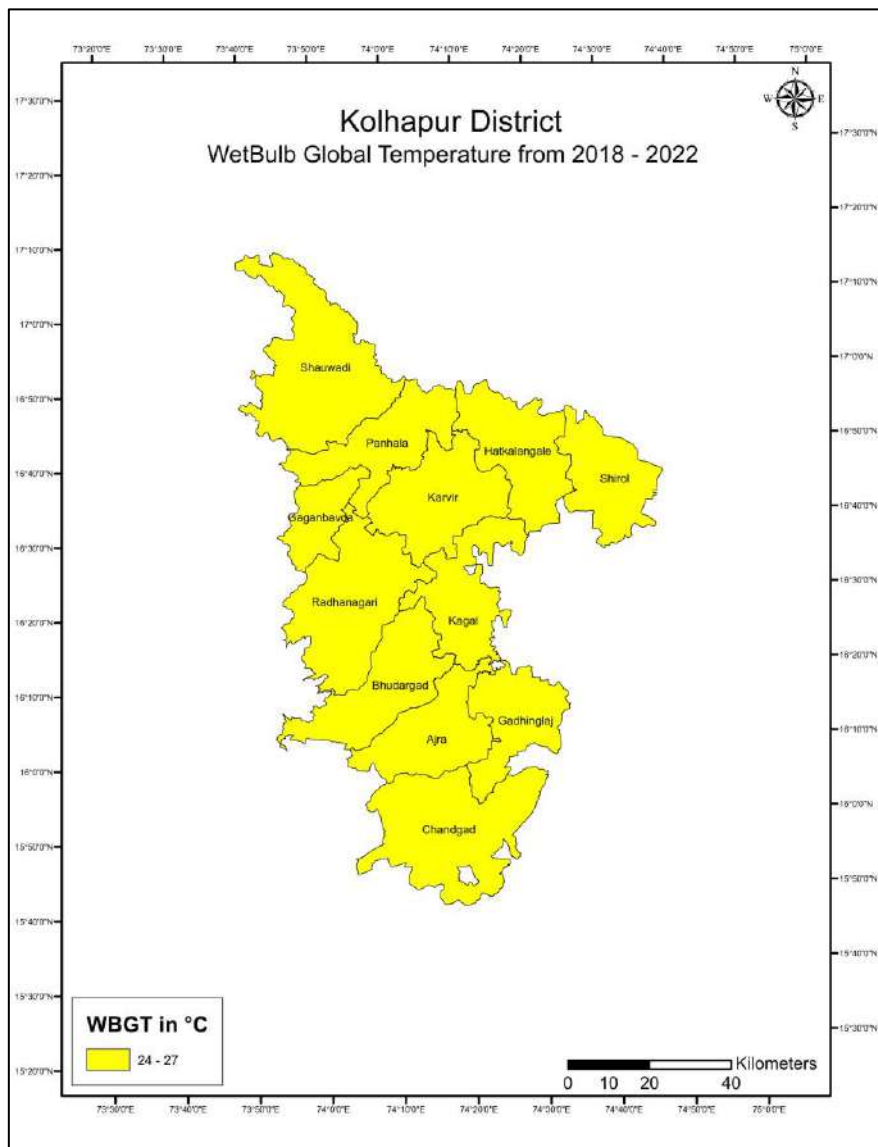


FIG. 31: WETBULB GLOBAL TEMPERATURE OF KOLHAPUR (2018-2022)

3.5. RANKING AND PROBABILITY OF DISASTERS IN THE DISTRICT

TABLE 22: RANKING AND PROBABILITY OF NATURAL HAZARD IN KOLHAPUR

NATURAL HAZARD								
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPAREDNESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	Preplanning	Time, effectiveness, resources	Community/ Mutual Aid staff and supplies	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Flood	3	2	2	3	1	1	2	Extreme
Cyclone	2	0	2	2	2	2	2	Medium
Landslide	2	1	2	2	2	2	3	High
Earthquake	1	0	0	0	0	0	0	Low
Heatwave	0	0	0	0	0	0	0	Low
Drought	1	0	0	0	0	0	0	Low
Wildfire	2	1	1	1	0	0	0	Low
Storm Surge	0	0	0	0	0	0	0	Low
Tsunami	0	0	0	0	0	0	0	Low
Epidemic	2	2	1	1	1	1	2	Medium
Cloud Burst	3	2	2	1	2	2	1	High
Lightning	3	1	1	1	2	2	1	High
Pest Attack	0	0	0	0	0	0	0	Low
Hailstorm	2	2	3	0	0	0	0	Low
Wild Animal Attack	3	3	3	3	2	2	1	Extreme
AVERAGE SCORE	1.60	0.93	1.13	0.93	0.80	0.80	0.80	Low

TABLE 23: RANKING PROBABILITY OF TECHNOLOGICAL HAZARD IN KOLHAPUR

TECHNOLOGIC HAZARD								
EVENT	PROBABILI TY	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Catego ry
		HUMA N IMPAC T	PROPER TY IMPACT	BUSINE SS IMPACT	PREPARE D-NESS	INTERNA L RESPON SE	EXTERN AL RESPON SE	
	<i>Likelihood this will occur</i>	<i>Possibili ty of death or injury</i>	<i>Physical losses and damages</i>	<i>Interruption of services</i>	<i>Preplanning</i>	<i>Time, effectiveness , resouces</i>	<i>Community / Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Electrical Failure	3	3	0	1	1	1	1	Mediu m
Generator Failure	3	0	0	0	1	1	1	Low
Transportatio n Failure	3	0	0	0	1	1	1	Low
Fuel Shortage	0	0	0	0	1	2	1	Low
Communicati ons Failure	3	0	0	0	1	1	1	Low
Information Systems Failure	2	0	0	0	1	1	1	Low
Fire	3	2	2	1	1	1	2	High
Hazmat Exposure	2	0	0	0	1	1	2	Low
Supply Shortage	0	0	0	0	1	1	1	Low
Structural Damage	3	1	1	2	1	1	1	Mediu m
AVERAGE SCORE	2.20	0.60	0.30	0.40	1.00	1.10	1.20	Low

TABLE 24: RANKING PROBABILITY OF HUMAN-RELATED HAZARD IN KOLHAPUR

HAZARD AND VULNERABILITY ASSESSMENT								
HUMAN RELATED HAZARD								
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPAREDNESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interruption of services</i>	<i>Preplanning</i>	<i>Time, effectiveness, resources</i>	<i>Community/ Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Stampede	0	1	1	1	1	1	1	Low
Drowning	3	3	0	1	1	1	1	Medium
Mass Casualty Incident (trauma)	3	2	2	2	1	1	1	High
Mass Casualty Incident (medical/infectious)	3	0	0	0	1	1	1	Low
Biological	3	0	0	0	0	0	0	Low
VIP Situation	0	1	1	1	0	0	0	Low
Hostage Situation	0	0	0	0	0	0	0	Low
Civil Disturbance	0	1	1	1	1	1	1	Low
Missing Resident	0	0	0	0	0	0	0	Low
Bomb Threat	0	0	0	0	0	0	0	Low
AVERAGE	1.20	0.80	0.50	0.60	0.50	0.50	0.50	Low

TABLE 25: RANKING PROBABILITY OF HAZARD INVOLVING HAZARDOUS MATERIALS IN KOLHAPUR

HAZARD AND VULNERABILITY ASSESSMENT								
HAZARD INVOLVING HAZARDOUS MATERIALS								
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
	Likelihood this will occur	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPAREDNESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Mass Casualty Hazmat Incident (From historic events >= 5 victims)	3	1	0	1	1	1	0	Medium
Small Casualty Hazmat Incident (From historic events < 5 victims)	3	1	0	0	1	1	0	Low
Chemical Exposure	3	0	0	0	0	0	0	Low
Terrorism, Chemical	0	0	0	0	0	0	0	Low
Radiologic Exposure, External	0	0	0	0	0	0	0	Low
Terrorism, Radiologic	0	0	0	0	0	0	0	Low
AVERAGE	1.50	0.33	0.00	0.17	0.33	0.33	0.00	Low

3.6. SOCIAL, ECONOMIC, AND ENVIRONMENTAL VULNERABILITY ANALYSIS

3.6.1. SOCIAL VULNERABILITY

The social vulnerability assessment of Kolhapur district provides crucial insights into the resilience and adaptive capacity of various tehsils to disasters. Social vulnerability is influenced by factors such as population density, economic status, access to healthcare, education levels, and infrastructure quality.

High Vulnerability Tehsils

- Karvir and Hatkalangale: These tehsils have high population densities and significant urban areas, which can exacerbate the impact of disasters. The presence of economically disadvantaged communities, coupled with inadequate infrastructure, increases their vulnerability. Enhanced disaster preparedness, community education programs, and improved healthcare facilities are essential to reduce risks.
- Panhala: With a mix of rural and semi-urban populations, this tehsil faces challenges related to limited access to healthcare and education. Strengthening social services and infrastructure will be vital in improving resilience.

Moderate Vulnerability Tehsils

- Ajra, Bhudargad, and Gaganbavda: These tehsils have moderate social vulnerability due to their rural nature, where communities may have strong social ties but limited access to critical services. Focused efforts on improving rural healthcare, education, and economic opportunities can help mitigate their vulnerability.
- Chandgad and Gadhinglaj: These regions also exhibit moderate vulnerability, with economic activities primarily based on agriculture. Diversifying livelihoods and enhancing disaster awareness can significantly improve resilience.

Low Vulnerability Tehsils

- Shauwadi and Radhanagari: Characterized by lower population densities and higher elevations, these tehsils are relatively less vulnerable. However, increasing urbanization and environmental changes could heighten risks. Proactive measures such as environmental conservation and sustainable development practices are crucial.
- Kagal: Despite being less vulnerable, continuous monitoring and maintaining robust infrastructure are necessary to ensure ongoing resilience.

Recommendations

- Promote community-based disaster risk reduction programs that empower local populations to respond effectively to emergencies.
- Invest in resilient infrastructure, particularly in high and moderate vulnerability tehsils, to withstand various disaster scenarios.
- Enhance access to healthcare and education across all tehsils, focusing on building capacities to manage disaster impacts.
- Support initiatives that diversify economic activities, reducing dependency on single sectors and increasing overall resilience.

3.6.2. ENVIRONMENTAL VULNERABILITY

An environmental vulnerability assessment of Kolhapur district reveals varying levels of susceptibility to environmental hazards across its tehsils. This assessment considers factors such as geographic location, climate variability, land use patterns, and ecological degradation, which influence each tehsil's ability to cope with environmental risks.

High Vulnerability Tehsils

- Chandgad and Ajra: These tehsils are characterized by extensive forest cover and hilly terrain, making them prone to landslides and soil erosion. Deforestation and unplanned development further exacerbate these risks. Implementing stringent land use regulations and reforestation programs are crucial to mitigate these vulnerabilities.
- Radhanagari: Home to the Radhanagari Wildlife Sanctuary, this tehsil faces threats from habitat destruction and water scarcity. Protecting natural resources and promoting sustainable tourism practices can help reduce environmental vulnerability.

Moderate Vulnerability Tehsils

- Panhala and Gaganbavda: These regions experience moderate environmental risks, primarily due to their mixed landscape of agricultural land and forested areas. Soil degradation and water management are key concerns. Adopting sustainable agricultural practices and efficient water management systems can enhance their resilience.
- Shauwadi: While it has significant forested areas, the tehsil faces challenges from illegal logging and encroachment. Strengthening enforcement of environmental regulations and promoting community-based conservation efforts are essential.

Low Vulnerability Tehsils

- Karvir and Hatkalangale: These urbanized tehsils have relatively lower environmental vulnerability, but face issues related to pollution and waste management. Implementing robust urban planning and waste management systems can mitigate these risks.
- Kagal and Gadhinglaj: Predominantly agricultural, these tehsils have low environmental vulnerability but require attention to irrigation practices and soil health to prevent long-term degradation. Encouraging sustainable farming techniques and soil conservation measures are important.

Recommendations

- Initiate large-scale reforestation projects and soil conservation measures, particularly in high vulnerability tehsils, to prevent soil erosion and landslides.
- Promote sustainable agricultural practices, including crop diversification, organic farming, and efficient water use, to reduce environmental stress in moderate and low vulnerability areas.
- Develop comprehensive water management plans to address water scarcity and promote rainwater harvesting and watershed management.
- Strengthen urban planning frameworks to address pollution, waste management, and green space preservation in urbanized tehsils.
- Engage local communities in conservation efforts, providing education and resources to support sustainable practices and environmental stewardship.

3.6.3. ECONOMIC VULNERABILITY

Karveer Tehsil

Economic Base: Karveer is economically diverse with agriculture, small-scale industries, and a growing service sector. The city of Kolhapur is within this tehsil, serving as a major commercial hub.

Vulnerability Factors:

- High dependency on agriculture, especially sugarcane and paddy, makes it vulnerable to floods and droughts.
- Concentration of small-scale industries and markets that could be severely impacted by disasters.
- Urban infrastructure, though developed, is susceptible to floods, particularly in low-lying areas.

Assessment: Moderate to High vulnerability, with significant risks from flooding affecting both agriculture and urban commerce.

Shahuwadi Tehsil

Economic Base: Predominantly agricultural, with a focus on rice, sugarcane, and horticulture. Forest resources also play a role.

Vulnerability Factors:

- High reliance on monsoon-dependent agriculture increases vulnerability to droughts and floods.
- Limited industrial activity and infrastructure, leading to lower economic diversity and resilience.
- Forest areas may be susceptible to landslides during heavy rains.

Assessment: High vulnerability due to agricultural dependency and limited economic diversification.

Gadhinglaj Tehsil

Economic Base: Agriculture, with a significant share in sugarcane production, along with growing industrial activities in small and medium enterprises (SMEs).

Vulnerability Factors:

- Dependency on a single crop (sugarcane) increases risk during droughts or pest outbreaks.
- Emerging industrial areas are at risk of flood and infrastructure damage.
- Proximity to the Karnataka border may influence market fluctuations in cross-border trade.

Assessment: Moderate vulnerability, with specific risks related to agricultural monoculture and emerging industrial zones.

Ajara Tehsil

Economic Base: Agriculture dominates, with rice and horticulture being significant. There is also forest-based economic activity.

Vulnerability Factors:

- High vulnerability to landslides and floods due to hilly terrain and heavy monsoon rains.

- Agriculture is highly susceptible to seasonal changes and extreme weather events.
- Poor infrastructure and limited industrial activity reduce economic resilience.

Assessment: High vulnerability, particularly in terms of natural hazards impacting agriculture and infrastructure.

Hatkanangle Tehsil

Economic Base: A mix of agriculture (especially sugarcane) and industrial activity, with significant textile industries in Ichalkaranji.

Vulnerability Factors:

- Industrial zones, especially textile industries, are at risk of flooding and water scarcity.
- Agricultural areas are vulnerable to droughts, affecting the sugarcane and cash crop sectors.
- The tehsil has some resilience due to diverse economic activities, but infrastructure can be a limiting factor.

Assessment: Moderate to high vulnerability, with risks affecting both industrial and agricultural sectors.

Panhala Tehsil

Economic Base: Tourism, agriculture (paddy, sugarcane), and small-scale industries.

Vulnerability Factors:

- High dependency on monsoon for agriculture, making it vulnerable to both droughts and floods.
- Tourism is seasonally dependent and can be severely impacted by natural disasters.
- Small-scale industries lack the resilience and capacity to recover quickly from disruptions.

Assessment: Moderate vulnerability, with significant risks to agriculture and tourism.

Radhanagari Tehsil

Economic Base: Predominantly agricultural, with a focus on paddy, horticulture, and forest resources.

Vulnerability Factors:

- Frequent flooding of the Radhanagari dam area affects agriculture and livelihoods.
- The economy is largely dependent on natural resources, making it vulnerable to environmental changes.
- Limited infrastructure and industrial activity reduce overall economic resilience.

Assessment: High vulnerability due to frequent flooding and dependency on agriculture and natural resources.

Recommendation

- Promoting crop diversification and climate-resilient farming practices to reduce dependency on single crops, particularly in tehsils like Shahuwadi and Gadhinglaj.
- Improving flood protection infrastructure, especially in urbanized and industrial areas like Karveer and Hatkanangle, to mitigate the impact on key economic sectors.

- Encouraging the development of disaster-resilient industrial practices, particularly in emerging industrial zones across the district.
- Strengthening community-based disaster management programs that focus on building local capacities and improving access to financial services, particularly in rural and high-vulnerability tehsils like Ajara and Radhanagari.
- In Panhala, developing sustainable tourism practices that can adapt to seasonal and disaster-related disruptions.
- Conducting regular economic vulnerability assessments to monitor changes and adapt strategies accordingly, ensuring that the district disaster management plan remains relevant and effective.

3.7. ELEMENT AT RISK

Kolhapur district, known for its rich cultural heritage and vibrant economy, is also exposed to various natural and human-made disasters. Understanding the elements at risk is crucial for effective disaster management planning. The primary elements at risk in Kolhapur include:

3.7.1. Human Habitat

Kolhapur is home to a significant population spread across urban and rural areas. The densely populated regions, particularly in low-lying or flood-prone zones, are highly vulnerable. Disasters can lead to loss of life, injuries, and displacement of communities. Special attention is needed for vulnerable groups such as the elderly, children, and people with disabilities.

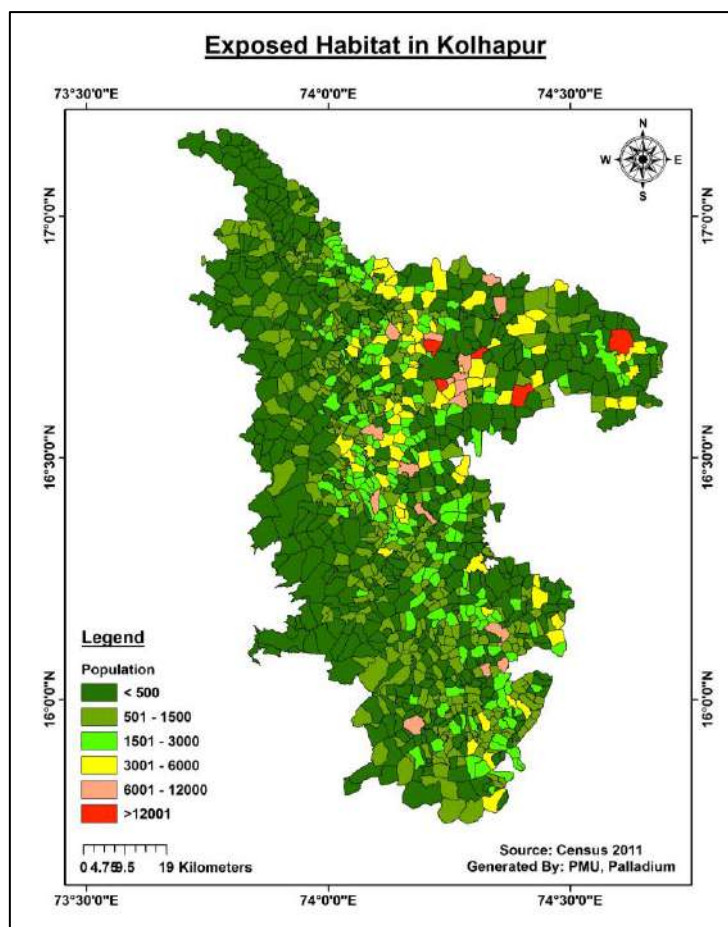


FIG. 32: EXPOSED HUMAN HABITAT OF KOLHAPUR

3.7.2. Health Facilities

The district is equipped with numerous health facilities, including hospitals, clinics, and primary health centres. During a disaster, these facilities face the risk of being overwhelmed by the influx of patients. Damage to infrastructure or disruption of services can hinder the delivery of emergency medical care, making it essential to protect and strengthen health facilities against potential hazards.

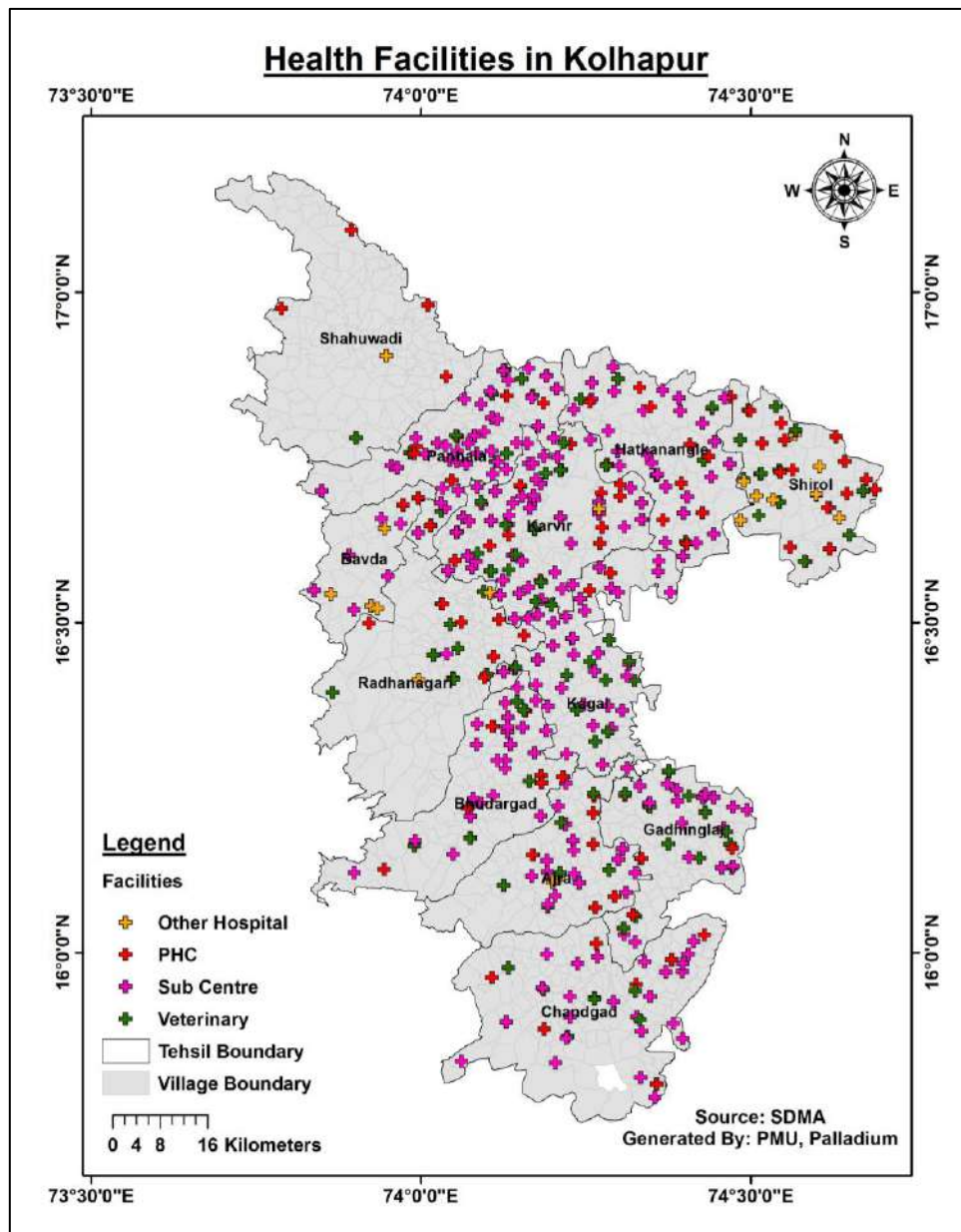


FIG. 33: EXPOSED HEALTH FACILITIES IN KOLHAPUR

3.7.3. Transport and Administrative Facilities

Kolhapur's transport network, including roads, bridges, and railways, is vital for the movement of people and goods. Disasters such as floods, landslides, or earthquakes can severely damage this infrastructure, leading to isolation of affected areas, delays in relief operations, and economic losses. Ensuring the resilience of transport facilities is crucial for effective disaster response and recovery.

Administrative buildings and facilities play a key role in coordinating disaster management activities. The district's ability to respond to and manage disasters depends on the functionality of these centers. Damage to

administrative infrastructure can impede communication, coordination, and decision-making processes during emergencies.

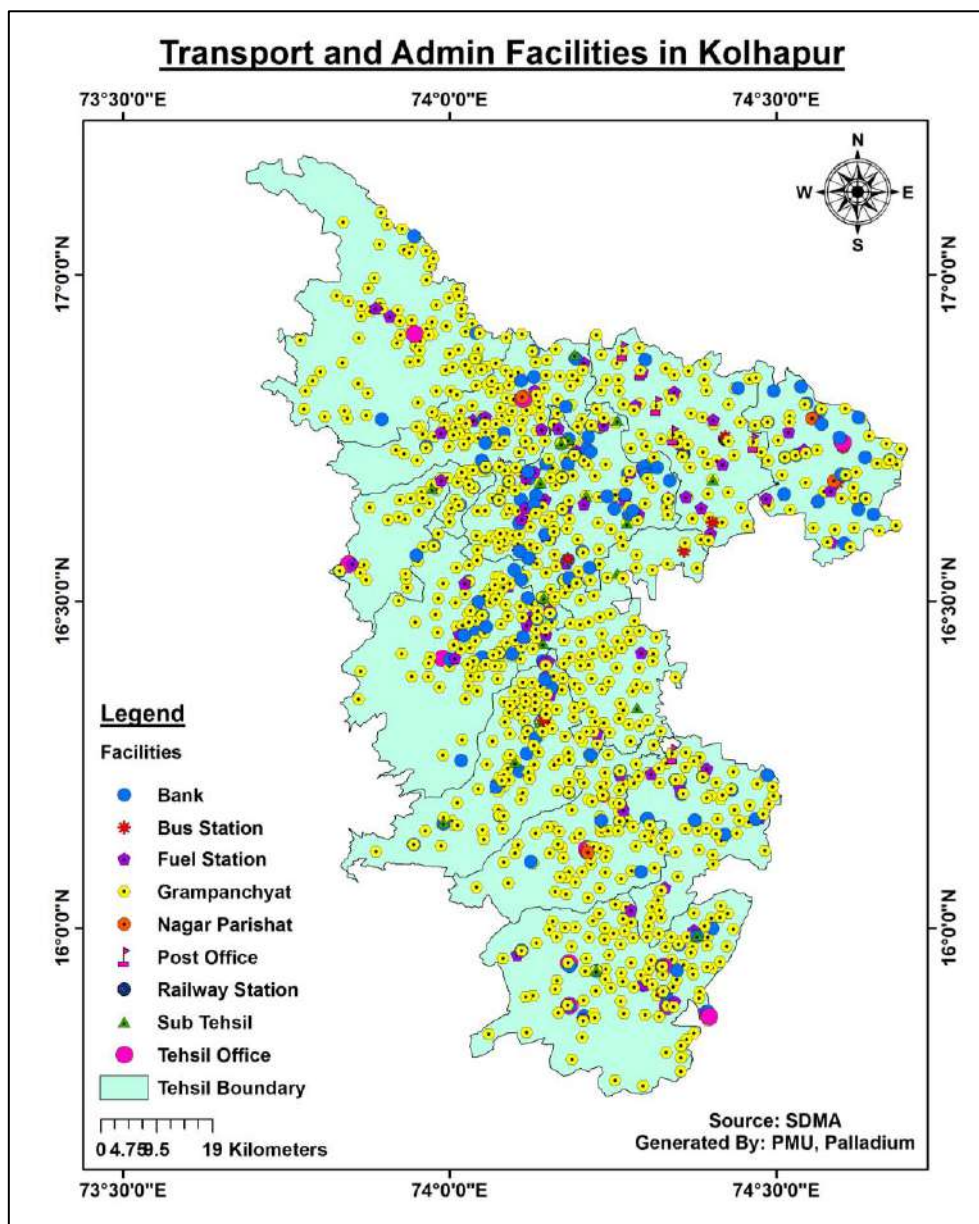


FIG. 34: EXPOSED TRANSPORT AND ADMIN FACILITIES IN KOLHAPUR

3.7.4. Public Utilities

Essential services such as water supply, electricity, and telecommunications are critical for the well-being of the population. Disasters can disrupt these services, leading to severe consequences, especially in healthcare and emergency response. Strengthening and protecting public utilities from potential hazards is necessary for maintaining continuity of services during disasters.

3.7.5. Educational Facilities

Schools, colleges, and other educational institutions in Kolhapur are not only centers of learning but also serve as emergency shelters during disasters. These facilities are at risk of structural damage, which could endanger the lives of students and staff. Additionally, disasters can disrupt educational activities, leading to long-term impacts on the academic progress of students.

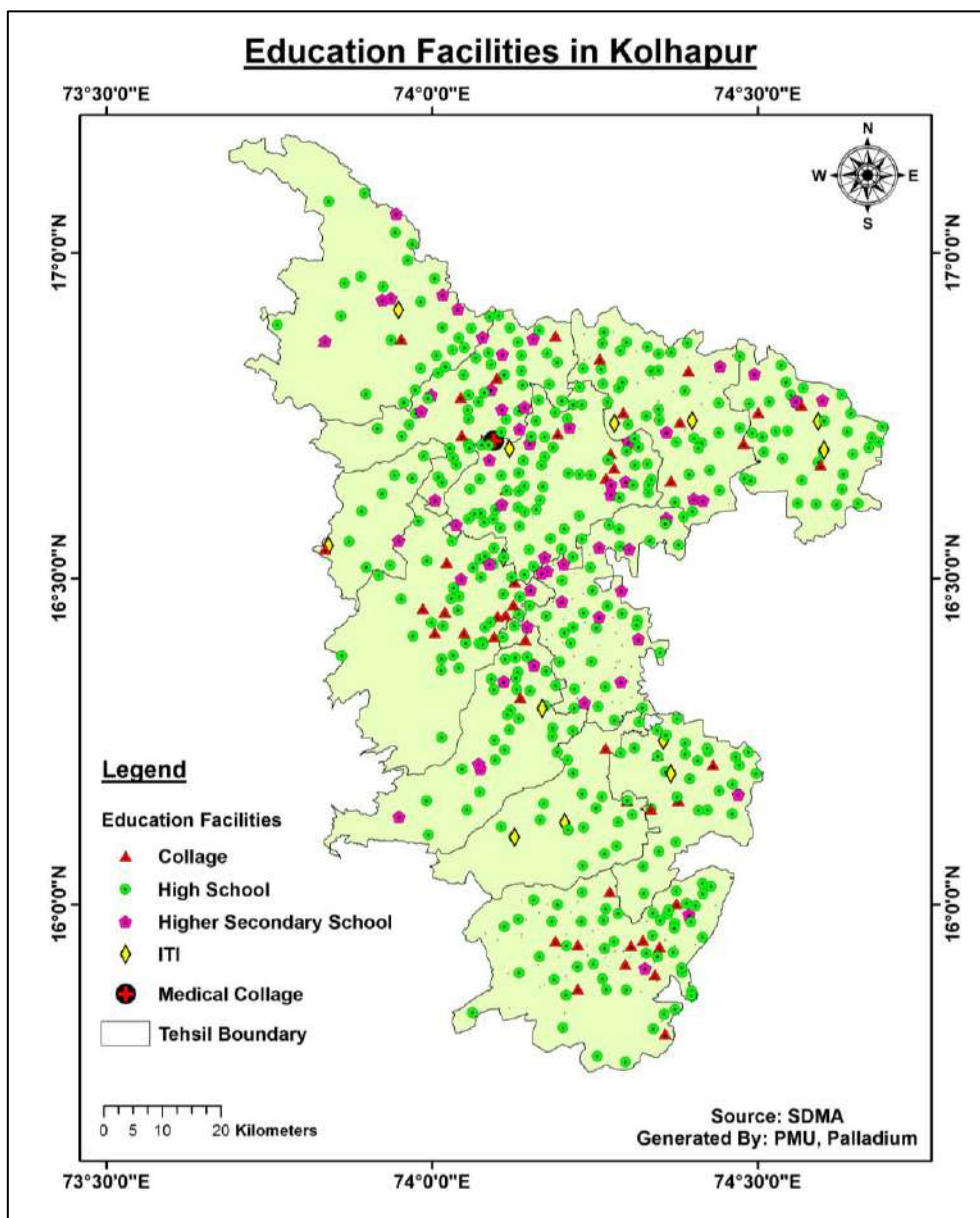


FIG. 35: EXPOSED EDUCATION FACILITIES IN KOLHAPUR

3.7.6. Agriculture and Livelihoods

Kolhapur's economy is heavily dependent on agriculture. Floods, droughts, and other natural disasters can destroy crops, livestock, and farmland, threatening the livelihoods of a large portion of the population. The loss of income and food security can exacerbate the impact of disasters on the community.

3.8. CAPACITY ASSESSMENT

3.8.1. Assessment of Existing Capacity

TABLE 26: EXISTING SEARCH AND RESCUE EQUIPMENT OF KOLHAPUR

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
1	Inflatable rubber boat with OBM	Order No. Adhavya Control Room/101/2016. dated12/07/2016	8		8
2	Screw driving set		2		2
3	Floating pump		2		2
4	Life jacket		200		200
5	Life Buy Ring		200		200
6	Search light		20		20
7	Head light with zoom		10		10
8	Flooring rope100l.		100		100
9	Inflatable life jacket	Order No.Adhovia Control Room/102/2016 dated 12/07/2016	50		50
10	Underwater search light		10		10
11	Life jacket	Hon. Collector Order No. RR/776/17 Attached Tah.Karya Shirol letter No.1477/2017 dated 20/07/2017	10		10
12	With search light charge		2		2
13	Life ring		10		10
14	Screw driving set		1		1
15	Life jacket		50		40
16	Life ring		50	Tehsildar Hatkanangle- 10	0
				Gadhinglaj- 10	
				Azra- 10	
				Radhanagari- 10	
				Bhudargarh- 10	
17	Search light		6	Sub-Divisional Officer	0
				Karveer- 1	
				Ichalkaranji- 1	
				Radhanagari- 1	
				Gadhinglaj- 1	
				Panhala-1	
				Bhudargarh- 1	
18	Head light with zoom		5		5
19	Flooring rope	50	Tehsildar Hatkanangle -5	10	
			Gadhinglaj -5		
			Azra- 5		
			Radhanagari-5		
			Bhudargarh- 5		
			Gaganbawda-5		

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
				Panhala-5	
				Shahuwadi-5	
20	Underwater search light	Hon. Collector	5		5
21	Inflatable rubber boat	Order No. RR/776/17 dated 18/07/2017. Attached Tah. Karya Shirol Letter No.1477/2017 dated 20/07/2017	1		0
22	Aska Light	Gram Panchayat Shirol	5		5
23	Inflatable rubber boat	Hon. Collector's Supply Order No. Works/12/A/Nai.A. RR/018 dated 06/07/2018	6	Tehsildar Office Gadhinglaj 1 Azra 1 Radhanagari 1 Bhudargarh 1 Gaganbawda-1	1
24	Life buoy ring	Received from Mah.Karya Karveer	50	Tehsildar Office Panhala 10 Gaganbawda-10 Shahuwadi-10	20
25	Drone camera	Order No. Work.12/A/ 1Nai.A./RR/2017	1		1
26	Chensaw	Order No. Work.12/A/ 1NAI/RR/746/201 8 dated 19/7/18	13		13
27	Safety Gloves (Canvas Leather)		12		12
28	30 Meter 10/11 mm BOB Nylon rope		6		6
29	Oars and rowlocks		3		3
30	Paddles	Coll.off.RR/ dt.06/07/18	18		18
31	Anchors		4		4
32	Galvanized metal bucket or bailer		4		4
33	DCP fire extinguisher 5 kg.		4		4
34	Emergency spotlight with minimum ho.		2		2
35	Toolkit (colt cutter wire cutter, pliers, screw)		2		2
36	Axe/hatchet 3 kg.	Collector.of/RR/72 4118 dt.06/07/18	2		2
37	Fiber Glass back board stretcher		3		3
38	Radio walkie sets		6		6

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
39	Park Pick	collector / RR/724/18 dt.06/07/2018	12		12
40	First Aid Kit		6		6
41	Yemo pronged grapnel or cat hooks		6		6
42	Throw bag		6		6
43	Safety Goggles		6		6
44	Safety Helmet		6		6
45	GPS Sets		2		2
46	Navigation Light		2		2
47	Rubber boat Life jacket Life bearing OBM Machine	Ja.No./Adhavya/Co ntrol Room/147/2020Co llector's Office Kolhapur Dt.16/06/2020	25 250 50 25	1) Tehsil Office Azra	0
				Rubber Boat-1	
				Life Junket-10	
				Life Bearing-2	
				OBM Machine- 01	
				2) Tehsil Office Kagal	
				Rubber Boat -01	
				Life jacket-10	
				Life Bearing-02	
				OBM Machine- 01	
				3) Tehsil Chandgarh	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine- 01	
				4) Municipal Council Gadhinglaj	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine- 01	
				5) Tehsil Shirol	
				Rubber Boat-04	
				Life jacket -40	
				Life Bearing - 08	

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
				OBM Machine-04	
				6) Tehsil Hatkanangle	
				Rubber Boat-02	
				Life jacket -20	
				Life Bearing - 04	
				OBM Machine - 02	
				7) Tehsil Shahuwadi	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				8) Tehsil Kagal	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				9) Tehsil Gaganbawda	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				10) Tehsil Radhanagari	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				11) Tehsil Bhudargarh	
				Rubber Boat-01	
				Life jacket -10	

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
				Life Bearing - 02	
				OBM Machine - 01	
				12) Tehsil Azra	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				13) Tehsil Chandgarh	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				14) Municipal Council Gadhinglaj	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				15) Tehsil Panhala	
				Rubber Boat-01	
				Life jacket -10	
				Life Bearing - 02	
				OBM Machine - 01	
				16) Tehsil Shirol	
				Rubber Boat-06	
				Life jacket -60	
				Life Bearing - 12	
				OBM Machine - 06	

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
48	Rubber boat	Ja.No./Adhavya/Co ntrol Room/176/2020Co llector's Office Kolhapur Dt.26/06/2020	3	1) Tehsil Office Hatkanangale	0 0 0 2
	Life jacket		30	Rubber Boat-03	
	Life bearing		6	Life jacket-30	
	OBM Machine		3	Life Ring-06	
				OBM Machine-01	
49	Rubber boat	Ja.No./Adhavya/Co ntrol Room/187/2020Co llector's Office Kolhapur Dt.06/07/2020	7	1) Tehsil Office Gaganbawda	6 60 12 6
	Life jacket		70	Rubber Boat-01	
	Life bearing		14	Life jacket-10	
	OBM Machine		7	Life Ring-02	
				OBM Machine-01	
50	Auto Fire Fighting unit	Ja.No./Adhavya/Co ntrol Room/32/2021Coll ector's Office Kolhapur Dt.19/03/2021	150		150
51	Life Jacket		200		200
52	Heavy Duty Search Light		230		230
53	Emergency Floating Light (Generator Mounted)		6		6
54	Saw Cutter		24		24
55	Breathing apparatus (Under Water)		12		12
56	Breathing apparatus (For Smock area)		6		6
57	Hydraulic cutter (Slab Metal Bar Cutting)		6		6
58	Rubber boat OBM Machine Petrol Tank Swiss Book Pest Life junket Life bearing OBM machine	Ja.No./Adhavya/Co ntrol Room/107/2021Co llector's Office Kolhapur Dt.29/06/2021	7 1 1 1 1 70 14 7	1) Tehsil Shahuwadi	6 0 0 0 0 50 10 5
				Rubber Boat-1	
				OBM Machine-01	
				Petrol Tank-01	
				Swiss Book-01	
				Pest-01	
				Life Junket-10	
				Life Ring - 02	
				Foot Pump-01	
				Blower-01	
				Paddle Set-01	
				Puncture Kit-01	
				2) Tehsil Panhala	
				Rubber Boat-1	

SN o	Name of material	Purchase authority and date of purchase	Total Number of Equipment	Equipment transferred at Taluka level	Equipm ent availabl e at DDMA
				OBM Machine-01	
				Petrol Tank-01	
				Petrol Pipe-01	
				Life Junket-10	
				Life Ring - 02	
				Foot Pump-01	
				Blower-01	
				Paddle Set-01	
				Puncture Kit-01	

3.8.2. Gap Assessment

Based on the hazard history and assessment in the document, here is a tehsil-wise gap analysis for Kolhapur district:

Radhanagari:

- Hazards: Floods (Bhogavati, Dudhganga rivers).
- Gaps: Limited flood management and preparedness; inadequate early warning systems.
- Suggestions: Strengthen river embankments, install automated rain gauges for better monitoring, and create awareness programs for local communities.

Karveer:

- Hazards: Floods (Bhogavati, Kumbhi, Kasari, Panchaganga rivers), Earthquakes (3.1 to 4.0 magnitude).
- Gaps: Lack of structural resilience to floods and earthquakes; poor community training on disaster management.
- Suggestions: Retrofitting of vulnerable buildings, training programs on earthquake response, and enhanced flood control measures like levees and drainage improvements.

Panhala:

- Hazards: Floods (Kasari, Kumbhi rivers), Landslides.
- Gaps: Insufficient landslide monitoring; inadequate drainage infrastructure.
- Suggestions: Implement slope stabilization techniques, expand landslide early warning systems, and improve drainage systems to reduce waterlogging.

Gaganbavada:

- Hazards: Landslides, Cyclones.
- Gaps: Lack of robust slope management; limited disaster communication networks.
- Suggestions: Promote afforestation to prevent soil erosion, establish cyclone shelters, and improve communication channels for timely warnings.

Kagal:

- Hazards: Floods (Dudhganga, Vedganga rivers).
- Gaps: Inadequate flood mitigation infrastructure; poor coordination between local authorities during disasters.
- Suggestions: Develop comprehensive flood response plans, enhance coordination among stakeholders, and introduce river desilting programs.

Shirol:

- Hazards: Floods (Dudhganga, Warana, Panchaganga, Krishna rivers).
- Gaps: Insufficient community awareness on flood risks; poor evacuation planning.
- Suggestions: Conduct regular flood drills, improve community-based disaster risk reduction (CBDRR) programs, and establish permanent evacuation centers.

Bhuradgad:

- Hazards: Floods (Vedganga river).
- Gaps: Limited capacity to handle recurring floods; outdated infrastructure.
- Suggestions: Modernize flood control infrastructure and implement resilient agricultural practices for flood-prone areas.

Shahuwadi:

- Hazards: Landslides, Earthquakes (up to 5.3 magnitude), Cyclones.
- Gaps: Poor landslide response planning; insufficient earthquake-resistant structures.
- Suggestions: Strengthen building codes, introduce community landslide monitoring teams, and increase awareness about retrofitting homes for seismic resilience.

Hatkalangale:

- Hazards: Floods (Warana, Panchaganga rivers).
- Gaps: Inefficient flood management; lack of awareness regarding flood risks.
- Suggestions: Install flood gauges along critical river points, introduce a mobile-based flood alert system, and carry out regular community training on flood response.

General Suggestion:

- Enhance local capacity through regular training and drills for communities, local authorities, and first responders.
- Retrofit critical infrastructure to withstand floods, landslides, and moderate earthquakes.
- Improve early warning systems, especially in landslide-prone and flood-prone areas.
- Promote community-based DRR initiatives focusing on hazard-specific awareness, particularly for floods and landslides.
- Strengthen inter-departmental coordination during disaster events and improve information sharing.

4. INSTITUTIONAL ARRANGEMENT FOR DISASTER MANAGEMENT

The management of most disaster situations primarily falls under the jurisdiction of the State and District levels. The central government plays a supportive role and extends assistance when the impact of a disaster surpasses the capacities of the district and state authorities. Depending on the severity of the disaster and the specific requirements of the affected areas, the central government mobilises emergency teams, support personnel, specialised equipment, and operational facilities. However, active assistance to an affected state or district is typically initiated only following the declaration of a national-level disaster. In such cases, the national response mechanism is activated, and ongoing state or district-level disasters are closely monitored to ensure prompt assistance whenever necessary.

The Disaster Management Act of 2005 (DM Act, 2005) establishes institutional and coordination mechanisms to enhance disaster management (DM) effectiveness at the national, state, and district levels. By this legislation, the Government of India (GoI) has instituted a multi-tiered institutional framework comprising the National Disaster Management Authority (NDMA), led by the Prime Minister, the State Disaster Management Authorities (SDMAs), overseen by the Chief Ministers, and the District Disaster Management Authorities (DDMAs), chaired by District Collectors and co-chaired by elected representatives of local authorities within their respective districts. As per NDMA guidelines, these entities are designed to facilitate a shift from traditional relief-centric approaches to proactive, holistic, and integrated strategies that strengthen disaster preparedness, mitigation, and emergency response efforts.

4.1. DISTRICT DISASTER MANAGEMENT AUTHORITY (DDMA)

District Disaster Management Authority (Kolhapur) is an institution constituted as per the National Disaster Management Act, 2005, at the district level to ensure effective management and response to any disaster. The DDMA (Kolhapur) has the following structure:

TABLE 27: STRUCTURE OF DDMA IN KOLHAPUR

Sr.No.	Members	Designation
1	District Collector	Chairperson
2	President, Zilla Parishad	Co-chairpersons
3.	Additional District Magistrate	Member Secretary
4	Chief Executive Officer, ZP	Member
5.	Superintendent of Police	Member
6.	District Civil Surgeon	Member
7.	Executive Engineer PWD	Member
8.	Executive Engineer Irrigation	Member
9.	Commissioner, MC Kolhapur	Member
10.	District Health Officer, ZP	Member

4.1.1. Nodal departments for various hazards

- Revenue & Disaster Management:** Hydro-meteorological, geological & Biological disasters
- Police:** Road accidents, Stampede, Law and Order
- Irrigation:** Flood, Dam break

- d. **Health & Family Welfare:** Heat waves, Chemical, biological, radiological & nuclear disasters
- e. **Factories & Boilers Dept:** Dept. of Industries and the industry: Industrial accidents
- f. **Agriculture:** Pest attacks, Drought, Flood, Cyclone
- g. **Animal Husbandry:** Cattle epidemics
- h. **Water resources:** Dam break
- i. **Public Works:** Building and Road collapse
- j. **Forests:** Forest Fire, Landslides
- k. **Airport:** Air accidents
- l. **Industrial accidents:** Directive of Industrial Safety and Health (DISH)
- m. **Port/Fisheries:** Cyclone, Storm surge, Tsunami, Boat accident, Oil spill
- n. **Zilla parishad:** Flood, Cyclone, Landslide
- o. **Animal Husbandry:** Biological disaster, Flood, Cyclone
- p. **Konkan Railway Division:** Rail accidents

4.2. DISTRICT DISASTER MANAGEMENT COMMITTEE (DDMC)

Disasters stem from various calamities, each presenting unique challenges. Effectively addressing these challenges requires a well-organized structure and trained personnel, including a team of high-level officials dedicated to disaster management. To mitigate the impact of disasters, meticulous planning and coordination under the leadership of the chairperson of the district disaster management authority are imperative. Hence, the formation of a district disaster management committee (ddmc) under the chairmanship of the district collector is essential.

The ddmc should convene at least once a year under the leadership of the district collector to assess overall mitigation and preparedness activities for disaster management in the district. The disaster risk management programme also underscores the importance of forming multiple-level committees, each equipped with plans and task forces. The role of the disaster management committee includes:

- assessing the threat of disasters
- evaluating the district's vulnerability to such disasters
- reviewing preparedness measures
- considering recommendations for enhancing the district disaster management plan (DDMP)

This committee convenes annually under the guidance of the collector and comprises the following functionaries:

TABLE 28: STRUCTURE OF DISTRICT DISASTER MANAGEMENT COMMITTEE IN KOLHAPUR

The District Collector	Chairman
The District Superintendent of Police	Member
The Chief Executive Officer, Zilla Parishad	Member
The Additional Collector	Member
The Resident District Collector	Member-Secretary
The Chief Fire Officer	Member
The District Health Officer	Member
The District Agriculture Officer	Member
The District Animal Husbandry Officer	Member
The Civil Surgeon	Member
The Executive Engineer, P.W.D.	Member
The Executive Engineer, Irrigation Department	Member

The District Collector	Chairman
The Executive Engineer, Minor Irrigation Division	Member
The Executive Engineer, M.S.E.D.C.	Member
The Executive Engineer, MWSSB	Member
The District Education Officer	Member
The Divisional Manager, Railways	Member
The Regional Transport Officer	Member
The Regional Manager, M.S.R.T.C.	Member
The District Publicity Officer	Member
The District Supply Officer	Member
The Local Station Director, A.I.R.	Member
The Local Station Director, Doordarshan	Member
District Port Officer	Member
Ass. Commissioner, Fisheries	Member

4.3. COORDINATION STRUCTURE AT DISTRICT LEVEL

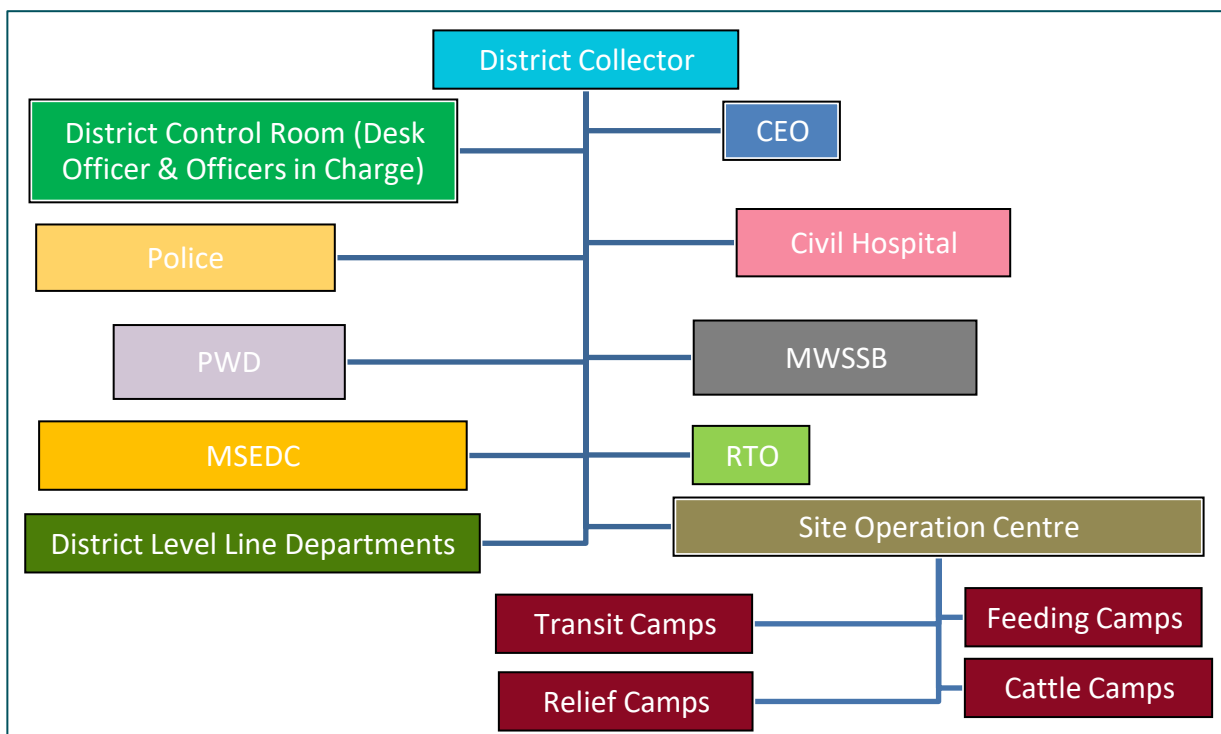


FIG. 36: DISTRICT LEVEL COORDINATION STRUCTURE IN KOLHAPUR

4.4. AGENCIES COMPETENT FOR DISSEMINATING WARNINGS OR ALERTS ISSUED

TABLE 29: LIST OF AGENCIES COMPETENT FOR DISSEMINATING WARNINGS OR ALERT IN KOLHAPUR

Disaster	Agencies
Earthquakes	IMD, MERI
Floods	Meteorology Department, Irrigation Department
Cyclones	IMD, Fisheries, Port
Epidemics	Public Health Department
Road accidents	Police
Industrial and Chemical Accidents	Industry, Police
Fires	Fire Brigade, Police

4.4.1. The warning or occurrence of disaster will be communicated to

- Chief Secretary, Relief Commissioner, Emergency Operation Centre
- Office of Divisional Commissioner
- All district-level officials, Municipal Councils
- The Officials of the central government located within the district
- Non-officials viz; Guardian Minister of the district, Mayor, ZP Presidents, MPs, Local Defence Services.

5. PREVENTION AND MITIGATION MEASURES

5.1. PREVENTION MEASURES

Preventing disasters or minimising their impact is crucial for effective disaster management. The District Disaster Management Plan (DDMP) incorporates various preventive measures to mitigate risks and enhance community resilience. Key preventive strategies include:

Risk Assessment and Hazard Mapping: Conducting comprehensive risk assessments and mapping to identify vulnerable areas and potential hazards, enabling informed decision-making and targeted interventions.

Early Warning Systems: Establishing robust early warning systems to provide timely alerts and information to at-risk communities, allowing for proactive preparedness and evacuation measures.

Building Regulations and Land Use Planning: Implementing strict building regulations and land use planning policies to mitigate risks associated with improper construction practices and urban development in hazard-prone areas.

Infrastructure Development: Investing in resilient infrastructure, such as flood barriers, stormwater drainage systems, and earthquake-resistant buildings, to withstand natural disasters and minimise damage.

Environmental Conservation: Promoting environmental conservation and sustainable land management practices to reduce the likelihood of disasters such as landslides, forest fires, and ecosystem degradation.

Community Awareness and Capacity Building: Conducting community awareness campaigns and capacity-building programs to educate residents about disaster risks, preparedness measures, and response protocols.

Emergency Response Planning: Developing comprehensive emergency response plans that outline roles, responsibilities, and coordination mechanisms for various stakeholders to ensure swift and effective response during emergencies.

Risk Reduction Measures: Implementing risk reduction measures, such as retrofitting vulnerable structures, establishing evacuation routes, and conducting regular drills and exercises to enhance preparedness and resilience at the local level.

Multi-Sectoral Collaboration: Facilitating multi-sectoral collaboration and partnerships among government agencies, non-governmental organisations, private sector entities, and community groups to address disaster risks and strengthen resilience collectively.

Continuous Monitoring and Evaluation: Regularly monitoring and evaluating the effectiveness of preventive measures, updating risk assessments, and refining strategies based on lessons learned and emerging threats to ensure the ongoing effectiveness of the DDMP.

By prioritising prevention measures, the district can proactively mitigate risks, reduce vulnerabilities, and build resilience to disasters, ultimately safeguarding lives, livelihoods, and infrastructure.

5.2. Flood Prevention and Preparedness Measures:

To track rainfall data, the district operates 130 rainfall monitoring stations (65 each from MAHARAIN—Revenue and MAHAVEDH—Department). Daily rainfall information is collected and disseminated to tehsil and department levels based on alerts from the IMD department.

A district-level disaster preparedness orientation meeting involving all relevant departments was conducted. Instructions were issued through a 24/7 Operational Control Room at the district headquarters. During the

monsoon season, control rooms are established at respective taluka headquarters and department levels. District-level officials, Tahsildars, SDOs, BDOs, and departments such as PWD, National Highway, and Port are advised to remain vigilant.

Flood-prone areas are identified by the Water Resources Department, which maintains a list of the most flood-prone areas. Disaster response teams have been formed at the taluka and village levels, including search and rescue, first aid, and shelter management teams. These teams received orientation sessions conducted by technical experts.

Several mock drills have also been organised to raise awareness about flood operations in collaboration with the police department.

5.3. MITIGATION MEASURES

Mitigation encompasses all actions aimed at diminishing the impact of a hazard and the susceptibility of the affected conditions, thereby minimising the magnitude of future disasters. Its goal is to decrease the physical, economic, and existential threats and address the root causes of vulnerability.

5.3.1. Structural measure

Structural mitigation measures play a vital role in enhancing the resilience of disaster-prone districts by reducing the impact of hazards on infrastructure, buildings, and communities. These measures involve the construction of physical structures designed to withstand or mitigate the effects of disasters. Here are some key points to consider by line departments during implementing structural mitigation strategies:

ENGINEERING SOLUTIONS: utilize engineering techniques to design and construct resilient infrastructure, such as bridges, roads, buildings, and flood control structures. These structures are engineered to withstand the forces of natural disasters like earthquakes, floods, hurricanes, and landslides.

BUILDING CODES AND STANDARDS: implement and enforce stringent building codes and standards to ensure that new construction and retrofitting of existing structures meet safety requirements. This includes provisions for earthquake-resistant construction, wind-resistant design, flood-proofing measures, and adherence to zoning regulations.

FLOOD CONTROL MEASURES: construct flood control structures such as levees, floodwalls, dams, and stormwater drainage systems to manage floodwaters and reduce the risk of inundation in flood-prone areas. These structures' proper maintenance and periodic inspections are essential to ensure their effectiveness.

SEISMIC RETROFITTING: retrofit vulnerable structures to improve seismic performance and earthquake resilience. This may involve strengthening foundations, adding structural bracing, reinforcing walls, and installing energy dissipation devices to absorb seismic energy.

LANDSLIDE MITIGATION: implement slope stabilisation measures, such as retaining walls, rockfall barriers, and vegetation management, to mitigate the risk of landslides in hilly or mountainous terrain. Landslide hazard mapping and land-use planning are essential to identify and avoid high-risk areas.

COASTAL PROTECTION: install coastal protection structures such as seawalls, breakwaters, and beach nourishment projects to mitigate the impact of coastal hazards like storm surges, erosion, and tsunamis. Dune restoration and mangrove reforestation can also provide natural coastal protection.

RESILIENT INFRASTRUCTURE DESIGN: design infrastructure with resilience in mind, incorporating features such as flexible utility systems, redundant lifelines, and modular construction techniques. This ensures that critical infrastructure can continue to function during and after disasters.

COMMUNITY ENGAGEMENT: involve local communities in planning, designing, and implementing structural mitigation measures to ensure solutions are tailored to their needs and priorities. Community education and awareness programs can promote adopting resilient building practices and disaster preparedness measures.

5.3.2. Non-Structural measure

Non-structural mitigation measures are also essential to disaster risk reduction strategies, focusing on reducing vulnerability and increasing resilience through methods other than physical infrastructure. These measures address disaster management's social, economic, environmental, and institutional aspects. Here are critical considerations for implementing non-structural mitigation in disaster-prone areas:

Risk Assessment and Planning: Conduct comprehensive risk assessments to identify district hazards, vulnerabilities, and exposure. Develop risk maps and hazard profiles to inform land-use planning, development regulations, and emergency response plans.

Land-Use Planning: Implementing zoning regulations and land-use plans that steer development away from high-risk areas, such as floodplains, earthquake fault lines, and landslide-prone slopes. Encourage sustainable development practices that minimise exposure to natural hazards.

Community Awareness and Education: Conduct public awareness campaigns and educational programs to inform residents about local hazards, evacuation routes, emergency procedures, and preparedness measures. Empower communities to take proactive steps to reduce their vulnerability to disasters.

Early Warning Systems: Establish and maintain early warning systems to provide timely alerts and information to at-risk communities. To disseminate warnings effectively, use various communication channels, including sirens, text messages, social media, and community networks.

Capacity Building and Training: Provide training and capacity-building programs for local authorities, emergency responders, community leaders, and volunteers. Equip them with the knowledge, skills, and resources to effectively prepare for, respond to, and recover from disasters.

Economic Diversification and Livelihood Protection: Promote economic diversification and livelihood protection measures to reduce dependence on vulnerable sectors and enhance resilience to financial shocks caused by disasters. Support small-scale enterprises, agriculture diversification, and alternative livelihood opportunities.

Environmental Conservation and Ecosystem Restoration: Preserve and restore natural ecosystems, such as wetlands, mangroves, and forests, which provide valuable ecosystem services, including flood control, erosion prevention, and biodiversity conservation. Healthy ecosystems can buffer communities against the impacts of disasters.

Community-Based Disaster Risk Management (CBDRM): Foster community participation and ownership in disaster risk management through CBDRM initiatives. Empower local communities to identify risks, priorities, and solutions and integrate their knowledge and traditional practices into disaster planning and response efforts.

Social Protection and Vulnerability Reduction: Implement social protection programs and measures to support vulnerable populations, including older people, children, persons with disabilities, and marginalised groups. Address underlying social inequalities and inequities that exacerbate vulnerability to disasters.

Coordination and Collaboration: Foster multi-stakeholder coordination and collaboration among government agencies, non-governmental organisations, academia, private sector entities, and community-based organisations. Promote partnerships for holistic and integrated approaches to disaster risk reduction.

Prioritising non-structural mitigation measures, disaster-prone districts can enhance their resilience, reduce vulnerabilities, and mitigate the impacts of natural hazards on communities and livelihoods. These measures

complement structural interventions and contribute to comprehensive disaster risk reduction efforts to build safer, more resilient societies.

5.4. MITIGATION STRATEGY

The strategy aims to establish a comprehensive policy framework for disaster risk reduction, focusing on prevention, mitigation, and preparedness in the pre-disaster phase. Key initiatives include the creation of a mitigation fund for the district, raising awareness of disaster risk reduction across all levels, and enhancing preparedness among stakeholders through optimised and accessible Information and Communication Technology Systems. To support these efforts, appropriate legislative and regulatory instruments will be developed to strengthen enforcement mechanisms at various government levels. Local and regional capacity building will focus on vulnerability, risk assessment, and post-disaster damage investigation. Additionally, the strategy prioritises the promotion of disaster-resistant construction techniques and enforcing safe building codes and practices across all sectors. Scientific research on risks and disasters will be encouraged to develop databases, enhance understanding of impacts, and identify preventive measures for the district.

5.5. DISASTER-SPECIFIC MITIGATION MEASURES

5.5.1. Flood

Some key pre-actions:

- Upon receiving the flood alert, the District Collector should promptly issue a flood alert to all police stations.
- Tehsildars should immediately inform residents living in low-lying areas about the potential flood risk.
- Utilize the public address system, SMS, and local cable TV networks to inform ordinary people about the flood.
- The Additional District Magistrate should coordinate with the Chief Medical Officer, District Health Officer, Rural Development Officers, and District Inspector of Schools.
- Ensure the complete evacuation of residents from low-lying areas.
- Tahsildars should ensure that relief centres are equipped with basic amenities to prevent the spread of diseases and provide first aid to the injured.

Key actions during floods:

- Cordoning off roads to areas prone to water accumulation due to incessant rains.
- marking entry points, such as road entry points from the National Highway, with names of villages and inundated areas.
- Transmitting traffic suspension signals to neighbouring districts in the event of floods or damage caused by heavy rains.
- Relaying information well in advance to prevent road congestion on National Highway/District Road sections.
- Notifying relevant authorities in the event of potential disruptions to train traffic, such as floods, bridge damage, or inundation of tracks, including contacting the Divisional Railway Manager.
- Cutting off electrical supply to prevent electrocution hazards.
- Contact the Konkan Railway authority for real-time updates on the situation.

Post-flood actions:

- Clearing debris and carcasses of animals and disposing of them appropriately to prevent the outbreak of epidemics.

- Restoring communication links and essential services such as electricity and transportation.
- Conducting vaccination campaigns against waterborne diseases for individuals at risk.
- Inspect all road and rail bridges for structural integrity before reopening them to the general public.
- Collaboration with NGOs and CBOs for psychological support.
- Conducting thorough inspections of railway lines to ensure their safety and allow relief trains to pass.
- Conduct post-disaster assessments and evaluations to identify lessons learned, preparedness gaps, and improvement opportunities. Incorporate findings into future disaster preparedness and mitigation efforts to enhance resilience and reduce vulnerability to landslides and other hazards.

5.5.2. **Landslide**

Some key pre-actions:

- Conduct comprehensive risk assessments to identify areas prone to landslides based on susceptibility zonation.
- Disseminate early warnings using rainfall gauges, ground cracks, leaching, and weather forecasts to detect potential landslide triggers and alert residents and authorities.
- Sustainable land use practices (construction should not be made at < 30-degree slope angle) that minimise slope instability.
- Implement vegetation management strategies such as afforestation, reforestation, and slope stabilisation techniques to enhance soil stability, reduce erosion, and mitigate landslide risks.
- Strengthen and retrofit critical infrastructure such as roads, bridges, and buildings in landslide-prone areas to withstand landslide impacts and minimise damage.
- Conduct community education and awareness campaigns to inform residents about landslide risks, evacuation routes, and emergency preparedness measures. Provide training on hazard recognition, early warning signs, and response protocols.
- Develop and implement emergency response plans for landslide events, including evacuation procedures, shelter locations, and coordination mechanisms between government agencies, first responders, and community organisations.
- Install warning signs, barriers, and protective structures in landslide-prone areas to restrict access and minimise human exposure to landslide hazards. Develop evacuation routes and emergency communication systems to facilitate timely evacuation and rescue operations.

Key actions during a landslide include:

- Promptly evacuate people from areas at risk of landslides to designated safe locations. Use established evacuation routes to ensure residents' safe and orderly movement of hazardous regions.
- Activate early warning systems to alert residents about the imminent threat of landslides. Use sirens, loudspeakers, text messages, social media platforms and other communication channels to disseminate warnings and evacuation instructions to affected communities.
- Mobilize emergency response teams, including search and rescue teams, medical personnel, and first responders, to conduct rescue operations and aid affected individuals. Establish temporary shelters and emergency medical facilities for displaced residents.
- Close roads and highways in landslide-prone areas to prevent accidents and ensure public safety. Redirect traffic away from affected areas and implement traffic management measures to minimise congestion and facilitate emergency response efforts.
- Shut down utilities such as gas, electricity, and water supply in landslide-affected areas to mitigate the risk of secondary hazards such as fires, electrocution, and contamination. Coordinate with utility companies to safely restore services once the landslide threat has passed.

- Assess the structural integrity of buildings, infrastructure, and utilities in landslide-affected areas to identify damage and potential hazards. Conduct inspections of roads, bridges, and structures to determine their safety and suitability for use.
- Conduct systematic search and rescue operations to locate and rescue individuals trapped or injured by landslides. Deploy trained personnel, search dogs, and specialised equipment to identify and extricate survivors from debris and unstable terrain.
- Coordinate with local authorities, emergency management agencies, and humanitarian organisations to facilitate a coordinated response to the landslide emergency. Provide logistical support, medical supplies, and humanitarian assistance to affected communities.
- Provide timely and accurate information to the public about the landslide situation, evacuation procedures, emergency shelters, and available support services. Offer psychological support and counselling to individuals affected by the landslide, including survivors, families, and first responders.

Key actions after a landslide include:

- Assess the extent of casualties and injuries resulting from the landslide. Provide survivors with medical assistance and emergency treatment and evacuate them to medical facilities for further care.
- Conduct a comprehensive assessment of the damage caused by the landslide to infrastructure, buildings, utilities, and natural resources. Document the extent of structural damage, debris accumulation, and environmental impacts to inform recovery and reconstruction efforts.
- Evacuate residents from landslide-affected areas to safe locations and establish temporary shelters or evacuation centres for displaced individuals and families. Provide evacuees with essential services such as food, water, sanitation, and medical care.
- Clear blocked roads, highways, and transportation routes to restore access for emergency responders, relief supplies, and essential services. Remove landslide debris and stabilise slopes to prevent further hazards and facilitate recovery.
- Repair and restore damaged infrastructure such as roads, bridges, utilities, and communication networks to ensure the resumption of essential services and connectivity. Prioritise critical infrastructure and key lifelines to expedite recovery efforts.
- Provide psychosocial support and counselling services to individuals and communities affected by the landslide, including survivors, families of victims, and first responders. Address emotional trauma, stress, and mental health needs to promote resilience and recovery.
- Engage affected communities in the recovery planning process to identify needs, priorities, and strategies for long-term recovery and reconstruction. Develop community-driven recovery plans that address housing, livelihoods, infrastructure, and social services.
- Conduct post-disaster assessments and evaluations to identify lessons learned, preparedness gaps, and improvement opportunities. Incorporate findings into future disaster preparedness and mitigation efforts to enhance resilience and reduce vulnerability to landslides and other hazards.

5.5.3. Cyclone

Operation of Control Rooms (DEOC):

- The DEOC will operate around the clock starting in June.
- During regular times, the Control Room should monitor preparedness activities before, during, and after disasters, including disseminating early warnings about cyclones received from IMD.
- It ensures the implementation of public health measures, monitors disease trends, and manages any situations arising from disasters.
- Details of Aapada Mitra with contact details should be available at the district level.

Preparatory Measures on Meteorological Alerts:

- Identification of potentially affected areas.
- Upon receiving alerts, disseminate cyclone strike information through the public addressing system (loudspeakers), local TV channels, and police vehicle loudspeakers.
- Instruct the Tehsil officer and police to inform the public in their respective areas.
- Evacuate people from high-risk areas to designated assembly points, preferably the least affected zone.
- Arrange shelter, food, water, and medicine at these assembly points.
- Notify the port authority and fishermen associations about the potential cyclone strike.
- Advise fishermen to avoid venturing into the high sea.
- Coordinate with port authorities to raise appropriate signals at the port.

Casualty Services and Medical Relief Centre Contingency Plan:

- Ensure 24/7 casualty services at all health institutions during disasters.
- Develop a contingency plan to establish medical relief centres (MRC) at strategic locations in advance. These centres should be strategically placed for efficient response and assistance.
- Mobile medical teams should provide regular services to relocated persons in their shelters.
- Efforts should be made to inform the public about the availability of 108 ambulance services wherever they are accessible in the districts. Ambulance Services:
- All ambulances from various district health institutions should be kept prepared.
- Additionally, other vehicles should be maintained and made roadworthy to be utilised during emergencies whenever possible.

Monitoring Actions During Cyclones:

- Contact the PWD, Tahsil officer and fire brigade control room to gather details of phone calls received during the cyclone to assess damage.
- Instruct the electricity department to cut off the power supply with overhead wires in the affected area to prevent short-circuiting and electrocution.
- Contact the state telecommunication department to assess any disruptions in the network.
- Coordinate with the police to ensure that roads in the affected area are cleared of obstructions as much as possible.
- Contact the port authority to evaluate the situation at the port.

Termination of Emergency:

- Confirm with the Meteorological Department that the cyclone risk has passed.
- Hold teleconferences/meetings with the heads of the fire department and the District Electric Supply Board and assess the situation.
- Instruct the Electric Supply Board to restore power supply region by region and provide feedback gradually.
- Broadcast/telecast "all clear" messages on SMS/WhatsApp/radio/TV, respectively.

5.6. RISK INSURANCE AND FINANCING

Risk financing and insurance play crucial roles in a comprehensive disaster management plan, providing financial protection and facilitating rapid recovery in the aftermath of disasters. Here are some key points:

Risk Financing Strategies:

District authorities should develop risk financing strategies to ensure adequate funding is available for disaster response, relief, and recovery efforts. This may involve setting aside contingency funds or establishing risk pools to cover potential losses.

Insurance Coverage:

Districts should explore insurance options to mitigate the financial impact of disasters on public infrastructure, property, and livelihoods. This may include procuring insurance policies for critical assets such as government buildings, schools, hospitals, and public utilities. Insurance coverage can extend to businesses, farmers, and households to protect against losses from natural disasters.

Catastrophe Bonds and Reinsurance:

Catastrophe bonds and reinsurance mechanisms can provide additional financial protection against large-scale disasters that exceed the capacity of traditional insurance. Districts can collaborate with insurance companies and reinsurance firms to access these instruments and transfer risk to the global financial markets.

Risk Assessment and Premium Setting:

Practical risk assessment is essential for determining insurance premiums and coverage limits. Districts should conduct vulnerability assessments and use risk modelling tools to estimate potential losses and inform insurance decisions.

Public-Private Partnerships:

Collaboration between government entities, private insurers, and financial institutions is essential for enhancing risk financing and insurance mechanisms. Public-private partnerships can facilitate the development of innovative insurance products tailored to the needs of local communities.

Community Outreach and Education:

District authorities should engage in community outreach and education initiatives to raise awareness about the importance of insurance and risk financing. Educating residents about available insurance options and risk reduction measures can enhance disaster preparedness and resilience at the grassroots level.

Post-Disaster Claims Processing:

Streamlining the claims processing and settlement process is critical for ensuring timely financial assistance to affected individuals and businesses. Districts should establish clear procedures for filing claims, assessing damages, and disbursing insurance payouts after disasters.

Incorporating risk financing and insurance into the district disaster management plan can help build financial resilience and safeguard communities against the economic impact of disasters.

6. PREPAREDNESS STRATEGIES

Preparedness measures are crucial for reducing the risk and minimising loss and damage to life and property during disasters. Preparedness, mitigation, response, and recovery are integral to the disaster management cycle.

The district's preparedness plan aims to safeguard the lives and properties of Kolhapur residents from potential hazards by implementing an effective long-term safety policy. This plan includes initiatives with specific objectives and strategies to achieve predefined goals within a set timeframe. The ultimate aim is to have resilient communities that minimise loss of life, injuries, and damage to property and infrastructure when hazards occur.

Strategies for hazard loss reduction focus on mitigating losses in the event of future hazards. Preparedness encompasses measures that enable individuals, households, organisations, communities, and societies to respond effectively and recover quickly from disasters. It ensures that necessary resources are available for an effective response and that responders are trained to utilise them effectively.

Hazard analysis has identified that Kolhapur is a commercial and medium industrial centre with highways and a railway line running parallel. The district is vulnerable to major earthquakes, fires, or chemical explosions, which could have significant impacts.

While the Kolhapur administration has taken various steps to enhance preparedness, there is still a need for greater awareness and training to establish an organised system within communities. Increasing community engagement and training initiatives can strengthen the district's preparedness and resilience to disasters.

6.1. RELIABLE COMMUNICATION SYSTEMS

Kolhapur, as a rapidly growing district, boasts a well-established communication system. However, during disasters such as earthquakes, there have been instances of partial or total collapse of the general communication infrastructure. This disruption hampers the flow of crucial information from disaster sites, resulting in delays in relief operations.

Therefore, The DEOC has the following equipment:

TABLE 30: LIST OF EQUIPMENT IN DEOC OF KOLHAPUR

Sl.no	Facility	Number
1	Telephone	4
2	Hotline	0
3	Computer	3
4	Printer	2
5	Mobile	2
6	Wifi	1
7	Satellite Phone	1
8	Software	1 (IRS)
9	Room	2
10	Room Size	950 Sqf
11	Staff	3

6.1.1. Communication and Media

The following departments are responsible for monitoring, predicting, and warning systems for specific disasters.

TABLE 31: LIST OF DEPARTMENTS RESPONSIBLE FOR MONITORING, PREDICTING, AND WARNING SYSTEM FOR SPECIFIC DISASTER IN KOLHAPUR

Disaster	Monitoring stations	Warning Systems and Technology	Departmental Agency
Earthquake	GSI	Phone, Wireless	GSI
Floods	Irrigation	Phone, Wireless	Irrigation
Cyclones	IMD	Phone, Wireless	IMD
Epidemics	PHC & Civil Hospitals	Phone, Wireless	Civil Surgeon/ DHO
IndustrialChemical Accidents	Industrial Safety and Health	Phone, Wireless	DISH
Fires	Municipal Corporation	Phone, Wireless	Municipal Council
Road accidents	Police Stations	Phone, Wireless	Police

6.1.2. Mass Media

The Presence of Media through different platforms are listed below:

TABLE 32: LIST OF MASS MEDIA IN KOLHAPUR

Department of Public Relations and Information				
S.No .	name	designation	Office	Mobile no.
1	Shri. Hemraj Bagul	Administration Head Information Director Maharashtra State Mumbai	022-2202405	8108970404
2	Empty	Departmental Deputy Director, Information, Kolhapur	0231-2662600/2663427	
3	Shri. Sachin Aadsul	Q. District Information Officer, Kolhapur	0231-2656146	9049987298
4	Mrs. Vrishali Patil	District Information Officer Kolhapur	0231-2656146	7875868344
5	Shri. Sunil Sontakke	Asst.Director Information		8888313851
District Statistics Office Kolhapur				
S.No .	name	designation	Office	Mobile no.
1	Mrs. Sarita Yadav	District Statistical Officer	0231-2640560	7588250630
Newspaper Representative				
1	Name of the newspaper	Name of the representative	Mobile no.	
2	Daily. Pudhaari	Shri.Anil Deshmukh	8805007051	
3	Daily. morning	Mr. Sunil Patil	9922315566	
4	Daily Lokmat	Shri. Rajaram Londe	9421200244	
5	Daily.Tarun Bharat	Shri. Praveen Desai	9860655056	
6	Daily. The market city	Shri. Vijay Patil	9823202121	
7	Maharashtra Times			

The media				
S.No .	Name of the diffusion medium	Name of the representative	Office	Mobile no.
1	B- News	Shri.Charudatta Josh. Vijay Kumbhar	0231-2523200	9325699920/ 9326499914
2	TV9 Marathi	Shri. Bhushan Patil		9665509273
3	Aakashvani Kolhapur	S. M. Padalkar	0231-2652645	9423860784
4	Durdarshan Kendra Mumbai Representative	Shri.Shashi Gajwani		9422048585 9975959595
5	Doordarshan Kendra Mumbai Cameraman	Shri.Vikas Patil		9850962936
6	IBN Lokmat	Shri. Dnyaneshwar Salokhe		9673946353
7	A.B.P. My personal	Shri. Vijay Kesarkar		9096973996
8	Sam Marathi	Shri. Ranjit Majgaonkar		9823694040
9	Zee, 24 hours	Mr. Pratap Naik	0231-2669066	9890950191
11	News 18	Shri. Amol Pandhare		9370845390
12	Jai Maharashtra	Shri. Amar Patil	0231-2659099	9822109099
13	Pudhaari News	Shri. Shekhar Patil	0231-2543111	7875707175
14	SPN	Shri.Bajirao Talekar		7875558316

6.1.3. Administrative Preparedness:

Control Room at the District:

A 24/7 operational control room is established at the Collectorate, equipped with a wireless system connected to Tahsil's headquarters. Additionally, there is a 24/7 Operational Police control room linked with the District Control Room.

Community Education and Preparedness Programmes:

Over 20 local NGOs operate in Kolhapur district, focusing on capacity development at the community level for disaster preparedness and recovery measures. These NGOs collaborate closely with the district administration during disasters, contributing to response management activities such as Search and Rescue Operations, Shelter Management, and distribution of essential items in affected areas.

Measures Taken for Promotion of Life/Crop/Property Insurance:

Special initiatives have been implemented in earthquake-prone areas to promote insurance coverage for life, crops, and property, enhancing resilience and mitigating losses.

Preparedness Measures Undertaken by Departments:

District-level departments and other relevant agencies contribute to preparedness efforts by reporting their respective measures. The District Collector uses this information to assess various departments' capabilities and preparedness levels, facilitating coordination with the Emergency Operations Centre, Relief Commissioner, and Divisional Commissioner.

6.2. INVENTORY AND EVALUATION OF RESOURCES

Inventory and evaluation of resources are necessary for assessing the capacity of the district to respond effectively to different types of disasters and, more specifically, to the catastrophes that the district is

specifically vulnerable to. Governmental and non-governmental (including) private resources will be mobilised during disasters. The list of resources available from the government and other agencies is in the annexure. These will be updated from time to time.

6.3. COMMUNITY AWARENESS AND EDUCATION

Over 20 local NGOs are actively engaged in Kolhapur district. The majority of these NGOs focus on capacity development at the community level, explicitly addressing disaster preparedness and recovery measures during crises. Strong coordination exists between the district administration and these NGOs, particularly during disasters, facilitating practical response management activities such as Search and Rescue Operations, Shelter Management, and the distribution of essential items to affected communities. The DDMA has also executed several awareness programs at the community level, schools, and colleges to create a better preparedness strategy.

6.4. DISTRICT-WISE IEC PLAN BASED ON HAZARD CALENDAR

IEC is an essential tool in disaster management to increase awareness, change attitudes, bring about positive behaviours, and promote the proactive involvement of concerned stakeholders to reduce loss of life, property, livelihood and environment.

6.4.1. Key Focus Areas for the effectiveness of IEC material

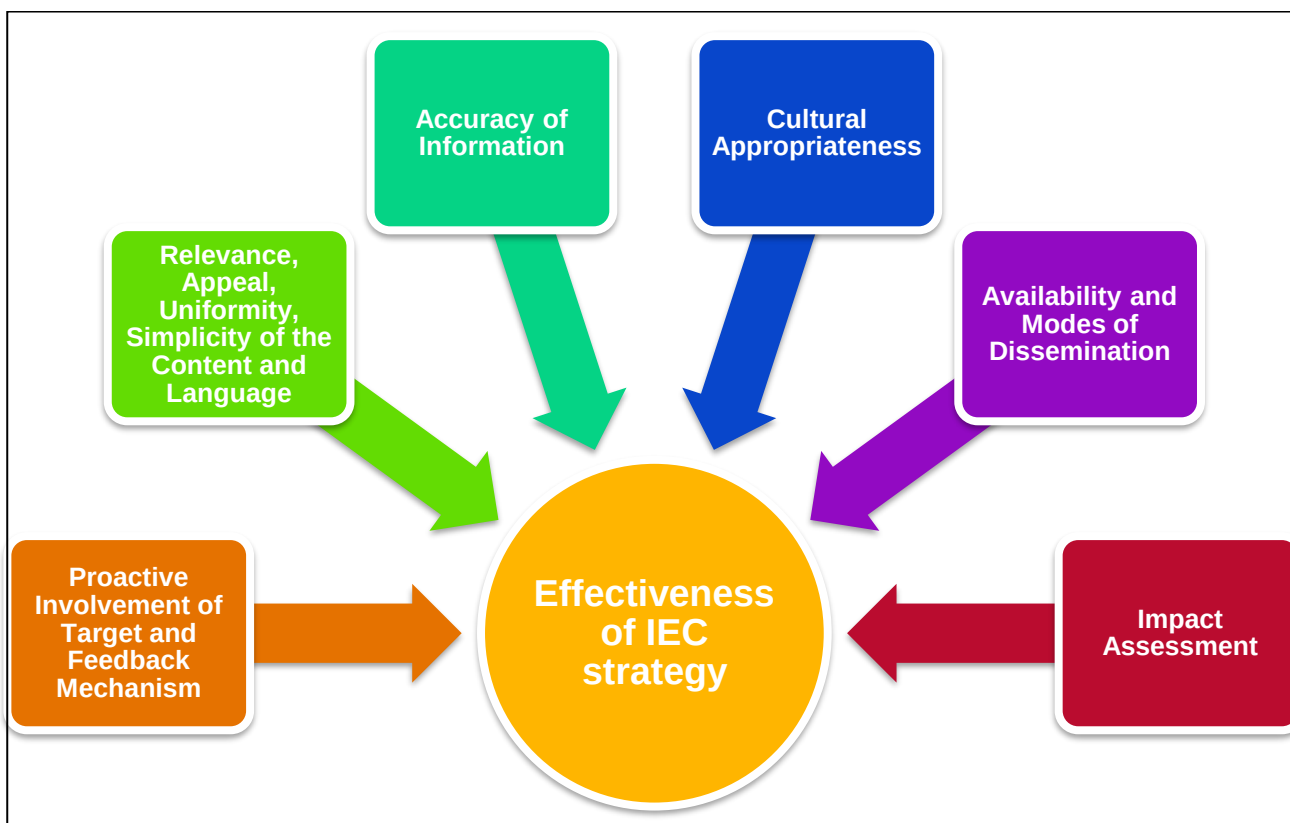


FIG. 37: EFFECTIVENESS OF IEC STRATEGY IN KOLHAPUR

6.4.2. Vulnerable Individuals/Groups and Alternative IEC

TABLE 33: LIST OF VULNERABLE INDIVIDUALS/GROUPS AND ALTERNATIVE IEC FOR KOLHAPUR

No.	Vulnerable Group	Barrier (generally multiple barriers)	Alternatives
1	Illiterate	Can not access IEC in literary form	Audio-visual content like videos, audio, pictorial material
2	People with visual impairment	Can not access IEC in a literary and visual format	Audio, Braille Handbook, screen reading software, audio description, DAISY (the Digital Accessible Information System)
3	Gender-based- women, LGBTQ+ (sexual minorities)	Social, technological, literary	Specialized in human interactions
4	Children (Different for different age groups- 1-6, 7-12 yr)	Physical and psychological	Specialized in human interactions
5	Communities with special needs, intellectual, speech, & Hearing impairments	Multiple barriers	Specialized in human interactions
6	People living in remote and inaccessible locations	Technological, infrastructural	Specialized in human interaction
7	Linguistic & cultural groups	Language	IEC in the local language
8	Nomadic/ Migratory groups	Unstable nature of routine and others (cultural, linguistic, literary)	Specialized in human interaction

6.4.3. Important Days in Maharashtra when disaster-related and relevant IEC interventions can be conducted

TABLE 34: LIST OF IMPORTANT DAYS FOR IEC INTERVENTION

No.	Day	Date	Significance	Tentative Topic
1	Balika Din	3 January	Birth anniversary of Savitribai Phule	Gender Inclusive Disaster Management
2	Patrakar Din	6 January	Birth Anniversary of Balshastri Jambhekar	Role of Media in Disaster Management
3	Sinchan Din	26 February	In memory of Shankarrao Chavan Memory	Water Security, Drought, Sustainable Water Management
4	Marathi Rajbhasha Din	27 February	Birth Anniversary of Kusumagraj (V. V. Shirvadkar)	Language access in emergency and disaster preparedness Language as a Tool for Disaster Management Importance of IEC in Local Language
5	Udyog Din	10 March	In memory of Laxmanrao Kirloskar	Entrepreneurship in Disaster Management

No.	Day	Date	Significance	Tentative Topic
				The Role of Disaster Entrepreneurship in Disaster Risk Reduction Role of Businesses, MSMEs in DRM Disaster Risk Management and the Role of the Corporate Sector BCM, ESG, CSR role in DRM
6	Samata Din	12 March	Birth anniversary of Yashwantrao Chavan	Diversity, equity-focused DRM Inclusive Disaster Risk Management
7	Shikshak Hakk Din (Teacher's Rights Day)	11 April	Birth anniversary of Mahatma Phule	Role of Teachers and Educators in DRM
8	Dyan Diwas (knowledge day)	14 April	Birth anniversary of Dr. B. R. Ambedkar	Role of Education in DRM Role of Research and Dissemination in Strengthening DRM Role of Educational Institutions in Disaster Knowledge Creation
9	Maharashtra Day	1 May	Also, an international labour day	Resilient Maharashtra: from present to future for all Labor Safety Industrial Disasters, including mining
10	Samajik Nyay Din (Social Justice Day)	26 June	birth anniversary of Shahu Maharaj	Role of Leadership in Disaster Management Grassroots leadership and DRM Social and Environmental Justice Disaster Justice Social Inclusion and DRM
11	Krishi Din	1 July	birth anniversary of Vasantao Naik	Agriculture-related disasters and relevant topics, soil erosion, Sustainable Agriculture, natural farming, Climate-resilient farming, etc
12	Shetkari Din	29 August	in the memory of Vitthalrao Vikhe Patil	Empowering farmers for DRM Relevant schemes, programmes and interventions
13	Shram Pratishtha Din	22 Sept	In the memory of Karmavir Bhaurao Patil	
14	Rajya Mahiti Adhikar Din	28 Sept	Awareness about the Right to Information	EWS, EWDS, Database management and mapping.
15	Rangbhumi Din	5 Nov	Birth Anniversary of Vishnudas Bhawe	Indigenous community, culture, traditions and DRR Role of Dance, Drama and other cultural activities in Disaster Awareness Role of art in Disaster mental Health and providing Psycho-social Support
16	Vidyarthi Din (Student Day in Maharashtra)	7 Nov	In the memory of Dr. B. R. Ambedkar	Child Centric DRR, School Safety, Role of School Students in Disaster Management Disaster Management in Schools

No.	Day	Date	Significance	Tentative Topic
17	Jaiv Tantradyan Din	14 Nov	Biotechnology Day	Biohazards, pest attacks, pandemics, etc

6.4.4. **Fiesta: Fostering Fortitude- A campaign to implement IEC interventions on festivals, reducing the risk of disasters.**

Below, Festivals celebrated in Maharashtra have special cultural significance, and the days are also prone to specific hazards. IEC material relating to such hazards can be disseminated during festivals to reduce the risk of disasters.

TABLE 35: LIST OF FESTIVAL AND SUITABLE IEC

No.	Festival	The focus of IEC Material
1	Ganesh Chaturthi	Drowning, Fire, Stampede
2	Navratri and Dussehra or Vijayadashmi	Fire, Stampede
3	Diwali	Fire
4	Janmashtami	Stampede
5	Ram Navami and Hanuman Jayanti	Stampede
6	Gudi Padwa or Chaitra Pratipada: The Harvest Festival of Maharashtra	Fire
7	Ramzan-Id (Id-Ul-Fitr), Bakri-Id (Id-Ul-Zuha)	Stampede
8	Narali Purnima	Drowning
9	Makar Sankranti	Accidents
10	Ashadhi Ekadashi	Stampede, Landslide, flood
11	Holi	Water-related

6.4.5. **Special events can be organized on significant dates**

List of Previous Major Disaster in Maharashtra and India (not a complete list)-

- Malin Landslide, 2014
- 26/11 Terrorist Attack
- Mumbai Flood 2005
- Latur Earthquake 1993
- Cyclone Nisarga, Tauktae, Phailin, etc.
- Mandhera Devi temple stampede, 2005
- Kumbh Mela Stampede, 2003
- Irshalwadi Landslide, 2023
- Marathwada drought, 1972
- Bhopal Gas Tragedy, 1984
- Jammu and Kashmir Earthquake, 2015
- Balasore Train Accident, 2023
- Chasnala mining disaster, 1975

6.5. GO-NGO COORDINATION

Sections 35 and 38 of the Disaster Management Act stress the importance of coordinating actions with NGOs. The National Policy on Disaster Management (NPDM) further underscores the national vision for community mobilisation and participation in disaster management (DM), aiming to galvanise collective efforts across government agencies and NGOs. Community-based disaster management, including integrating policies, plans, and execution at the grassroots level and early warning dissemination, is a crucial focus of the NPDM. Facilitating productive partnerships with NGOs is a central thrust within this policy framework, offering significant opportunities for enhancing NGO engagement in DM and leveraging their unique advantages and core competencies. Strengthening humanitarian coalitions, alliances, and NGO networks is essential, along with improving public awareness, capacity building, and knowledge management through Community-Based Organizations (CBOs) and NGOs. Additionally, institutional mechanisms for advocating and engaging NGOs with government agencies on DM matters need fortification while encouraging the replication and scaling up of successful community-level practices remains crucial.

6.5.1. GO-NGO Coordination Strategy

Establishment of Coordination Mechanisms:

- Form joint task forces or committees comprising relevant GO departments and NGO representatives.
- Designate focal points within GO and NGOs as primary contacts for coordination and communication.
- Schedule regular meetings, workshops, and training sessions to discuss strategies, share best practices, and address challenges collaboratively.
- Roles and Responsibilities:
- Clearly define the roles and responsibilities of GO and NGOs in disaster management, outlining areas of expertise, resources, and jurisdiction.
- Develop standard operating procedures (SOPs) outlining protocols for collaboration, resource mobilisation, and joint decision-making processes.
- Ensure joint decision-making processes for effective utilisation of resources and alignment of strategies.

Capacity Building and Training:

- Conduct joint capacity-building programs, workshops, and simulations to enhance the skills and preparedness of GO and NGO personnel.
- Provide training on disaster response protocols, emergency communication, humanitarian principles, and community engagement strategies.
- Conduct regular drills and exercises to test coordination mechanisms and enhance readiness for disaster response.

Resource Mobilization and Sharing:

- Facilitate sharing resources, including equipment, facilities, and personnel, between GO and NGOs, based on identified needs and priorities.
- Establish joint fundraising, resource mobilisation, and donor coordination mechanisms to efficiently utilise available funds and assets.
- Maintain an inventory of available resources and assets from GO and NGOs for easy reference during emergencies.

Community Engagement and Participation:

- Foster community participation and involvement in disaster risk reduction (DRR) initiatives through GO-NGO partnerships.
- Support community-led initiatives, volunteerism, and local capacity building to strengthen resilience and enhance preparedness at the grassroots level.
- Ensure effective dissemination of information and community awareness-raising activities to promote disaster preparedness and response.

6.5.2. **GO-NGO Communication Protocol During Emergencies**

Effective communication between government organisations (GO) and non-governmental organisations (NGOs) is essential for coordinated response efforts during emergencies. Here's a protocol for GO-NGO communication during emergencies:

- Identify focal points within GO and NGOs who will serve as primary contacts for communication.
- Exchange contact information, including phone numbers, email addresses, and other relevant communication channels.
- Establish multiple communication channels for real-time communication, including phone calls, text messages, emails, and instant messaging platforms.
- Designate an emergency communication system or platform where updates, alerts, and important information can be shared securely and efficiently.
- Schedule regular briefings and updates between GO and NGOs to share situational updates, operational plans, and resource requirements.
- Provide timely information on emerging threats, hazards, and developments related to the emergency.
- Share relevant information, data, and intelligence between GO and NGOs to facilitate informed decision-making and coordinated response efforts.
- Ensure transparency and openness in sharing information while respecting confidentiality and sensitive data.
- Conduct coordination meetings, either in person or virtually, to discuss response strategies, allocate resources, and address operational challenges.
- Invite critical stakeholders, including representatives from relevant government agencies, NGOs, community leaders, and other partners, to participate in coordination meetings.
- Coordinate resource mobilisation efforts between GO and NGOs to ensure efficient allocation and utilisation of available resources.
- Share information on available assets, personnel, equipment, and facilities to address gaps and avoid duplication of efforts.
- Foster collaborative decision-making processes where GO and NGOs have equal participation and input.
- Establish consensus on response priorities, action plans, and resource allocation based on identified needs and priorities.
- Coordinate the dissemination of emergency alerts, warnings, and public announcements to affected communities through various communication channels.
- Ensure that GO and NGOs convey consistent and accurate messages to avoid confusion and misinformation.

6.5.3. **List of NGOs/CBOs**

TABLE 36: LIST OF NGOS AVAILABLE IN KOLHAPUR

S.No	Name of the Institution	Chairman /Secretary	Office	Mobile no.
1	Jeevan Mukti Seva Sanstha,	Shri. Ashok Rokade Shri.Prashant Shende	0231- 2631891	9850079801 9175976259
2	Paramdham Seva Sanstha,	Shri.Prakash Vadangekar	0231- 2548422	9423281077 9422046797
3	Disaster Rescue Lifeguard Society	Mr. Dinkar Kamble		9049809394/
4	Jeevan Jyot Emergency Services Society, Kolhapur	Shri.Sunil Ganpat Jadhav,		9822551360 9096408261 7447212144 9881298932
5	Wazir Education and Social Foundation	Mr. Rauf Patel		9850229035
6	First Vision Emergency Services Society	Shri Krishnaat Bhende		9158466411
8	Jeevan Dan Mahila Multipurpose Service Society	Mr. Kamble		
5	Child Welfare Complex Mangalwar Peth	Aniket Niketan/Shri.PKDavari	0231- 2625429 /0231- 2622985	9420778070
6	Transportation Social Worker, Near Dudhali Vikas School, Kolhapur	Shri.Vinayak Revankar		9890190909
7	Sahajseva Trust 1) Chairman- Mr. Sanmati Mirje, 2) Member- Mr. Arvind Parmar, 3) Member- Mr. Prakash Kesarkar, 4) Manager- Mr. Sunil Kumbhar			9422412755 /9823017447 9822665757 /
8	Pramod Patil, Hill Rider & Hikers Group, Kolhapur			9423285155
9	Manugraph India Ltd. Shirol, Suryakant Carpenter, Shailesh Bandekar			9881199711
10	Aniruddha Upasana Foundation, Suhas Nikam			9822024019

7. CAPACITY BUILDING AND TRAINING MEASURES

According to the Disaster Management Act (2005), capacity-building encompasses the following aspects:

- Identify existing resources and acquire or create additional resources as needed.
- Acquisition or creation of resources identified in the preceding step.
- Organization and provision of training for personnel and coordination of such training to ensure effective disaster management.

The overarching goal of capacity-building in disaster management is to mitigate risk and enhance community safety. This is achieved by bolstering resilience and strengthening coping mechanisms. Practical capacity-building efforts at the district level necessitate active involvement from all stakeholders. It entails maintaining a comprehensive and regularly updated inventory of disaster management resources and initiatives for awareness-raising, education, and structured training. The Deputy Commissioner oversees district-wide capacity-building activities, while Heads of Departments are tasked with enhancing the capacity of their respective departments.

The District Disaster Management Authority (DDMA) plays a crucial role in enhancing the capacity of the district to manage disasters effectively. Here are some activities that the DDMA can undertake towards capacity building:

- Organize training sessions, workshops, and drills for government officials, first responders, community leaders, and volunteers to enhance their disaster preparedness, response, and recovery skills and knowledge.
- Conduct awareness campaigns and public outreach programs to educate the community about potential hazards, disaster risks, and preventive measures. This can include distributing informational materials, organising community meetings, and utilising mass media channels.
- Conduct simulation exercises and mock drills to simulate disaster scenarios and test various stakeholders' preparedness and response capabilities. These exercises help identify strengths, weaknesses, and areas for improvement.
- Collaborate with NGOs, civil society organisations, academic institutions, private sector entities, and other stakeholders to leverage their expertise, resources, and networks in disaster management efforts. Establishing partnerships fosters a coordinated and multi-sectoral approach to building resilience.
- Hosting marathons, slogan-writing contests, and painting competitions across various subdivisions to encourage participation from diverse groups.
- Conducting specialised training sessions for masons and engineers to equip them with skills for constructing disaster-resistant buildings.
- Distributing Information, Education, and Communication (IEC) materials to government offices, schools, colleges, and villages.
- Arranging training programs for stakeholders and employees of state government agencies.

7.1. TRAINING AND CAPACITY BUILDING

The capacity analysis approach should encompass short-term, medium-term, and long-term perspectives, addressing policy and operational levels with a multifaceted approach. Training initiatives should address identified capacity gaps, utilising local expertise within the district to facilitate various programs effectively.

Training programs should target stakeholders at the policy level, including officials at the District Disaster Management Authority (DDMA) and the operational level, such as civil defence, home guard, and police personnel. These training sessions should focus on response and mitigation strategies to enhance the district's disaster management capabilities.

7.1.1. Roles and Responsibilities of the Departments for Capacity Building

Revenue & Disaster Management Department:

- Ensure the operational readiness of the District Emergency Operations Center (DEOC).
- Regularly train DEOC staff to enhance their skills and preparedness.
- Equip the DEOC with essential emergency resources, maps, and a reliable communication network.
- Develop a skilled workforce proficient in mountain rescue, swimming, diving, and boat operation, considering the district's vulnerability and status as a tourist destination.
- Provide training to rescue teams in first aid, search and rescue techniques, and basic life-saving procedures.
- Maintain a comprehensive database of trained personnel in various aspects of disaster management and revenue within the district administration.
- Ensure an adequate supply and replenishment of search and rescue equipment, first aid kits, public address systems, blankets, tarpaulins, etc.
- Offer training in first aid and basic search and rescue techniques to revenue officers at the grassroots level.
- Establish a District Disaster Response Force modelled on the National Disaster Response Force (NDRF) to bolster disaster response capabilities.

Police Department, Home Guards, Civil Defence & Fire Services:

- Ensure that trained police personnel are documented within a district-level database dedicated to individuals skilled in disaster management.
- Provide ongoing training for police personnel to enhance their capacity to use modern techniques and technologies for disaster management and search and rescue (SAR) operations.
- Conduct refresher courses for district police officials in Kolhapur under the supervision and guidance of the Maharashtra State Police and the National Disaster Response Force (NDRF).
- Provide training in psycho-social care for teams tasked with preventing human trafficking, which often increases in the aftermath of disasters.
- Ensure the availability of necessary search and rescue (SAR) equipment for disaster management teams.
- Offer volunteer training sessions covering various aspects such as search and rescue (SAR), first aid, traffic management, dead body management, evacuation procedures, shelter and camp management, mass care and crowd management.
- Equip Home Guards companies with SAR items to effectively respond to and manage emergencies.
- Conduct regular mock drills by firefighting staff to simulate scenarios involving hazardous materials and related accidents.
- Arrange periodic refresher courses for departmental staff at the national and state training institutes.
- Establish a task force to inspect industrial units and offices for biannual compliance with fire safety regulations.

Health Department:

- The health department organises and conducts training sessions for healthcare personnel, including doctors, nurses, paramedics, and public health workers. These training programs should focus on disaster response protocols, triage procedures, first aid, infection control, and other relevant topics.
- The health department should establish and train specialised emergency medical teams to provide medical care during disasters. These teams may include rapid response teams, mobile medical units, and disaster medical assistance teams (DMATs).
- The health department should educate the community about disaster preparedness and response. They should organise community workshops, seminars, and awareness campaigns to inform the public about emergency procedures, evacuation plans, and health-related risks during disasters.
- The health department should collaborate with other government agencies, non-governmental organisations (NGOs), and international partners involved in disaster management. This coordination ensures a cohesive capacity-building approach and facilitates resource sharing and mutual support during emergencies.
- The health department should conduct regular simulation exercises, drills, and tabletop exercises to test the readiness of healthcare facilities and personnel in responding to different types of disasters. These exercises help identify gaps in preparedness and improve response capabilities.
- In addition to medical training, the health department should provide training on psychosocial support for healthcare providers and volunteers. This training equips them with the skills to address disaster survivors' mental and psychosocial needs, including counselling, stress management, and trauma-informed care.
- Training sessions will be conducted for members of local communities, Primary Health Centers (PHC), Community Health Centers (CHC), Anganwadi workers, and Accredited Social Health Activists (ASHAs) to equip them with updated techniques and procedures in health, Water, Sanitation, and Hygiene (WASH) practices, trauma counselling, psychosocial care, and assistance for persons with disabilities (PWDs).
- Capacity-building efforts at the institutional level will be undertaken through various activities as part of the Hospital Emergency Preparedness Programme (HEPP).
- Collaboration and coordination will be established with organisations such as the Red Cross, National Cadet Corps (NCC), National Service Scheme (NSS), and Civil Defence volunteers to disseminate awareness among the community regarding disaster preparedness and response.
- Awareness materials will be developed for distribution within the community to enhance understanding of disaster management practices and protocols.
- A core group of master trainers will be identified and trained at the district level to serve as focal points for cascading training initiatives and ensuring sustained capacity-building efforts within the region.
- The health department should regularly evaluate capacity-building efforts to assess their effectiveness and identify areas for improvement. Feedback from training participants and stakeholders should be used to refine training programs and enhance overall disaster preparedness and response capabilities.

Education Department:

- The education department is responsible for integrating disaster management education into the curriculum at all levels of schooling. This includes incorporating topics such as disaster preparedness, response, mitigation, and recovery into various subjects to raise awareness and build knowledge among students.

- The education department organises training programs and workshops for teachers to equip them with the knowledge and skills necessary to teach disaster management effectively. Teachers are trained to conduct drills, provide first aid, and support students during emergencies.
- Schools conduct regular drills and training sessions to educate students on disaster preparedness and response. This includes practising evacuation procedures, learning first aid techniques, and raising awareness about natural hazards and their potential impact.
- The education department collaborates with disaster management agencies and NGOs to develop educational materials, such as textbooks, manuals, posters, and videos, that can be used to teach students about disaster management concepts and practices.
- The education department supports research and innovation in disaster management education. This includes funding research projects, promoting best practices, and exploring new technologies and teaching methods to enhance school disaster preparedness and resilience.

Irrigation Department:

- Conducting training sessions for departmental staff members to equip them with the knowledge and skills necessary to manage irrigation systems during disasters. This training may cover emergency response protocols, safety procedures, and effective communication strategies.
- Collaborating with relevant stakeholders to organise public awareness campaigns to educate communities about disaster preparedness measures in flood-prone areas. This may involve conducting workshops, distributing informational materials, and leveraging local media channels to disseminate critical information.
- Implementing and maintaining early warning systems to alert communities about potential disasters, particularly floods. Training staff members to effectively operate and maintain these systems ensures timely dissemination of warnings and helps mitigate the impact of disasters on vulnerable populations.
- Ensuring irrigation infrastructure's proper maintenance and upkeep to minimise the risk of system failures during disasters. This includes regular inspections, repairs, and reinforcement of infrastructure components to withstand extreme weather events.
- Engaging in research and innovation initiatives to develop and implement new technologies and best practices for disaster-resilient irrigation systems. This may involve conducting studies, pilot projects, and knowledge-sharing activities to enhance the department's capacity to address emerging challenges posed by disasters.

Agriculture:

- Organizing training programs and workshops to educate farmers on disaster preparedness, response, and recovery measures. This training may cover crop protection, soil conservation, water management, and post-disaster recovery strategies.
- Encouraging farmers to adopt resilient farming practices that can withstand and mitigate the impact of disasters. This includes promoting drought-resistant crops, agroforestry, conservation agriculture, and sustainable land management techniques.
- Providing training and guidance to livestock farmers on disaster preparedness measures for the protection and welfare of livestock during emergencies. This may involve educating farmers on livestock sheltering, feeding, and evacuation procedures.
- Collaborating with relevant agencies to establish and maintain early warning systems for weather-related disasters such as floods, droughts, and cyclones. The agriculture department is crucial in

disseminating timely weather forecasts and advisories to farmers to help them make informed decisions.

Animal Husbandry:

- Conducting training programs and workshops for livestock owners and farmers on disaster preparedness, response, and recovery measures. This includes educating them on livestock sheltering, feeding, and evacuation procedures during emergencies such as floods, cyclones, and droughts.
- Providing training on primary animal health care and first aid techniques to livestock owners and animal health professionals. This includes recognising signs of illness, administering medications, and providing emergency treatment to injured animals during disasters.
- Developing and implementing livestock evacuation plans with local authorities and disaster management agencies. Training livestock owners on safe and effective disaster evacuation procedures, including routes to safe shelters and assembly points.
- Educating livestock owners on disaster risk reduction measures to minimise the impact of disasters on livestock and livelihoods. This includes promoting resilient livestock breeds, proper animal housing and fencing, and water and feed management practices.

Zilla Parishad and Gram Panchayat:

- Organizing training sessions, workshops, and awareness campaigns at the village and district levels to educate community members about disaster preparedness, response, and recovery. This includes disseminating information about local hazards, evacuation procedures, emergency shelters, and first aid.
- Conduct vulnerability and risk assessments at the village and district levels to identify areas prone to disasters and assess the vulnerabilities of communities, infrastructure, and natural resources. This information helps develop targeted capacity-building programs and disaster risk reduction strategies.
- Providing training to elected representatives, community leaders, and volunteers on disaster management principles, leadership skills, and coordination mechanisms. Empowering local leaders enables them to effectively mobilise resources, coordinate response efforts, and advocate for the needs of their communities during disasters.
- Organizing search and rescue training programs for local volunteers, firefighters, and emergency responders. This includes training on basic search and rescue techniques, use of rescue equipment, and coordination with district-level authorities and emergency services.

7.2. INSTITUTIONAL CAPACITY BUILDING AND TRAINING NEED ASSESSMENT

Institutional capacity building and training needs assessment are pivotal to formulating an effective district disaster management plan. These processes involve evaluating various institutions' existing capabilities and resources in disaster response and mitigation. By understanding the strengths, weaknesses, and gaps in capacity, targeted training programs can be developed to enhance the skills and competencies of government agencies, non-governmental organisations (NGOs), community groups, and other stakeholders. Training needs assessments help identify specific knowledge and skills required for different roles within disaster management, ensuring that training programs are tailored to address these needs. Moreover, continuous monitoring and evaluation mechanisms enable ongoing learning and improvement, ensuring that capacity-building efforts remain relevant and effective in the face of evolving risks and challenges. Through a collaborative and multi-sectoral approach, institutional capacity-building and training initiatives are crucial in building resilience and preparedness within the district's disaster management framework.

Below are the sets of questionnaires for conducting a Training Needs Assessment, which all departments are required to complete to prepare a training calendar accordingly:

7.2.1. COMMUNITY CAPACITY BUILDING

Communities are the first to be impacted by disasters and the initial responders. Encouraging community participation ensures local ownership, addresses local needs, and fosters volunteerism and mutual aid to prevent and mitigate damage. This participation is guided by the principles of "self-help," "help thy neighbour," and "help thy community." known as community-based disaster management (CBDM) or community-based disaster risk management capacity (CBDRM), community-based approaches focus on reducing vulnerability and disaster risk. Capacity building within communities involves establishing and strengthening disaster response structures, raising awareness, conducting training sessions, launching public information campaigns, and promoting sustainable livelihood activities through skill development. Task teams are formed for search and rescue (SAR), water, sanitation, and hygiene (WASH), early warning systems, first aid, and shelter management. Special attention is given to the needs of vulnerable groups such as older people, women, children, and persons with disabilities. Youth and women's organisations are networked and trained in various response aspects, including first aid, search and rescue, shelter management, and psychosocial counselling. Community plans are integrated into panchayat, block, and district plans, with coordination from the district disaster management authority (DDMA) and involvement of volunteers and social organisations such as home guards, national youth corps (NYKS), national cadet corps (NCC), red cross, market trade associations, youth clubs, self-help groups (SHGS), community-based organisations (CBOs), NGOs, and anganwadi centres. These entities play vital roles in disseminating community awareness. Traditional methods like folk songs, street plays, and engagement through local fairs, festivals, documentaries, and mass media are employed to educate and raise awareness. Community-based disaster risk reduction (CBDRR) and village contingency planning (VCP) are essential for capacity building at the grassroots level, managed by relevant departments with support from local authorities, panchayat raj and rural development (pred), and urban local bodies (ULBS), all under the overarching guidance of the district administration.7.1.4 training method and approaches.

TABLE 37: LIST OF TRAINING METHOD AND APPROACHES FOR CAPACITY BUILDING

Sl.no.	Task	Method	Nodal agency	Supporting Agency
1	Information dissemination regarding various hazards and their respective do's and don'ts should be prioritised, with an emphasis on preparing community-based disaster management plans in these areas. Schools, industrial clusters, slums, and resettlement colonies are identified as first-priority locations, given their high vulnerability. The second priority should be given to communities residing on the district's outskirts, particularly in villages.	Through Natak, Film Shows, Rallies, Media, Newspaper Media, Posters and Pamphlets, Group discussions and workshops etc	District Administration	Non Government Organisations (N GOs), Schools and colleges volunteers, NSS, NCC, Sports groups, etc.
2	Constitution of Community Based Disaster Management Committees and Taskforces	Through Community level meeting	District Administration	Aapadamitra, Members, Local

Sl.no.	Task	Method	Nodal agency	Supporting Agency
				Volunteers etc.
3	Capacity Building of Community Members	Through mock drills, preparation of community plans, trainings and workshops on disaster specific topics	District Administration	Civil Defence, Police, Fire, CBOs and NGOs
4	Training to the task forces and committee members, including first aid and trauma counselling, search and rescue and firefighting, warning dissemination, etc.	Training and workshops	Revenue Department along with Health, Police and Fire Departments	Civil Defence, Police, Fire, CBOs, and NGOs
5	Post-disaster epidemic problems	Seminars and community meetings	Health Department	Local health departments, and NGOs
6	Training programs focusing on constructing seismic-resistant buildings and retrofitting existing structures will be conducted. The target participants include contractors, masons, engineers, architects, and local communities.	Showing Films, videos, distributing posters and brochures, reading materials, etc. in training and workshop s.	District Administration	PWD, Private contractors and NGOs etc

7.2.2. TRAINING OF TRAINER

Training of trainers (ToT) plays a crucial role in capacity building for disaster management for several reasons:

- Trainers who are trained effectively can train more individuals, creating a multiplier effect. This helps disseminate knowledge and skills across a wider audience within the community or organisation.
- ToT ensures trainers have the knowledge, skills, and resources to deliver high-quality training programs. They are equipped to provide accurate information and effectively impart essential disaster preparedness, response, and recovery skills.
- ToT programs often establish standardised training methodologies, materials, and approaches. This ensures consistency in the training provided, regardless of the location or trainer, leading to uniformity in disaster management practices.
- By training trainers within the community or organisation, there is a built-in mechanism for sustainability. Trainers can continue to provide training over time, even as new individuals join the community or organisation.

- Trainers who undergo ToT are often equipped with skills to adapt training programs to suit different communities or organisations' specific needs and contexts. This flexibility ensures that training remains relevant and effective in diverse settings.
- ToT empowers individuals within communities or organisations to take ownership of disaster management initiatives. Trained trainers can facilitate local capacity-building efforts, empowering others to contribute to disaster resilience and response efforts.

7.2.3. **Disaster Management Education**

Disaster management education encompasses a broad spectrum of learning to prepare individuals, communities, and organisations to effectively mitigate, respond to, and recover from natural and artificial disasters. It encompasses formal education in academic settings and informal learning through workshops, training sessions, and public awareness campaigns. Disaster management education equips individuals with the knowledge, skills, and attitudes to understand various hazards, assess risks, and implement appropriate measures to reduce vulnerability and enhance resilience. It emphasises the importance of preparedness, early warning systems, evacuation procedures, emergency response protocols, and post-disaster recovery strategies. By fostering a culture of safety, collaboration, and proactive action, disaster management education contributes to building more resilient and disaster-ready societies.

7.2.4. **Role of Aapda Mitra in Community-Based Disaster Management and their Capacity Utilization**

Aapda Mitra, or disaster volunteers, is crucial in Community-Based Disaster Risk Reduction (CBDRR) efforts. These volunteers are community members trained and equipped to assist in disaster management at the local level. Their roles in CBDRR include:

- Aapda Mitra participates in identifying and assessing disaster risks within their communities. They gather information about local hazards, vulnerabilities, and capacities and contribute to developing community risk maps and profiles.
- Aapda Mitra is involved in developing and implementing community disaster preparedness plans. They help organise drills, training sessions, and awareness campaigns to educate community members about disaster risks and preparedness measures.
- Aapda Mitra assists in disseminating early warning messages to their communities and ensuring that vulnerable populations know evacuation procedures. They may help organise evacuation drills and provide guidance during evacuation efforts.
- In a disaster, Aapda Mitra is a first responder, providing immediate assistance such as search and rescue, first aid, and temporary shelter. They work alongside other emergency responders and community leaders to coordinate response efforts and address immediate needs.
- Aapda Mitra contributes to the recovery and rebuilding process by assisting in damage assessment, debris removal, and the distribution of relief supplies. They also support community members accessing government assistance programs and rebuilding their lives.

Overall, Aapda Mitra is vital in strengthening community resilience and fostering a culture of preparedness and solidarity in the face of disasters. Their involvement in CBDRR efforts helps communities become more self-reliant and better equipped to cope with and recover from adverse events.

7.2.5. **Skill Upgradation and follow-up training**

Skill upgradation and follow-up training are essential components of capacity building for disaster management. As disaster risks evolve and new challenges emerge, individuals and organisations involved in disaster response must continuously enhance their skills and knowledge. Skill upgradation consists of

providing training programs that address specific areas of need identified through capacity assessments and feedback from previous training sessions. These programs may focus on various topics, including search and rescue techniques, first aid, disaster communication, evacuation procedures, and disaster risk assessment. Follow-up training sessions are equally important, as they allow participants to reinforce their learning, address gaps in understanding, and stay updated on the latest best practices and innovations in disaster management. By investing in skill upgradation and follow-up training, organisations can ensure that their personnel are better prepared to respond effectively to disasters, minimise loss of life and property, and support communities in times of crisis.

7.2.6. Training Calendar & stakeholders to be trained

TABLE 38: ANNUAL TRAINING CALENDAR OF DISTRICT DISASTER MANAGEMENT AUTHORITY, KOLHAPUR, (2024-25)

No.	Name of Training Programs	Target Audiences	Duration of Program	No of Participants	No Training programs are required
1	Training of Nodal officers of district line departments about their roles and responsibilities in disaster/climate risk management and the DM planning process, developing disaster mitigation proposals and their implementation.	Nodal officers of district line departments	2 Days	30	2
2	Orientation of Tehsildar and BDOs on disaster/climate risk management and nature-based solutions	Tehsildars, BDOs	1 Day	30	2
3	Training Program on Urban Disaster Resilience and Climate Risk Mitigation in urban areas	SDO, BDO, CEO-Municipality	1 Day	20	1
4	Training program on Urban Risk Reduction and Resilience: Focus on flood risk management, Solid Waste Management and Drainage System	Line department	1 Day	30	1
5	Training program on Lightning Risk Management and Safety Measures at the Taluka level	Farmers, NGO, Agriculture department	1 Day	30	1
6	Training Program on Crowd Management and Stampede Risk Reduction at Taluka level	Taluka level Police, Home guard, Aapada Mitra	1 Day	30	1
7	Training program on Effective Involvement of CBOs, NGOs, CSOs and private sector stakeholders in Disaster Risk Management at Taluka level Levels	CBOs, NGOs, CSOs and private sector stakeholders	1 Day	20	1
8	Training on Child-Centric DRR	School	1 Day	30	1
9	Training on River Basin Management	Irrigation Dept, PWD, CWC, WRD, Tehsildar	1 Day	30	1

No.	Name of Training Programs	Target Audiences	Duration of Program	No of Participants	No Training programs are required
10	Training on mental health and psycho-social wellbeing in DM at Taluka level	Health dept, NGO	1 Day	30	1
11	Training on gender-inclusive DRR	Fire, Civil society, WCD, SJD	1 Day	30	1
12	Training on Industrial and Chemical Disaster Management, CBRN	Local industries	2 Days	30	2
13	Training of trainers for Life-saving techniques in disasters, Triage, Rainwater Harvesting and Energy Conservation.	Aapda Mitra, Local Youth, Schools	1Days	35	4
14	Training on handling tourists during emergency	Tourism, Travel agency, Coast Guards, Aapada Mitra, NGO	1 Day	30	1
15	Training on school safety and security at the Taluka level	Schools	1 Day	30	1

8. RESPONSE AND RELIEF MEASURES

Response and relief measures are crucial components of disaster management, particularly in the aftermath of a catastrophic event. The response phase involves immediate actions to save lives, minimize losses, and stabilize the situation. It encompasses a range of activities, such as search and rescue operations, emergency medical assistance, and evacuation efforts. Response teams, including emergency responders, medical personnel, and volunteers, work tirelessly to aid and support affected individuals and communities. Relief measures, however, focus on providing essential assistance to disaster victims for rehabilitation and recovery. This includes distributing food, water, shelter, and medical supplies and establishing temporary shelters and medical facilities. Relief efforts aim to address the immediate needs of those impacted by the disaster, offering them support and assistance during their crisis. Together, response and relief measures play a critical role in mitigating the impact of disasters and helping affected communities rebuild and recover.

8.1. LEVELS OF EMERGENCY

Emergency levels, often denoted as L0, L1, L2, and L3, represent different stages or degrees of severity in disaster management. These levels help categorise emergencies based on their magnitude and impact, allowing for appropriate response and resource allocation. Here's a brief overview of each level:

L0 (Level 0): This level typically refers to the preparedness and mitigation phase before a disaster occurs. It involves risk assessment, planning, training, and capacity-building to enhance readiness for potential emergencies. At this stage, efforts focus on preventing or minimising the impact of disasters through proactive measures.

L1 (Level 1): Level 1 emergencies denote low-level incidents or situations that can be managed locally or in the community with existing resources and capabilities. These emergencies may include minor accidents, localised disruptions, or incidents with limited public safety and infrastructure impact. Local authorities or emergency services typically coordinate response efforts at this level.

L2 (Level 2): Level 2 emergencies represent moderate-level incidents that require a coordinated response beyond the capacity of local resources. These emergencies may involve larger-scale disasters such as floods, earthquakes, or severe storms that affect multiple communities or regions. Response efforts at this level may include mobilising additional resources from neighbouring areas or government agencies, including personnel, equipment, and logistical support.

L3 (Level 3): Level 3 emergencies signify high-level incidents or catastrophic disasters that overwhelm local, regional, or national response capabilities. These emergencies pose significant threats to public safety, infrastructure, and the environment, requiring a comprehensive and coordinated response from multiple agencies and jurisdictions. Response efforts at this level may involve deploying national-level resources, activating emergency management protocols, and coordinating with international partners for assistance and support.

8.2. RESPONSE STRUCTURE AND FUNCTIONS

At the district level, before and immediately after a disaster, the district administration will activate the district control room to ensure that relevant information is promptly disseminated to the appropriate authorities.

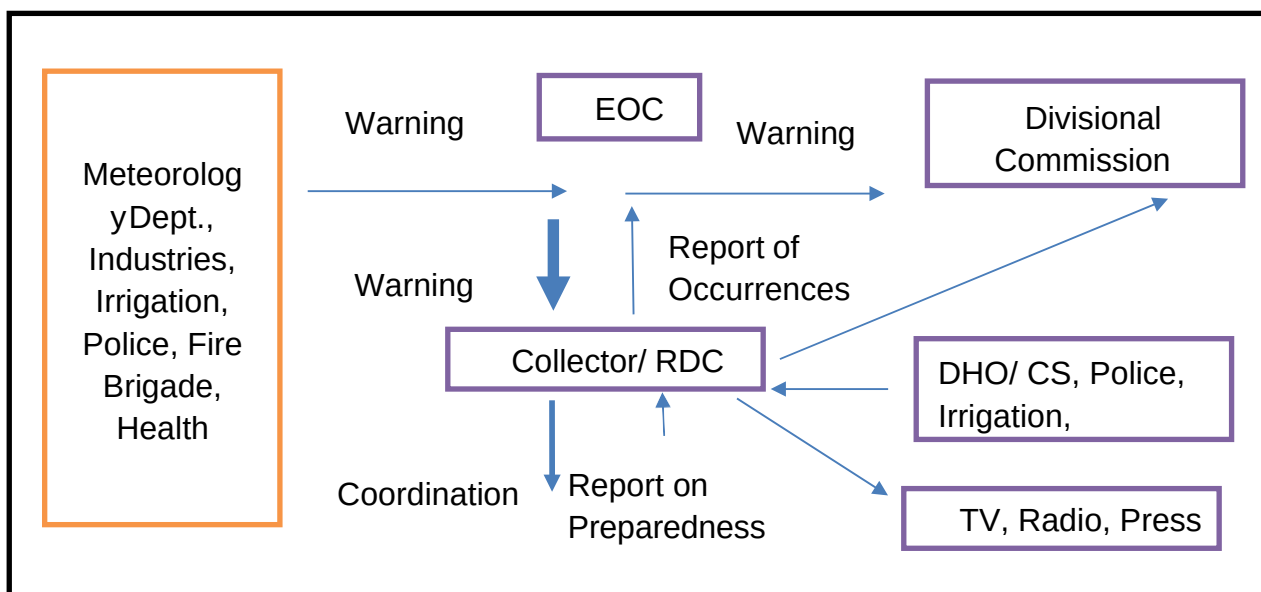


FIG. 38: RESPONSE STRUCTURE AND FUNCTION IN KOLHAPUR

8.2.1. Incident Command System (ICS)

The Incident Command System (ICS) serves as a comprehensive management system designed to address various types of disasters, whether natural or artificial. With its flexible and modular structure, ICS possesses several key attributes that enable its practical application across multiple incidents, regardless of size or complexity. The primary management functions of ICS encompass Command, Operations, Logistics, Planning, and Finance/Administration. These functions collectively provide the framework for coordinating and managing response efforts systematically and organizationally.

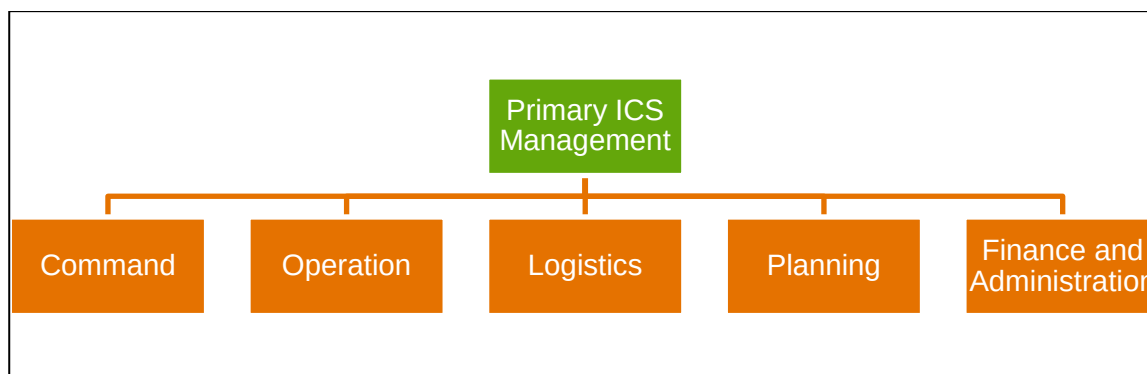


FIG. 39: STRUCTURE OF INCIDENT COMMAND SYSTEM IN KOLHAPUR

The Incident Command System (ICS) aims to enhance the existing disaster response management structure by ensuring that designated authorities at various levels are supported by trained Incident Command Teams (ICTs). These teams are equipped with the necessary skills and knowledge to manage different disaster response aspects effectively. The five primary command functions within the ICS are:

Incident Commander: Responsible for overseeing all incident activities, the Incident Commander ensures that response efforts are coordinated and directed effectively.

Operations Section: This section develops tactical organisation and coordinates resources to implement the Incident Action Plan, ensuring that response actions are carried out efficiently.

Planning Section: Responsible for gathering, evaluating, and presenting incident information, the Planning Section maintains resource status and prepares the Incident Action Plan and related documentation.

Logistics Section: Providing essential resources and services to support the response organisation, the Logistics Section ensures that all necessary equipment and supplies are available as needed.

Finance/Administration Section: Monitoring costs associated with the incident; this section manages accounting, procurement, time recording, and cost analysis and provides overall fiscal guidance to support effective financial management throughout the response process.

8.2.2. Incident Command Organisation Chart

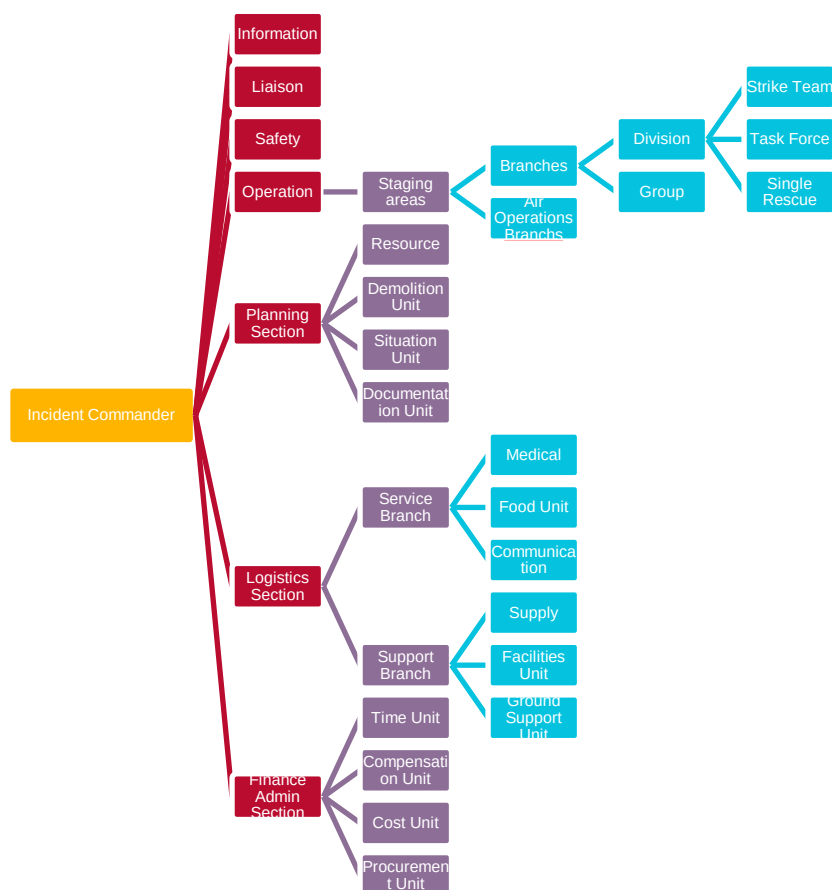


FIG. 40: STRUCTURE OF INCIDENT COMMANDING ORGANIZATION IN KOLHAPUR

8.2.3. Response Structure

Planning Assumptions

- The multi-disaster response plan takes a generic approach to disaster situations to identify information requirements, communication, coordination, monitoring, and institutional arrangements.
- The overall response structure remains constant irrespective of the type of disaster.
- The flow chart indicates the chain of command that should be set in motion to manage the disaster.

Engagement of Defence and Paramilitary Forces

In the event of a disaster at the district level, the District Collector will promptly communicate the required assistance to various departments. Efforts will be made to mobilise support from NGOs and other relevant agencies within the district. If the District Collector deems the situation beyond the district's capacity to manage, assistance from the defence and paramilitary forces may be requested.

Important Contact Numbers

TABLE 39: LIST OF IMPORTANT CONTACTS RESPONSIBLE FOR RESPONSE MECHANISM

Name of Department	Reporting Office	Contact No.
Navy	Maritime Operation Centre, Mumbai	022- 2275192022751486
	INS Shivaji (Lonavala)	02114 – 284304 /284862 Commodore-Harish Batra Mobile No. 7350018001
Air Force	Air Force Station Cotton Green	022 –23714982 / 4902 / 4947 Group Captain
Army	2 nd Maratha life Infantry, Pune	Captain Pawan Singh-08283864213
Civil Defence & Home Guard	Civil Defence Head Office, Mumbai	022 – 2284 3667 /4171
	Civil Defence, Pune	020 – 26360041/26361072 /26360067
	Civil Defence, Nashik	0253 – 2573149
	Civil Defence, Kalyan	0251 –2313494 / 2317578
	Civil Defence, Thane	022 –25342288
	Civil Defence, Uran	022 –27222343 / 27221355
	Civil Defence, Tarapur	02525 –264677 / 78
	Home Guard Head Office, Mumbai	022 – 2284 2423 / 6941
Police	D.G.P. Control	022 –2202 6636 /2282 2631
Geological Survey of India	Director, GSI, Pune	020 –26696489
NDRF	National Disaster Response Force	02114 – 247000
Weather Forecasting Centre	Pune Forecasting Centre	020 – 25535211
	Regional Meteorological Dept., Colaba	022 – 22150431
Mantralaya Control Room	Mumbai	022 – 222027990 Mob - 9321587143
Divisional Commissioner Office Control Room	CBD Belapur	022 - 27571516

Communication

- Handling all outgoing messages on behalf of the Relief Camp Officer, including data collection, record-keeping, assistance locating missing persons, and organising information for the Site Operations Centre.
- The communication room is equipped with various facilities, including telephones, fax machines, intercom units, VSAT connection, PCs with modems and printers, mobile phones, photocopying machines, and wireless communication.
- During sensitive situations, the media should exercise caution to avoid causing mental distress to the victims. They should disseminate accurate information and refrain from spreading rumours to prevent misinformation.
- It is essential to publish accurate numerical data to ensure the public is well-informed and not misled.

Law and Order

The Police Department plays a crucial role in disaster management by relocating people to safer areas, assisting the Revenue Department in relief work, and safeguarding victims' properties. They maintain law and order in disaster-affected regions, coordinate search and rescue operations with NCC/VTF/NGOs, provide security at relief camps and material storage facilities, and ensure orderly distribution of relief materials. Additionally, they oversee evacuating people to safe locations and facilitate post-mortem examinations and legal procedures. Special attention is given to protecting children and women in shelter places.

Public Grievances / Missing Persons Search

A district-level committee chaired by the District Collector addresses public grievances regarding missing persons. Search and rescue teams are deployed to locate missing individuals, whether alive or deceased.

Animal Care

The Animal Husbandry Department provides the necessary equipment for managing cattle deaths in disaster-affected areas, including carcass disposal and treatment of injured animals. Vaccination programs are implemented to prevent disease outbreaks among animals. Separate arrangements are made for pets and cattle.

Management of Deceased

The Carcass Disposal team is responsible for promptly clearing carcasses after a disaster to prevent disease spread. The health department initiates post-mortem procedures for deceased individuals by regulations. Proper disposal of dead bodies is essential to prevent epidemics, and death certificates are issued to relatives to facilitate legal processes.

Plan Activation

Upon receiving a disaster warning or the occurrence of a disaster, the disaster response structure will be activated with approval from the competent authority. The occurrence of a disaster will be promptly reported to the Commissioner of Relief/SDMA by the concerned monitoring authority through the fastest available means. The Commissioner of Relief (CoR) will activate all departments for emergency response, including the State Emergency Operations Centre (EOC), District EOC, and Emergency Response Centres (ERCs). Instructions will be issued detailing the exact resources required, such as workforce, equipment, and essential items from key departments/stakeholders, the type of assistance needed, and the time frame for assistance. Coordination details with other Task/Response Forces will also be included. The State EOC and other control rooms at the State and district levels will be activated with full staffing. The State Government may issue a notification in the official gazette declaring affected areas as disaster zones under applicable Acts/Rules. Once the situation is under control and normalcy is restored, the Commissioner of Relief will declare the end of the emergency response and issue instructions to withdraw staff deployed in emergency duties.

TABLE 40: LIST OF STAKEHOLDERS RESPONSIBLE OF EMERGENCY PLANNING

Sr. No.	Emergency Management Function / Tasks	Function /Task Lead	Support function officer/agencies
1	Direction Control, Coordination	DM	DDO, SP, Resident Dy. Collector and Tahsildar
2	Information Collection, Analysis and Damage Survey	DM	DDO, SP, Resident Dy. Collector (RDC), Tahsildar, DIC, Dy. DDO, Ex. Engr, R&B, DAO
3	Communication	RDC	Dy. Tahsildar, Mobile Operators, TV, Radio, Police, Forests, Fire
4	Alert and Warning	RDC / SP	EOC / Disaster Tahsildar, District Information Officer (DIO)

Sr. No.	Emergency Management Function / Tasks	Function /Task Lead	Support function officer/agencies
5	Transport (ESF, Evacuation, Relief Supply)	RTO / DTO	RDC, DDO, DSO, SP, DMHO
6	SAR (Search and Rescue)	SP / Civil defence/SDRF / NDRF	Fire, civil defence, Home Guards & SDRF (when the magnitude of any disaster is beyond the coping capabilities of these response agencies, NDRF may be requisitioned for search & rescue operations.)
7	Emergency Public Information	DIO	EOC / Police/ Transport/ Forest
8	Law and Order/Public Protection	SP	Dy. SP, Home Guards Commandant, NGOs, Paramilitary and Armed Forces
9	Public Works	Ex. Eng.	Irrigation, Ex. Engr., Panchayat, NGOs, Water Supply Board, Municipalities, Home Guards, Police
10	Mass Care / Emergency Assistance /Shelters	Dist. Primary Education Officer	School Principal, Teachers, Health, PHC, State Transport, Water Supply, RTO, Tahsildar, TDO
11	Health and Medical Services, Psychosocial	District Health Officer (DHO)	Supt. Govt. Hospital, Municipality, PHCs, CHCS, Red Cross, Fire Brigade, Civil

8.3. EMERGENCY SUPPORT FUNCTIONS BY LINE DEPARTMENTS IN PRIMARY AND SECONDARY ROLES

8.3.1. Health department

The health department plays a crucial role in Emergency Support Functions (ESFs) by providing essential medical services and public health support during disasters and emergencies. Some of the critical roles of the health department within ESFs include:

- Providing medical care and treatment to disaster survivors, including emergency medical services, triage, and patient stabilisation.
- Conducting surveillance to monitor the spread of diseases and outbreaks among affected populations and implementing measures to prevent further transmission.
- Implementing disease control measures such as vaccination campaigns, vector control, and provision of prophylactic treatments to prevent the spread of infectious diseases.
- Supporting healthcare facilities by ensuring their readiness to handle increased patient loads, providing medical supplies and equipment, and coordinating patient transfers if necessary.
- Offering mental health and psychosocial support services to individuals affected by the disaster, including counselling, crisis intervention, and referral to mental health professionals.
- Assessing and addressing environmental health hazards such as contaminated water sources, unsafe food supplies, and sanitation issues to prevent disease outbreaks.
- Coordinating medical evacuations and transportation of patients to healthcare facilities, including arranging for medical transports and providing medical escorts as needed.

8.3.2. **Police and Civil Defence**

- The police department maintains law and order in disaster-affected areas, ensuring the safety and security of the public and property. They enforce evacuation orders, manage traffic control, and prevent looting or other criminal activities.
- Both the police and civil defence departments are involved in search and rescue operations to locate and evacuate individuals in distress. They coordinate with other agencies and volunteers to conduct search missions, provide medical assistance, and transport survivors to safety.
- During emergencies, large crowds may gather at evacuation shelters, distribution centres, or disaster sites. The police department manages crowd control to prevent stampedes, maintain order, and ensure the safety of evacuees and responders.
- Police and civil defence personnel assist in evacuating residents from high-risk areas to designated shelters or safe locations. They manage shelter operations, registration of evacuees, and provision of essential services such as food, water, and medical care.
- Controlling traffic flow is essential for efficient emergency response and evacuation. The police department regulates traffic, establishes evacuation routes, and assists in moving emergency vehicles and personnel to affected areas.
- Police and civil defence departments disseminate vital information to the public regarding evacuation orders, shelter locations, emergency contacts, and safety precautions through various communication channels such as social media, public announcements, and emergency alerts.
- They collaborate with other emergency response agencies, including fire departments, medical services, and government agencies, to coordinate response efforts, share resources, and address emerging challenges during disasters.

8.3.3. **Revenue Department**

- The revenue department conducts rapid damage assessments to evaluate the extent of damage to infrastructure, property, and livelihoods caused by the disaster. This information is crucial for prioritising response and recovery efforts.
- the department is responsible for coordinating the distribution of relief materials to affected populations, including food, water, shelter, and medical supplies. They ensure that relief reaches those in need promptly and equitably.
- during emergencies, the revenue department assists in evacuating residents from high-risk areas to designated shelters or safe locations. They oversee the management of evacuation centres, including registration of evacuees, provision of basic amenities, and coordination with other agencies.
- following the immediate response phase, the revenue department plays a vital role in the rehabilitation and recovery of affected communities. This involves facilitating the reconstruction of damaged infrastructure, restoring essential services, and supporting livelihood recovery initiatives.
- the department facilitates assessing and disbursing compensation to individuals and families affected by the disaster. They also coordinate with government and non-governmental organisations to mobilise relief funds and resources for recovery efforts.
- the revenue department is a focal point for coordination between various government agencies, local authorities, and stakeholders involved in disaster response and recovery. They facilitate information sharing, decision-making, and resource mobilisation to ensure a cohesive and effective response.

8.3.4. **Irrigation and Water Supply Department**

- the irrigation department is responsible for managing rivers, dams, and reservoirs to mitigate the impacts of floods. This includes monitoring water levels, releasing excess water from reservoirs in a controlled manner, and providing early warning to downstream communities.
- during droughts or water scarcity situations, the irrigation department may be tasked with providing emergency water supply to affected areas. This could involve transporting water from alternative sources, such as nearby reservoirs or groundwater wells, to ensure community access to safe drinking water.
- to prevent flooding and waterlogging during heavy rainfall, the irrigation department maintains canals, drains, and embankments. They clear blockages, repair infrastructure damage, and ensure proper drainage systems are in place to minimise the risk of water-related disasters.
- in the aftermath of disasters such as floods or cyclones, the irrigation department plays a vital role in assessing and repairing damage to irrigation infrastructure. This includes repairing breached embankments, restoring irrigation channels, and rehabilitating damaged water supply systems to resume agricultural activities.

8.3.5. **Transport Department**

- The Transport Department collaborates with disaster management authorities to develop evacuation plans for areas at risk of natural disasters such as floods, cyclones, landslides or wildfires. They identify evacuation routes, designate assembly points, and coordinate the orderly movement of people to safer locations using various modes of transportation.
- During emergencies, the Transport Department may mobilise additional public transportation services, such as buses, trains, or ferries, to evacuate residents from affected areas or transport them to emergency shelters. They ensure that transportation routes are clear and accessible and adequate vehicles and drivers are available to facilitate evacuation.
- In the aftermath of earthquakes, landslides or severe cyclones, the Transport Department is crucial in clearing debris, repairing damaged roads, bridges, and highways, and restoring transportation infrastructure to ensure the uninterrupted flow of traffic and emergency services.

8.3.6. **Role of NDRF**

- Established under the Ministry of Home Affairs, Government of India, the National Disaster Response Force (NDRF) is tasked with two primary objectives.
- Firstly, it engages in search and rescue operations during disasters, aiming to save lives and mitigate the impact of calamities.
- Secondly, during peacetime, the NDRF conducts training and capacity-building programs to enhance preparedness across various response groups.
- One of its battalions is stationed at Talegaon, Pune, Maharashtra, which falls within its operational jurisdiction.

- In disaster, NDRF units can be deployed for search and rescue efforts. At the same time, their expertise and resources can also be leveraged to conduct training programs for different response teams.

**Office of the Commandant 5th Battalion NDRF,
Sadumbare, Pune (MH) MO – 79423506765
C/Room-02114-247000
FAX-02114-247008**

8.4. DISTRICT EMERGENCY OPERATION CENTRE

The District of Kolhapur established an Emergency Operation Centre (EOC) on the 2nd floor of the old District Headquarters building. This centre will operate 24/7 and is well equipped with a dedicated workforce and modern equipment. Given the critical role of the district Emergency Operation Centre, the equipment allocated to it is exclusively utilised for disaster management. The primary function of this centre is to streamline and coordinate all disaster-related activities in the district, spanning from preparedness to response and recovery efforts.

Each Emergency Support Function (ESF) has a designated permanent workspace within the EOC, furnished with adequate telephone and internet connectivity. The District Disaster Management Officer, IT assistant and their team members are stationed at the EOC to oversee and coordinate disaster management activities in collaboration with supporting agencies. Dedicated telephone lines and other communication facilities are present within the centre to facilitate efficient communication during emergencies.

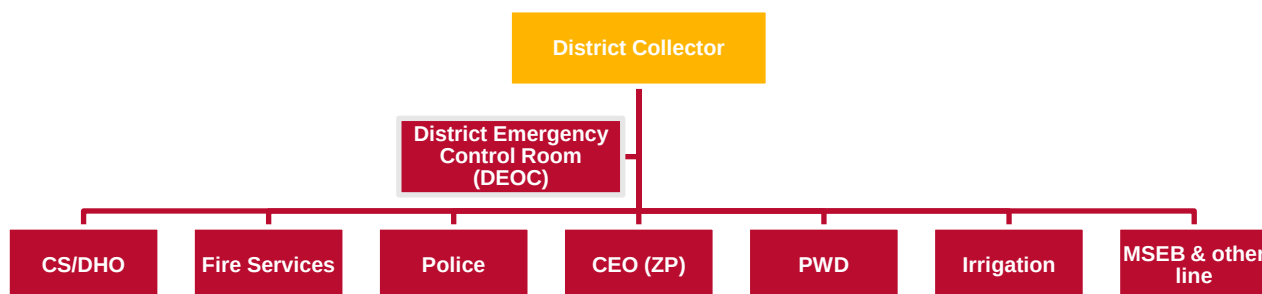


FIG. 41: STRUCTURE OF DISTRICT EMERGENCY OPERATION CENTRE IN KOLHAPUR

8.4.1. Role of Emergency Operation Centre in Normal Time

The Collector of District Kolhapur is authorised to designate an Administrative Officer as the Emergency Operation Centre's (EOC) officer-in-charge. This individual will be responsible for ensuring the EOC's efficient operation. The key responsibilities of the EOC in charge during regular periods include:

- Verifying the operational status of all equipment within the EOC.
- Regularly gather data on the vulnerability of various blocks and villages from relevant line departments for disaster management.
- Compiling status reports on preparedness and mitigation initiatives undertaken by district-level departments and forwarding them to the Government of Maharashtra and the Divisional Commissioner's office.
- Overseeing the proper implementation of the District Disaster Management Plan.
- Maintaining and updating the Inventory of Resources and data bank.

- Updating the District Disaster Management Plan in response to evolving circumstances.
- Activating the trigger mechanism upon receipt of disaster warnings or occurrences within the district.

8.4.2. Role of Emergency Operation Centre during Disaster

Upon receiving messages from competent agencies, it is imperative to issue warnings to the general public and critical departments, essential for emergency response. Ensuring the accuracy and timeliness of these warnings is a primary responsibility of the Emergency Operation Centre (EOC). The EOC must establish a well-organized communication network to disseminate these warnings effectively. The Collector serves as the competent authority for issuing disaster warnings.

Furthermore, disaster warnings must be communicated to the following stakeholders:

- Chief Secretary, Revenue, Government of Maharashtra
- All Emergency Support Functions
- Members of the District Disaster Management Committee (DDMC)
- Hospitals, especially those located in the disaster-affected area and other hospitals within the district
- Office of the Divisional Commissioner
- Kolhapur Municipal Corporation and local units of the Defence Services
- Emergency Operation Centres in neighbouring districts
- National/State Emergency Operation Centre
- People's representatives from the district

The Emergency Operation Centre (EOC) is tasked with arranging desks for Emergency Support Functions within its premises to enhance coordination and assistance. In the absence of the Collector, the Additional District Magistrate & Resident Deputy Collector assumes authority and carries out all duties and powers of the designated officer. Community preparedness and disaster response measures are promptly implemented upon receiving a warning.

Additionally, the occurrence of a disaster triggers the following actions:

- Expansion of the EOC to accommodate desks for Heads of Departments responsible for specific tasks.
- Direction and control of all district-level staff, as required by the Collector, by the Responsible Officer. This includes staff from various departments such as Industrial Safety & Health, Health Department, Red Cross Society, Food & Supply, Police, Zilla Parishad, Municipal Authorities, Public Health, PWD, Transport Department, Irrigation, Fire Brigade Department, and Telecommunication. Any scheduled leave for officers and staff from these organisations is automatically cancelled upon requisition by the Responsible Officer, who directs them to report for duty immediately.
- In large-scale disasters, the Responsible Officer may liaise with local Army/Navy/NDRF Battalion units for incident response, including rescue, evacuation, and emergency relief measures.
- Requisitioning of resources, materials, and equipment from the private sector by the Responsible Officer.
- Industry activation of onsite plans, with assistance available upon request.
- Activation of the Response Plan, with desk arrangements for the Operation Logistics and Planning Section overseen by the Responsible Officer.
- Authorization for establishing transit and relief camps, feeding centres, and cattle camps through the Operation and Logistics Section.
- Activation of wireless communication from the EOC to the Operation Section Chief, Site Operations Bases, Transit Camps, Feeding Centers, Relief Camps, and Cattle Camps.

- Submit the Preliminary Information Report and Action Taken Report, based on available information, to the Chief Secretary, Director of Disaster Management Unit (DMU), Principal Secretary of Rehabilitation & Reconstruction, and the Divisional Commissioner, Konkan Division.
- Authorization of immediate evacuation as deemed necessary by the Responsible Officer. In case of potential disasters in neighbouring districts or beyond state borders, the Responsible Officer issues alert warnings to the concerned authorities.

8.4.3. Trigger Mechanism

Upon receiving information about an emergency, the staff on duty at the Emergency Operation Centre (EOC) will promptly relay the information to the District Collector (DC) or Additional District Magistrate (RDC) and await instructions for further action. Suppose the emergency involves a disaster occurring in any part of the district. In that case, the EOC staff will also endeavour to notify members of the District Disaster Management Authority (DDMA), leaders of Emergency Support Functions, central hospitals, and the State Disaster Management Authority. Additionally, the on-duty staff will gather relevant details regarding the disaster's type, magnitude, and location and communicate this information to the appropriate authorities.

The EOC in charge will ensure that details of all Divisional Commissioner and State EOC contacts are readily available. Desk officers, team leaders, and members of the Incident Command Team will be promptly notified to report to the District EOC. The Incident Command Team and Desk officials will then respond by their standard operating procedures and directives from the Incident Commander (IC).

8.4.4. Trigger Mechanism for Kolhapur District

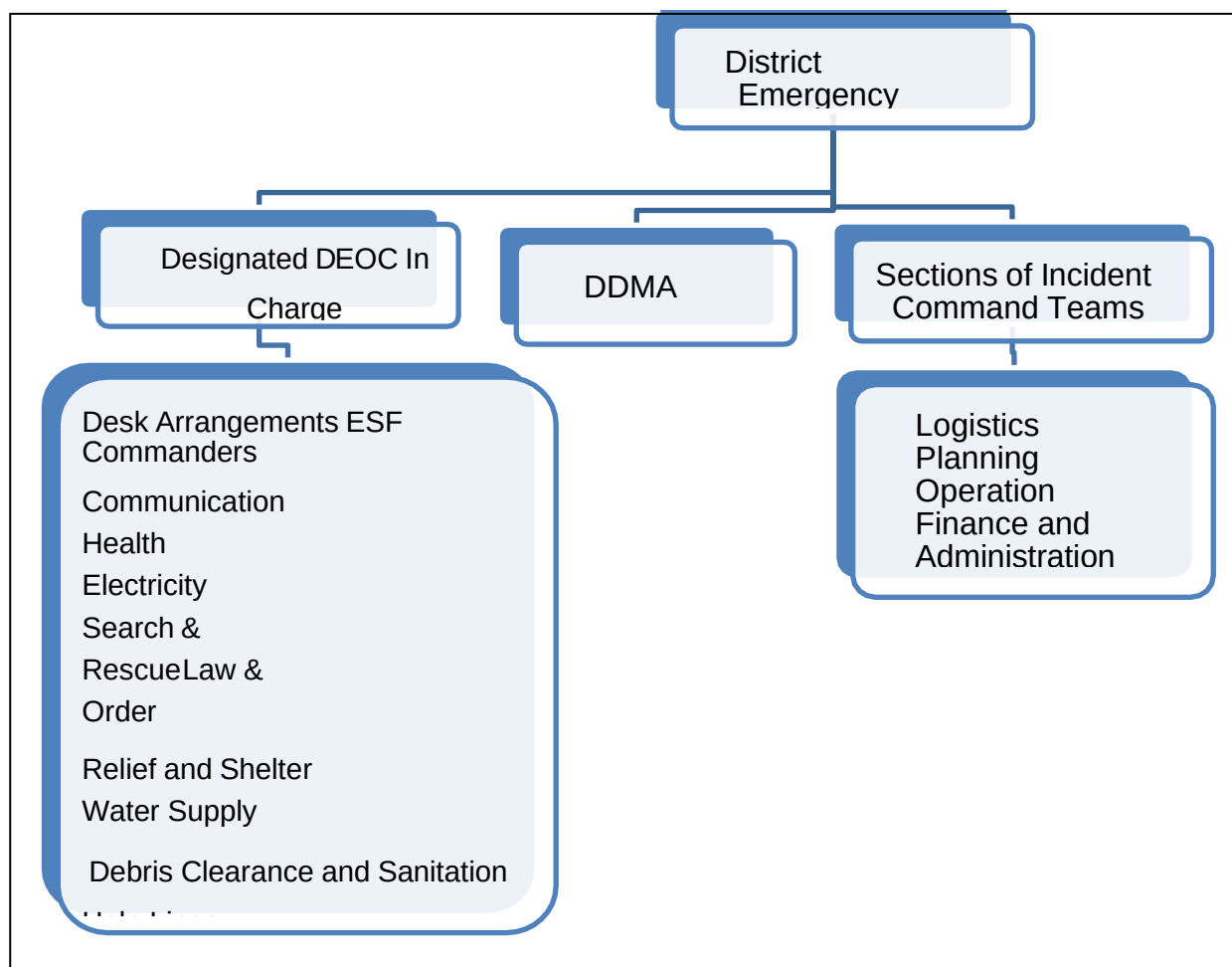


FIG. 42: STRUCTURE OF EMERGENCY TRIGGER MECHANISM IN KOLHAPUR

8.5. INCIDENT RESPONSE SYSTEM (IRS) APPLICATION AND MODULES

The Incident Response System (IRS) is a comprehensive framework designed to manage and coordinate emergency response activities during disasters and crises. It comprises various applications and modules tailored to different aspects of incident management, including:

- This module facilitates reporting incidents by individuals, organisations, or government agencies. It allows for real-time monitoring of incidents, tracking their status, and aggregating data to provide situational awareness to decision-makers.
- The resource management application helps inventory and track available resources such as personnel, equipment, and supplies. It enables efficient allocation and utilisation of resources based on the needs identified during incident response operations.
- This module focuses on facilitating communication and collaboration among stakeholders involved in incident response, including government agencies, emergency responders, and partner organisations. It provides tools for sharing information, coordinating activities, and managing communication channels effectively.
- GIS technology is integrated into the IRS to provide spatial data analysis, mapping, and visualisation capabilities. It helps identify high-risk areas, assess the impact of incidents, and plan response operations based on geographic information.
- The IRS includes situational awareness and decision support modules, which provide decision-makers with timely and accurate information about incident dynamics, resource availability, and response priorities. It supports the generation of reports, dashboards, and analytical insights to aid in decision-making processes.
- This module focuses on training and capacity-building activities for stakeholders involved in incident response. It offers e-learning modules, tabletop exercises, and simulation-based training sessions to enhance the skills and preparedness of responders and decision-makers.
- The IRS facilitates the documentation and reporting of incident response activities, including incident logs, situation reports, after-action reviews, and lessons learned. It ensures accountability, transparency, and continuous improvement in emergency management practices.

Overall, the IRS applications and modules provide a robust framework for enhancing the preparedness, response, and recovery capabilities in the face of various emergencies and disasters. They enable efficient coordination, communication, and resource management to mitigate the impact of incidents and safeguard the lives and livelihoods of the population.

The DDMA must access the <https://irsds.in/maha> website and ensure that all essential information, including contact details, resources, and equipment, is updated on the portal.

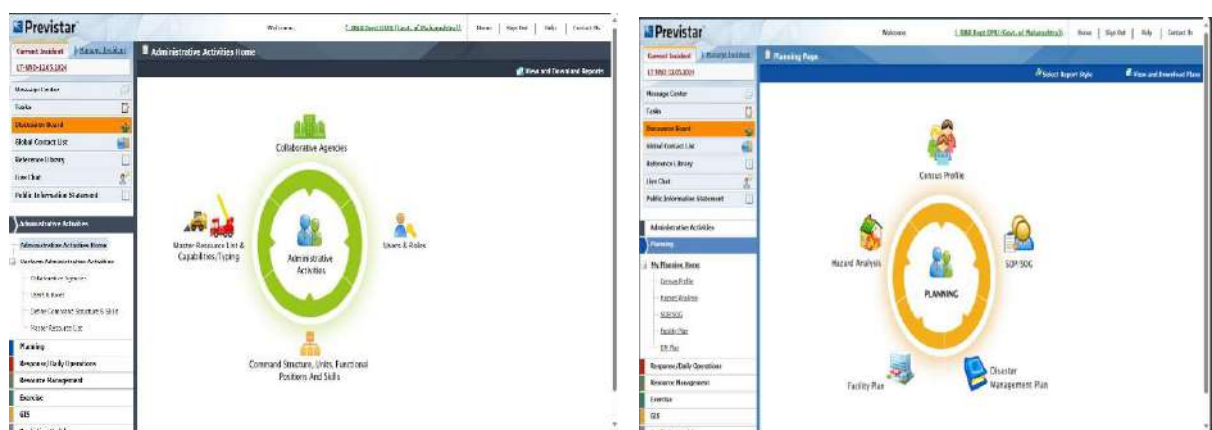


FIG. 43: DASHBOARD OF IRS-MAHA

8.6. PREPAREDNESS MEASURES FOR EFFECTIVE RESPONSE

Preparedness measures are critical for ensuring an effective response to disasters. It involves a proactive approach to disaster management, encompassing various actions and strategies to minimise the impact of disasters and enhance response capabilities. Key preparedness measures include conducting risk assessments to identify potential hazards, developing comprehensive disaster response plans, and providing regular training and capacity-building initiatives for emergency responders and community members. Additionally, ensuring the availability and proper maintenance of essential resources, establishing robust communication systems, conducting public awareness campaigns, and implementing early warning systems are vital components of preparedness efforts. By prioritising these measures, communities and organisations can enhance their readiness to respond swiftly and effectively to disasters, ultimately saving lives and reducing the impact on affected populations.

8.7. USE OF EWDS

8.7.1. CAP SACHET

The Common Alerting Protocol (CAP) Sachet, developed by the National Disaster Management Authority (NDMA), is a tool designed to facilitate effective communication during emergencies “<https://sachet.ndma.gov.in/>”. These sachets contain standardised information formatted according to the CAP, enabling authorities to disseminate alerts, warnings, and other critical information to the public and response agencies promptly and consistently. In India, including Maharashtra, CAP Sachets enhance communication capabilities during disasters such as floods, cyclones, earthquakes, and other emergencies. CAP Sachets help improve coordination among various stakeholders, streamline response efforts, and ultimately enhance community resilience to disasters by providing a common platform for alerting and sharing information.



FIG. 44: DASHBOARD OF CAP SACHET

8.7.2. Damini

The Damini Lightning Alert app, developed by IITM-Pune and ESSO, provides early warnings about lightning activity in India. The app sends GPS notifications to users when lightning is detected within 20–40 kilometres of their location. It also provides information about the current location of lightning strikes, probable locations of upcoming lightning, and the direction and movement of thunderstorms. The app also includes general information about lightning and precautionary steps to take during lightning.

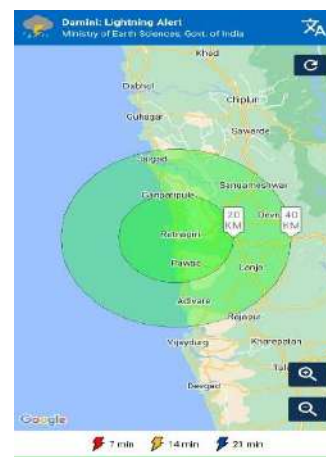


FIG. 45: DASHBOARD OF DAMINI APPLICATION

9. REHABILITATION, RECONSTRUCTION AND RECOVERY MEASURES

Rehabilitation and reconstruction represent the recovery phase following the relief and rescue operations in the aftermath of a disaster. This phase persists until affected communities regain normalcy in their lives. It encompasses various activities such as damage assessment, debris clearance, distribution of housing assistance, formulation of aid packages, ongoing monitoring and review, addressing issues like non-starters and rejected cases, managing non-occupancy of houses, planning for relocation, urban development initiatives, awareness campaigns, capacity building efforts, promotion of housing insurance, establishment of grievance redressal mechanisms, and social rehabilitation programs.

9.1. POST-DISASTER REHABILITATION AND RECONSTRUCTION STRATEGIES

Post-disaster reconstruction and rehabilitation should focus on the following activities for speedy recovery in disaster-hit areas. The contribution of both the government and the affected people is significant in dealing with all the issues properly.

- Damage assessment.
- Disposal of debris
- Disbursement of assistance for houses
- Formulation of assistance packages
- Monitoring and review
- Cases of non-starters rejected cases, non-occupancy of houses.
- Relocation
- Town planning and development plans
- Reconstruction as Housing Replacement Policy
- Awareness and capacity building
- Housing Insurance
- Grievance redressal

9.1.1. Strategy

Strategies for restoring physical infrastructure and lifeline services may be:

- **Build Back Better:** This ensures greater resilience, preparedness, and minimum loss in the event of future disaster.
- **Participatory Planning:** Infrastructure improvement measures must be balanced with, or at least be in line with, beneficiaries' social and cultural needs and preferences.
- **Coordination:** A recovery plan will help improve coordination between various development agencies. Damage Assessment and Need Assessment shall be the basis of recovery planning; multiple sectors for the recovery process may be:

- Essential Services: Essential Commodities (eatables), Health, Water, Sanitation, Power, Communication & Transport.
- Infrastructural: Housing, Public Buildings and Roads
- Livelihood: Employment, Agriculture, Cottage Industry, Shops and Establishments.

Essential services such as power, water supply, sanitation, etc., should be restored quickly. Alternate water supply arrangements and temporary sanitation facilities can be sought with the help of particular agencies. Special arrangements should be made to provide essential services. It can include creating temporary infrastructure for storing and distributing water, running tankers, power supply and sanitation facilities.

9.2. POST-DISASTER DAMAGE AND NEEDS ASSESSMENT

Post-disaster needs assessment is a crucial process conducted in the aftermath of a disaster to evaluate the impact on affected communities and determine their immediate and long-term needs. This assessment involves gathering comprehensive information about the extent of damage caused by the disaster, including damage to infrastructure, homes, livelihoods, and social services. Additionally, it identifies the vulnerabilities of the affected population and assesses their capacity to cope with the aftermath of the disaster. The needs assessment findings guide the development of response and recovery strategies, ensuring that assistance is targeted effectively to address the most pressing needs of the affected communities. Moreover, the assessment helps coordinate efforts among various stakeholders, including government agencies, humanitarian organisations, and local communities, to facilitate a comprehensive and coordinated response to the disaster.

9.2.1. PDNA District Committee members

The PDNA should be a well-coordinated inter-agency mechanism. Agreement on the management structure of the PDNA is essential. The management structure shall comprise of the following:

PDNA management team: depending on the district's decision, the district Collector typically leads the assessment team. The management team shall meet regularly to oversee the assessment process, provide strategic guidance, take decisions, and ensure that the necessary resources are available for undertaking the evaluation.

Coordination team: the PDNA management team will agree on assigning a few staff to provide coordination between the district government and logistics. The members can be from the district line department. The team shall be responsible for managing day-to-day planning, coordinating with the sector team members and state government and donors in conducting the assessment, analysing the data, preparing the reports, and developing the recovery and reconstruction framework under the guidance of the PDNA management team. The Coordination team shall be responsible for organising the assessment's conduct and ensuring all logistical arrangements are in place.

Sector teams: The sector teams shall comprise designated technical representatives from line departments. The team members from the state level will assist the district level during the field visit to the affected area. The sector team will collect sector-specific baseline data, damage, and loss data, undertake field visits to validate the data collected, analyse the data, and write the sectorial assessment report on damage and loss and proposed sector priorities for recovery and reconstruction.

Report Preparation Secretariat: the coordination team, with technical support from development partners (if required), shall coordinate with the sectorial team members for the sector report based on data analysis for their sector. The coordination team will then compile and summarise the individual sectorial report into a consolidated report.

9.3. PDNA FORMAT

Sector-wise Damage Assessment Formats

After a disaster, every intending department shall communicate the damage-loss assessment to the district authorities through proper channels in the format below.

Name of Department:

Dated:

Type of Hazard:

Power Supply Department

TABLE 41: DAMAGE ASSESSMENT MATRIX FOR POWER SUPPLY DEPARTMENT

Sl.no	Name of Tehsil	Name of village	Item/Services	No. of unit damage	No. of the village affected	Population affected	Recovery measure
			Feeder				
			Transformer				
			HT lines				
			LT line				
			Electric poles				

Health Department

TABLE 42: DAMAGE ASSESSMENT MATRIX FOR HEALTH DEPARTMENT

Sl. no	Name of Tehsil	Name of Village	Items	Particulars	Total
			PHCs (Damaged/ Destroyed)	No. of buildings	
				Estimate loss (Rs.)	
			CHC's (Damaged/ Destroyed)	No. of buildings	
				Estimate loss (Rs.)	
			Other Buildings (Damaged/ Destroyed)	No. of buildings	
				Estimate loss (Rs.)	
			Human lives lost	Male	
				Female	
			A person who suffered grievous injurious	Male	
				Female	
			A person who suffered minor injuries	Male	
				Female	

Irrigation Department

TABLE 43: DAMAGE ASSESSMENT MATRIX FOR IRRIGATION DEPARTMENT

Sl.no	Tehsil	Village	Type	No. of units affected	Population affected	Recovery measure
			Well			
			Bore Well			
			Water Supply Disrupted			
			Contamination			
			ESR damaged			
			GLR			
			Damaged			
			Sump Damaged			
			Pipelines damaged			

Sl.no	Tehsil	Village	Type	No. of units affected	Population affected	Recovery measure
			Stand Post damaged			
			Hand Pump			

PWD

TABLE 44: DAMAGE ASSESSMENT MATRIX FOR PWD

Sl. no	Name of Tehsil	Name of Village	Items	Particulars	Total
			Fully Damage Pucca House	Number of Houses	
				Estimated Loss in Rs.	
			Fully Damage Kuccha House	Number of Houses	
				Estimated Loss in Rs.	
			Severely Damage Pucca House	Number of Houses	
				Estimated Loss in Rs.	
			Severely Damage Kuccha House	Number of Houses	
				Estimated Loss in Rs.	
			Partly damaged Houses (Pucca/Kuccha)	Number of Houses	
				Estimated Loss in Rs.	
			No. of huts damaged	Number of Houses	
				Estimated Loss in Rs.	
			Roads (All)	Number of Houses	
				Estimated Loss in Rs.	
			State Roads	Number of Houses	
				Estimated Loss in Rs.	
			District Roads	Number of Houses	
				Estimated Loss in Rs.	
			Village Roads	Number of Houses	
				Estimated Loss in Rs.	
			Bridges	Number of Houses	
				Estimated Loss in Rs.	
			Culvert	Number of Houses	
				Estimated Loss in Rs.	
			Hospital	Number of Houses	
				Estimated Loss in Rs.	
			Office Buildings	Number of Houses	
				Estimated Loss in Rs.	
			Police Station	Number of Houses	
				Estimated Loss in Rs.	
			Shops	Number of Houses	
				Estimated Loss in Rs.	
			Others	Number of Houses	
				Estimated Loss in Rs.	

Agriculture Department

TABLE 45: DAMAGE ASSESSMENT MATRIX FOR AGRICULTURE DEPARTMENT

Sl. no	Name of Tehsil	Name of Village	Type of Crop	Total cropped area affected (in Ha)		Estimated loss to crops in Rs.		Total
				Agriculture	Horticulture	Agriculture	Horticulture	

Livestock/Animal Husbandry Department

TABLE 46: DAMAGE ASSESSMENT MATRIX FOR LIVESTOCK/ANIMAL HUSBANDRY DEPARTMENT

Sl. no	Name of Tehsil	Name of Village	Items	Particulars	Total
			Milch animal lost (Buffalo/Cow)	No	
				Estimate loss (Rs.)	
			Milch Animal lost (Sheep/Goat)	No	
				Estimate loss (Rs.)	
			Draught animal lost (Horse/Bullock)	No	
				Estimate loss (Rs.)	
			Draught animal lost (Calf/Donkey/Pony/Mule)	No	
				Estimate loss (Rs.)	
			Poultry Lost (Chick/Duck)	No	
				Estimate loss (Rs.)	
			Others	No	
				Estimate loss (Rs.)	

Education Department

TABLE 47: DAMAGE ASSESSMENT MATRIX FOR EDUCATION DEPARTMENT

Sl. no	Name of Tehsil	Name of Village	Items	Particulars	Total
			Primary School (Damaged- Fully/ Partially)	No. of Buildings	
				Estimate loss (Rs.)	
			High School (Damaged- Fully/ Partially)	No. of Buildings	
				Estimate loss (Rs.)	
			Collages (Damaged- Fully/ Partially)	No. of buildings	
				Estimate loss (Rs.)	
			University (Damaged- Fully/ Partially)	No. of buildings	
				Estimate loss (Rs.)	
			Other Educational Institute	No. of buildings	
				Estimate loss (Rs.)	
			Others	No	
				Estimate loss (Rs.)	

Women and Child Development Department

TABLE 48: DAMAGE ASSESSMENT MATRIX FOR WOMEN AND CHILD DEVELOPMENT DEPARTMENT

Sl. no	Name of Tehsil	Name of Village	Items	Particulars	Total
			Anganwadi (Damaged- Fully/ Partially)	No. of Buildings	
				Estimate loss (Rs.)	
			Others (Damaged- Fully/ Partially)	No. of Buildings	
				Estimate loss (Rs.)	
			Others	No. of Buildings	
				Estimate loss (Rs.)	

Food Supplies Department

TABLE 49: DAMAGE ASSESSMENT MATRIX FOR FOOD SUPPLY DEPARTMENT

Sl.no	Name of Tehsil	Name of Village	Type	No. of Godown damaged	The kind of Grain perished	Qty of Grain perished (Ton)	Qty of Grain at risk (Ton)	Recovery measure
			Civil Supply					
			Others					

9.4. KEY TIMELINE

The recent advancement in disaster assessment, particularly the adoption of the National Disaster Management Plan, 2016, by the Government of India, in line with the Sendai Framework for DRR (2015- 2030), puts greater emphasis on resilient recovery. For resilient recovery, the critical factor is assessing post-disaster damage and needs. The PDNA steps are explained in the PDNA Manual in more detail, but the key steps are presented below.

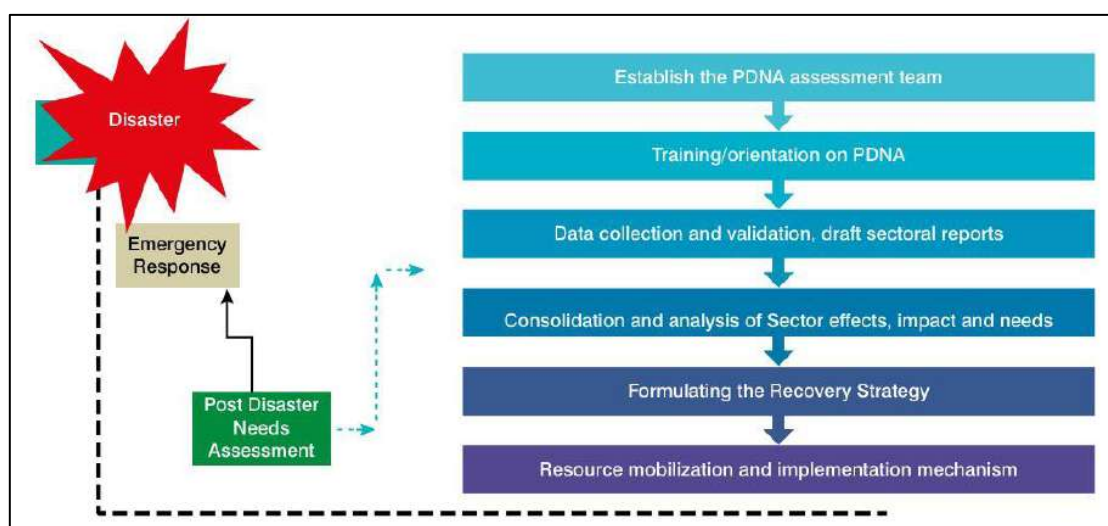


FIG. 46: STEPS OF PDNA AS PER NDMA

For each of the steps, the critical factor is the timeline. The agreed international methodology based on UN-ECLAC by the UN, EU and WB proposed the following timeline for a comprehensive assessment.

Survey Timeline

TABLE 50: SURVEY TIMELINE FOR PDNA

Types	Week							
	1	2	3	4	5	6	7	8
Estimation of disaster effects								
Baseline data collection								
Field visit and survey								
Estimation of damage and production losses								
Aggregation of damage and production losses								
Estimation of disaster impact								
Micro-economic impact analysis								
Macro-social impact analysis								
Personal/household impact analysis								
Estimation of post-disaster needs								
Recovery needs								
Reconstruction needs								
Assessment report preparation								

9.5. SOPs FOR TRAINING DISTRICT OFFICIALS AND STAKEHOLDERS ON PDNA

Training Content:

1. Introduction to Post-Disaster Needs Assessment (PDNA) methodology and frameworks.
2. Overview of the assessment process, including data collection methods, tools, and techniques.
3. Identification and prioritisation of critical sectors for assessment, such as shelter, infrastructure, livelihoods, health, education, and environment.
4. Guidance on conducting damage and loss assessments, including rapid assessments and detailed assessments.
5. Training on vulnerability and capacity assessments (VCA) to identify the needs and vulnerabilities of affected populations.
6. Overview of data analysis and interpretation techniques to derive meaningful insights from assessment findings.
7. Guidelines for developing assessment reports and presenting findings to relevant stakeholders.
8. Case studies and practical exercises to reinforce learning and application of assessment methodologies.

Training Delivery:

1. Identify qualified trainers with expertise in disaster management and needs assessment methodologies.
2. Conduct training sessions in a conducive in-person or virtual environment, ensuring accessibility for all participants.
3. Utilize multimedia presentations, training manuals, and interactive activities to engage participants and facilitate learning.
4. Encourage active participation and group discussions to share experiences, challenges, and best practices.
5. Provide opportunities for hands-on practice through simulation exercises and mock assessment scenarios.
6. Conduct post-training evaluations to assess participants' understanding and identify areas for improvement.

Training Logistics:

1. Arrange a training venue with necessary facilities, including audiovisual equipment, internet connectivity, and training materials.
2. Coordinate with relevant stakeholders to ensure participation from critical departments and organisations involved in disaster management.
3. Prepare and distribute training materials to participants, including presentations, handouts, and reference guides.
4. Schedule training sessions at convenient times and allocate sufficient duration for comprehensive coverage of training topics.

Monitoring and Evaluation:

1. Monitor training sessions to ensure adherence to the training agenda and address any issues or concerns participants raise.
2. Conduct pre-and post-training assessments to measure participants' knowledge gain and assess the effectiveness of the training.
3. Collect participant feedback to evaluate the training delivery quality and identify improvement areas.
4. Review training outcomes and make necessary adjustments to future training sessions based on lessons learned.

Documentation and Reporting:

1. Maintain comprehensive records of training sessions, including attendance sheets, training materials, and evaluation reports.
2. Prepare training reports summarising key outcomes, participant feedback, and recommendations for future training initiatives.
3. Share training reports with relevant stakeholders and incorporate feedback into the planning and implementing future training programs.

Continuous Improvement:

1. Regularly review and update training materials and methodologies to incorporate new developments and lessons learned from past experiences.
2. Encourage ongoing professional development opportunities for trainers and participants to enhance their skills and knowledge in post-disaster needs assessment.
3. Foster collaboration and knowledge-sharing among stakeholders to promote a culture of continuous learning and improvement in disaster management practices.

9.6. INFRASTRUCTURE RESTORATION AND RECONSTRUCTION

9.6.1. Short-term Recovery Programs

Short-term recovery programs are crucial in restoring livelihoods and providing immediate support to individuals and communities affected by disasters. These programs often include livelihood security measures to ensure the economic stability of disaster-affected populations. This may involve providing short-term employment opportunities, vocational training, and income-generating activities to help individuals regain their financial footing. Additionally, access to loans, financial assistance, and grants are essential components of short-term recovery efforts, offering individuals and businesses the financial resources needed to rebuild and recover. These assistance programs serve as a lifeline for those grappling with the aftermath of disasters, offering hope and support as they navigate the path towards recovery and resilience.

9.6.2. Long-term recovery programs: Sustainable livelihood

In such cases, a structured approach to recovery is necessary to address unique needs and complex rebuilding tasks. Community recovery initiatives adopt a comprehensive, long-term perspective to address critical recovery needs and mobilise resources effectively.

This often involves the formation of committees or task forces to develop specific recovery plans, identify funding sources, and coordinate assistance efforts. Under the national response framework, emergency support function (esf) community recovery plays a crucial role in coordinating federal resources to facilitate the long-term recovery of states and communities. This function focuses on restoring infrastructure, housing, and local economies to reduce future risk and ensure sustainable recovery. While routine disaster assistance and mitigation programs address some recovery aspects, incidents with severe impacts and complex recovery needs necessitate extensive inter-agency coordination and technical support through esf efforts.

9.6.3. Matrix of short-term and long-term Recovery Program

TABLE 51: SHORT-TERM AND LONG-TERM RECOVERY PROGRAM MATRIX

Activity/Action	Estimate of Duration (Short term)	Estimate of Duration (Long term)
Warning	Hours to a few days	
Response/Operations	Ongoing	Ongoing
Emergency	15 days	60 days
Preparation of damage assessment	4 days	4 - 8 days
Disaster declaration	1 – 10 days	0 – 30 days
Federal/State Mitigation Strategy	1 - 15 days	15 – 30 days
Recovery	7 – 150 days	150 – 365 days
Temporary building moratorium	<= 30 days	<= 60 days
Letter of intent to submit HM Grant	<= 60 days	<= 60 days
Short term reconstruction	<=1 year	200 – 365 days
Long term reconstruction	100 days to 5 years	5 to 10 years

9.7. SOCIAL AND PSYCHOLOGICAL SUPPORT

Social and psychological support is a critical component of disaster response and recovery efforts to address the emotional and mental well-being of individuals and communities affected by disasters. In the aftermath of a disaster, people often experience a range of emotions, such as fear, anxiety, grief, and trauma, which can significantly impact their mental health and overall resilience. Social and psychological support initiatives provide a safe space for individuals to express their feelings, share experiences, and receive validation and empathy from trained counsellors and support groups. These programs also offer coping mechanisms, stress management techniques, and psychoeducation to help people navigate through their emotions and rebuild their sense of normalcy. Social and psychological support initiatives promote healing, resilience, and recovery in the wake of adversity by fostering a sense of community, belonging, and solidarity.

10. SOCIAL INCLUSION IN DISASTER RISK REDUCTION

Disasters magnify societal inequalities and highlight the importance of inclusive disaster response. Traditional approaches often overlook disparities based on gender, caste, or class, treating affected individuals as uniform victims. This oversight perpetuates injustice as vulnerable groups suffer disproportionately. Disaster Risk Reduction (DRR) aims to rectify these inequities by acknowledging the unequal coping capacities within society. Although addressing social marginalization extends beyond DRR's scope, DRR initiatives must understand social realities and strive for inclusivity. Legislation like the Disaster Management Act of 2005 prohibits discrimination in disaster-related activities, recognizing that economically weaker and socially marginalized groups are most affected. Vulnerability to disasters is shaped by a community's social, cultural, economic, and political context, exacerbating existing inequalities and disenfranchising affected groups from decision-making processes. As defined by the World Summit for Social Development, social inclusion emphasizes active participation, equity, equality, social justice, and human dignity, embracing diversity. Conversely, social exclusion manifests as discrimination, deprivation, and denial based on various attributes, hindering full societal participation. Socially excluded groups often remain invisible in disaster response efforts despite forming a significant portion of the population. Their specific needs are frequently overlooked in Disaster Management Plans (DMPs). Inclusive Disaster Risk Management aims to ensure equal rights and opportunities, preserve dignity, embrace diversity, and build resilience for all community members without excluding anyone based on age, gender, disability, or other factors.

10.1. GENDER PERSPECTIVE AND DRR

Gender-based vulnerabilities in disaster situations stem from entrenched societal norms and power dynamics that favor men over women. These inequalities lead to women having less access to resources, decision-making power, and legal protection, making them more vulnerable to the impacts of disasters. Despite their potential contributions to disaster risk reduction, women are often marginalized in relief and recovery efforts. Disasters exacerbate existing gender inequalities, increasing women's vulnerability to violence, malnutrition, and economic hardships. Post-disaster reconstruction programs often overlook the needs of women, particularly those heading households or lacking formal property ownership. Women face challenges accessing relief, participating in decision-making processes, and rebuilding their lives after disasters. However, disasters also present opportunities to empower women and challenge traditional gender roles. Efforts to promote gender equity in post-disaster recovery include registering reconstructed houses in joint names, providing shelters to widows and single women, and empowering women through access to social security measures and income-generating activities. Moreover, it's crucial to address the concerns of sexual and gender minorities in disaster risk management. These groups face additional vulnerabilities due to societal stigma and discrimination, which are often overlooked in disaster planning and response. The inclusion of sexual and gender minorities in disaster risk reduction efforts can help mitigate their heightened vulnerabilities and promote a more equitable approach to disaster management.

10.2. SCHEDULED CASTES AND SCHEDULED TRIBES

Scheduled Castes (SC) and Scheduled Tribes (ST) constitute significant portions of India's population and are recognized in the Indian Constitution as historically disadvantaged groups. Various governmental committees and commissions have been formed to address the issues faced by these communities. Legal frameworks like the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act aim to protect their rights and prevent discrimination. In Disaster Risk Reduction (DRR), acknowledging the specific challenges SC and ST communities face is crucial. Caste-based discrimination and social exclusion are prevalent issues, exacerbating vulnerabilities during disasters. Many SC and ST communities reside in hazard-prone areas with inadequate infrastructure and limited access to basic amenities, increasing their susceptibility to disasters. Additionally,

women from these communities often face intensified gender-based discrimination and violence. DRR efforts should ensure the inclusion of SC and ST communities in planning, implementation, and decision-making processes. Particular attention should be given to addressing caste-related challenges and avoiding caste-blind approaches. Post-disaster situations and mitigation planning must prioritize social inclusion practices, such as ensuring equitable distribution of relief materials and access to essential services without discriminatory practices. For Scheduled Tribes, the Constitution of India protects their identity, traditions, and customs through Schedules V and VI. Tribal communities tend to remain marginalized due to geographical isolation and social exclusion. DRR efforts for tribal communities should focus on restoring their natural resource base, providing timely relief and rehabilitation packages, and promoting community participation and ownership over interventions. Customized plans aligned with the Panchayats Extension in Scheduled Areas (PESA) should be developed to address their needs and priorities.

10.3. CHILDREN

The United Nations Convention on the Rights of the Child (1989) established legally binding international standards to safeguard children's rights. It asserts children's entitlement to essential needs such as food, water, shelter, and education, emphasizing protection from abuse, neglect, exploitation, and trafficking, particularly in disaster situations. Children's vulnerability due to their age and limited understanding of crises underscores the need for special attention and support during emergencies. In disaster scenarios, children face various risks, including separation from families, gender-based violence, and recruitment into child labor. Disruptions in education, access to food, and nutrition exacerbate their vulnerability. Post-disaster recovery efforts must prioritize reopening Anganwadi centers and schools, even if temporary structures are required. Increased food supplies in these facilities help address nutritional needs. The Juvenile Justice Act (2000) mandates care, protection, and rehabilitation for children, establishing Child Protection Units at village and block levels. These units offer nutrition, child-friendly recreational spaces, protection from violence and trafficking, and efforts to reunite children with their families. The Ministry of Women and Child Development, Ministry of Social Justice and Empowerment, Ministry of Human Resource Development, and relevant commissions and societies collaborate to develop support mechanisms and oversee child protection efforts during disasters, ensuring timely intervention and support.

10.4. ELDERLY

The global population is ageing rapidly, with projections indicating that by 2030, more people will be over 60 than under 10. While this trend signifies progress, failure to adapt disaster risk reduction (DRR) efforts to this demographic shift can increase the vulnerability of older people to disasters. In India, like elsewhere, changes in the population's age structure occur due to increased life expectancy and better healthcare, leading to population ageing. Although the proportion and size of the elderly population are increasing over time, the elderly face unique challenges during disasters, often overlooked and highly vulnerable. Specific attention is needed in all phases of disaster risk management to address their psychological vulnerabilities, impaired mobility, health issues, and economic limitations. The UN Charter for Older People in DRR emphasizes three fundamental principles: recognizing the needs of older people, ensuring they are not overlooked, and valuing their knowledge and skills in disaster management. Governments, donors, and organizations are urged to fulfil older people's rights, engage their capacities, and address the shortcomings in DRR policies and practices. In post-disaster situations, it is essential to consider the needs of older people separately and establish community-based support mechanisms to assist them without uprooting them from their immediate surroundings. District-level DRR plans should identify elderly individuals living without family support, and temporary arrangements should be made to provide for their needs, including food, medicine, and shelter. Special measures may also be necessary to protect the property and assets of senior citizens.

10.5. PERSONS WITH DISABILITIES (PWD)

The UN Convention on the Rights of Persons with Disabilities (UNCRPD) defines persons with disabilities as those with long-term impairments hindering their full participation in society due to various barriers. The convention emphasizes their inclusion in disaster relief and risk reduction efforts. In India, the population of persons with disabilities (PWD) is 2.68 crore, comprising 2.2% of the total population, with a majority residing in rural areas. Studies show that PWD is disproportionately affected by disasters due to a lack of personal preparedness plans and inadequate consultation about their needs. During disasters, evacuation is challenging for many PWD, and they often feel excluded from humanitarian responses. They face barriers throughout the disaster risk management (DRM) cycle, including limited social participation, poor access to information and services, and invisibility during relief operations. To address these challenges, DRR efforts must focus on the vulnerabilities of PWD, ensuring their specific needs are met. Local community-based support systems, including buddy systems, can assist PWD during emergencies. Proactive efforts by PWD to identify reliable helpers and keep them informed about their needs are essential. Disaster response planning should include lists of PWD requiring special care, and post-disaster facilities should be barrier-free and PWD-friendly. Additionally, special arrangements may be necessary to protect PWD's property and assets.

11. FINANCIAL ARRANGEMENTS/RESOURCES

11.1. RECOMMENDATION BY XV FINANCE COMMISSION

The XV Finance Commission has made significant Disaster Risk Management (DRM) recommendations. They presented two reports covering the years 2020-21 and the final report spanning 2021-22 to 2025-26. The recommendations are outlined in Chapter 6 of the 2020-21 report and Chapter 8 of the 2021-22 to 2025-26 report. Key points include a new methodology for allocation, departing from the expenditure-based approach of previous commissions. The new method integrates capacity (reflected through past expenditure), risk exposure (area & population), and hazard & vulnerability (disaster risk index). They've suggested a State Contribution of 25% for allocation, except for the NEH States, which contribute 10%. Funding structures have also been revamped. The National Disaster Risk Management Fund (NDRMF) and State Disaster Risk Management Fund (SDRMF) are proposed at the national and state levels. 20% of the total earmarked grants for disaster management are designated for mitigation, with the remaining 80% for the response fund. The response fund is subdivided into three windows: Response & Relief (40%), Recovery & Reconstruction (30%), and Preparedness & Capacity Building (10%). The allocation aims to balance resources for immediate response, rebuilding assets and livelihoods, and enhancing state preparedness through training and capacity building. For the period 2021-26, the suggested corpus includes Rs. 1,60,153 crores for SDRMF for states and Rs. 68,463 crores for NDRMF for states. These recommendations represent a comprehensive disaster risk management framework, focusing on immediate response and long-term resilience-building measures.

Summary of Recommendations

- The contribution ratio by Union and States to the State-level allocations for disaster management recommended by FC-XIII should be maintained. Thus, states are to contribute 25 per cent of SDRF and SDMF funds except for the NEH States, which shall contribute 10 per cent, and the union government will provide the rest.
- Mitigation Funds should be set up at national and State levels in line with the provisions of the Disaster Management Act. The Mitigation Fund should be used for local-level and community-based interventions that reduce risks and promote environment-friendly settlements and livelihood practices.
- Allocation of disaster management funds to SDRMFs should be based on factors of past expenditure, area, population, and disaster risk index (which reflect States' institutional capacity, risk exposure, and hazard and vulnerability, respectively). Assuming an annual increase of 5 per cent, we arrive at a total corpus of Rs.1,60,153 crore for States for disaster management for 2021-26, of which the Union share is Rs. 1,22,601 crore and States share is Rs. 37,552 crores.
- Total State allocation for SDRMF should be subdivided into funding windows encompassing the disaster management cycle. Thus, the SDRF should get 80% of the total allocation and the SDMF 20 per cent. The SDRF allocation of 80 per cent should be further distributed as follows: Response and Relief – 40 per cent; Recovery and Reconstruction – 30 per cent; and Preparedness and Capacity-building – 10 per cent. While the SDRF and SDMF funding windows are not interchangeable, there could be flexibility for re-allocation within the three sub-windows of SDRF.
- The allocation for the NDRMF should be based on expenditure in previous years. Assuming an annual increase of 5 per cent, the total national allocation for disaster management is estimated to be Rs. 68,463 crores for 2021-26.
- The allocation for the NDRMF should also be subdivided into funding windows similar to that of States' allocation for disaster management. Hence, the NDRF should get 80 per cent of the total allocation for the NDRMF, with further division into 40 per cent for Response and Relief, 30 per cent

for Recovery and Reconstruction and 10 per cent for Preparedness and Capacity-building. The NDMF should be allotted 20 per cent of the total allocation for the NDRMF. If required, the Ministry of Home Affairs may examine the need to amend the Disaster Management Act to create three sub-windows within the NDRF. While the funding window of NDRF and NDMF should be maintained, there could be flexibility for re-allocation within these sub-windows.

- To discourage excessive and unsubstantiated demands from States, all Central assistance through the NDRF and NDMF should be provided on a graded cost-sharing basis. States should contribute 10 per cent for aid up to Rs. 250 crores, 20 per cent for assistance up to Rs. 500 crore and 25 per cent for all assistance exceeding Rs. 500 crores.
- A Recovery and Reconstruction Facility should be established within the NDRF and SDRF. Assistance for recovery and reconstruction is generally a multi-year program, and the assistance shared between the Union and States needs to be released annually against expenditures and only as a percentage of the total cost.
- State Governments need essential disaster preparedness to respond effectively to disasters. Their institutions and facilities must be well-functioning to meet a situation's necessities. The readiness and capacity-building grants could support the SDMA, SIDMs, training and capacity-building activities and emergency response facilities. A similar window of preparedness and capacity-building should be made available within the NDRF, which could be used to support national agencies.
- Major capital works required for proper upstream river basin management (to mitigate annual flood disasters caused by river erosion) with gestation periods of ten to fifteen years cannot be accommodated through the Finance Commission award. Therefore, we recommend that such projects be considered national priority projects. Only such holistic projects can help address flood mitigation adequately. A piecemeal approach will result in the yearly washing away of river embankments.
- There should be six earmarked allocations for a total amount of Rs. 11,950 crores for certain priority areas, namely, two under the NDRF (Expansion and Modernization of Fire Services and Resettlement of Displaced People affected by erosion) and four under the NDMF (Catalytic Assistance to Twelve Most Drought-prone States, Managing Seismic and Landslide Risks in Ten Hill States, Reducing the Risk of Urban Flooding in Seven Most Populous Cities and Mitigation Measures to Prevent Erosion).
- A streamlined payment system to the Ministry of Defense by the Ministry of Home Affairs should be institutionalized through mutual consultations. Three options for the payment system have been outlined.
- To strengthen institutional capacities, a dedicated capacity should be established to supervise the NDRMF and SDRMF and augment disaster funding through other sources. In addition, a disaster database should be developed to help assess the impact of expenditures on different aspects of disaster management. Other interventions, such as disbursing assistance to women members of households, will make disaster management more effective and efficient. NDMA, as a leading agency in disaster management, needs to be proactive and collaborate with states to push the agenda of reforms in disaster management.
- To improve and streamline the access of Central assistance to the states, the existing system of assessment of the damages caused by any natural calamities should be replaced by a two-stage assessment – an initial humanitarian needs assessment for response and relief assistance and a post-disaster needs assessment (PDNA) for recovery and reconstruction needs.
- All the new funding windows need to be supported through the development of guidelines, the drawing up of which should be led by the NDMA.

- An annual report at the national level may record all the allocations, expenditures, key achievements, and results against various indicators developed for the implementation of the SFDRR. The contribution of these allocations to national and State capacities may be evaluated against a set of indicators determined by the NDMA.
- If SDRMF and NDRMF assistance falls short of the required assistance, the Union and States should have recourse to other financial instruments. These instruments are identified as reconstruction bonds, contingent credit/stand-by facilities with international financial institutions, crowdfunding platforms, and corporate social responsibility.
- Insurance mechanisms, which act as a social safety net and supplement the existing financial mechanisms, must be introduced in partnership with insurance companies after due diligence. These mechanisms are a national insurance scheme for disaster-related deaths, synchronizing relief assistance with crop insurance, a risk pool for infrastructure protection and recovery, and access to international reinsurance for outlier hazard events.

11.2. SDRF & SD MF GUIDELINES

The guidelines on the constitution and administration of the State Disaster Response Fund (SDRF) are instrumental in providing a structured approach towards disaster management at the state level. These guidelines, issued under the Disaster Management Act of 2005, delineate the period of operation, funding allocations, calamities covered, constitution of the fund, contributions, release mechanisms, and other administrative aspects essential for effective disaster response and relief efforts.

Period of Operation: The guidelines are applicable from the financial year 2021-22 to 2025-26, as recommended by the Fifteenth Finance Commission. The allocation for the State Disaster Risk Management Fund (SDRMF) for this period is divided into the State Disaster Response Fund (SDRF) and the State Disaster Mitigation Fund (SDMF). The SDRF, receiving 80% of the total SDRMF, is subdivided into Response and Relief, Recovery and Reconstruction, and Preparedness and Capacity-building sub-allocations.

Calamities Covered: The SDRF is designated for immediate relief in disasters such as cyclones, droughts, earthquakes, fires, floods, tsunamis, hailstorms, landslides, avalanches, cloud bursts, pest attacks, frost, and cold waves. Additionally, states can allocate up to 10% of the SDRF for local disasters not listed by the Ministry of Home Affairs, subject to predefined norms.

Constitution of State Disaster Response Fund: The SDRF is established under the Reserve Fund, with contributions from the Central and State Governments. The interest accrued on the SDRF is credited half-yearly, and the fund is utilized strictly for disaster response and relief.

Contributions to the Fund: The total corpus of the SDRF is determined by the Fifteenth Finance Commission, with the Central Government contributing 75-90% of the funds based on the state's categorization. States must make suitable budget provisions to transfer their share of contributions promptly.

Booking of Expenditure on Immediate Relief: Expenditure from the SDRF is meticulously accounted for, with clear instructions on booking relief works. Any deviations from prescribed accounting norms may result in withholding further releases until compliance is achieved.

Release of Central Government's Contribution: The Central Government's contribution to the SDRF is disbursed in two instalments, with conditions mandating compliance with accounting procedures and the State Executive Committees (SEC) constitution.

State Executive Committee: Each state is mandated to constitute a State Executive Committee responsible for managing SDRF affairs, including decision-making on relief expenditures, contributions, and investments.

Accounts and Audit: The Accountant General maintains the SDRF's accounts, ensuring transparency and accountability in fund utilization. The Comptroller and Auditor General of India conducts annual audits to ascertain adherence to approved norms and guidelines.

SDMF: Within the allocation recommended by the Fifteenth Finance Commission for the SDRMF, the SDMF receives 20 per cent of the total funds, while the remaining 80 per cent goes to the SDRF. The SDMF is essential for financing projects and initiatives that aim to mitigate the risks posed by disasters, such as infrastructure development, early warning systems, community-based disaster risk reduction programs, and other measures to reduce vulnerabilities to future disasters. Unlike the SDRF, which primarily deals with immediate response and relief activities, the SDMF focuses on proactive measures to minimize the adverse effects of disasters, ultimately contributing to building resilient communities and reducing the overall impact of disasters on society and the economy.

11.3. FUND OUTLAY AND YEAR-WISE STATUS OF UTILISATION

STATE DISASTER RISK MANAGEMENT FUND (SDRMF)							FUNDS (PERCENTAGE ALLOCATION)	
(IN CRORES) 100%							(IN CRORES)	
SDRMF	2021-22	2022-23	2023-24	2024-25	2025-26	Total	SDMF (20%)	32031
							SDRF (80%)	128122
Union Share	22184	23294	24466	25688	26969	122601	Response & Relief (40%)	64061
States' share	6799	7137	7491	7864	8261	37552	Recovery & Reconstruction (30%)	48046
							Preparedness & capacity building (10%)	16015
TOTAL	28983	30431	31957	33552	35230	160153	Total	160153

**Funding Windows of SDRF and SDMF are not Interchangeable*
**Flexibility for re-allocation within three sub windows of SDRF up to 10% of the earmarked allocation has been recommended*

FIG. 47: FUND OUTLAY AND YEAR-WISE STATUS OF UTILIZATION

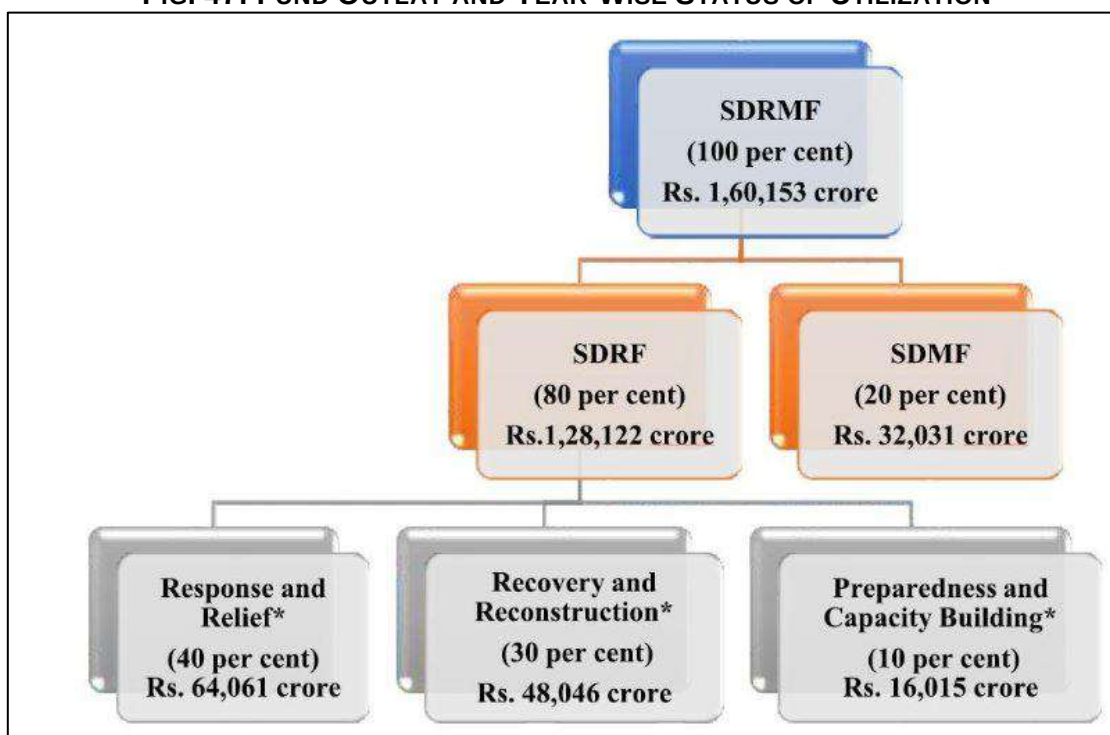


FIG. 48: FUND DISTRIBUTION STRUCTURE

TABLE 52: ALLOCATION OF STATE DISASTER RESPONSE FUND (SDRF) FOR THE AWARD PERIOD 2021-26 FOR MAHARASHTRA

Year	State Share	Central Share	Total
2021-22	859.20	2577.60	3436.80
2022-23	902.40	2706.40	3608.80
2023-24	947.20	2841.60	3788.80
2024-25	994.40	2984.00	3978.40
2025-26	1044.00	3132.80	4176.80
Total	4747.20	14242.40	18989.60

11.4. CENTRALLY SPONSORED SCHEMES SUPPORTING DRR AND STATE SCHEMES

- **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA):** While primarily focused on providing employment and livelihood security in rural areas, MGNREGA also contributes to DRR by creating community assets such as water conservation structures, flood control measures, and rural infrastructure that enhance resilience to disasters.
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT):** AMRUT aims to improve urban infrastructure in cities and towns, including water supply, sewerage, and urban transport. These infrastructure developments often incorporate disaster-resilient features, such as flood management systems, drainage improvements, and construction standards that mitigate risks from natural hazards in urban areas.
- **National Rural Drinking Water Program (NRDWP):** NRDWP focuses on providing a safe and sustainable drinking water supply in rural areas. It includes provisions for water quality monitoring, source protection, and infrastructure development to address water-related risks and vulnerabilities, particularly during disasters like floods and droughts.
- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY):** PMKSY aims to enhance the irrigation potential and water use efficiency in agriculture. By promoting efficient water management practices, watershed development, and rainwater harvesting techniques, PMKSY reduces agricultural vulnerabilities to droughts and floods, thereby enhancing resilience to climate-related disasters.
- **National Rural Livelihoods Mission (NRLM):** NRLM aims to reduce poverty by promoting diversified and gainful self-employment and wage employment opportunities for rural households, including those vulnerable to disasters. It supports forming self-help groups, developing skills, and accessing financial services.
- **State Urban Development Schemes:** Many states have urban development schemes, like AMRUT, tailored to their metropolitan areas' specific needs and priorities. These schemes often include provisions for improving infrastructure resilience to disasters, such as stormwater drainage systems, flood control measures, and earthquake-resistant construction standards.
- **Jal Jeevan Mission (JJM):** JJM aims to provide Functional Household Tap Connection (FHTC) to every rural Household by 2024. The program focuses on service delivery at the household level, i.e., Water Supply regularly in adequate quantity and of prescribed quality. This also includes the provision of functional tap connections to schools, Anganwadi Centre, GP buildings, Health Centers, GP buildings Health Centers, wellness centers, and community buildings.

- **Swachh Bharat Mission (Grameen) (SBMG)** Phase- II is being implemented during the period from 2020-21 to 2024-25 with the focus on sustaining Open Defecation Free (ODF) status and covering all villages with Solid and Liquid Water Management. SBMG Phase 2 is based on the convergence model between different funding viz; SBM(G) budgetary grants, 15th Finance commission grants to Rural Local Bodies (RLBs), MGNREGs, etc.

Rapid changes in India's climate stress ecosystems, agricultural output, and freshwater resources. They are also causing damage to critical infrastructure, including those related to WASH services. Toilets and water pipelines in rural India are damaged and water sources get contaminated. This leaves people previously covered by safe WASH services to 'slip back' to either practicing open defecation or accessing drinking water from polluted sources. In 2011, the Department of Drinking Water and Sanita published the 'Standard Operating Procedures for Responding to Natural Disasters: Rural Drinking Water Supply and Sanitation.

Other schemes, such as cash transfers via the direct benefit transfer (DBT) system, have assisted those most affected. Through the Pradhan Mantri Garib Kalyan Yojana (Prime Minister's Poor Welfare Package), the government disbursed Rs. 69,000 crore (approximately US\$ 9.25 billion) to 420 million individuals, along with free food grains for 750 million people during Covid-19 times. Programs such as the Pradhan Mantri Jan Dhan Yojana (Prime Minister's Financial Inclusion Scheme) and the Pradhan Mantri MUDRA Yojana have facilitated people's connection to banking services and provided them with affordable loans, integrating them into the expanding national financial framework. Additionally, agricultural insurance is crucial for mitigating risks faced by farmers, particularly small-scale ones.

11.5. OTHER FINANCING OPTIONS

Apart from government schemes, Disaster Risk Reduction (DRR) can also be financed through various other means, including:

- **Corporate Social Responsibility (CSR):** Many corporations allocate a portion of their profits to CSR activities, which can include initiatives related to DRR. These funds can support community resilience-building projects, disaster preparedness training, infrastructure development in disaster-prone areas, and rehabilitation efforts after disasters.
- **Public-Private Partnerships (PPPs):** Collaboration between governments, private sector entities, and civil society organizations can leverage CSR funds for DRR initiatives. PPPs can fund projects ranging from early warning systems to disaster-resilient infrastructure construction.
- **Crowdfunding:** Crowdfunding platforms allow individuals, organizations, and communities to raise funds for DRR projects. These projects range from building disaster shelters to implementing community-based early warning systems.
- **Disaster-Specific Campaigns:** During and after disasters, crowdfunding campaigns can quickly mobilize funds for emergency response and recovery efforts. Individuals and organizations worldwide can contribute to these campaigns, enabling rapid assistance to affected communities.
- **Philanthropic Foundations:** Philanthropic foundations often provide grants for DRR initiatives, research, and capacity-building programs. These funds can support various activities, including risk assessments, community training, and advocacy efforts.
- **Endowments:** Some foundations establish funds dedicated to DRR, ensuring sustained financial support for long-term resilience-building efforts.

- **Grant Programs:** International organizations and aid agencies provide grants to governments, NGOs, and communities for DRR projects worldwide. These funds support initiatives such as disaster preparedness training, infrastructure development, and livelihood restoration.
- **Technical Assistance:** Besides financial support, international agencies offer technical expertise, knowledge-sharing, and capacity-building services to enhance DRR efforts at the local, national, and regional levels.

12. MONITORING EVALUATION, UPDATION MAINTENANCE AND DISSEMINATION OF DDMP

The District Disaster Management Plan (DDMP) for Kolhapur is prepared with the intention of public dissemination, aiming to inform both the general population and relevant institutions, departments, and agencies involved in disaster management. It serves as a comprehensive guide detailing policies, methodologies, and techniques to mitigate various disaster risks and effectively prepare for potential calamities, thereby minimising the impact of disasters and safeguarding lives. Emphasising a crucial principle, the plan underscores the necessity for disaster management to be integrated across all departments, highlighting the collective responsibility shared by each entity in addressing disaster challenges.

12.1. PLAN EVALUATION

The DDMA, Kolhapur, conducts periodic reviews of the District Disaster Management Plan (DDMP) every six months, with updates occurring annually before the monsoon season, typically in May. Upon receiving approval from the relevant authorities, copies of the updated plan are distributed to the pertinent stakeholders within the DDMA. Per the provisions outlined in the Disaster Management Act of 2005, the DDMA is responsible for planning, coordinating, monitoring, and executing the DDMP.

- Initial drafts of the DDMP are subject to discussion within the DDMA, with final adjustments made by the Chairman.
- As mandated by Section 31, Clause (4) of the Disaster Management Act, the DDMP undergoes annual review and revision by the DDMA.
- This process involves incorporating both vertical and horizontal plans into the district-wide plan.
- The finalised and approved version of the updated DDMP is then disseminated to all stakeholders within the DDMA.
- Additionally, the DDMA regularly evaluates the implementation of the plan and issues instructions to relevant stakeholders as deemed necessary for effective execution.
- The DDMP shall include:
 - a) The areas in the district are vulnerable to different forms of disasters.
 - b) The measures to be taken for the prevention and mitigation of disaster by
 - c) The Departments of the Government at the district level and local authorities in the district.
 - d) The Departments of the Government must take capacity-building and preparedness measures at the district level and the local authorities in the district to respond to any threatening disaster or disaster.
 - e) The response plans and procedures, in the event of a disaster, provide for:
 - i) Allocation of responsibilities to the Departments of the Government at the district level and the local authorities in the district.
 - ii) Prompt response to disaster and relief thereof.
 - iii) Procurement of essential resources.
 - iv) Establishment of communication links; and
 - v) The dissemination of information to the public.
 - f) such other matters as may be required by the State Authority.
- The District Authority shall send a copy of the District Plan to the State Authority, which shall forward it to the State Government.
- To review different disaster management activities in the district and evaluate the DDMP, all the concerned stakeholders/agencies participating in the meeting conducted half-yearly under the chairmanship of the Chairman, DDMA – Kolhapur. In the meeting, all concerned

departments/agencies give their recommendations on specific issues of Disaster Management and are directed to submit their updated reports quarterly.

12.2. POST-DISASTER EVALUATION

The DDMA Chairman is responsible for establishing specialised protocols to gather data on any disaster, regardless of its scale or level of vulnerability. This post-disaster assessment mechanism will involve the collaboration of qualified professionals, experts, and researchers, ensuring that the collected data undergoes rigorous cross-verification and documentation for future reference. The DDMA will evaluate the District Disaster Management Plan (DDMP) through meetings and consultations involving all relevant stakeholders. The roles and responsibilities of these stakeholders in developing the DDMP are outlined in Chapter 14 of the plan.

12.3. PLAN UPDATE

The Chairman of the District Disaster Management Authority (DDMA) ensures the regular updating of the DDMP by collaborating with relevant line departments. This updating process involves several key considerations, including:

- Reviewing the resource inventory of equipment and workforce in the district, along with their addresses and contact details.
- Incorporating valuable insights gained from actual disasters and updating the matrix of past disasters.
- Adapting operational activities and locations based on standard operating procedures (SOPs) and checklists.
- Integrating lessons learned from training sessions and near-miss incidents.
- Incorporating feedback and insights from mock drills and simulation exercises.
- Updating the disaster profile to reflect any changes in the nature or frequency of hazards.
- Incorporating technological advancements and innovations for hazard identification.
- Updating databases using modern technologies such as Geographic Information Systems (GIS).
- Considering changes in the demographic composition of the surrounding population.
- Accounting for shifts in the geo-political environment that may impact disaster management strategies.

12.4. DESKTOP REVIEW

Desktop review is crucial in upgrading a district disaster management plan (DDMP). It involves a comprehensive examination and analysis of existing documentation, reports, and data related to disaster management within the district. This review typically encompasses a wide range of materials, including previous versions of the DDMP, reports on past disasters, assessments of hazard vulnerabilities, records of training exercises and drills, and relevant policy documents. The desktop review aims to identify areas for improvement, gaps in preparedness, and emerging challenges that need to be addressed in the updated plan. By thoroughly assessing existing information and drawing insights from past experiences, authorities can ensure that the revised DDMP is comprehensive, practical, and tailored to the specific needs and risks faced by the district.

12.5. CONSULTATION WITH KEY OFFICIALS

For effective disaster management in the district, the District Disaster Management Authority (DDMA), Kolhapur, must ensure robust coordination and consultation among various stakeholders, local bodies, and authorities. This coordination extends to relationships between DDMA and other entities, such as the State Disaster Management Authority (SDMA) and the National Disaster Management Authority (NDMA). Such partnerships acknowledge the necessity of collaborative efforts at all levels of disaster management to ensure seamless planning, service delivery, information sharing, and resource allocation, thereby enhancing the district's resilience to disasters. A hierarchical approach to consultation is essential, starting from the village level and progressing upward through tehsil, sub-division, and district levels. To facilitate the implementation of the District Disaster Management Plan (DDMP), the chairperson or CEO of DDMA must ensure the following arrangements within the district:

- a. Operational disaster management committees or task forces at various levels, including village, tehsil, sub-division, and district, responsible for planning, organising, coordinating, and implementing disaster mitigation, preparedness, response, and recovery measures.
- b. Emergency Operation Centres at sub-division and district levels to support disaster management efforts by coordinating information, resources, and services.
- c. Functional agencies of the district administration, DDMA, and District Emergency Operation Centre (DEOC) work together to manage specific threats and assist other agencies as needed.

12.6. FIELD/OBSERVATION STUDY

A field/observation study is essential to upgrading a District Disaster Management Plan (DDMP) as it provides firsthand insights into the district's vulnerabilities, resources, and capacities. This study involves physically visiting the district's various locations, including urban and rural areas, to assess the existing infrastructure, natural features, population density, communication networks, healthcare facilities, evacuation routes, and other relevant aspects. By conducting field surveys, observations, and interviews with key stakeholders such as local authorities, community leaders, emergency responders, and residents, valuable data can be gathered to inform the revision and enhancement of the DDMP. The field/observation study helps identify gaps and challenges in disaster preparedness and response, assesses the effectiveness of existing mitigation measures, and determines the specific needs and priorities of different areas within the district. Additionally, it facilitates the validation of data collected through desktop reviews and ensures that the updated DDMP accurately reflects the ground realities and addresses the district's unique characteristics. A comprehensive field/observation study is a foundation for informed decision-making and developing tailored strategies to enhance the district's disaster resilience.

12.7. GUIDANCE FOR DDMP REVIEW

- **Establish Review Committee:** Form a multidisciplinary review committee comprising representatives from relevant government departments, emergency responders, NGOs, community leaders, and other stakeholders involved in disaster management.
- **Conduct Desktop Review:** Conduct a thorough desktop review of the existing DDMP. Evaluate its effectiveness, relevance, and alignment with current disaster risks, policies, and best practices. Identify any gaps, outdated information, or areas for improvement.
- **Field/Observation Study:** Undertake field visits to assess the district's ground realities, vulnerabilities, and capacities. Gather firsthand insights through site surveys, interviews with stakeholders, and observations of infrastructure, natural features, and community dynamics.

- **Stakeholder Consultation:** Engage extensively with key stakeholders to gather feedback, insights, and recommendations for enhancing the DDMP. Solicit input from local authorities, emergency responders, community groups, and vulnerable populations to ensure inclusivity and relevance.
- **Review Plan Components:** Evaluate each component of the DDMP, including hazard assessments, risk analyses, mitigation strategies, response protocols, recovery plans, and coordination mechanisms. Assess each aspect's clarity, feasibility, and effectiveness and identify areas for refinement.
- **Update Hazard Profiles:** Review hazard profiles to reflect the latest scientific data, historical trends, and emerging threats. Incorporate new hazards, such as pandemics or technological disasters, into the risk assessment framework.
- **Enhance Preparedness Measures:** Strengthen preparedness measures by identifying gaps in training, resources, and coordination mechanisms. Develop targeted capacity-building initiatives to address specific needs identified during the review process.
- **Improve Coordination Mechanisms:** Streamline coordination mechanisms between relevant government agencies, departments, and stakeholders involved in disaster management. Clarify roles, responsibilities, and communication protocols to ensure effective collaboration during emergencies.
- **Incorporate Lessons Learned:** Integrate lessons from past disasters, exercises, and simulations into the DDMP. Analyse successes, challenges, and areas for improvement to enhance the plan's responsiveness and adaptability.
- **Finalize Updated DDMP:** Compile all feedback, recommendations, and revisions into a revised version of the DDMP. Ensure the updated plan is comprehensive, actionable, and aligned with national and international disaster management frameworks.
- **Approval and Adoption:** Present the updated DDMP to the District Disaster Management Authority (DDMA) for approval. Seek endorsement from relevant authorities and stakeholders before formally adopting the revised plan.
- **Dissemination and Training:** Disseminate the updated DDMP to all relevant stakeholders and ensure widespread awareness of its contents. Conduct training sessions, workshops, and drills to familiarise stakeholders with their roles and responsibilities outlined in the plan.
- **Periodic Review and Revision:** Establish a schedule for regular review and revision of the DDMP to ensure its continued relevance and effectiveness. Monitor progress, evaluate implementation, and adapt strategies in response to evolving risks and priorities.

12.8. DDMP REVIEW, NDMA-2014 AND NDMP 2019 SHARING THE REPORT FOR THE FEEDBACK AND FINALIZATION

As part of the review process, it is essential to align the DDMPs with the evolving priorities, guidelines, and frameworks set forth by the National Disaster Management Authority (NDMA).

The NDMA, through its guidelines issued in 2014 and the National Disaster Management Plan (NDMP) of 2019, provides comprehensive frameworks and standards for disaster management at the national, state, and district levels. These documents outline vital principles, strategies, and actions to mitigate risks, respond effectively, and facilitate recovery in the aftermath of disasters.

It is imperative to review existing plans thoroughly to ensure that DDMPs align with the latest NDMA guidelines and best practices. This review should assess the adequacy, relevance, and effectiveness of the DDMPs in addressing current and emerging risks and their alignment with NDMA-2014 and NDMP 2019.

Once the review is complete, the findings, recommendations, and proposed revisions should be documented in a comprehensive report. This report should highlight areas of strength, areas for improvement, and specific actions required to enhance the DDMPs.

Subsequently, the report should be shared with relevant stakeholders, including district authorities, government agencies, non-governmental organizations, community representatives, and other partners involved in disaster management. Their feedback and inputs should be sought to ensure the revised DDMPs reflect a collective understanding of local risks, vulnerabilities, and priorities.

The revised DDMPs can be finalized through collaborative feedback and consultation to incorporate the necessary updates, enhancements, and improvements recommended during the review process. This iterative approach ensures that DDMPs remain dynamic, responsive, and relevant to the district's evolving needs and disaster management challenges.

By aligning DDMPs with NDMA guidelines and engaging stakeholders in the review and finalization process, districts can enhance their capacity to effectively prepare for, respond to, and recover from disasters, ultimately contributing to communities' overall resilience and well-being.

13. DISASTER RISK GOVERNANCE

13.1. MAINSTREAMING DRR IN DEVELOPMENTAL PLANNING

Depending on its scale, disasters can significantly set back the development of an affected region and even beyond, reversing decades or more of accumulated gains. Development without recognizing disaster probabilities and incorporating adequate risk reduction could, in effect, worsen existing risks and carry with it the likelihood of introducing new risks, aggravating the negative impact of potential disasters. Mainstreaming of DRR is the extensive and sound integration of DRR into all developmental initiatives to enhance disaster resilience, reduce losses, and hasten progress towards development goals. Mainstreaming DRR is an approach in which both development and DRR are incorporated concurrently and seamlessly into all aspects of development – policies, planning, and implementation. Since climate change impacts act as risk multipliers, worsening uncertainties associated with almost every hydro-meteorological hazard, sound approaches to DRR mainstreaming naturally integrate how climate change impacts alter the risk scenarios. The unfortunate fact that DRR mainstreaming has remained somewhat improperly understood or vaguely interpreted by decision-makers and practitioners is a weakness that needs to be corrected. Undoubtedly, in the future, DRR mainstreaming will assume a more central role in both development and disaster management. Hence, it is one of the main pillars of the District Disaster Management Plan. In many ways, the actions under Sustainable Development Goals (SDGs) and the responses to climate change are integral to development initiatives, and building disaster resilience is a common theme in all of these. DRR mainstreaming focuses on building disaster resilience not as a sub-component of a disaster-specific plan but as an approach that must be tightly integrated into all developmental plans.

13.2. INTER-AGENCY COORDINATION

Inter-agency coordination at the district level is essential for effective disaster governance, response, dissemination of early warnings, and the implementation of non-structural measures. In India, this coordination is facilitated through the District Disaster Management Authority (DDMA) and various institutional arrangements mandated by the National Disaster Management Act of 2005. The DDMA, established in every district, is the focal point for coordinating and implementing disaster management activities. Chaired by the District Magistrate or Collector, the DDMA comprises officials and experts from relevant departments and sectors, ensuring a multi-disciplinary approach to disaster preparedness and response. Its primary functions include formulating and implementing the District Disaster Management Plan (DDMP), coordinating activities within the district, mobilizing resources, and conducting awareness programs.

The DDMA collaborates with governmental and non-governmental agencies to facilitate effective coordination, including other DDMA's, the State Disaster Response Force (SDRF), the National Disaster Response Force (NDRF), and other emergency response agencies. This collaboration ensures seamless coordination during disasters and maximizes resource utilization. The DDMA is empowered to issue necessary directions and guidelines to local authorities and agencies within its jurisdiction, ensuring the effective implementation of disaster management measures. It also plays a crucial role in disseminating early warnings and alerts issued by competent authorities for various hazards, including earthquakes, floods, cyclones, epidemics, industrial accidents, fires, and road accidents. Institutional arrangements like the District Crisis Management Group (Task Force) further enhance coordination by overseeing critical response operations through specialized task forces. These task forces, headed by relevant organizations, are responsible for specific functions such as coordination and planning, administration and protocol, warning dissemination, search and rescue, public health, shelter, logistics, damage assessment, telecommunications, and media liaison. Additionally, District Disaster Management Committees (DDMC) or Advisory Committees (DDMAC) are appointed to provide advice on various subject-specific fields within the overall context of disaster

management. These committees comprise disaster management experts from government departments, research institutes, or NGOs, ensuring a comprehensive approach to disaster governance at the district level. Moreover, coordination structures involve various levels of government and community organizations, including Urban Area Disaster Management Committees, Block Disaster Management Committees, and Gram Panchayat/Village Disaster Management Committees. These committees are responsible for developing and implementing disaster management plans at their respective levels, ensuring decentralized and localized approaches to disaster preparedness and response.

13.3. ROLES AND RESPONSIBILITIES OF THE LINE DEPARTMENTS IN PREPAREDNESS, RESPONSE AND RECOVERY

13.3.1. Phase 1: Preparedness

District Administration/Collector's Office

- Develops and updates the District Disaster Management Plan (DDMP).
- Coordinates with line departments to identify resources and capacities.
- Conducts mock drills and exercises to test preparedness levels.
- Establishes communication channels and early warning systems.

District Disaster Management Authority (DDMA)

- Formulates policies and guidelines for disaster management.
- Conduct risk assessments and hazard mapping.
- Facilitates training and capacity-building programs for stakeholders.
- Ensures the availability of emergency supplies and equipment.

Health Department

- Prepares medical response plans and stockpiles essential medicines.
- Trains healthcare workers in disaster response protocols.
- Identifies and equips health facilities to handle mass casualties.
- Establishes disease surveillance systems.

Fire and Emergency Services

- Conducts fire safety inspections and awareness campaigns.
- Trains personnel in search and rescue techniques.
- Procures and maintains firefighting equipment and vehicles.
- Establishes mutual aid agreements with neighboring districts.

Public Works Department (PWD)

- Conduct vulnerability assessments of critical infrastructure.
- Develop contingency plans for infrastructure restoration.
- Procures emergency response equipment such as generators and pumps.
- Identifies safe locations for emergency shelters.

13.3.2. Phase 2: Response

District Administration/Collector's Office

- Activates the District Emergency Operations Centre (EOC).
- Declares disaster alerts and issues evacuation orders if necessary.
- Coordinates search and rescue operations.
- Facilitates the deployment of resources and personnel.

District Disaster Management Authority (DDMA)

- Coordinates with line departments and external agencies.
- Monitors the situation and updates response plans accordingly.
- Provides regular briefings to stakeholders and the public.
- Ensures timely and effective communication with higher authorities.

Health Department

- Set up medical camps and emergency treatment centers.
- Mobilizes medical teams to affected areas.
- Conduct disease surveillance and outbreak response.
- Provides psychosocial support to affected individuals.

Fire and Emergency Services

- Conducts search and rescue operations in affected areas.
- Assists in evacuations and crowd control.
- Provides emergency medical services and first aid.
- Responds to hazardous material incidents.

Public Works Department (PWD)

- Clears debris and restores transportation routes.
- Assesses the structural integrity of buildings and infrastructure.
- Restores essential services such as water and electricity.
- Provides temporary shelter and housing solutions.

13.3.3. Phase 3: Recovery

District Administration/Collector's Office

- Conduct damage assessments and surveys.
- Initiates the process of disbursing financial aid and compensation.
- Coordinates with NGOs and voluntary organizations for long-term recovery efforts.
- Implements measures to build back better and enhance resilience.

District Disaster Management Authority (DDMA)

- Develop recovery plans and strategies.
- Monitors progress and evaluates the effectiveness of recovery programs.
- Advocates for resources and support from higher levels of government and donors.
- Conducts lessons learned exercises to improve future response and recovery efforts.

Health Department

- Restores healthcare services to pre-disaster levels.
- Conduct health assessments and address lingering health issues.
- Implements public health interventions to prevent disease outbreaks.
- Provides ongoing support for mental health and psychosocial needs.

Fire and Emergency Services

- Repairs and maintains firefighting equipment and infrastructure.
- Conducts community outreach programs on fire safety.
- Participates in post-disaster reviews and debriefings.
- Updates emergency response plans based on lessons learned.

Public Works Department (PWD)

- Implements long-term infrastructure reconstruction projects.
- Upgrades infrastructure to mitigate future disaster risks.
- Engages in community rebuilding and resilience-building activities.
- Enhances emergency response capabilities through training and investment.

13.4. ESTABLISHING COHERENCE AMONG DRR, CLIMATE CHANGE AND DEVELOPMENTAL GOALS

Establishing coherence among Disaster Risk Reduction (DRR), Climate Change, and Development requires recognizing the interconnectedness of these domains and aligning efforts across various sectors and ministries. The global agenda for 2030 highlights the potential for designing financing mechanisms, policies, and programs that can address multiple targets simultaneously. This approach not only improves efficiency but also facilitates faster implementation. Coherence and mutual reinforcement imply coordinated efforts across different sectors, going beyond conventional inter-agency coordination. It necessitates a new approach where actions taken under one framework strengthen goals across all three. To achieve this, coherence must be integrated into mainstream planning mechanisms.

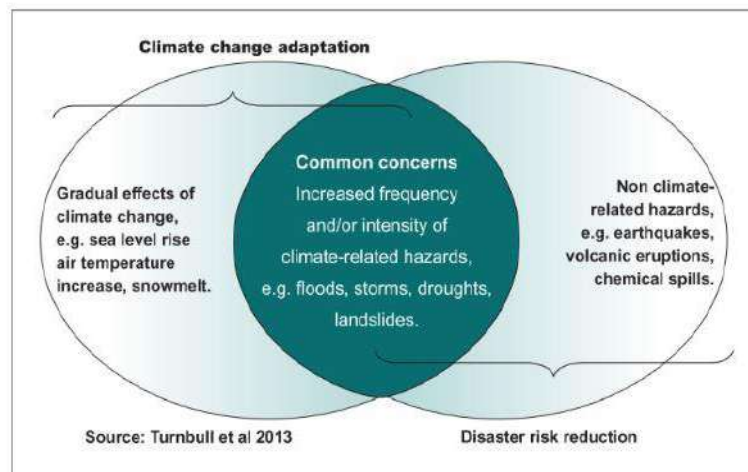


FIG. 49: RELATION BETWEEN CLIMATE CHANGE AND DRR

From the perspective of Disaster Risk Reduction, several indicative areas can be identified to initiate this process:

- **Improving Risk Understanding:** Integrating the understanding of disaster risks, both natural and those induced by development, into all development initiatives is essential. This includes comprehending risks from hazards as well as newly created risks.
- **Understanding Cascading Risks:** Recognizing the cascading nature of risks, where decisions in one sector can influence disaster risk in another, is crucial for effective risk management.
- **Assessing Capacities and Vulnerabilities:** Assessing vulnerabilities arising from cascading risks and the capabilities to resist, absorb, and accommodate these risks is essential.
- **Incorporating Disaster Risk into Initiatives:** Recognizing disaster risk as an intrinsic part of all projects, programs, and initiatives across government, private sector, and civil society is essential.
- **Aligning Risk Management Approaches:** Harmonizing risk management approaches across sectors facilitates coherent action.
- **Improving Integration within Government:** Enhancing horizontal and vertical integration for DRR within government structures through decision-making tools and information technology can improve coordination.
- **Setting Targets and Monitoring Mechanisms:** Establishing targets, timeframes, indicators, and monitoring mechanisms facilitates consolidating efforts across sectors to enhance disaster resilience.

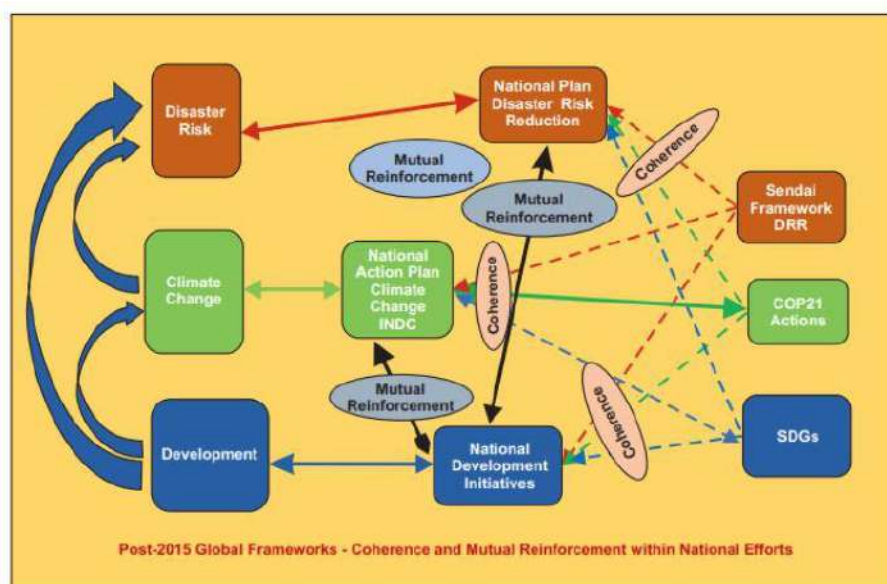


FIG. 50: COHERENCE AND MUTUAL REINFORCEMENT WITHIN NATIONAL EFFORTS

13.4.1. Coherence and Mutual Reinforcement

The presence of risk multipliers is a threat to the success of all development frameworks, and coping with risks is central to sustainable development. Given the changes in human demographics and trends in development, the impact of climate change, and increasing exposure to disaster risks, there has never been a greater need to enhance coherence and coordination among all the major global initiatives to reduce risks and vulnerability to hazards and to improve resilience. Effective reduction of losses and risks from natural hazards and climate extremes requires integrated actions at different levels of governance. One of the most significant challenges is creating institutional convergence that integrates global goals emanating from these agreements. DRR 30 and Climate Change Adaptation are part of the critical agendas being considered in all these recent global agreements. All three agreements share a common aim of making development sustainable. Strong commitment to ambitious goals and accelerated implementation of these international agreements must be a global priority. Given the complementariness between the post-2015 agendas, leveraging the total impact of these instruments creates shared value. Efforts must be deployed to ensure that each does not build in “policy risks” or contradictory policies that generate more - rather than less - risk in development. The different monasteries, targets and actions in the three frameworks constitute a more comprehensive resilience agenda than when implemented independently without mutual reinforcement. Building resilience requires action that spans the multiple domains of development, humanitarian initiatives, responding to climate change and disaster risk reduction.

14. STANDARD OPERATING PROCEDURES & CHECKLISTS

14.1. SOP FOR REVENUE DEPARTMENT

Pre-Disaster Preparedness

1. Establishing Disaster Management Committees at the district, taluka, and village levels to promptly initiate various actions during disasters and provide them with training.
2. Prepare a comprehensive disaster management plan and sensitize all departments, preparing a list of phone numbers and relevant contacts.
3. Activate control rooms at the district and taluka levels for 24 hours during monsoon emergencies, ensuring safe shelters are identified in advance.
4. Engage with voluntary organizations and other agencies for their participation in emergency management.
5. Coordinate the distribution and management of essential items and thoroughly inspect all arrangements.
6. Disseminate urgent messages through village committees upon receiving prior information and planning for the safe evacuation of people. Also, finalize alternative arrangements promptly.
7. Formulate response teams and coordinate alternate communication arrangements.
8. Coordinate with the administration and machinery of adjoining districts for waterlogging and rainfall-related issues.
9. Maintain updated records of standing orders.
10. Plan alternative arrangements based on the severity of contact breakdown in villages.

During an emergency

1. Prepare immediate damage assessment reports and plan for prompt action. Formulate response teams and appoint coordination and control officers.
2. Tackle natural disasters through various committees at the village and taluka levels.
3. Assist with government decisions, maintaining a record on the GR table.
4. Provide food, grains, clothing, and shelter assistance to the affected population. Prepare shelters and provide immediate relief and support, including food and water.
5. Collect information on incidents and report to senior offices promptly.
6. Provide essential items for first aid to voluntary organizations for distribution and assistance.
7. Arrange vehicles for transporting patients to hospitals.
8. Coordinate with various government offices.
9. Ensure the availability of diesel and petrol for all vehicles and machinery.
10. Seek assistance from neighboring districts in the event of a major disaster.
11. Keep control rooms operational during disasters and maintain coordination.
12. Ensure proficiency in handling relief work without any lapses.
13. Arrange for meetings with key individuals as needed.

14. Maintain smooth operation of the emergency response committee through regular meetings.

Post-emergency/disaster

1. Provide orders/guidance from the government regarding the government's stance and disaster relief work to all departments.
2. Initiate disaster relief work by coordinating with the relevant departments.
3. Implement government aid funds and material distribution in the affected district.
4. Engage experts to assess the extent of damage caused by the disaster and formulate a comprehensive plan for addressing the situation.
5. Maintain a 24-hour information center to disseminate information through media and communicate with the public.
6. Arrange for the safety of critical individuals.
7. Collect information and report to the government.
8. Implement special programs to mitigate post-disaster stress and tension in the affected areas.

14.2. SOP FOR POLICE DEPARTMENT

Pre-Disaster Preparedness

1. Plan to evacuate people stranded due to heavy rainfall swiftly.
2. Activate control rooms to operate 24/7.
3. Pre-plan alternate routes for traffic in case of road closures due to flooding.
4. Arrange for relief funds and other necessities for those affected by the disaster. Deploy message transmission devices to areas prone to being cut off.

During an emergency

1. Ensure smooth traffic management systems.
2. Enforce laws and maintain order during the relief efforts.
3. Utilize various media channels to dispel rumours.
4. Clear roads and pathways in disaster-affected areas.
5. Provide immediate assistance and shelter to affected individuals.
6. Conduct medical assessments and provide first aid to injured individuals.
7. Maintain communication via wireless devices when landlines are down.
8. Engage in relief operations alongside NCC/NSS/Home Guard units.
9. Implement emergency communication setups in areas with broken communication links.
10. Ensure law and order are maintained.

Post-emergency/disaster

- Enforce laws and maintain order to prevent looting and theft in affected areas.
- Conduct search and rescue operations and control the crowd.
- Organize safe shelter and relief distribution centers.

- Ensure legal procedures and arrangements are made promptly for deceased individuals.

Home Guard

1. Control crowds and traffic in disaster-affected areas.
2. Assist in search and rescue operations.
3. Aid in the normalization of civilian life.

14.3. SOP FOR IRRIGATION & WATER RESOURCE DEPARTMENT

Pre-Disaster Preparedness

1. Implementation of Control Rooms operational 24 hours.
2. Appointment of Nodal Officers at each taluka and establishment of control rooms at the headquarters.
3. Deployment of communication devices capable of transmitting messages on all possible platforms.
4. Vigilance and coordination with relevant departments by ensuring proper management and coordination before and during the release and closure of water from dams. Stay in touch with Rainfall Measurement Centers and Survey Stations.
5. Arrangements for informing the people in the affected areas about the threat of floods and the release of water from dams, using vehicles such as sirens, cables, and radios. Provision of pumps, generators, boats, excavators, etc., where necessary for water evacuation.

During an emergency

1. Monitor all dams by establishing communication networks and closely monitoring the rising water levels due to heavy rainfall.
2. Alert the people in the areas of the dams before the release of water.
3. Search and rescue operations for those stranded in flooded areas and provision of pumps, generators, boats, excavators, etc., for water evacuation where necessary.
4. Provide necessary information to the Revenue Department in case public panic leads to property damage.

Post-emergency/disaster

1. Surveying the condition of water resources and promptly rectifying any damages.
2. Providing the administration with all possible assistance in relief work.
3. Providing immediate water supply to relief camps and affected areas.
4. Ensuring that water resources are not contaminated.

14.4. SOP FOR NAGARPALIKA

Pre-Disaster Preparedness

1. Establish 24-hour control rooms and appoint control officers.
2. Keeping firefighting equipment such as hoses, fire extinguishers, fire buckets, sandbags, and other supplies ready.
3. Plan to immediately clean all drains/sewers to ensure swift water drainage and implement preventive measures such as spraying disinfectants to control diseases.

4. Inspect buildings susceptible to collapse during disasters and arrange immediate relocation if necessary.
5. Establishing emergency committees for disaster management and ensuring individual awareness. Prepare safe evacuation routes during emergencies.
6. Implementing an effective waste management system and raising public awareness.

During an emergency

1. Issuing alerts to the public using sirens during emergencies.
2. Mobilizing firefighting teams, equipment, and other resources.
3. Take immediate action to ensure quick drainage of excess water, conduct cleanliness drives, and administer medication.
4. Organizing relocation efforts if necessary.

Post-emergency/disaster

1. Maintaining 24-hour operation of control rooms for information dissemination and communication with the public.
2. Conducting awareness campaigns for public health and ensuring the provision of clean water.
3. Implementing sanitation campaigns to prevent the outbreak of diseases among the population.

14.5. SOP FOR HEALTH DEPARTMENT

Pre-Disaster Preparedness

1. Establishing 24-hour control rooms.
2. Keeping all officers stationed at headquarters and ensuring the availability of essential medicines and medical kits and planning to ensure continuous availability of gloves, masks, first aid supplies, anti-snake venom, and chlorine tablets, even in emergencies.
3. Establishing health camps, organizing department-wise planning, and educating the public on cleanliness and health.

During an emergency

1. Ensuring all hospitals, primary health centers, and dispensaries have stocked medicines and updated medical records. Making available medical officers and updated medical kits at disaster sites.
2. Distributing preventive medicines and anti-allergic doses to prevent the spreading of contagious diseases and providing necessary information to municipalities and village panchayats to prevent the spread of infectious diseases.
3. Providing immediate medical treatment to the injured and conducting post-mortems for deceased individuals.

Post-emergency/disaster

4. Communicating with municipalities and relevant village panchayats to provide necessary information to prevent disease spread and ensure the availability of preventive medicines and medical supplies.
5. Providing immediate preventive medicines and anti-allergic doses to people engaged in relief work to prevent the spread of diseases.

6. Deploying health workers to provide health services to affected areas and controlling the situation.

14.6. SOP FOR ZILA PARISHAD HEALTH DEPARTMENT

During an emergency

1. Providing information to the public to prevent the spread of infectious diseases by controlling food and water and emphasizing hygiene and cleanliness. Assistance should be sought from voluntary organizations and concerned individuals.
2. Contact the Tehsildars for additional assistance, such as staff and medicines.
3. Providing medical treatment to the injured and those in distress.
4. Provision of first aid and medicines in affected areas.
5. Establishing information centers in hospitals.
6. Maintaining communication with the District Magistrate's control room.

14.7. SOP FOR PUBLIC WORKS DEPARTMENT

Pre-Disaster Preparedness

1. Conduct regular risk assessments to identify vulnerable infrastructure.
2. Develop and maintain an updated disaster management plan for the PWD, including protocols for assessing damage, prioritizing response actions, and coordinating with other relevant agencies.
3. Implement routine maintenance schedules for critical infrastructure assets to ensure structural integrity and resilience against disasters.
4. Identify high-risk structures and priorities retrofitting or reinforcement measures to enhance their ability to withstand seismic activity, flooding, and other hazards.
5. Conduct community outreach programs and awareness campaigns to educate the public about disaster risks, evacuation routes, and emergency protocols related to public infrastructure.

During Emergencies

1. Deploy rapid assessment teams to conduct on-site inspections of damaged infrastructure, assess the extent of structural damage, and identify immediate safety hazards.
2. Collect and compile data on infrastructure damage, road blockages, and other critical issues to inform decision-making and resource allocation for emergency repairs and recovery operations.
3. Prioritize the clearance of debris, fallen trees, and other obstructions to restore access to roads, highways, and public facilities for emergency responders and the public.
4. Undertake temporary repair works, such as patching potholes, repairing damaged culverts, and stabilizing slopes to ensure the safety and usability of key transportation routes and public assets.

Post-Emergency/Disaster Recovery

1. Conduct detailed structural assessments and engineering surveys to evaluate the long-term impacts of disasters on public infrastructure and determine the scope of rehabilitation and reconstruction efforts.
2. Document and analyses lessons learned from the disaster response and recovery process to identify areas for improvement in infrastructure design, construction standards, and emergency management practices.

3. Develop detailed reconstruction plans and specifications for repairing or replacing damaged infrastructure in accordance with engineering standards and safety regulations.
4. Coordinate with contractors, suppliers, and other stakeholders to expedite the procurement of materials and equipment needed for infrastructure restoration projects and ensure compliance with quality control measures.
5. Integrate disaster risk reduction principles and climate resilience considerations into designing and constructing new infrastructure projects to minimize vulnerability to future disasters.
6. Enhance the capacity of PWD staff through training programs, workshops, and knowledge-sharing initiatives on disaster risk management, emergency response procedures, and resilient infrastructure development strategies.

14.8. SOP FOR TELECOMMUNICATION DEPARTMENT

During Emergencies

1. Restoration of telecommunication services.
2. Preparation of various teams for the restoration of telecommunication services.
3. Contact the District Control Room through the Tehsildars for additional assistance.
4. Providing updated information to the District Control Room every two hours during emergencies.

14.9. SOP FOR RAILWAY DEPARTMENT

1. Control of crowds at railway stations through railway police.
2. Providing updated information on railway schedules and accidents to the public.
3. Sending injured individuals to hospitals.
4. Providing updated information to the District Control Room every two hours during emergencies.

14.10. SOP FOR AGRICULTURE DEPARTMENT

Pre-Disaster Preparedness

1. Conduct regular risk assessments to identify potential hazards.
2. Provide training to agricultural extension officers, farmers, and other stakeholders on disaster-resistant farming practices, early warning systems, and emergency response procedures.
3. Preparedness and awareness programs to educate farmers on crop diversification, soil conservation techniques, and water management strategies to enhance resilience against disasters.
4. Maintain an inventory of agricultural inputs, including seeds, fertilizers, pesticides, and farming equipment, to ensure adequate supplies are available for emergency response.
5. Establish strategic stockpiles of essential agricultural commodities in accessible locations to support immediate post-disaster recovery efforts.
6. Coordinate with relevant government agencies, NGOs, and private sector partners to promptly procure and distribute relief supplies to affected farmers.

During Emergencies

1. Monitor weather forecasts, crop conditions, and pest infestation patterns to provide early warnings to farmers about potential risks and advisories for preventive actions.
2. Activate communication channels, such as mobile alerts, radio broadcasts, and community meetings, to disseminate timely information and guidance to farmers during emergencies.
3. Deploy rapid assessment teams to survey agricultural areas affected by disasters and assess the extent of crop damage, livestock losses, and infrastructure destruction.
4. Compile and analyses data collected from field assessments to priorities response efforts, allocate resources, and develop recovery plans tailored to the needs of affected farmers.
5. Establish emergency assistance centers or mobile outreach teams to provide immediate support and relief services to affected farmers, such as emergency shelter, food, water, and veterinary care for livestock.

Post-Emergency/Disaster Recovery

1. Implement rehabilitation and recovery programs to restore agricultural infrastructure, rehabilitate degraded lands, and promote sustainable farming practices in disaster-affected areas.
2. Provide technical assistance and training to farmers on soil conservation, water management, organic farming, and climate-resilient agriculture techniques to build long-term resilience against future disasters.
3. Support farmers in marketing their produce, accessing markets, and diversifying income sources to mitigate the economic impacts of disasters and improve livelihood resilience.
4. Facilitate the revival of local agricultural value chains, agribusinesses, and rural enterprises through targeted interventions, market linkages, and capacity-building initiatives.

14.11. SOP FOR DISTRICT INFORMATION OFFICE

1. Dissemination of information about various accounts in the district through media.
2. Coordination with various media for dissemination.

14.12. SOP FOR STATE TRANSPORT DEPARTMENT

Pre-Disaster Preparedness

1. Conduct regular risk assessments to identify potential hazards and vulnerabilities in the transport infrastructure, including roads, bridges, and public transport systems.
2. Develop and maintain an up-to-date emergency response plan that outlines roles, responsibilities, and procedures for different scenarios, such as natural disasters, accidents, and security threats.
3. Train transport department personnel regularly on emergency response procedures, including evacuation protocols, first aid, and communication protocols. Conduct drills and simulations to ensure readiness.
4. Implement a robust maintenance program to ensure the structural integrity of roads, bridges, and other transport infrastructure. Regular inspections should be carried out to identify and address potential hazards.

5. Establish partnerships and communication channels with other emergency response agencies, such as police, fire departments, and disaster management authorities, to facilitate coordinated responses during emergencies.
6. Educate the public about emergency preparedness measures, such as safe driving practices, evacuation routes, and emergency contact information. Utilize various communication channels, including social media, to disseminate information.
7. Maintain stockpiles of essential emergency supplies, such as road flares, first aid kits, emergency lights, and communication equipment, at strategic locations for rapid deployment during emergencies.

During Emergencies

1. Immediately activate emergency response teams to assess the situation and coordinate response efforts. Designate specific personnel to manage communication with other agencies and stakeholders.
2. Implement traffic control measures to manage congestion and facilitate the movement of emergency vehicles. Deploy traffic marshals at critical intersections and diversion points to ensure smooth traffic flow.
3. Aid evacuees, including providing transportation services for vulnerable populations such as the elderly, disabled, and those without access to private vehicles. Coordinate with other agencies to establish evacuation shelters and distribution centers.
4. Mobilize teams to clear debris, repair damaged roads, and restore transport infrastructure quickly. Prioritize routes leading to critical facilities such as hospitals, emergency shelters, and relief distribution centers.
5. Regularly communicate with other emergency response agencies and stakeholders to share information, coordinate response efforts, and address emerging challenges. Utilize designated communication channels for efficient coordination.

Post-Emergency/Disaster

1. Conduct rapid assessments to evaluate the extent of damage to transport infrastructure and facilities. Compile detailed damage reports and submit them to relevant authorities for further action.
2. Initiate recovery and restoration efforts to repair damaged infrastructure, including roads, bridges, and public transport systems—Mobilize resources and personnel to expedite the restoration process.
3. Aid and support to affected communities, including facilitating transportation for relief workers, distributing emergency supplies, and offering counselling services to those in need.
4. Conduct a comprehensive review of the emergency response to identify strengths, weaknesses, and areas for improvement. Use the findings to update emergency response plans, procedures, and training programs.
5. Invest in measures to enhance the resilience of transport infrastructure against future emergencies and disasters. This may include infrastructure upgrades, adopting new technologies, and implementing risk reduction measures.

14.13. SOP FOR MAHARASHTRA STATE ELECTRICITY BOARD

Pre-Disaster Preparedness

1. Establishment of control rooms.
2. Identification of vulnerable power supply infrastructure for ensuring electrical safety.

3. Ensuring availability of maintenance equipment such as transformers, poles, and wires at appropriate locations.
4. Elevating transformers in flood-prone areas if feasible.

During Emergencies

1. Prompt restoration of damaged power supply lines.
2. Continuous operation of control rooms.
3. Swift replacement of submerged transformers.
4. Providing information about restoration work and estimated time of completion.
5. Establishment of information desks to address citizens' complaints.
6. Implementing measures to prevent accidents due to electrical hazards, ensuring proper flow of electricity on power lines, and promptly removing fallen trees and poles.

Post-emergency/disaster

1. Immediately conduct assessments of the electricity distribution infrastructure to identify damage to substations, transformers, poles, and power lines. Report findings promptly to the relevant authorities.
2. Develop a restoration plan prioritizing critical infrastructure such as hospitals, emergency services, and communication facilities. Ensure that restoration efforts are coordinated and efficient.
3. Efficiently allocate resources, including personnel, equipment, and materials, to expedite restoration. Coordinate with other agencies and stakeholders to maximize resource utilization.
4. Implement stringent safety protocols to prevent accidents during the restoration process. Provide training and guidance to field personnel on safe working practices.
5. Keep the public informed about the progress of restoration efforts, estimated timelines for power restoration, and safety instructions. Use multiple communication channels to reach a broad audience.
6. Engage with affected communities to address their concerns, provide assistance where needed, and facilitate community resilience efforts. Establish communication channels to receive feedback and address grievances.
7. Monitor the restoration process closely and adapt plans as necessary based on evolving conditions and challenges. Maintain open communication channels with field teams to address any issues promptly.
8. Conduct a thorough review of the response to identify strengths, weaknesses, and areas for improvement. Use the findings to enhance future disaster preparedness and response efforts.

15. Annexure:

15.1. Important Contact Details

TABLE 53: CONTACT DETAILS OF NEIGHBORS DISTRICT COLLECTOR'S OFFICE

S.No.	Collector's Office	Office Number	Upper Collector	Resident Collector	Planning Officer	Chief Executive Officer	Deputy Chief Executive Officer (Admn.)	Cafo	Treasury
1	Mumbai	022 - 22662440	22610013	22670656	22660167	Thane - 2	Thane - 0	Thane 025335108	Thane - 0
2	Nashik	0253 - 2578500	2576062	2578501	2573020	2596957	2591010	2590908	2572296
3	Pune	020 - 26114949	26124137	26122114	26122252	26134313	26134806	26135426	26114715
4	Satara	02162-232750	230138	236133	233843	230688	238126	233832	227778
5	Sangli	0233 - 2602001	2372889	2326824	2373525	2273008	2372725	2372865	2377655
6	Aurangabad	0240-2331200	2334256	2338394	2334285	2331291	2331576	2331571	2342033
7	Latur	02382-224001	224201	220711	222172	242970	242991	245230	245196
8	Washim	07252-233400	232638	233653	233976	232861	232832	233874	232439
9	Nagpur	0712 - 2564973	25665130	2565976	2560071	2561461	2565145	2565046	2561844
10	Gadchiroli	07132 - 221001	222003	222004	222013	222304	222642	232350	222331
11	Sindhudurg	0262 - 228844	228854	228845	228849	228807	228817	228725	228841
12	Ratnagiri	02352-222301	222139	223573	2222962	222386	222428	222427	225513

TABLE 54: CONTACT DETAILS OF CABINET 2024

S.No.	Name	Accounts	Office Phone Number	Residence phone number
1	Shri. Eknath Sambhaji Shinde, Chief Minister of Maharashtra State	General Administration, Urban Development, Information and Technology, Information and Public Relations, Public Works (Public Enterprises), Transport, Marketing, Social Justice and Special	022-22025151,022-22025222,022-22854166,022-22793340	Nandanvan 23630609,23630286, Thane 25346655, 25336379,

S. No .	Name	Accounts	Office Phone Number	Residence phone number
		Assistance, Aid Rehabilitation, Disaster Management, Rivers and Catchment Environment, Salt Land Development, Minorities, Development and Auqaf, and any other departments or subjects not expressly assigned to the Ministers.		
2	Shri. Devendra Gangadharrao Phadnavis/ Shri. Ajit Pawar, Deputy Chief Minister	Home, Finance and Planning, Law and Justice, Water Resources and Area Development, Housing, Energy, Royal Etiquette	022-22022401,022-22025014	Sea 23630344, 23633190
3	Shri. Radhakrishna Eknath Rao Vikhe-Patil, Minister	Revenue Animal Husbandry,Dairy Development	22024850, 22025247	Royalston 23515889, 23524664
4	Shri. Sudhir Sachchidanand Mungantiwar, Minister	Forestry, cultural work, fishing	22027174, 22029742	Foliage 23618585,
5	Shri. Chandrakant (Grandfather) Bachchu Patil, Minister	Higher and mechanical education, textile industry, parliamentary work	22025398, 22024751	Singhagad 22020092,
6	Shri. Dr. Vijaykumar Krishna Rao Gavit, Minister	Tribal Development	22024950, 22025360	Chitrakoot 23685501,
7	Shri. Girish Dattatreya Mahajan, Minister	Rural Development and Panchayati Raj, Medical Education, Sports and Youth Welfare.	22026658, 22024832	Service House 23637075,
8	Shri. Gulabrao Raghunath Patil, Minister	Water supply and sanitation	22843657, 22843647	Jetwan 23630096,
9	Shri. Grandfather Dagdu Bhuse, Minister	Monkeys and miners	22886188, 22886093	Rajgarh 22046639,
10	Shri. Sanjay Dulichand Rathod, Minister	Food and Drug Administration	22817040, 22817074	Shivneri 23632045,
11	Shri. Suresh Bhau Dagdu Khard , Minister	labour	22843718, 22813623	Dnyaneshwari 23633659,
12	Shri. Sandipanrao Asaram Bhumre, Minister	Employment we, fruitfulness	22025251, 22028660	Ratnasindhu 220253311,
13	Shri. Uday Ravindra Samant, Minister	Industry	22843628, 22843664	Muktagiri 23613514,
14	Shri. Prof.Dr. Tanaji Jaywant Sawant, Minister	Public Health and Family Welfare	22023858, 22025051	
15	Shri. Ravindra Dattatreya Chavan, Minister	Public Works, Anna Nagari Supply and Customer Protection	22024700, 22025736	Raigad 22023203,
16	Shri. Abdul Nabi Sattar, Minister of State	Agriculture	22875930, 22876342	Panhalgarh 22020334,

S. No.	Name	Accounts	Office Phone Number	Residence phone number
17	Shri. Deepak Vasant Rao Kesarkar, Minister	School Education and Marathi Language	22025270, 22026582	Ramtek 23620771,
18	Shri. Atul Moreshwar Save, Minister	Cooperatives, Other Backward Classes, Socially and Educationally Backward Classes, Welfare of Deprived Castes, Nomadic Tribes and Special Backward Classes	22023992, 22022100	Shivgarh 22882902,
19	Shri. Shambhuraj Shivajirao Desai, Minister	State production fees	22042810, 22885104	Pawangarh 22020527,
20	Shri. Mangal Prabhat Lodha, Minister	Tourism, Skill Development and Entrepreneurship, Women and Child Development	22831983, 22025313	Vijayadurg 22020097,

TABLE 55: CONTACT DETAILS OF SENIOR ADMINISTRATIVE OFFICER AT GOVERNMENT LEVEL

S.No.	Name	Department	Office	Mobile no.
1	Hon. Shri. Sitaram Kunthe	Chief Secretary M.R. Mumbai	022-22025042	9820702800
2	Hon. Shri. Dr. Nitin Karer	Upper Chief Secretary Forest Revenue	022-220202345	9820719800
3	Hon'ble Mrs. Summat Bhage	Secretary Relief and Rehabilitation	022-22025274	8605359999

TABLE 56: CONTACT DETAILS OF SENIOR ADMINISTRATIVE OFFICER AT DEPARTMENTAL LEVEL

S.No.	Name	Department	Office	Mobile no.
1	Hon.Shri. Dr. Chandrakant Pulkundwar	Divisional Commissioner Pune	020-26362223	970210056
2	Mrs. Kavita Vdivedi	Upper Commissioner, Pune	020-26362492	9822409736
3	Mrs. Poonam Mehta	Deputy Commissioner, Revenue, Pune	020-26360326	
4	Mrs. Varsha Untaval	Deputy Commissioner, General Administration Pune	020-26361068	8308069999
5	Mrs. Poonam Mehta	Deputy Commissioner, Rehabilitation Pune	020-26361603	
6	Mrs. Samiksha Chandrakar	Deputy Commissioner, Supply Department, Pune	020-26361877	8484830850
7	Shri. Sanjeev Bhukan	PA TO DIV COMMISSIONER	020-26361365	9822107615
8	Shri. Aniket Joshi	PA TO DIV COMMISSIONER	020-26362223	9665209727

TABLE 57: CONTACT DETAILS OF HON'BLE KHASDAR AND MLA

S.No.	Name	Voters' Union	Mobile no.
1	Hon'ble Khasdar Munna Mahadik	Member of Rajya Sabha	9822555577
2	Hon'ble Khasdar Sanjay S. Mandalik	47 Kolhapur	9922998099
3	Hon. MP Dhaisheel S. That is	48 Handcuffs	9422044444
4	Hon. Shri MLA Chandrakant (Dada) Patil	Kothrood	9422304150

S.No.	Name	Voters' Union	Mobile no.
5	Hon.Shri.Prakash Abitkar	272- Radhanagari	9422421600
6	Hon.Shri.Hassan Mialal Mushrif	273- Kagal	9821419462
7	Hon.Shri.Rituraj Patil	274-Kolhapur South	9764495999
8	Hon.Shri. P.N. Patil	275-Karveer	9822429292
9	Mrs. Jaishree Jadhav	276-Kolhapur North	9552073100
10	Hon.Shri.Vinayak Kore	277-Shahuwadi	9657572020
11	Hon.Shri.Raju (Baba) Awale	278-Hatakangale	98233069930
12	Hon.Shri.Prakash Awade	279-Ichalkaranji	9822265555
13	Hon.Shri.Rajendra Patil- Yadravkar	28 8- Shirol	9822655555
14	Hon.Shri. Satej alias Bunt D. Patil	Member of the Legislative Council	9823012905
15	Hon. Rev. Fr. Rajesh Patil	Chandgarh	9403578777
16	Hon. Rev. Fr. Rajesh Kshirsagar	Planning Chairman	9860977788
17	Hon.A.Shri. Jayant Aasgaonkar	Member of the Legislative Council	9923152525

TABLE 58: CONTACT LIST OF BRANCHES TO BOARD LEVEL OFFICERS OF GENERAL DISTRIBUTION (DEPARTMENT LEVEL)

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
1	Shri Paresh Bhagwat	Chief Engineer	Kolhapur Office	7875769000
2	Sprout crows	Superintendent Engineer	Kolhapur Board Office 0231-2650581	7875769111
3	Prashant Kumar Masal	Executive Engineer		7875769004
4	Dipk Rao Shankar Patil	Executive Engineer	Kolhapur Rural Department	7875769006
5	Balasaheb Vishwanath Munde	Additional Executive Engineer		7875769204
6	Empty	Deputy Executive Engineer	Panhala subdivision	7875769228
7	Pravin Ma. Patil	Junior Engineer	Panhala Branch Office	7875769230
8	Prakash Sakham Chougule	Junior Engineer	Dewale Branch Office	7875769231
9	Ravindra Shri. Mohite	Junior Engineer	Ghotwade Branch Office	7875769234
10	Ajay Manik Rao Jadhav	Junior Engineer	Kotoli Branch Office	7875769232
11	Pratibha m. Jadhav	Junior Engineer	Parle Branch Office	7875769233
12	Rajshri Ba. Lord	Junior Engineer	Wadiratnagiri Branch Office	7875769229
13	Girish Pandurang Bhosle	Deputy Executive Engineer	Subdivision Kadamwadi	7875923911
14	Residence Anna Gaikwad	Assistant Engineer	Shiye Branch Office	7875924048

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
15	V.V. Latkar	Junior Engineer	Nigwe (Du) Branch Office	7875923954
16	S.S. V.S.S. Chandramani	Junior Engineer	Gandhinagar 2 Branch Office	7875923989
17	J.B. Goudad	Junior Engineer	Vadange Branch Office	7875924058
18	M.V. Bhange	Junior Engineer	Ambewadi Branch Office	7875924095
19	R.S. D. Pillars	Junior Engineer	Kerle Branch Office	7875923950
20	Mukund Ambi	Deputy Executive Engineer	Subdivision Phulewadi	7875922385
21	Nitin Ashok Shinde	Assistant Engineer	Balinga City Branch Office	7875922406
22	Rishikesh Rs. Joshilkar	Junior Engineer	Balinga Rural Branch Office	7875922427
23	Prakash Sakharam Chougule	Junior Engineer	Cuditre Branch Office	7875922466
24	Shubham Ravindra Jangle	Junior Engineer	Sangrul Branch Office	7875922409
25	Deepak Hon. Chavan	Junior Engineer	Kandgaon Branch Office	7875922461
26	Raju Sh. blankets	Junior Engineer	Koge Branch Office	7875922512
27	Snehal no. Gaikwad	Junior Engineer	Are Branch Office	7875922481
28	Ratnakar Pandit Mohite	Deputy Executive Engineer	Subdivisions around	7875920619
29	Shubhangi a. Mengane	Junior Engineer	Parithe Branch Office	7875920623
30	Pramod D. Patil	Junior Engineer	Kothali Branch Office	7875920644
31	Amit Kr. Nakate	Junior Engineer	Rashivade Branch Office	7875920637
32	Amit R. Jumping	Junior Engineer	Hasur Branch Office	7875920695
33	Anmol The. Bawdekar	Junior Engineer	Hon. Shirola Branch Office	7875920642
34	Prithviraj Ch. Horses	Junior Engineer	Bachani Branch Office	7875920653
35	Subhash Shankar Patil	Junior Engineer	Ispurli Branch Office	7875920627
36	Dayanand Mallikarjun Kamatgi	Deputy Executive Engineer	Subdivision Kle	7875926098

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
37	Rishikesh a. Sajane	Assistant Engineer	Padal Branch Office	7875926181
38	Prajakta m. Patil	Junior Engineer	Kale Branch Office	7875926118
39	Namdev Na. Nagargoje	Junior Engineer	Savarde Branch Office	7875926150
40	Sushil Su. Sabe	Junior Engineer	Market Enjoyment Branch Office	7875926178
41	Vinayak Hon. Yadav	Deputy Executive Engineer	Sub-division Gaganbawda	7875927260
42	Atharva Po. Spiders	Junior Engineer	Tisangi Branch Office	7875927332
43	Ashwinkumar Gu. Suryavanshi	Junior Engineer	Gaganbawda Branch Office	7875927262
44	Surekha Shelke	Deputy Executive Engineer	Subdivision Kodoli	7875925156
45	Pradip Sh. Chougule	Assistant Engineer	Kodoli City Branch Office	7875925265
46	Ramdas Ma. Shelke	Junior Engineer	Pakhale Branch Office	7875925260
47	Satish Ashok Walke	Junior Engineer	Seventh Branch Office	7875925249
48	Empty	Junior Engineer	Kakhe Branch Office	7875925234
49	Komal Maruti Patil	Junior Engineer	Pargaon Branch Office	7875925161
50	Praveen Vitthal Kumbhare	Deputy Executive Engineer	Subdivision Shahuwadi	7875919144
51	Rohit Katkar	Junior Engineer	Malkapur Branch Office	7875919219
52	Kiran Mane	Assistant Engineer	Shahuwadi Branch Office	7875919226
53	Pawan Su. That is	Assistant Engineer	Bhedsgaon Branch Office	7875919249
54	Ganesh Sutar	Junior Engineer	Bambawade Branch Office	7875919285
55	Vikas Dagde	Junior Engineer	Warul Branch Office	7875919180
56	Vaibhav Bajrang Kukde	Junior Engineer	Sarud Branch Office	7875919145
57	Empty	Junior Engineer	Cotton Branch Office	7875919254
58	Sanjay Ch. Shinde	Additional Executive Engineer		7875769154

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
59	Ankur Bha. Sonavane	Assistant Engineer	Gargoti 1 Branch Office	7875769180
60	Milind R. The stomach	Junior Engineer	Mhasve Branch Office	7875769182
61	Vivek v. More	Junior Engineer	Kadgaon Branch Office	7875769184
62	Sunil D. Mangasule	Junior Engineer	Hoopari 1 Branch Office	7875769197
63	Kiran Dt. Kembalkar	Assistant Engineer	Hoopari 2 Branch Office	7875769168
64	Sumaiya R. Jamdar	Assistant Engineer	Hoopari Rural Branch Office	7876769169
65	Ravindra A. blankets	Assistant Engineer	Rendal Branch Office	7875769196
66	Omkar or. Black	Assistant Engineer	Pattankodoli 1 Branch Office	7875769200
67	Mahesh Bha. Mudhale	Assistant Engineer	Gadmudshingi Branch Office	7875769171
68	Kanchan Vs. Shinde	Junior Engineer	Radhanagari 1 Branch Office	7875909475
69	Sushant no. Nikam	Junior Engineer	Awali Branch Office	7875909481
70	Sagar m. Dhongde	Assistant Engineer	Walva Branch Office	7875909569
71	Anmol Da. Bhosle	Junior Engineer	Shirgaon Branch Office	7875909610
72	Mamata Di. Patil	Junior Engineer	Solankur Branch Office	7875909490
73	Prakash Ta. Patil	Assistant Engineer	Murgud Branch Office	7875769174
74	It's priceless. The seated	Junior Engineer	Murgud Rural Branch Office	7875769202
75	Vinod Kr. solution	Deputy Executive Engineer	Kagal Subdivision	7875769159
76	Without K.S. Mhathkar	Assistant Engineer	Kagal City Branch Office	7875769187
77	Rajendra H. blankets	Assistant Engineer	Gokul Shirgaon Rural Branch Office	7875769193
78	Suhas Su. Shinde	Assistant Engineer	Gokul Shirgaon MIDC Branch Office	7875769191
79	Abhilash v. Twelve vessels	Assistant Engineer	Siddhanerli Branch Office	7875769190
80	Vaibhav Mohd. Gondil	Executive Engineer	Jaisingpur Department	7875769009

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
81	Minakshi Pr. Awghade	Additional Executive Engineer		7875769355
82	Sachin Kumar no. Jagtap	Deputy Executive Engineer	Sub-division Vadgaon	7875769374
83	Subhash Ba. Patil	Assistant Engineer	Hatkanangle City Branch Office	7875941816
84	Babasaheb is there. Solge	Assistant Engineer	Jaisingpur North Branch Office	7875940540
85	Priyanka Ba. Patil	Assistant Engineer	Kurundwad City Branch Office	7875942900
86	Deepak v. Jamne	Assistant Engineer	Shirol Branch Office	7875944010
87	Sagar Shi. Hujra	Assistant Engineer	Kini Area Branch Office	7875940236
88	Anil Ba. Horseman	Junior Engineer	Chokak Branch Office	7875942712
89	Rohit Ra. Birnale	Junior Engineer	Hatkanangle Branch Office	7875941686
90	Sandeep b. blankets	Junior Engineer	Herle Branch Office	7875942550
91	Salim Muzaffar	Junior Engineer	Danoli Branch Office	7875941388
92	Rohit is. Sevekari	Junior Engineer	Purple Branch Office	7875941003
93	Shashikant Gunn. That is	Junior Engineer	Jaisingpur Rural Branch Office	7875940897
94	Ravindra E. Patil	Junior Engineer	Datwad Branch Office	7875943473
95	Peacock Ba. Avale	Junior Engineer	Kurundwad 2 Branch Office	7875943344
96	Megha Mob. Jadhav	Junior Engineer	Shirdhon Branch Office	7875943843
97	Puja d. Rajge	Junior Engineer	Aurwad Branch Office	7875944652
98	Jayatirtha a. Sanglikar	Junior Engineer	Ambap Branch Office	7875769399
99	Shubham Ra. Chougule	Junior Engineer	Buwache Area Branch Office	7875939689
100				
101	Vijayakumar Ba. Aadke	Executive Engineer	Gadhinglj Department	7875769010

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
102	Nagesh Kr. Basarkatty	Additional Executive Engineer		7875929033
103	Abhijeet J. Pumpkins	Assistant Engineer	Gadhinglj City 1 Branch Office	7875769287
104	Sripad Pr. Chikurde	Assistant Engineer	Gadhinglj City 2 Branch Office	7875769299
105	Anil Kr. Sadalage	Assistant Engineer	Gadhinglj Rural Branch Office	7875927946
106	Rajendra Bhai. Khandekar	Assistant Engineer	Dudge Branch Office	7875769258
107	Anil Kr. Sadalage	Assistant Engineer	Nool Branch Office	7875928563
108	Sunil Ba. Chougule	Deputy Executive Engineer	Subdivision Nesri	7875928957
109	Sharad Q. Patil	Assistant Engineer	Nesri Branch Office	7875769286
110	Sanjay Kumar v. Patil	Assistant Engineer	Mahagaon 1 Branch Office	7875929426
111	Ashwin Bha. Devannavar	Junior Engineer	Halkarni 2 Branch Office.	7875930356
112	Ashwin Bha. Devannavar	Junior Engineer	Nangannur Branch Office	7875930356
113	Nikhil Ra. Peony	Assistant Engineer	Azra 1 Branch Office	7875930578
114	Sandeep S. Gaikwad	Assistant Engineer	Azra 2 Branch Office	7875930867
115	India S.S. Jadhav	Assistant Engineer	Malingre Branch Office	7875931899
116	Ravindra Dho. Redecker	Assistant Engineer	Uttur 1 Branch Office	7875931484
117	Vishal Shi. Lodhi	Deputy Executive Engineer	Sub-division Chandgarh	7875930245
118	Rajesh Dhon. Khorate	Assistant Engineer	Chandgarh 1 Branch Office	7875932139
119	Vinod M. Skeletal muscle	Assistant Engineer	Chandgarh 3 Branch Office	7875932682
120	Ajit Na. blankets	Assistant Engineer	Covad 1 Branch Office	7875933504
121	Sanjay Shan. Magdum	Assistant Engineer	Covad 2 Branch Office	7875933811
122	Development No. from the particles	Assistant Engineer	Turkewadi Branch Office	7875934068

S.No.	Name of the officers Sarvashree	Designation	Place of work	Mobile no.
123	Prashant Rathi	Executive Engineer	Ichalkaranji Department	7875769008
124	Vijay v. Kothavale	Assistant Engineer	Ichalkaranji East Branch Office	7875936020
125	Mohan Pr. Kolekar	Assistant Engineer	Ichalkaranji North Branch Office	7875937061
126	Santosh Kumar Ja. Patil	Assistant Engineer	Jawaharnagar Branch Office	7875938202
127	Gauss Mullah	Assistant Engineer	Kabanur Branch Office	7875938438
128	Vinod c. Lotke	Assistant Engineer	Vikasnagar Branch Office	7875939360
129	Sunil Dhon. Akkivate	Additional Executive Engineer	Subdivision Ichalkaranji Rural	7875769331
130	Umesh Ra. Steps	Assistant Engineer	Sajni Branch Office	7875769337

TABLE 59: CONTACT DETAILS OF SUPERINTENDENT ENGINEER/EXECUTIVE ENG. AND DEPUTY ENGINEERS

S.No	Name	Designation	Name of the Office	Function telephone	Mobile no.
1	Shri.S. P.S. Potter	Superintendent Engineer	S.B. Board, Kolhapur	0231/2654861	9421204449
2	Shri.S. M. Ghatge	Asst. Engineer	----- "-----	0231/ 2650140	8830472288
3	Shri. S.R. Patil	Executive Engineer	S.B.V.Kolhapur	0231/2651457	9423777778
4	Mrs. L.R. Shah	Deputy Ca.A.	S.B.V.Kolhapur	0231/2651457	9158296418
5	Shri.M. S.S. Kanjar	Deputy Engineer	S.B.U.V.Kolhapur	0231/2651133	8888982266
6	Mr. Tushar Shirguppe	Deputy Engineer	S.B.U.V.Shirol	02322/225610	9422419114
7	Shri. Chandrakant Patil	Deputy Engineer	S.B.U.V.Kagal	2325/244179	9049441021
8	Shri.Shivaji S.Patil	Deputy Engineer	S.B.U.V.Hatakangale	0230/2483398	9422694796
9	Mrs. Hema Joshi	Deputy Engineer	Building Project Sub.V.Co.	0231/2651133	7058911727
12	Shri. P.S. R.S. Jadhav	Executive Engineer	S.B.(D.) v. Kolhapur	0231/2650042	9850954589
13	Shri.S.D.Mane	Deputy Commissioner. a.	S.B.(D.) v. Kolhapur	0231/2650042	9284589976
15	Shri. a. V.S.S. Bhosle	Deputy Engineer	S.B.U.V.Gadhinglj	02327/222279	9762759053
16	Mr.Iftekhar A.Hannan Mullah	Deputy Engineer	S.B.U.V. Chandgarh	02320/224151	9421284461

S.No	Name	Designation	Name of the Office	Function telephone	Mobile no.
17	Shri.D.S.Mirajkar	Deputy Engineer	S.B.U.V. Bhudargarh	02324/220068	9423275050
18	Shri.Rajendra Namdev Sawant	Deputy Engineer	S.B.U.V. Azra	02323/246641	7588588303
20	Shri. Shivaji invited	Deputy Engineer	S.B.U.V. Radhanagari	02321/234355	9420085569
21	Shri. C.A. Ayreker	Executive Engineer	Special Projects Department, to	0231/2666855	9922904827
22	Shri. Morskar	Deputy Ca.A.	Special Projects Department, to	0231/2656856	942114887
23	Shri. Sachin Kumbhar	Deputy Engineer	S.B.U.V. Panhala	0231/2654656	9527397687
24	Shri. D. R.S. Bhosle	Deputy Engineer	S.B.U.V. Shahuwadi	02329/224231	9823986066
25	Mrs. Sarita Deshpande	Deputy Engineer	S.B.U.V. Gaganbawda	02346/224049	9922966799
26	Shri.K.D.Mudhale	Executive Engineer	R.M.Department, Kolhapur	0231/2652960	7057200417
27	Shri. S.V. Rasne	Deputy Executive Engineer	R.M.Department, Kolhapur	0231/2652960	9421207545
28	Shri.J.C.Bagwan	Deputy Engineer	R.M. Sub-Division No.1, Kolhapur	0231/2652960	9657178200
29	Shri. R.B. Shinde	Deputy Engineer	R.M. Sub-Division No. 2, Kolhapur	--	9422038710
30	Next to Mr.K.H	Deputy Engineer	R.M. Sub-Division Satara	--	8879649564
31	Shri.S.V.Sangavkar	Executive Engineer	Z.P. (Left) Division, Co.	0231/2656083	9423042152
33	Shri.Amit Patil	Deputy Engineer	Z.P. (Left) Sub.V. Karveer	0231/2526726	9860002516
35	Shri.K.A.Patil	Deputy Engineer	Z.P. (Left) Sub.V. Shahuwadi	02329/224129	9423260247
36	Shri. R.B. Gardener	Deputy Engineer	Z.P.(Left)U.S. Gadhinglj	02327/222238	9960791472
38	Shri.Manohar Rangrao Patil	Deputy Engineer	Z.P.(Left)U.S. hand.	0230/2483126	
39	Shri. a. M.Sc. Ramsay	Deputy Engineer	D. and Quality.N.Laboratory	--	7767801160
40	Shri.K.D.Mudhale	Deputy Engineer	PMGSY Kolhapur		7057200417
41	Shri. M.R. Shinde	Executive Engineer	Electricity (S.B.) v.co.	0231/2667929	9623048259
42	Shri. Umesh Raskar	Deputy Ca.A. Engineer	Electricity (S.B.) v.co.	0231/2667929	
43	Shri. Dange	Deputy Ca.A. Engineer	Electrical (S.B.) Sub V, Miraj	--	9422044441

S.No	Name	Designation	Name of the Office	Function telephone	Mobile no.
44	Shri.C.B. Chakote	Deputy Engineer	Power (S.B.) Sub V .Co.	0231/2546097	9527512524
45	Shri.Sandeep Jadhav (Ati.)	Superintendent	Forests and Gardens, Kolhapur	020/25690694	
47	Shri.Krantikumar Mirajkar	Executive Engineer	Sa.Ban. Department, Miraj	0233/2222665	7588167063
48	Mrs. Vinita S. Karveer	Deputy Ca.A.	-----"-----	0233/2222665	9922959410
49	Shri.K.B.Powar	Deputy Engineer	Sa.Ban. Deputy Vs. Miraj	0233/2223023	8055149692
50	Shri. Immortal Machindra Nalvade	Deputy Engineer	Sa.Ban. Deputy Vs. Sangli	0233/2373266	9373119493
51	Mr. Pravin Kumar Lavand	Deputy Engineer	Sa.Ban. Deputy Vs. Kavthe Maha.	02341/222227	9403703232
52	Shri.Mahadev Laxman Mali	Deputy Engineer	Sa.Ban. Deputy V.Jat	02344/246206	
53	Shri.Dattatreya Sambhaji Katkar	Deputy Engineer	Sa.Ban. Deputy V.Jat	02344/246314	9921783115
54	Shri.M.S.Patil	Deputy Engineer	Sa.Ban. Deputy V.Palus	02346/228300	9970560579
55	Mr. A. B. Pol	Deputy Engineer	Sa.Ban. Deputy V. Kadegaon	02347/242134	9423040195
56	Shri. Milind Kulkarni	Executive Engineer	Sa.Ban. (W.) V. Sangli	0233/2375898	9405684176
57	Shri. Development of Pt	Deputy Ca.A.	Sa.Ban. (W.)V.Sangli	0233/2375898	9850699614
58	Shri.Swanil Patil	Deputy Engineer	Sa.Ban. Deputy v. Islampur	02342/224334	8830798204
59	Mr. VV Mohite	Deputy Engineer	Sa.Ban. Deputy V. Vita	02347/272645	9850760003
60	Shri. S.P. Burley	Deputy Engineer	Sa.Ban. Deputy v. Aatpadi	02343/221208	7843096892
61	Shri.P.V.Kadam	Deputy Engineer	Sa.Ban. Deputy Vs. Shirala	02345/272122	9922102177
62	Shri.Aakash Jagannath Huddar	Deputy Engineer	Sa.Ban. Deputy Vs. Tasgaon	02346/240526	8275795761
63	Mrs. Shailaja Gaikwad	Deputy Engineer	Project Sub v. Sangli	--	9850733239
65	Mrs. Shailaja Gaikwad	Deputy Commissioner. a.	Road Project V. Sangli	0233/2372015	9850733239
66	Mr. Puja Bartke	Deputy Engineer	Road Project Sub-V.Co.	0231/2542014	9373386655
67	Mrs. B.S.Biraje	Executive Engineer	Z.P. (Left) v. Sangli	0233/2372719	9423249641
68	Shri.S.D.Kamat	Deputy Commissioner. a.	Z.P. (Left) Deputy v. Sangli	0233/2372720	9922903104

S.No	Name	Designation	Name of the Office	Function telephone	Mobile no.
69	Mrs. Vrinda Patil	Deputy Engineer	Z.P. (Left) Sub-V. Miraj	0233/2222613	8275592122
70	Mr. Vishwas Budhaji Naik	Deputy Engineer	Z.P. (Left) Deputy v. Tasgaon	02346/240646	7588575915
71	Shri. S.S. V.S. Patil	Deputy Engineer	Z.P. (Left) Deputy v. Islampur	02347/272030	9130609976
75	Shri.D.B. Chavan	Deputy Engineer	Z.P. (Left) v. Kavthe Maha.	02341/222031	9423272260
76	Shri.H.R.Gaikwad	Deputy Engineer	Z.P. (Left) Deputy v. Jat		

TABLE 60: CONTACT DETAILS OF AGRICULTURE OFFICERS AT KOLHAPUR DISTRICT

S.No	Name	Designation	Department	Mobile no.	Email
1	Shri Arun Bhingardev (Q)	District Superintendent of Agriculture Officer, Kolhapur	District Superintendent of Agriculture Officer, Kolhapur	9404990777	d73arun@gmail.com
2	Black Sridhar Prabhakar	Deputy Director of Agriculture	District Superintendent of Agriculture Officer, Kolhapur	9850116397	shridharkale6463@gmail.com
3	Jadhav Anand Hari	Technical Officer, Fl.	District Superintendent of Agriculture Officer, Kolhapur	9421122715	ananda.jadhav66@gov.in
4	Kamble Ramakant Dilip (Q)	Mechanism Officer, Extension	District Superintendent of Agriculture Officer, Kolhapur	9130505809	ramakantkamble05@gmail.com
5	Kamble Ramakant Dilip (Q)	Mechanism Officer, MRS	District Superintendent of Agriculture Officer, Kolhapur	9130505809	ramakantkamble05@gmail.com
6	Mrs. Shete Sneha Mahavir (Q)	Mechanism Officer, Statistics	District Superintendent of Agriculture Officer, Kolhapur	9049454649	ssneha6795@gmail.com
7	Shri Atul Jadhav (Q)	District Quality Control Officer	District Superintendent of Agriculture Officer, Kolhapur	9404990809	-
8	Mrs. Shete Sneha Mahavir	Agricultural Officer	District Superintendent of Agriculture Officer, Kolhapur	9049454649	ssneha6795@gmail.com
9	Kamble Ramakant Dilip	District Soil Survey Soil Testing Officer	District Soil Survey Soil Testing Laboratory	9130505809	ramakantkamble05@gmail.com
10	Mrs. Raksha Shinde	Project Moderator, Spirit	Project Director, Atma, Kolhapur	8605400638	shridharkale6463@gmail.com

S.No	Name	Designation	Department	Mobile no.	Email
11	Shri. S.S. Patade	Project Deputy Director, Spirit	Project Director, Atma, Kolhapur		shridharkale6463@gmail.com
12	Chavan Abhaykumar Yashwant	Agricultural Development Officer	Agricultural Development Officer, Dist. Pt. Kolhapur	8369735159	abhay17041991@gmail.com
13	Mrs. Vasgaonkar (Repe) Sarika Shamrao	District Agriculture Officer (General)	Agricultural Development Officer, Dist. Pt. Kolhapur	7709499467	sarika.repe@gmail.com
14	Deepak Sitaram Deshmukh	District Agriculture Officer (Agriculture Officer)	Agricultural Development Officer, Dist. Pt. Kolhapur	8275002095	deepakd2201@gmail.com
15	Tanaji Khandu Patil	Campaign Officer	Agricultural Development Officer, Dist. Pt. Kolhapur	9637186704	tanajipatil55@gmail.com
16	Shri Abhijeet Dilip Gadde (Q)	Sub-Divisional Agricultural Officer	Sub-Divisional Agriculture Officer, Kolhapur	7066768663	abhijitgadade555@gmail.com
17	Mrs. Hawle Jaishree Haridas	Mechanism Officer	Sub-Divisional Agriculture Officer, Kolhapur	9421398927	ingale_jayashri@rediffmail.com hawalejayashri@gmail.com
18	Mrs. Patil Kranti Mahavir	Agricultural Officer	Sub-Divisional Agriculture Officer, Kolhapur	9423859286	krantib7@gmail.com
19	Anup Suryakant Raskar	Agricultural Officer	Government Nursery, Jaisingpur	9527897928	
20	Bhingardeve Arun Dinkar	Sub-Divisional Agricultural Officer	Sub-Divisional Agriculture Officer, Karveer	9404990777	
21	Mrs. Kore Ashwini Sambhaji	Mechanism Officer	Sub-Divisional Agriculture Officer, Karveer	9860894199	ashwinikore93@gmail.com
22	Jadhav Atul Ganapatrao	Agricultural Officer	Sub-Divisional Agriculture Officer, Karveer	9404990809	jadhavatul8199@gmail.com
23	Deshmukh Vinayak Vishnupant	Sub-Divisional Agricultural Officer	Sub-Divisional Agriculture Officer, Gadhinglj	9422087765	sdaogad@gmail.com
24	Bonge Haridas Bhimrao (Q)	Mechanism Officer	Sub-Divisional Agriculture Officer, Gadhinglj	9284611568	haridasbonge11@gmail.com
25	Mrs. Ranjana Deshmukh	Agricultural Officer	Sub-Divisional Agriculture Officer, Gadhinglj	9422736061	ranjanadeshmukh25@gmail.com

S.No	Name	Designation	Department	Mobile no.	Email
26	Amol Balu Sapkal	Taluka Agriculture Officer, Shahuwadi	Taluka Agriculture Officer, Shahuwadi	9028790741	amolsapkal125@gmail.com
27	Mr. Sandeep Anant Shelke	Agriculture Officer, (Office)	Taluka Agriculture Officer, Shahuwadi	9423244230	sandeepshelake10@gmail.com
28	Grandson Sachin Madhukar (Q)	Divisional Agricultural Officer	Divisional Agricultural Officer, Malkapur	9028150107	sachinnatu2009@gmail.com
29	Shri Shivaji Bapu Kashid	Board Agricultural Officer	Board Agriculture Officer, Shahuwadi	7057834477	shivajikashid1972@gmail.com
30	Amol Balu Sapkal	Board Agricultural Officer	Board Agriculture Officer, Bambawade	9028790741	amolsapkal125@gmail.com
31	Gadde Abhijit Dilip	Taluka Agriculture Officer	Taluka Agriculture Officer, Hatkanangle	9422625600	abhijitgadade555@gmail.com
32	Torane dhiraj madhukar	Agriculture Officer (Office)	Taluka Agriculture Officer, Hatkanangle	9665802164	torane.dhiraj@gmail.com
33	Dr. Aitvade Nilkumar Mahavir	Board Agricultural Officer	Board Agriculture Officer, Hoopri	8070201008	nilsan.bestfriends@gmail.com
34	Example Nandkumar Anna	Board Agricultural Officer	Board Agriculture Officer, Hatkanangle	8275919596	example@gmail.com
35	Shri Chandrashekhar Sitaram Sulgaonkar	Board Agricultural Officer	Board Agriculture Officer, Vadgaon	9420960560	sss22968@gmail.com
36	Fonde Anil Ramchandra	Taluka Agricultural Officer, Gadhinglj	Taluka Agricultural Officer, Gadhinglj	7588628028	anilphonde@gmail.com
37	Bonge Haridas Bhimrao (Q)	Agriculture Officer (Office)	Taluka Agricultural Officer, Gadhinglj	9404990833	haridasbonge11@gmail.com
38	Bonge Haridas Bhimrao	Divisional Agricultural Officer	Divisional Agriculture Officer, Mahagaon	9284611568	haridasbonge11@gmail.com
39	Mrs. Deshmukh Ranjana Sudhir	Divisional Agricultural Officer	Divisional Agricultural Officer, Gadhinglj	9422736061	ranjanadeshmukh25@gmail.com
40	Jangle Chandrakant Baburao	Taluka Agriculture Officer	Taluka Agriculture Officer, Shirol	9850166395	cbjangale27@gmail.com
41	Vishwas Guruv (Q)	Agriculture Officer, (Office)	Taluka Agriculture Officer, Shirol	94044991130	vishwasgurv3730@gmail.com
42	Shashikant Kamble (Q)	Board Agricultural Officer	Board Agriculture Officer, Karudwad	9404991094	shashikantkamble05@gmail.com
43	Aware Dattatreya Sanjay	Board Agricultural Officer	Board Agricultural Officer, Jaisingpur	9767071906	dattatraoffice@gmail.com

S.No	Name	Designation	Department	Mobile no.	Email
44	Mrs. Kavyashree Mohan Gholap	Taluka Agriculture Officer, Panhala	Taluka Agriculture Officer, Panhala	9834453033	
45	Shri Sambhaji Baburao Patil	Agriculture Officer, (Office)	Taluka Agriculture Officer, Panhala	7588089120	patils7519@gmail.com
46	Kamble Deepak Eknath	Board Agricultural Officer	Board Agriculture Officer, Panhala	9405292386	dk309192@gmail.com
47	Shri Tanaji Namdev Khot	Board Agricultural Officer	Board Agricultural Officer, Kale	9422464240	tanajikhot2@gmail.com
48	Pol Yashodip Pandurang	Taluka Agriculture Officer, Kagal	Taluka Agriculture Officer, Kagal	9890010492	yashodippol145@gmail.com
49	Biranje Sambhaji Bandu	Agriculture Officer, (Office)	Taluka Agriculture Officer, Kagal	9763314843	sbbiranje@gmail.com
50	Patil Ravindra Ramchandra	Board Agricultural Officer	Board Agricultural Officer, Cotton	9605642761	ravi.patil107138@gmail.com
51	Pol Yashodip Pandurang	Board Agricultural Officer	Board Agricultural Officer, Kagal	9890010492	yashodippol145@gmail.com
52	Nikat Vishnu Dattatreya	Board Agricultural Officer	Board Agriculture Officer, Murgud	8888228466	nikatvishnu96@gmail.com
53	Banda Babu is a potter	Taluka Agriculture Officer	Taluka Agriculture Officer, Karveer	7588058279	bindhastbanda23@gmail.com
54	Mrs. Dhoble Swati Mohan	Agriculture Officer, (Office)	Taluka Agriculture Officer, Karveer	9860153353	swatidhobale@yahoo.in
55	Mrs. Valvekar Mohini Prakash	Board Agricultural Officer	Board Agriculture Officer, Karveer	7588355247	mwalekar2001@gmail.com
56	Dilip Babu Guruv (Q)	Board Agricultural Officer	Board Agriculture Officer, Kalamba	8766550336	guravdilip2612@gmail.com
57	That is, Narendra Damodar	Board Agricultural Officer	Board Agriculture Officer, Beed	9422512522	narendramane@gmail.com
58	Mrs. Nalwade Shrutika Chandrakant (Q)	Taluka Agriculture Officer, Radhanagari	Taluka Agriculture Officer, Radhanagari	7558590036	shrutikan95@gmail.com
59	Sangli Anil Vishwanath (Q)	Agriculture Officer (Office)	Agriculture Officer (Office)	9518583910	anilsangle112@gmail.com
60	R.P. Gondhali	Board Agricultural Officer	Board Agriculture Officer, Radhanagari	9404990677	ranjit.6458@gmail.com
61	Mrs. Nalwade Shrutika Chandrakant	Board Agricultural Officer	Board Agriculture Officer, Sarawade	7558590036	shrutikan95@gmail.com
62	Sangale Anil Vishwanath	Board Agricultural Officer	Board Agriculture Officer in Charge, Kaulav	9518583910	anilsangle112@gmail.com

S.No	Name	Designation	Department	Mobile no.	Email
63	Gaikwad Ramesh Baliram	Taluka Agriculture Officer, Gaganbawda	Taluka Agriculture Officer, Gaganbawda	9423983990	rgb10967@gmail.com
64	Khade Gajanan Asheak	Agriculture Officer (Office)	Taluka Agriculture Officer, Gaganbawda	9922343352	gajanankhade69@gmail.com
65	Khade Gajanan Asheak	Board Agricultural Officer	Board Agriculture Officer, Salvan	9922343352	gajanankhade69@gmail.com
66	Mr. Aniket Arvind Mane	Taluka Agriculture Officer, Chandgad	Taluka Agriculture Officer, Chandgad	8275194863	aniketmane4088@gmail.com
67	Satish Pandurang Kumbhar (Q)	Agriculture Officer, (Office)	Taluka Agriculture Officer, Chandgad	9423984635	satishkumbhar407@gmail.com
68	Deepak Anandrao Phadtare (Q)	Board Agricultural Officer	Board Agriculture Officer, Chandgarh	8329852629	dipakphadtare82@gmail.com
69	Mr. Aniket Arvind Mane	Board Agricultural Officer	Board Agriculture Officer, Kowad	8275194863	aniketmane4088@gmail.com
70	Gambre Vijay Chandu	Board Agricultural Officer	Board Agriculture Officer, Turkewadi	9420604079	vijayg4079@gmail.com
71	Fonde Anil Ramchandra (Q)	Taluka Agriculture Officer	Taluka Agriculture Officer, Azra	7588628028	anilphonde@gmail.com
72	Dalvi Vijay Singh Ramchandra	Agriculture Officer, (Office)	Taluka Agriculture Officer, Azra	9403470650	dalavivr@gmail.com
73	Mali Pradeep Arvind (Q)	Board Agricultural Officer	Taluka Agriculture Officer, Azra	7588088330	pradeepmali78@gmail.com
74	Patil Prakash Gurusiddhappa (Q)	Board Agricultural Officer	Board Agricultural Officer, Uttur	7588185736	PPPPrakash12345@gmail.com
75	Patil Kiran Jaisingh	Taluka Agriculture Officer	Taluka Agriculture Officer, Bhudargarh	9689381939	patilkj86@gmail.com
76	Bhandawale Nitin Dinkar (Q)	Agriculture Officer, (Office)	Taluka Agriculture Officer, Bhudargarh	7588699139	nitindbhandawale@gmail.com
77	Mr. Sunil Davari	Divisional Agricultural Officer	Divisional Agriculture Officer, Gargoti	9404954818	sunildavari@gmail.com
78	Bhandavale Nitin Dinkar	Divisional Agricultural Officer	Divisional Agriculture Officer, Kadgaon	7588699139	nitindbhandawale@gmail.com

TABLE 61: CONTACT DETAILS OF HEAD OF DEPARTMENT OF KOLHAPUR ZILLA PARISHAD

S.No	Name of the officer	Office	Office Number	Mobile number
1	Shri. Karthikeyan S. Bhaprase	Chief Executive Officer	0231-2655598	8610480624

S.No .	Name of the officer	Office	Office Number	Mobile number
2	Shri. Ajay Kumar Mane	Additional Chief Executive Officer	0231-2991363	9423044516
3	Mrs. Sushma Desai	Project Director, D.G.V	0231-2656342	9822801366
4	Mrs. Manisha Desai-Shinde	Deputy Chief Executive Officer (SAPR)	0231-2655416	9422433612
5	Shri. Arun Jadhav	Deputy Chief Executive Officer (GRP)	0231-2655486	9156859199
6	Mrs. Madhuri Parit	Project Operator Water Life Mission	0231-2950866	9420777524
7	Mrs. Shilpa Patil	District Program Officer, MNAV)	0231-2950432	9423044648
8	Shri. Atul Akurde	Chief Accounts and Finance Officer	0231-2950201	8275484082
9	Shri. Rajesh Gaikwad	District Health Officer	0231-2652327	9420487691
10	Dr. Pramod Babur	District Animal Husbandry Officer	0231-2652331	8530835035
11	Shri Abhay Kumar Chavan	Agricultural Development Officer	0231-2951256	8369735159
12	Shri. S.M.Powar	Social Welfare Officer	0231-2950162	8605443279
13	Mrs. Meena Shendkar	Education Officer Primary	0231-2650781	9823426499
14	Shri Eknath Ambokar	Teaching Officer Secondary	0231-2668229	9421187798
15	Shri. Sachin Sagavkar	Executive Engineer Construction	1231-26560823	9423042152
16	Shri.V.A.Karad	Executive Engineer Grapapu	0231-2651960	9921033000
Other concerned department heads/officer				
1	Mrs. Dipali Patil	Principal Gramsevak Prashidchakshan Kendra	0231-2601791	8275087055
2	Mrs. Anuradha Mhetre	Teaching Officer Scheme		7350982121
3	Shri. Sanjay Katkar	Executive Engineer	0231-2669365	9922965801
4	Dr. Sanjay Ranveer	Additional District Health Officer	0231-2652327	9423438801
5	Mrs. Aruna Hasbey	Deputy Chief Accounts and Finance Officer	0231-2950201	9423856881
6	Shri. Dinkar Kharat	Assistant Group Development Officer NREGA	0231-2655486	9325278495
7	Shri. Uday Saranaik in charge	Deputy Education Officer Primary	0231-2650781	9890356999
8	Shri. Shankar Yadav in charge	Deputy Education Officer Comprehensive Education		9823579944
9	Shri. Gajanan Ukirade	Deputy Education Officer Secondary	0231-2668229	9921059637

S.No .	Name of the officer	Office	Office Number	Mobile number
10	Shri. Dingbar More	Deputy Education Officer Secondary	0231-2668229	9405362133
11	Mrs. Smita Khandare	District Program Officer	0231-2651617	9860952474

TABLE 62: CONTACT DETAILS OF GROUP DEVELOPMENT OFFICER AND ASSISTANT GROUP DEVELOPMENT OFFICER

S.No .	Name of the officer	Office	Office Number	Mobile number
1	Shri. Vijay Yadav	Panchayat Samiti, Karveer	0231-2546726	9890888065
2	Mrs. Shabana Mokashi	Panchayat Samiti, Hatkanangle	0230-2483126	9764182983
3	Sri.Shankar Kavutke	Panchayat Samiti, Shirol	02322-236448	9766021201
4	Shri. Kuldeep Bhoge	Panchayat Samiti, Kagal	02325-244022	8390419419
5	Mr. Sharad Magar	Panchayat Samiti, Gadhinglj	02327-222238	9923725019
6	Shri. Balasaheb Bhoge	Panchayat Samiti, Chandgarh	02320-224123	9121167375
7	Shri. Sanjay Dhamal	Panchayat Samiti, Azra	02323-246127	8668536743
8	Shri. Shekhar Jadhav	Panchayat Samiti, Bhudargarh	02324-220028	9503291743
9	Shri.Sandeep Jadhav	Panchayat Samiti, Radhanagari	02321-234026	9421123168
10	Shri. Sonali Madkar	Panchayat Samiti, Panhala	02328-235034	9403556024
11	Shri. Mangesh Kushewar	Panchayat Samiti, Shahuwadi	02329-224129	9881168099
12	Mrs. Almas Syed	Panchayat Samiti, Gaganbawda	02326-222026	9403555842
Assistant Group Development Officer Class-2				
1	Shri. Rajendra Jadhav	Panchayat Samiti, Karveer	0231-2546726	9420583936
2	Shri. Uddhav Mahale	Panchayat Samiti, Hatkanangle	0230-2483126	9673969981
3	Shri. Pradeep Patil	Panchayat Samiti, Shirol	02322-236448	9850395157
4	Shri. Subhash Sawant	Panchayat Samiti, Kagal	02325-244022	8999049703
5	Shri. Kiran Khatawkar (In charge)	Panchayat Samiti, Gadhinglj	02327-222238	9421112265
6	Shri. Suresh Thombre (In charge)	Panchayat Samiti, Chandgarh	02320-224123	9552263339
7	Shri. Dinesh Shete (In charge)	Panchayat Samiti, Azra	02323-246127	
8	Shri. Sushant Single (In charge)	Panchayat Samiti, Bhudargarh	02324-220028	
9	Shri. Sandeep Bhandari	Panchayat Samiti, Radhanagari	02321-234026	
10	Shri. Avinash Meshram (In charge)	Panchayat Samiti, Panhala	02328-235034	9922908989
11	Shri. Pravin Herwade (In charge)	Panchayat Samiti, Shahuwadi	02329-224129	
12	Shri. Kripesh Topane (In charge)	Panchayat Samiti, Gaganbawda	02326-222026	

TABLE 63: CONTACT DETAILS OF SENIOR ADMINISTRATIVE OFFICER AND POLICE DEPARTMENT

S.No .	Name	Designation	Office	Mobile no.
1	Dr. Shri. Sunil Phulari	Special Inspector General of Police, Kolhapur Circuit Kolhapur	0231-2656568/	9763616161
2	Mr. Mahendra Pandit	District Superintendent of Police, Kolhapur	0231-2653960	9922440555
3	Mrs. Jaishree Desai	Upper Superintendent of Police, Kolhapur	0231-2656163	9730191430
4	Shri. Nikesh Khatmode	Upper Superintendent of Police Gadhinglj	0230-2433595	9823521001
5	Shri. Ajit Kumar Tike	City Police Deputy Superintendent City Department, Kolhapur, dysp	0230-2543340	8275306824
6	Shri. Sanjeev Jhade	Police Inspector Juna Rajwara, Kolhapur PI	0230-2542233	9823148976
7	Shri. Dilip Pawar	Police Inspector Laxmipuri, Kolhapur	02322-2641933	9823266233
8	Shri. Anil Tanpure	Police Inspector Rajarampuri, Kolhapur	0231-2524633	9822312233
9	Shri. Ajit Kumar Sikandar	Police Inspector Shahupuri, Kolhapur	02327-2661733	8369096182
10	Shri.Sujit Kumar Kshirsagar	Deputy Divisional Police Karveer Division, dysp	0231-2544898	8275524771
11	Shri. Kishore Shinde	Prof. IPS, Karveer PI	0231-2644133	9699311499
12	Shri. Gajendra Lohar	Police Inspector Kagal	02325-244033	8888834999
13	Shri. Shivaji does	Asst.Inspector of Police, Murgud API	02325-264333	9967448992
14	Shri. Deepak Jadhav	Asst.Inspector of Police, Gandhinagar	0231-2613933	9870335581
15	Shri. Pankaj Giri	Asst.Inspector of Police, Shirolu MIDC	0231-2468018	9922441314
16	Shri. Digambar Gaikwad	Asst.Inspector of Police, Gokul Shirgaon	0231-2671933	9637829989
17	Shri. Tavasum Magdum	Asst.Inspector of Police, Ispurli	0231-2356635	8169046324
18	Mr. Appaso Pawar	Shahuwadi department dysp	02329-2542967	9922205812
19	Shri. Gyandev Tiger	Asst.Inspector of Police, GaganbawdaAPI	02326-222033	8421128599
20	Shri. Callas Kodag	Asst.Inspector of Police, Kodoli	02328-224140	9922444949
21	Shri. Santosh Gore	Inspector of Police, Radhanagari	02321-234033	8975505900
22	Shri. Mahesh Ingle	Inspector of Police, Panhala	02328-235024	9821255164
23	Shri. Vijay Gherde	Inspector of Police, Shahuwadi	02329-224133	7030876999
24	Shri. Ranjit Patil	Asst.Inspector of Police, Kale	02328-232033	9975142333
25	Shri. Sameer Singh Salve	Deputy Divisional Police Officer, Ichalkaranji Department	0230-2434151	9145119049
26	Shri. Raju Tehsildar	Inspector of Police, Shivajinagar	0230-2432000	9807999711
27	Shri. Praveen Khanapore	Inspector of Police, Village	0230-2422200	9923176077

S.No	Name	Designation	Office	Mobile no.
28	Shri. Development Armstrong	Asst.Inspector of Police, Shahapur	0230-2440533	9552777272
29	Shri. Raviraj Phadnil	Asst.Inspector of Police, Kurandwad	02322-244233	9975666999
30	Shri. Pakanj fell	Asst.Inspector of Police, Hoopri	0230-2450333	9922441314
31	Local Crimes Branch Ich			
32		Asst.Inspector of Police, Shavasha Ichalkaranji	0230-2432450	
33	----	Control Room, Ichalkaranji	0230-2420350	---
34	Shri. Mrs. Rohini Solanke	Deputy Divisional Police Officer, Jaisingpur Division	02322-229272	8788097875
35	Shri. Satyavan Hake	Inspector of Police, Jaisingpur	02322-225333	9765598777
36	Shri. Ashok Saikar	Inspector of Police, Hatkanangle	02330-2483133	9821623414
37	Shri. Vilas Bhosle	Inspector of Police, Vadgaon	02330-2471021	9923203915
38	Shri. Shivaji Gaikwad	Inspector of Police, Shirol	02322-236433	8408866689
39	Shri. Ramdas Ingwale	Deputy Divisional Police Officer, Gadhinglj Department	02327-224186	9527985100
40	Shri. Sachin Patil	Inspector of Police, Bhudargarh	02324-220033	9527958888
41	Mr. Nagesh Yamgad	Asst.Inspector of Police, Azra	02323-246133	8208509006
42	Shri. Nitin Sawant	Inspector of Police, Chandgarh	02320-224133	9552071500
43	Shri. Gajanan Salgar	Inspector of Police, Gadhinglj	02327-222233	9870354270
44	Shri. Garvey	Asst.Inspector of Police, Nesri	02327-272133	8356972981
45	Mrs. S. Patki	Economic Offenses Branch - Deputy Departmental Officer Kolhapur	0231-2524533	9823012849
46	Shri. Priya Patil	Police Inspector Economic Offenses Branch Kolhapur	0231-2657591	8793112128
47	Mrs. S. Patki	Deputy Superintendent of Police Home, Kolhapur	0231-2657591	9823012849
48	Shri. Jaysingh Riswadkar	Control Room, Kolhapur	0231-2662333	9823772872
49	Shri. Mahadev Waghmode	Inspector of Police, Kolhapur	0231-2665617	9420756782/ 8668899497
50	Shri. Tanaji Sawant	Inspector of Police, D.V.Sha Kolhapur	0231-2651911	9673007369
51	Shri. Dattatreya Borigiide	Inspector of Police, DVS Security Kolhapur	0231-2660601	8805058181
52	Shri. Vishwas Patil	Inspector of Police, Cyber Police Station, Kolhapur	0231-2665975	9823510699
53	Shri. Nandkumar More	Inspector of Police, S.W.S., Kolhapur	0231-2641326	9623533110
54	Shri. Rajaram Mane	R . P .I, R.P.N.Headquarters Kolhapur	0231-2656052	9146120222
55	Surjit Singh Rajput	Motor Transport Department Kolhapur	---	9923450059
56	Mrs. Sneha Giri	Airport Security, Kolhapur	0231-2677354,	9821220485
57	Mr. Nitin Joshi	Sub-Inspector of Police Bintari Message Department, Kolhapur	0231-2653900	9923443900
58		Police Inspector Police Welfare	---	

S.No	Name	Designation	Office	Mobile no.
59	Mrs. Geetanjali Babur	Asst.Police Inspector, Overwork Women Efficiency Cell	---	9921054600
60	Shri. Sameer Gaikwad	Asst.Inspector of Police, P.O	0231-2662433	9823254569
61	Shitalkumar Kolhal	Asst.Inspector of Police, AHTU Kolhapur	---	9422963377
62	Shri. Chandrakant Bhosle	Police Inspector Extra Workload B.D.D.S	0231-2652333	9923051477
63	Shri.Abasaheb Sumbe	Inspector of Police, Bintari Message Department, Kolhapur	---	9823598384
64		A.T.S.Kolhapur	0231-2653131	---
65	Mrs. Sujata Chavan	Asst.Inspector of Police, Application Branch	---	9657391934
66	Mrs. Manisha Dubul	S.P. C.I. D	---	9923333569
67	Shri. Sambhaji Dongale	Inspector of Police, C.I. D	--	9881747495
68	Shri. Shashikant More	Deputy Divisional Police Officer, I. B	0231-2696520	8169004852
69	Shri. Sardar Nale	Deputy Divisional Police Officer, Anti-Corruption Department	0231-2540989	9673506555
70	Shri.Jagannath Jankar	Asst.Inspector of Police, Highway Traffic Police	0231-2677400	9049351621
71	Shri.Umesh Hazare	Asst.Superintendent of Police S.I. D	--	9422043379
72	Mr. Chetan Chougule	Asst. Superintendent of Police Administration Kolhapur Component Head		9823921770
73	Mrs. Nilam Patil	Police Inspector Administration Kolhapur		8805456400
74	Shri. Sandeep Diwan	Commander, Ati. Assignment IRB Group No	0231-2653466	9823944720
75	Shri. Tushar Patil	Superintendent of Police P.C. R	0231-2549696	8805007104

TABLE 64: CONTACT DETAILS OF WATER RESOURCES/DAMS DEPARTMENT

S.No.	Name	Designation	Office	Mobile no.
1	Shri. a. S.S. Mhetre	Superintendent of Engineering to. P.O. Man. Kolhapur	0231- 2653182/2651260	9834765504
2	Shri. S. R. Patil	Deputy Superintendent of Engineering to. P.O. Man. Kolhapur	0231- 2653182/2651260	9890156784
3	Shri. C.S. H.S. Patole	Superintendent of Engineering San. P.O. Man. Sangli	0233- 2302894/2302709	9850967039
4	Shri. a. V.S.S. Pawar	Work.Abhi.Dudhganga .C.V.No.1 Kolhapur	0231-2654601	7745079613
5	Shri D.K. D. Shinde	Work.Abhi.Varana .C.V.No.1 Islampur	02342 - 224539	9423785795
6	Shri.J.A.Devkar	Work.Abhi.S.P.V.Sangli	0233-2302925	9822264893
7	mrs. S.S. C.S. That is	Work.Abhi.Co.Pa.V. (North) Kolhapur	0231-2654736	9158572264
8	Shri. S. V. Davane	Sub-Work.Abhi.Co.Pa.V. (North) Kolhapur (Additional charge)	0231-2654736	9156087874

S.No.	Name	Designation	Office	Mobile no.
9	Shri Praveen Parkar (Radhanagari Project)	Deputy Engineer Bhogavati Pa U Department Radhanagari	02321-234042	9423285741
10	Shri S .M.Nirukhe	Branch Engineer Radhanagari Pat. Branch Radhanagari		9922670777
11	Shri Praveen Parkar (Tulsi Project)	Deputy Engineer Bhogavati Pa U Department Radhanagari	02321-234042	9423285741
12	Mr. Sameer Nirukhe	Branch Engineer Dhamod Pat. Branch Dhamod		9922670777
13	Shri MM Keetwadkar (Varana Project)	Deputy Engineer Varana Patbandhare Subdivision Kodoli	02345-226218	7875517637
14	Shri. Gorakh Patil	Branch Engineer Varna Pat Branch Varnavati		9730604344
15	Shri. P.S. M. Kamble (Dudhganga Project)	Deputy Engineer Dudhganga Pat Subdivision Nidhori		8888843757
16	Shri S.V. Davane (Kasari Project)	Deputy Engineer Panchganga Patbandhare Subdivision Kolhapur	0231-2654736	7559209639
17	Shri Praveen Parkar (Kumbhi Project)	Deputy Engineer Bhogavati Patbandhare Subdivision Radhanagari	02321-234042	9423285741
18	Shri MM Keetwadkar (Kadvi Project)	Deputy Engineer Varana Patbandhare Subdivision Kodoli	02345-226218	7875517637
19	Shri. R.S. P.S. Bandivdekar	Executive Engr. Medium P.V. No. 2 Kolhapur	0231-2650502	9922955229
20	Shri. S.S. J.S. Vichal	Deputy Works.Engineer Medium Projects Department No.2, Kolhapur		9860920281
21	Ku. S.S. S.S. Shukla	Junior Engineer, Medium Projects Department No.2, Kolhapur		9607227589
22	Shri. S.S. M.Sc. Jagdale	Asst.Eng. Grade-2, Medium Project Sub-Division,Chandgarh		9665533752
23	Shri. S.S. N.S. Patil	Asst.Adv. Grade-1, Medium Project Sub-Division No.2,Kolhapur		9518794691
24				
25	U .S. Bhosle	Branch Engineer, Medium Project Subdivision No. 2, Kolhapur Dhamani		8308509394
26	Mrs. S.S. Raje	Executive Engr. Dams Department (South) Kolhapur	0231-2650263	9822467272
27	Mrs. S. D. Dalvi	Junior Engineer Patbandhare Department (South) Kolhapur		9890199316
28	Shri D.R. Dhondfode	Junior Engineer Chandgarh Patbandhare Sub-Division Chandgarh		8805908854
29	Shri A.S. Phadtare	Deputy Departmental Officer Gadhinglaj Patbandhare Sub- Division Gadhinglaj		9850525115
30	Shri.R.M.Allakhan	Junior Engineer Gadhinglaj Patbandhare Sub-Division Gadhinglaj		7028408900
31	Shri.D.V.Khatte	Deputy Divisional Engineer Dudhganga Left Canal Subdivision No. 4 Kur		9921869342
32	Shri.K.D.Repe	Junior Engineer Dudhganga Dawa Kalva Sub-Division No. 4 Kur		9422428191

S.No.	Name	Designation	Office	Mobile no.
33	Shri D.K. V.S.S. Khatte	Branch Engineer Small Bridges Sub-Division No. 3 Azra		9921869342
34	Mrs. D.S. a. Patil	Deputy Divisional Officer Vedganga Patbandhare Sub-Division, Gargoti		9130641852
35	Shri. M.G. Desai	Branch Engineer Gargoti Patbandhare Branch, Gargoti		9119579722
36	Shri. Mahesh Chavan	Sub-Divisional Officer Vedganga Chikotra Patbandhare Sub-Division, Gargoti		7972902813
37	Shri. M.Sc. K.S. Chavan	Branch Engineer Vedganga Chikotra Patbandhare Sub-Division, Gargoti		9404659600

TABLE 65: CONTACT DETAILS OF SUPERINTENDENT ENGINEER MECHANICAL BOARD KOLHAPUR

S.No.	Name	Designation	Office	Mobile no.
1	Shri. P.S. nut. Bhosle	Superintending Engineer, Mechanical Board, Kolhapur (Additional Charge)	0231-2655328	9822679871
2	Shri. Ankush.K. Jadhav	Deputy Superintendent Engineer Mechanical Board Kolhapur	0231-2655328	9423270474
3	Shri S.K. M. Bagivde	Executive Engineer Mechanical Department Kolhapur	231-2655328	9823889353
4	Shri Shailendra. V.S.S. Pandare	Branch Engineer Inspection Subdivision Kolhapur	0231-2651284	9421111630
5	Shri Sangram.V. Patil	Deputy Engineer Pvt. a. U V No. 2 Kolhapur		9421963367
6	Shri. V. V. Deshmukh	Deputy Engineer Pvt. a. U V No. 1 Kolhapur	0231-2657622	9767736464
7	Shri. U.V. Gawde	Deputy Engineer Mechanical Subdivision No. 4 Kolhapur		
8	Mr. Praveen.B. Potter	Deputy Engineer Inspection Subdivision Kolhapur	0231-2657722	9890418280
9	mrs. Snehal.B. Hell	Assistant Engineer Grade 2 Mechanical Department Kolhapur		9096620850
10	mrs. Jyostna Powar	Assistant Engineer Grade 2 Pvt. a. U V No. 2 Kolhapur		9689262316
11	Shri.Umesh Jadhav	Executive Engineer, Takari Mechanical and Electrical Department Sangli		9860467721
12	Shri. Kakad MM	Executive Engineer, Tembu Ursa Irrigation Mechanical Electrical Corps, Ugalewadi Karad		9923097473
13	Shri. Javed Waheed Qazi	Executive Engineer, Mechanical Department Alori (Koyana)		9422070544
14	Shri. Anand Ramdas Kalamegh	Executive Engineer, Mechanical Department Satara		9422202583
15	Shri. Anandrao More	Executive Engineer, Chief Gate Erection Divisional Squad No. 3 Islampur (Peth Naka)		7020372399

TABLE 66: CONTACT DETAILS OF SOIL AND WATER RESOURCES DEPARTMENT KOLHAPUR

S.No.	Name	Designation	Office	Mobile no.
1	Shri. nut. V.S.S. Aajgekar	District Water Resources Officer, Soil and Water Resources Department, Kolhapur	0231-2651663	9423857499
2	Shri. Santosh Anandrao Patil	Deputy Executive Engineer		9921420679

TABLE 67: CONTACT DETAILS OF MAHARASHTRA LIFE AUTHORITY DEPARTMENT, KOLHAPUR

S.No	Name	Designation	Office	Mobile no.
1	Shri. V.D. Vicar	Executive Engineer, MGPRD Department, Kolhapur	0231-2537751	9545192937
2	Shri. R.V. Perit	Deputy Executive Engineer Departmental Office Kolhapur	0231-2537753	9158642330
3	Shri. U. S. Blankets	Deputy Engineer (Mechanical)		9922609599
4	Shri. P.S. H.S. Gaikwad	Deputy Engineer MGPRD Subdivision No. 1 Kolhapur		9637231122
5	Shri. D.K.Patil	Deputy Engineer MGPRD Subdivision No. 2 Kolhapur		9420298360
6	Shri. N.S. nut. Lokrey	Deputy Engineer MGPRD Subdivision No. 3 Kolhapur		8888056688
7	Shri. J.S. D. by cutting	Deputy Engineer MGPRD Subdivision Ichalkaranji		9422378231
8	Mrs. R.A.Patil	Deputy Engineer MGPRD Subdivision No. 6 Kolhapur		7556070285
9	Shri. S.A. Jadhav	Deputy Engineer P MGP Subdivision Gadhinglaj		8237337711

TABLE 68: CONTACT DETAILS OF MAHARASHTRA STATE ROAD TRANSPORT CORPORATION, KOLHAPUR DIVISION

A.No	Name	Designation	Name of the Office	Function Telephone	Mobile no.
1	Mrs. A. Shay Bartcke	Department Controller	Divisional Office,Co.	0231-2654474	9822074438
2	Shri. y. Hon. Kantode	Mechanical Engineer Cha.	Divisional Office,Co.	0231-2650086	9881671293
3	Mrs. Su.A. assuming	Deputy Mechanical Engineer	Divisional Office,Co.	0231-2650086	8581994884
4	Shri. r. Shi. Horns	Deputy Superintendent Run	Divisional Office,Co.	0231-2672362	8999762169
5	Shri. No. 100/1 c. Bogle	Vibha. Transportation Officer	Divisional Office,Co.	0231-2650971	9921689244
6	Mrs. Hon.P.Telvekar	Vibha. Accounting Officer	Divisional Office,Co.	0231-2650974	7972048849
7	Shri. A.D.Parte	Vibha. Statistical Officer	Divisional Office,Co.	0231-2650972	9764740728
8	Mrs. G.V. Suryanvashi	Dept. Working Class Officer	Divisional Office,Co.	0231-2650975	8087336414
9	Shri. No. 100/1 Sh.S. Bhosle	Labor Officer	Divisional Office,Co.	0231-2650023	7020501725

A.No	Name	Designation	Name of the Office	Function Telephone	Mobile no.
10	Shri. San.San. Shinde	Vibha. Store Officer	Divisional Office,Co.	0231-2651805	8459462957
11	Shri. Bha. a. Madane	Su.V.D.Officer	Divisional Office,Co.	0231-2650973	9049446872
12	Shri. M.S. Lingraj	Vibha. Engineer, Architecture	Divisional Office,Co.	0231-2651985	8855908059
13	Shri. A.S.More	Vibha. Wow. Superintendent,Q	Divisional Office,Co.	0231-2650971	9404552900

TABLE 69: CONTACT DETAILS OF HEAD OF DEPOTS IN KOLHAPUR

A.No	Name	Designation	Name of the Office	Function. telephone	Mobile no.
1	Shri. A.D. Mhetter	Head of Depot	Kolhapur	0231-2651447	8847700525
2	Shri. Shi.B. Jadhav	Head of Depot	Sambhajinagar	0231-2631431	9421111721
3	Shri. Sa.Tu. Patil	Head of Depot	Ichalkaranji	0230-2432496	8275031742
4	Shri. Gu.Gya. Rane	Head of Depot	Gadhinglj	02327-222306	9730772019
5	Shri. P.R. Nakate	Head of Depot	Gargoti	02324-220035	9975707031
6	Shri. N.V. Bodhe	Head of Depot	Malkapur	02329-224153	9975258534
7	Mrs. W. R. Jagdale	Head of Depot	Chandgarh	02320-224132	9975112412
8	Shri. Na.Ma. Kites	Head of Depot	Kurundwad	02322-244203	9359306735
9	Shri. Q. From. Telvecker	Head of Depot	Kagal	02325-244076	9822800411
10	Shri. U.A. Patil	Head of Depot	Radhanagari	02321-234038	7972741090
11	Shri. S. M. Shingade	Head of Depot	Gaganbawda	02326-222017	9975115774
12	Shri. v. Cr. Shinde	Head of Depot	Azra	02323-224396	7038575858

TABLE 70: LOCATION AND CONTACT DETAILS OF BUS STAND

A.No	Name	Designation	Name of the Office	Function. telephone	Mobile no.
1	Shri. mole. Vibhute	Just head of the location	to. Bus station	0231-2650620	9975115774
2	Shri. Q.V.Guru	Just head of the location	Sambhajinagar Bus Station	231-2622416	8624892625
3	Shri. Mrs. Thorat	Just head of the location	Ichalkaranji Bus Station	0230-2432202	9823288535
4	Mrs. Tondle	Just head of the location	Gadhinglaj bus station	02327-222264	8308648353
5	Shri. S.A. Patil	Just head of the location	Gargoty Bus Station	02324-220024	9421114603
6	Mrs. Dhanwade	Just head of the location	Malkapur Bus Station	02329-224131	9834862918
7	Shri. Raj Karekar	Just head of the location	Chandgarh Bus Station	02320-224124	9011586058
8	Shri. six. a. Deshmukh	Just head of the location	Kurundwad Bus Station	02322-244237	9096821153
9	Mrs. Prajakta Mohite	Just head of the location	Kagal Bus Station	02325-244064	8308016970
10	Mrs. Rupali Dhere	Just head of the location	Radhanagari Bus Station	02321-234024	9763059151
11	Shri.Ma.B.Patil	Just head of the location	Gaganbawda Bus Station	02326-222011	7796357640
12	Shri. A.D. Mullah	Just head of the location	Azara Bus Station	02323-246140	9420131380

TABLE 71: CONTACT DETAILS OF TRAFFIC CONTROL CENTRE

A.No	Name	Designation	Name of the Office	Function. telephone	Mobile no.
1	Railway station	.....	Traffic Control Center	0231-2662201	.....
2	Rankala	.....	Traffic Control Center	0231-2543330	.....
3	Nrishinghwadi	.....	Traffic Control Center	02322-240103	.....
4	Uttur	.....	Traffic Control Center	02323-254933	.....
5	Panhala	.....	Traffic Control Center	02328-235323	.....
6	Jotiba	.....	Traffic Control Center	02328-239024	.....
7	Hand bracelets	.....	Traffic Control Center	0230-2483136	.....
8	Vadgaon	.....	Traffic Control Center	0230-2471054	.....
9	Jaisingpur	.....	Traffic Control Center	02322-225311	.....
10	Babwade	.....	Traffic Control Center	02329-234433	.....
11	Kodoli	.....	Traffic Control Center	02328-224129	.....
12	Moorgood	.....	Traffic Control Center	02325-264363	.....

TABLE 72: CONTACT DETAILS OF NATIONAL HIGHWAY DEPARTMENT, KOLHAPUR

S.N o.	Name of the officer	Designation /Name of Office	Mobile number	Office/Teleph one Number	Workspace
1	Shri. Kashinath Devappa Mudhale	Executive Engineer/ National Highways Department, Kolhapur	73505317 17	0231-2652960	Kolhapur /Sangli
2	Shri. Santosh Vasant Rasane	Deputy Executive Engineer /National Highways Department, Kolhapur	94210754 5	0231-2652960	Kolhapur
3	Shri. Jahangir Chandulal Bagwan	Deputy Engineer / National Highway Subdivision No.1 Kolhapur	96571782 00		Sangli
4	Shri. Rajesh Balkrishna Shinde	Deputy Engineer / National Highway Subdivision No.2 Kolhapur	94220387 10	0231-2652960	Kolhapur
5	Shri. Prakash Dadoji Shedekar	Deputy Engineer/ National Highway Subdivision, Bhawani Mandap Kolhapur	83080441 80		Karad / Sangli
6	Shri. Kishore Srirang Shejval	Assistant Executive Engineer/ National Highway Sub-Division Satara	88796499 64		Satara

TABLE 73: CONTACT DETAILS OF KOLHAPUR CITY DISASTER MANAGEMENT COMMITTEE

S.No.	Employee Name	Administrator	Office/Telephone Number	Email
1	Hon. Rahul Rokade	Additional Commissioner	NA	addlcommkmc@gmail.com
2	Mrs. Sadhana Patil	Deputy Commissioner No.1	NA	
3	Hon. Shilpa Darekar	Deputy Commissioner No	NA	dmckmc02@gmail.com
4	Hon. Sanjay Saranaik	Asst.Commissioner no. 1	NA	amc1kmc@gmail.com
5	Hon. Dr. Vijay Patil	Asst.Commissioner no. 2	NA	amc2kmc@gmail.com

S.No.	Employee Name	Administrator	Office/Telephone Number	Email
6	Shri. Harshjit Ghatage	City Engineer	Members	cityengineerkmc@rediffmail.com
7	Shri. Dr. Prakash Pavra	Health Officer	Members	kmchealthofficer14@gmail.com
8	Shri. Netradip Sarnobat	Water Engineer	Members	hyengrkmc@gmail.com
9	Shri. Manish Prafull Ranbhise	Chief Fire Officer	Members	firekmckop@gmail.com
10	Mr. Shital Dhanwade	President of the Metropolitan Journalists Association	Members	shital.dhanawade29@gmail.com
11	Hon. Mohan Suryavanshi	Public Relations Officer	Members	prokmc29@gmail.com

TABLE 74: CONTACT DETAILS OF MUNICIPAL OFFICER

S.No.	Name	Designation	Office Phone No.	Mobile no.
1	Mrs. K. Manju Lakshmi	Commissioner	2546171	9766532001
2	Hon. Rahul Rokade	Additional Commissioner	2546526	9403782816
3	Mrs. Sadhana Patil	Deputy Commissioner-1	2542601	9404233152
4	Shri. Pandit Patil	Deputy Commissioner-2	2542880	9850704021
5	Shri. Sanjay Saranaik	Asst. Commissioner-1	2540291	9766532030
6	Shri. Krishna Patil	Asst. Commissioner-2	2543384	7700074981
7	Shri. Netradip Sarnobat	City Engineer	2540291	9766532099
8	Shri. Harshjit Ghatage	Water Engineer	2546118	9421172094
9	Shri. Dr. Prakash Power	Health Officer	2540291	9421924136
10	Shri. Dr. Jasampat Pawar	Chief Health Inspector	2540290	9766532044
11	Mrs. Kalavati Misal	Chief Auditor	2540291	9511892050
12	Shri. Sanjay Saranaik	Chief Accountant	2540291	9766532030
13	Shri. Varsha Parit	Senior Auditor	2540291	7020732841
14	Shri. Deepak Kumbhar	Senior Auditor	2540291	8446700900
15	Shri. Manish Prafull Ranbhise	Chief Fire Officer/and Disaster Management Officer	2537221 /	9766532020
16	Shri. Mohan Suryavanshi	Public Relations Officer	2540291	9766532029
17	Shri. Samir Vyagrambare	Chief Horticulture Officer	2540291	7709018282
18	Shri. Sachin Jadhav	Estate Officer	2540291	9766532032
19	Shri. Narayan Pujari	Asst. Engineer Electrical	2540291	9518394772

TABLE 75: CONTACT DETAILS OF MUNICIPAL CORPORATION

S.No.	Name	Designation	Office Phone No.	Mobile no.
1	Shri. N.S. Patil	Departmental Office No.1 Gandhi Maidan	2622262	7709042171
2	Shri. Narayan Bhosle	Departmental Office No.2 Ch.Shivaji Market	2543844	9342717111
3	Shri. Satish Phappe	Departmental Office No.3 Rajarampuri	2521615	9823454251
4	Shri. Ramesh Kamble	Departmental Office No.4G.Tararani Market	2530022	9423041279

S.No.	Name	Designation	Office Phone No.	Mobile no.
5		Location officer	-----	9970833366
6	Handyman Yusuf Mulla	Q. Station Officer	-----	7709019697
7	Kanta Yashwant Bandekar	Q. Station Officer	-----	9545909344
8	Jayant Malhari Khot	Q. Station Officer	-----	7063570725

TABLE 76: CONTACT DETAILS OF MUNICIPAL CORPORATION PUBLIC WORKS DEPARTMENT / EFFICIENCY PATH DEPARTMENTAL OFFICE NO.-1 GANDHI MAIDAN

S.No.	Name	Designation	Office Phone No.	Mobile no.
1	Shri. Shri. N.S. Patil	Pathakpramukh	0231-2622262	7709042171
2	Shri. Unwashed Nerlekar	Liaison Officer	0231-2622262	7020112192
3	Shri. Aniruddha Korde	Liaison Officer	0231-2622262	9960647979
4	Shri. Dagdu Patil	Mukadam	0231-2622262	9423842114
5	Shri. Anil Jadhav	Q. Mukadam	0231-2622262	9823526553

TABLE 77: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-1 GANDHI MAIDAN MEDILAK PATH

S.No.	Name	Designation	Office Phone No.	Mobile no.
1	Dr. Prakash Pavra	Pathak pramukh	-----	9421111544
2	Dr. Aakash Ganeshacharya	Medical Officer	-----	9822378254
3	Dr. Arpita Khairmode	Medical Officer	-----	9822651482
4	Dr. Competition Bhise	Medical Officer	-----	9850531743
5	Dr. Sudarshan Patil	Medical Officer	-----	9423044312

TABLE 78: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-1 GANDHI MAIDAN HEALTH INSPECTOR PATH

S.No.	Name	Designation	Office Phone No.	Mobile no.
1	Shri. Rahul Rajgolkar	Health Inspector	0231-2540290	9766532040
2	Shri. Rishikesh Saranaik	Health Inspector	0231-2540290	9766532028
3	Shri. Rajendra Patil	Health Inspector	0231-2540290	9766532039

TABLE 79: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-1 GANDHI MAIDAN ELECTRICAL CORRIDOR

S.No.	Name	designation	Office Phone No.	Mobile no.
1	Shri. Amol Vernekar	Electrical Supervisor	-----	9860956007
2	Shri. Beautiful Waze	Wireman	-----	9856998914

TABLE 80: CONTACT DETAILS OF KOLHAPUR MUNICIPAL CORPORATION PUBLIC WORKS DEPARTMENT / EFFICIENCY PATH DEPARTMENTAL OFFICE NO.-2 G. SHIVAJI MARKET

S.No.	Name	Designation	Office	Mobile no.
1	Hon. Shri. N.S. Bhosle	Sub-City Engineer -Head of Patch	2543844 /25443088	9342717111
2	Shri. Residence Powar	Liaison Officer	2543844/25443088	9049272834
3	Shri. Sagar Shinde	Liaison Officer	2543844/25443088	9766120498
4	Shri.Pramod Barale	Liaison Officer	2543844/25443088	8208034066
5	Shri. Rajan Altekar	Q. Ward Pastry	2543844/25443088	9922770874
6	Shri. Sudhakar Chopra	Q. Ward Pastry	2543844/25443088	9552324347

TABLE 81: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-2 CH.SHIVAJI MARKET MEDICAL PATH

S.No.	Name	Designation	Office	Mobile no.
1	Hon. Dr. Ms. Vidya Herwade	Patch Chief and Responsible Administration Medical Officer	Panchganga Hospital -	9422494130
2	Hon. Dr. Manali Mithari	Medical Officer	2545768	9960934444
3	Hon. Dr. Revati Hiremath	Medical Officer	2545768	9637879790

TABLE 82: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-2 CH.SHIVAJI MARKET, HEALTH INSPECTOR

S.No.	Name	Designation	Office	Mobile no.
1	Shri. Rahul Rajgolkar	Health Inspector	0231-2540290	9766532040
2	Shri. Rishikesh Saranaik	Health Inspector	0231-2540290	9766532028
3	Shri. Manoj Lot	Health Inspector	0231-2540290	9766532041
4	Shubhangi Powar	Health Inspector	0231-2540290	9766532042
5	Shri. Mahesh Bhosle	Health Inspector	0231-2540290	9766532043

TABLE 83: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-2 CH.SHIVAJI MARKET, VIDYUT PATHAK

S.No.	Name	Designation	Office	Mobile no.
1	Aniruddha Yadav	Light Inspector	0231-2540291	7058307727

TABLE 84: CONTACT DETAILS OF KOLHAPUR MUNICIPAL CORPORATION PUBLIC WORKS DEPARTMENT / EFFICIENCY PATH DEPARTMENTAL OFFICE NO.-3 RAJARAMPURI

S.No.	Name	Designation	Office	Mobile no.
1	Hon. Satish Phappe	Deputy City Engineer - Head of Path	0231-2521615	9823454251
2	Hon. Suresh Vilas Patil	Controlling Officer	-----	7588385039
3	Hon. Padmal Patil	Controlling Officer	-----	7620327552
4	Hon. Not difficult. Suravase	Controlling Officer	-----	9665948090
5	Dada Patole	Mukadam	-----	8551996638

TABLE 85: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-3 RAJARAMPURI MEDICAL CORPS

S.No.	Name	Designation	Office	Mobile no.
1	Hon. Dr. Manjushri Rohidas	Head of the Path	0231-2521615	9421924136
2	Hon. Dr. Shobha Dabhade	Medical Officer	0231-2530012	9422044053
3	Hon. Dr. Byke Ricker	Medical Officer	0231-2530012	9421924136
4	Hon. Dr. Parshuram Kadam	Medical Officer	0231-2530012	9421924136

TABLE 86: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-3 RAJARAMPURI PATHAK, HEALTH INSPECTOR

S.No.	Name	Designation	Office	Mobile no.
1	Sushant Kavade	Health Inspector	0231-2530012	9766532045
2	Karan Latwade	Health Inspector	0231-2530012	9766532047
3	Munir Faras	Health Inspector	0231-2530012	9766532052
4	Shri.Raj Holkar	Health Inspector	0231-2530012	9766532047

TABLE 87: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-3 RAJARAMPURI ELECTRICAL CIRCLE

S.No.	Name	Designation	Office	Mobile no.
1	Munir Gawndi	Light Supervisor	0231-2521615	9404262500

TABLE 88: CONTACT DETAILS OF KOLHAPUR MUNICIPAL CORPORATION PUBLIC WORKS DEPARTMENT / EFFICIENCY PATH DEPARTMENTAL OFFICE NO.-4 G. TARARANI MARKET

S.No.	Name	Designation	Office	Mobile no.
1	Hon. Ramesh Kamble	Deputy City Engineer- Head of Path	0231-2536726 /2530011	9423041279
2	Vinod Panchal	Junior Engineer - Liaison Officer	0231-2530011	8788040986
3	Mira Nagime	Junior Engineer - Liaison Officer	0231-2530011	7218412696
4	Shri. Umesh Bagul	Junior Engineer - Liaison Officer	0231-2530011	9595777694
5	Mr. Sham Shete	Surveyor	0231-2530011	9422044283
6	Shri.Gautam Bhosle	A. Clerical	0231-2530011	9657409797
7	Mr. Dilip Dorkar	Electrical Inspector	0231-2530011	9422629944
8	Shri.Anil Patil	H. Mechanic, Tararani Market	0231-2530011	9975115758
9	Dushyant Patil	H. Mechanic, Nagalapark	0231-2530011	8668606086

TABLE 89: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-4 G. TARARANI MARKET MEDICAL PATH

S.No.	Name	Designation	Office	Mobile no.
1	Hon. Dr. Nikhil Patil	Administration Medical Officer and Head of Path	Civil Health Center Sadar Bazar	9850656664
2	Hon. Dr. Rati Abhiwant	Medical Officer	Civil Health Center Mahadik Mal	9822913308
3	Hon. Ms. Sonakshi Patil	Medical Officer	Civil Health Center Kasba Bawda	7350656664

TABLE 90: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-4 G. TARARANI MARKET PATH, HEALTH INSPECTOR

S.No.	Name	Designation	Office	Mobile no.
1	Shri.Nandkumar Patil	Health Inspector	0231-2540290	9766532048
2	Mr. Muneer Faras	Health Inspector	0231-2540290	9766532052
3	Mr. Karan Latvadekar	Health Inspector	0231-2540290	9766532047

TABLE 91: CONTACT DETAILS OF DEPARTMENTAL OFFICE NO.-4 G. TARARANI MARKET ELECTRICAL PATH

S.No.	Name	Designation	Office	Mobile no.
1	Mr. Chetan Layakar	Junior Engineer	0231-2540298	8855016270
2	Mr. Dilip Dorkar	Light Inspector	0231-2536726	9422629944

TABLE 92: CONTACT DETAILS OF KOLHAPUR MUNICIPAL HEALTH DEPARTMENT - PHARMACIES AND MEDICAL OFFICERS

S.No.	Medical Officer/Head of Patrol	Name of the clinic	Office	Mobile no.
1	Dr. Prakash Pavra	Savitribai Phule Hospital	-----	9421924136
2	Dr. Vidya Kale/Hervade	Panchganga Hospital	-----	9422494130
3	Dr. Vijay Musle	Isolation Hospital	-----	9850656664
4	Dr. Competition Bhise	Firngai Hospital	-----	9850531743
S.No.	Name of the officer	Designation	Office	Mobile no.
1	Hon. Eyalamp Sarnobat	Water Engineer	-----	9766532099
2	Hon. Nandkumar S. Patil	Deputy Water Engineer. A,B,C,D Ward	-----	7709042171

S.No.	Medical Officer/Head of Patrol	Name of the clinic	Office	Mobile no.
3	Hon. Raosaheb Chavan	Deputy Water Engineer. E Worrd	-----	9503024848
4	Hon. U.Z. Bhetekar	Deputy Water Engineer. Drainage Department	-----	7709042181
5	Hon. R.K.Patil	Assistant Engineer. Drainage Department	-----	9665035588
S.No.	Name of Liaison Officer	Name and Address of Station / Ward	Office	Mobile no.
1	Shri.Milind Patil	Treasure of Water / (A/B)	0231-2628729	9890083545
2	Priya Patil	Kalamba Filter House / (A/B)	0231-2323728	9921513282
3	Priya Patil	AAPTENAGAR PUMPING STATION/(A/B)	0231-2320741	9921513282
4	Priya Patil	Subhash Nagar Pumping House / (A/B)	0231-2691976	9921513282
5	Desire to suppress	Konkanemath Water Tank (C/B)	0231-2541885	8530873057
6	Milind Jadhav	Rajarampuri Distribution & Cyber Chowk / (E Rajaram)	0231-2525728	7387943377
7	Arun Gujar	Kavalana Distribution Division / (E Kavalana.)	2312537504	9503022727
8	Arun Gujar	Kasba Bawda Filter House / (E Ramanam.)	0231-2667782	9503022727
9	Jaysh Jadhav	Balinga Filter House	-----	7709042182
10	Bhetekar	Sump-Pump Filter House Dasara Chowk	-----	9766532081
11	R.K.Patil	Drainage Plant Kasba Bawda	-----	9665035588

TABLE 93: CONTACT DETAILS OF TANKER SUPPLIER

S.No.	Name of tanker supplier	Ward	Office	Mobile no.
1	Milind Patil	A/B Old City	-----	9890083545
2	Priya Patil	A/B Suburban	-----	9921513282
3	Desire to suppress	C/D	-----	8530873057
4	Milind Jadhav	E. Rajarampuri	-----	7387943377
5	Arun Gujar	This is Kavalana	-----	9503022727

TABLE 94: CONTACT DETAILS OF SENIOR ADMINISTRATIVE OFFICER AT DISTRICT LEVEL

S.No.	Name	Designation	Office	Mobile no.
1	Hon.Shri.Amol Yedge	Collector	0231-2654811	9503731693
2	Mr. Sanjay Shinde	Upper Collector	0231-2657855	9422404242
3	Shri. Sanjay Teli	Resident Deputy Collector	0231-2654812	9405583799
4	Shri. Hanmant Mhetre	Tehsildar Revenue	0231-2665811	9075802126
5	Shri. Dingbar Sanp	Deputy Tehsildar Revenue		9923501285
6	Shri. Swapnil Pawar	Upper Secretary	0231-2654812	9028875321
8	Shri. Suryakant Patil	Tehsildar Karamanuk	0231-2680791	8698000201
9	Mrs. Surekha Divate	Tehsildar General	0231-2665813	9271540021
10	Mrs. Snehal Naik	Deputy Tehsildar General		9552772674
11	Dr. Property Player	Deputy Collector of Revenue	0231-2668252	9011027027
12	Shri. Solutions Shendege	District Election Officer	0231-2658316	9404677085

S.No.	Name	Designation	Office	Mobile no.
13	Mrs. Asha Holkar	Tehsildar Elections		9158303900
14	Mrs. Mohini Chavan	District Supply Officer	0231-2655579	7887874496
15	Mrs. Saraswati Patil	Asst. District Supply Officer		9226342943
16	Mrs. Pragya Kamble	Food Grain Distribution Officer	0231-2980627	9096764245
18	Mrs. Lashkare	Deputy Collector Rehabilitation	0231-2658215	9922498291
19	Mrs. Rupali Redekar	Tehsildar Rehabilitation		9766251344
20	Shri. Power steps	Deputy Collector Ro.H.Y	0231-2665815	9975639961
21	Mrs. Pragya Kamble	Naib Tehsildar Ro.H.O.		9096764245
22	Shri. Shakti Kadam Shri. Vivek is black	Land Acquisition Officer no. 6 and	0231-2541592	9325717103
23	Mrs. Vivek Powar	Tehsildar Sanjay Gandhi Scheme	0231-2668252	9922676313
24	Shri. Vijay Pawar	District Planning Officer	0231-2665816	9850981876
25	Shri. Gajanan Patil	Asst. District Planning Officer		7972303058
26	Shri. Nagendra Mutkekar	District no. P.O. Administration Officer	0231-2665814	9404852155
27	Shri. Anand Patil	Minerals Officer Kolhapur	0231-2654812	9421471153
28	Shri. Shri. Chandrashekhar Sanp	Special Executive Magistrate	0231-2644354	9850959744
29	Shri. Kuldeep Gajageshwar	P.A. Collector		8169792383
30	Shri. Prasad Sankpal	District Disaster Management Officer	0231-2652950 2659232,2652 953,2652954. 1077 Toll Free	9823324032
Karveer Sub-Division				
31	Shri. Harish religious	Sub-Divisional Officer Karveer	0231-2543336	9764645087
32	Shri. Sanjay Madhale	Deputy Tehsildar		8788626060
33	Shri. Swapnil Raode	Tehsildar Karveer	0231-2644354	7385764330
34	Shri. Vijay Jadhav	There is no choice. Tehsildar Karveer		9146432121
35	Shri. Bhalchandra Yadav	Resident No.Tah. Karveer		7972362695
36	Mrs. Sharmila Gosavi	Deputy Tahsidlar Sgt.		8983535483
37	Shri. Baburao Bodke	There is no selection.Tah. Karveer		

S.No.	Name	Designation	Office	Mobile no.
38	Mrs. Shelja Patil	Tehsildar Gaganbawda	02326-222038	8275918399
39	Empty	Revenue No.Tah. Gaganbawda		
40	Empty	Resident No.Tah. Gaganbawda		9421106108
Radhanagari Sub-Division				
41	Shri. Sushant Bansode	Sub-Divisional Officer Radhanagari	0231-2659135	9850133799
42	Shri. Spiders	Naib Tehsildar U.V. Radhanagari		9764803098
43	Mrs. Anita Deshmukh	Tehsildar Radhanagari	02321/234023	9527727200
44	Shri. Subodh Vayangankar	Resident No.Tah. Radhanagari		
45	Shri. Amardeep Wakde	Tehsildar Kagal	02325/244023	9689475858
46	Shri. Amardeep Wakde	Deputy Tehsildar Kagal		9689475858
47	Mrs. Kulkarni	Deputy Tehsildar Revenue		9552408229
48	Mrs. Rupali Suryavanshi	Resident No.Tah. Kagal		9405153155
Deputy Divisional Officer Panhala				
49	Shri. Sameer Shingte	Deputy Divisional Officer Panhala	02328-235023	9423041444
50	Mrs. Madhavi Shinde	Tehsildar Panhala	02328-235026	9767400406
51	Shri. Sanjay Valvi	Resident No.Tah. Panhala		7798889008
52		No selection.fold panhala		
53	Shri. Ramling Chavan	Tehsildar Shahuwadi	02329/224130	8999575803
Sub-Divisional Officer Ichalkaranji				
54	Mrs. Mosmi Chougul	Sub-Divisional Officer Ichalkaranji	0230-2436787	9423572931
55	Shri. Chetan Konkar	Deputy Tehsildar Ichalkaranji		8976559356
56	Shri. Manoj Aitvade	Upper Tehsildar Ichalkaranji		9130833514
57	NA	Supply Inspection Officer, Ichalkaranji	0230-2436787	
58	Mrs. Kalpana Dhavale	Tehsildar Hatkanangle	0230-2483128	8482876900
59	Empty	Resident no. Tehsildar Hatkanangle		
60	Mrs. Shobha Koli	Election Deputy Tah. Hand bracelets		9421247158
61	Dr. Anil Kumar Helkar	Tehsildar Shirol	02322-233447	7276974155

S.No.	Name	Designation	Office	Mobile no.
62	Empty	Revenue No.Tah. Shirol		9423042683
63	Shri. Avinash Pisal	Sanjay Gandhi is not. Tehsildar Shirol		
Sub-Divisional Officer Gadhinglaj/Chandgad				
64	Shri. MalikArjuna believed	Sub-Divisional Officer Gadhinglj	02327-222263	9822366999
65	Empty	Deputy Tehsildar		
66	Shri. Rishiket Shelke	Tehsildar Gadhinglj	02327-222252	8381016665
67	Shri. V. N. Bute	Resident No.Tah. Gadhinglj		9272318173
68	Shri. Rajendra Yadav	Revenue No.Tah. Gadhinglj		9404990614
69	Shri. V.S.S. N. Bute	There is no selection.Tah. Gadhinglj		9272318173
70	Shri. Rajesh Chavan	Tehsildar Chandgad	02320-224128	9028861778
Sub-Divisional Officer, Bhudargarh				
71	Mrs. Vasundhara Barve	Sub-Divisional Officer, Bhudargarh	02324-220222	9860653184
72	Mrs. Archana Patil	Tehsildar Bhudargarh	02324-220029	9960020021
73	Shri. Santosh Adhari	Election Deputy Tah. Bhudargarh		
74	Shri. Sameer Mane	Tehsildar Azra	02323-246131	9405860348
75	Empty	Election Deputy Tah. Azra		

TABLE 95: CONTACT DETAILS OF SUB-FOREST CONSERVATION-FOREST ENHANCEMENT BUILDING, BAWDA OPPOSITE POST OFFICE KOLHAPUR

S.No.	Name	Designation	Work	Mob no.
1	Shri. Sunil Parashu Khot	Forest Officer (P&ER)	0231-2651959	8805193248
2	Shri. Guru Prasad	Deputy Forest Conservator Forest Department Kolhapur	0231-2651959	9168818151
3	Shri. Navnath Kamble	Assistant Forest Conservator (Khakuto & Wildlife) Deputy Forest Conservator Forest Department Kolhapur	0231-2651959	9421952068
4	Shri. Kamlesh Patil	Assistant Conservator of Forests (Afforestation & Campa) Deputy Conservator of Forests Forest Department Kolhapur	0231-2651959	9552851202
5	Shri. Ramesh Shankar Kamble	Forest Ranger Karveer (Additional Charge) Forest Circle Karveer	0231-2540139/2540117	9420208334
6	Shri. Avinash Tayanak	Forest Ranger Gaganbawda, Forest Ranger Gaganbawda	02326-254103/254065	9422701221
7	Shri. Amit Bhosle	Forest Ranger Malkapur , Forest Range Malkapur	02329-204400/224045	9604720710
8	Mrs. Sushma Jadhav	Forest Ranger Pendakhale (Additional Charge) Forest Circle Pendakhale	02329-202404	7018645887

S.No.	Name	Designation	Work	Mob no.
9	Shri. Anil Mohite	Forest Ranger Panhala, (Additional Charge) Forest Range Panhala	02328-235533/235548	9404414248
10	Shri. Nandkumar Bhosle	Forest Ranger Chandgarh Forest Circle Chandgarh	02320-224939 /	8600263748
11	Mrs. Smita Dake	Forest Ranger Azra Forest Circle Azra	02323-246505/246228	9764636754
12	Mr. Prashant Awale	Forest Ranger Patne Forest Ranger Patne	02320-229585	8698333673
13	Shri. Avinash Gulabroa	Forest Ranger Gargoti Forest Range Gargoti	02324-221850 -	9422701221
14	Mrs. Pallavi Chavan	Forest Ranger Kadgaon Forest Circle Kadgaon	02324-233055 - 233046	8600807733
15	Shri. Vishal Patil	Forest Ranger Radhanagari Forest Circle Radhanagari	02321-234003/234861	8956081008

TABLE 96: CONTACT DETAILS OF OTHER GOVERNMENT OFFICES

S.N o.	Names	Designation	Office	Mobile no.
1	Shri.Ravindra Awale	Superintendent, State Excise, Kolhapur (state excise)	2546025	8888842140
2	Mrs. Nilama Adsul	District Sports Officer, Kolhapur	2645208	8329388432
3	Mr. Deepak Patil	Regional Transport Office, Kolhapur (rto)	02312663131/2661010	
4	Shri. S.S. Karthikeyan	Kolhapur Authority Chief Executive Officer	2530299/2537751	8610480624
5	Shri. Ganesh Gholpe	Bank of India, M. D. Lead Bank	0231-2627124	9923947259
6	Shri. Sachin Saali	Asst.Social Welfare Officer Kolhapur	2651318	7972221721
7	Mrs. Ashwini Narande	District Treasury Officer, T. Oh.	2644407	9764362580
8	Shri. Jagannath Salunkhe	Regional Officer, Maharashtra Pollution Corporation mpcb	2652952	9822048330
9	Mrs. Shete (In charge)	Superintendent, Land Records, Kolhapur (slr)	2543349	9422961157
10	Shri. Sanjay Mali	Asst.Director, District Employment and Self Employment Office, Kolhapur	2545677	9867596355
11	Shri. Ajay Patil	General Manager, District Industries Centre, Kolhapur (dec)	2655438	9930410922
12	Shri. Huge horses	Asst. Commissioner of Labour, Kolhapur	0231-2653714	9075001854
13	Mrs. Bartcke	Divisional Controller, S.T. Mahamanl, Kolhapur	2656146	9822074438
14	Shri. Sachin Aadsul	District Information Officer	2656146	9049987298
15	Mrs. Meena Shende	Departmental Co-Director, Higher Education, Rajaram College Campus	2535400	9823426499
16	Dr. Satish Patil	Superintendent of Animal Husbandry, Kolhapur	0231-2662782	9175298654
17	Shri. Dr. Surendra Bharte	Assoc. Commissioner, Animal Husbandry	0231-2662782	8459408981
18	Shri. M.S. Dhopati	Superintendent District Court, Kolhapur	0231-2545974	9860602626
19	Shri. Lord Cutmore	Chief Clerk Government Printing Office, Kolhapur	0231-2650395	9371237901
20	Shri. Arjun Ingle	Bawda Post Office	0231-2654055	8806644966

S.No.	Names	Designation	Office	Mobile no.
21	Shri. Prasad Telway	Main Post Office, Kolhapur	0231-2656830	9423860756

TABLE 97: CONTACT DETAILS OF DEPARTMENT OF PUBLIC RELATIONS AND INFORMATION

S.No.	Name	Designation	Office	Mobile no.
1	Shri. Hemraj Bagul	Administration Head Information Director Maharashtra State Mumbai	022-2202405	8108970404
2	Empty	Departmental Deputy Director, Information, Kolhapur	0231- 2662600/2663 427	
3	Shri. Sachin Aadsul	Q. District Information Officer, Kolhapur	0231-2656146	9049987298
4	Mrs. Vrishali Patil	District Information Officer Kolhapur	0231-2656146	7875868344
5	Shri. Sunil Sontakke	Asst.Director Information		8888313851
District Statistics Office Kolhapur				
S.No.	Name	Designation	Office	Mobile no.
1	Mrs. Sarita Yadav	District Statistical Officer	0231-2640560	7588250630
Newspaper Representative				
1	Name of the newspaper	Name of the representative	Mobile no.	
2	Daily. Pudhaari	Shri.Anil Deshmukh	8805007051	
3	Daily. morning	Mr. Sunil Patil	9922315566	
4	Daily Lokmat	Shri. Rajaram Londe	9421200244	
5	Daily.Tarun Bharat	Shri. Praveen Desai	9860655056	
6	Daily. The market city	Shri. Vijay Patil	9823202121	
7	Maharashtra Times			
The media				
S.No.	Name of the diffusion medium	Name of the representative	Office	Mobile no.
1	B- News	Shri.Charudatta Josh. Vijay Kumbhar	0231-2523200	9325699920/93 26499914
2	TV9 Marathi	Shri. Bhushan Patil		9665509273
3	Aakashvani Kolhapur	S. M. Padalkar	0231-2652645	9423860784
4	Durdarshan Kendra Mumbai Representative	Shri.Shashi Gajwani		9422048585 9975959595
5	Doordarshan Kendra Mumbai Cameraman	Shri.Vikas Patil		9850962936
6	IBN Lokmat	Shri. Dnyaneshwar Salokhe		9673946353
7	A.B.P. My personal	Shri. Vijay Kesarkar		9096973996
8	Sam Marathi	Shri. Ranjit Majgaonkar		9823694040
9	Zee, 24 hours	Mr. Pratap Naik	0231-2669066	9890950191
11	News 18	Shri. Amol Pandhare		9370845390
12	Jai Maharashtra	Shri. Amar Patil	0231-2659099	9822109099
13	Pudhaari News	Shri. Shekhar Patil	0231-2543111	7875707175
14	SPN	Shri.Bajirao Talekar		7875558316

TABLE 98: CONTACT DETAILS OF MAHARASHTRA EMERGENCY MEDICAL SERVICES

S r.	Base Location	Ambulance No.	Medical Officer (EMSO)	Personal Contact No	EA (Pilot)	Personal Contact No
1	Isolation Hospital	MH14 CL1397	Dr. A.S. Manisha Shivaji Kadam	8605771469	Mr. Dinkar Vasant Nilkant	9021782921
			Dr. A.S. Chhaya Nandkumar Sathe	9960511263	Mr. Sachin Ashok Lagare	8459449293
			Dr. A.S. Reshma Mubarak Momin	9767412100		
2	CPR Hospital	MH14 CL0399	Dr. A.S. Taha Faras	9518524889	Mr. Mahindra Mahadev Kudalkar	9763406595
			Dr. A.S. Alfaj K Attar	8329454867	Mr. Sudhakar Babaso Power	8975131512
3	Wadange PHC	MH14 CL0628	Dr. A.S. Mayor Mohan Kanade	9423246376	Mr. Mangesh Pandurang Patil	8308209002
			Dr. A.S. Navina Bambarkar	9422501994	Mr. Suresh Dinkar Kadam	9420006594
					Mr. Amit Sarjerao Magdum	9673186934
4	So	MH14 CL0442	Dr. A.S. Bhaskar Vishnu Vanjare	9325993098	Mr. Ravindra Maruti Gurav	9422526883
			Dr. A.S. Amar Dinkar Nale	8767950087	Mr. Aananda Maruti Gurav	9022673512
5	Nivde	MH14 CL0449	Dr. A.S. Suraj Nalawade	8390734336	Mr. Rajendra Hari Patil	9403498517
			Dr. A.S. Asha Rege	9890254904	Mr. Satish Antu Kambale Free Mp3 Download	9423313647
6	Sangrul	MH14 CL1244	Dr. A.S. Anup College	9405254095	Mr. Bharat Raghunath Patil	9657215450
			Dr. A.S. Sunil Dinkar Nale	8208501856	Mr. Dnyanesh Gaganan More	9158558523
			Dr. A.S. Punam Yuvraj Magdum	8793299410	Mr. Netaji Pandurang Patil	9595812323
7	Radhanagari	MH14 CL0401	Dr. A.S. Akshay Balasaheb Powar	9545341296	Mr. Vikas Krushnath More	9922866700
			Dr. A.S. Pradipkumar Ramling Potdar	8805385901	Mr. Udhhav Pantaji Korea	9503504005
8	Spurli	MH14 CL0460	Dr. A.S. Sachin Ramesh Teli	8180986528	Mr. Sangram Sadashiv Patil	9021171070
			Dr. A.S. Abulais Mehboob Bagwan	7798023174	Mr. Amol Shantinath Lokhande	9096654999
9	Rashivade	MH14 CL0493	Dr. A.S. Pradnya Dhanaji Pokarnekar	8329173836	Mr. Sachin Prataprao Bhosale	8329788165
			Dr. A.S. Akash Appasaheb Sutar	7758885781	Mr. Sangram Manohar Bill	9764680753

S r.	Base Location	Ambulance No.	Medical Officer (EMSO)	Personal Contact No	EA (Pilot)	Personal Contact No
					Mr. Mahendra Madhukar Patil	9730279191
10	Amba	MH14 CL0521	Dr. A.S. Kshitija Dhawade	8975777481	Mr. Ravindra Dhondiram Patil	9552484348
			Dr. A.S. Snehal J Patil	9689771119	Mr. Sanjay Yashwant Kambale	8007718785
11	Malkapur	MH14 CL1239	Dr. A.S. Balaji Madhukar Patil	9021314135	Mr. Chetan Maruti Patil	9764470402
			Dr. A.S. Sachin Vilasrao Shinde	9975744544	Mr. Ajit Eknath Patil	8788606015
			Dr. A.S. Sushrut Yadav	8329054293		
12	Bambavde	MH14 CL0429	Dr. A.S. Rahul Bhimrao Sutar	9226921930	Mr. Amol Dattatray Patil	9158393913
			Dr. A.S. Prakash Dhyanu Wanted	9545194519	Mr. Satish Jayshingrao Nikam	9921198900
			Dr. A.S. Suvarna Vinayak Alugade	9822254648	Mr. Mansing Hemant Patil	9049187825
13	Shiroli	MH14 CL0410	Dr. A.S. Shamal Patil	9595335081	Mr. Abhishek Vishwas Patil	9970206815
			Dr. A.S. Pankaj Patil	9975124659	Mr. Sagar Annaso - The Best Of Sagar Annaso	9359627473
			Dr. A.S. Snehal Barge	9923467012		
14	Kagal	MH14 CL0648	Dr. A.S. Nitin Rajaram Jadhav	8983184077	Mr. Sunil Tukaram Patil	9673737447
			Dr. A.S. Mohan Kadam	9850783792	Mr. Majid Iqbal Shaikh	9028484886
15	Unchgaon	MH14 CL1149	Dr. A.S. Ankita Chavan	8975699179	Mr. Amit Baliram More	9923129292
			Dr. A.S. Deepshri Chhagan Khambe	8600126334	Mr. Dhanaji Namdev More	9665122926
			Dr. A.S. Sharukh Gajbar	9371827433	Mr. Muner Calendar Mulla	9970193405
16	Kini	MH14 CL0474	Dr. A.S. Abidhusen Alexander Borgave	8956310768	Mr. Suraj Ashok Chavan	9404405382
			Dr. A.S. Vaibhav Balavant Kumbhar	9970330793	Mr. Anant Gajanan Awalkar	9730219912
					Mr. Azaruddin Kashim Mulani	9665382313
17	Jotiba	MH14 CL0439	Dr. A.S. Asif Giasuddin Khan	9404703313	Mr. Ashok Arjun Kalgaonkar	7972341784
			Dr. A.S. Head Chandrakant Atigre	9545013232	Mr. Nivas Laxman Lad	9604233030

S r.	Base Location	Ambulance No.	Medical Officer (EMSO)	Personal Contact No	EA (Pilot)	Personal Contact No
18	Kodoli	MH14 CL0659	Dr. A.S. Vishvajeet Druvadas Patil	9096715200	Mr. Sunil Balu Sone	9096934502
			Dr. A.S. Rohit Ramesh Menkar	8806095196	Mr. Rushikesh Bhanudas with Surya	7218519777
19	Hupari	MH14 CL0558	Dr. A.S. Avinash Ashok Chavan	8459870007	Mr. Sukadev Raigonda Pujari	9975435460
			Dr. A.S. Ramakant Satpute	8624045385	Mr. Purandar Shimandhar Kambale	9156778171
20	Ichalkaranji	MH14 CL0403	Dr. A.S. Vaishnavi Sutar	7020289916	Mr. Chandrakant Anant Kambale	9326640099
			Dr. A.S. Vaibhav Shinde	9588642212	Mr. Omkar Jaysing Machare	9970767242
			Dr. A.S. Ashish Kambale	9445769715		
21	Hatkangale	MH14 CL0552	Dr. A.S. Ishwar Mahadev Yamagar	7028371908	Mr. Suresh Nanu Patil	8329834411
			Dr. A.S. Rohit Subhash	9834981462	Mr. Bhagwat Bhimrao Kambale	9096189966
					Mr. Shrikant Dattatrya Nalavade	9156772820
22	Takali (Sainik)	MH14 CL0504	Dr. A.S. Ashwini Mirje	9552935975	Mr. Riyadh Moula Bandar	7875025172
			Dr. A.S. Maya Sane	9890677764	Mr. Sunil Baburao Karadge	7387975056
23	Jaishingpur	MH14 CL0550	Dr. A.S. Bharti Vitthal Vanmore	9766666184	Mr. Pandurang Dhanpal Thomake	9975920301
			Dr. A.S. Shubham Gajanan Tayade	9552080938	Mr. Nitesh Vitthal Potekar	9689999817
			Dr. A.S. Pallavi Maruti Sidnurle	9730897605		
24	Nrusinhwadi	MH14 CL0618	Dr. A.S. Deepa Rangrao Patil	8459817449	Mr. Anil Ramchandra Koli	7972783089
			Dr. A.S. Sujata Shriniwas Patil	9970328820	Mr. Ajay Suresh Nikam	9730581127
			Dr. A.S. Kiran Pawar	9881427373	Mr. Dattatray Yallappa Rabakai	9049042099
25	Murgud	MH14 CL0629	Dr. A.S. Swapnil Shivgonda Powade	7218038540	Mr. Avdhut Dattatray Patil	9158626121
			Dr. A.S. Shrikant Maruti Gurav	8390037032	Mr. Ajit Madhukar Patil	9763018080

S r.	Base Location	Ambulance No.	Medical Officer (EMSO)	Personal Contact No	EA (Pilot)	Personal Contact No
26	Gargoti	MH14 CL0409	Dr. A.S. Indrakumar Sadashiv Gurav	7030776696	Mr. Prakash Rajaram Bote	8275450500
			Dr. A.S. Samadhan Ramchandra Warushe	9890070323	Mr. Samadhan Sadashiv Mangale	7776998584
27	Kadgaon (Bhudargad)	MH14 CL0473	Dr. A.S. Aparna Dhananjay Desai	7057388686	Mr. Sagar Shivaji Patil	9764201585
			Dr. A.S. Indrakumar Sadashiv Gurav	7030776696	Mr. Bhimrao Govind Rane	8412974253
					Mr. Dayanand Mohan Chavan	9359946633
28	Nesari	MH14 CL0445	Dr. A.S. Amol Mane	9405356922	Mr. Sagar Vishnu Gavade	9545064704
			Dr. A.S. Sachin J Shinde	9673614398	Mr. Dinesh Sadashiv Gavali	8888723555
29	Gadhinglaj	MH14 CL0421	Dr. A.S. Minal Suresh Bhosale	9403751316	Mr. Sandeep Annapa Kurale	7057708108
			Dr. A.S. Nikita Jagtap	9763874578	Mr. Pradip Baburao Dongle	9021906641
			Dr. A.S. Suraj Ganppat Vidhate	9130146706		
30	Halkarni	MH14 CL0437	Dr. A.S. Pravin Digambar Hawale	8975397471	Mr. Paygonda And Chougule	9420892519
			Dr. A.S. Prasanna Neminath Chougule	8669222108	Mr. Pundalik Siddhapa Yenachavandi	9689869834
					Mr. Sachin Tukaram Kesarkar	7057441141
31	Ajara	MH14 CL0538	Dr. A.S. Ashish Godase	9130314607	Mr. Abhijit Jotiba Mane Free Mp3 Download	9764207083
			Dr. A.S. Bapurao Dhansing Jadhav	878813223	Mr. Sahadev Villas Shintre	9923436046
32	Kapashi	MH14 CL0533	Dr. A.S. Tejaswi Prakash Patil	9503141919	Mr. Kalmlesh Chandrakant Kamble	9158543290
			Dr. A.S. Mahesh Patil	9028707069	Mr. Deepak Pandurang Parit	7745054797
33	Uttur	MH14 CL0471	Dr. A.S. Arvind Ramchandra Gorule	8080078472	Mr. Vishvas Saint Bhosale	7387233389
			Dr. A.S. Tushar Shivaji Kamble	7499704158	Mr. Santosh Chandrakant For example	9923975260
					Mr. Yuvraj Maruti Chavan	7028654192

S r.	Base Location	Ambulance No.	Medical Officer (EMSO)	Personal Contact No	EA (Pilot)	Personal Contact No
34	Chandgad	MH14 CL0654	Dr. A.S. Pritam Vishnu Patil	8605657789	Mr. Sachin Vasant Matavandakar	7350183064
			Dr. A.S. Nikita Jagtap	9763874578	Mr. Rahul Annappa Rote	8308880917
35	Kowad	MH14 CL1237	Dr. A.S. Dayanand Ganachari	9552180388	Mr. Vijay Govind Patil	8530669633
			Dr. A.S. Suchitra Ganachari	8308956858	Mr. Mahesh Yashwant Cigarettes	8530980796
			Dr. A.S. Suraj Ganppat Vidhate	9130146706		
36	Mangaon	MH14 CL1248	Dr. A.S. Laxmikant Rajaram Gundap	9975336833	Mr. Ramchandra Nana Godase	9404978929
			Dr. A.S. Nandraj Laxman Patil	8975688808	Mr. Sachin Mahadev Cigarettes	8605703218
			Dr. A.S. Parag Vilasrao Joshi	8975936511	Mr. Chandrakant Birrappa Kattikar	8975013599

TABLE 99: CONTACT DETAILS OF CHIEF EXECUTIVE OFFICER /MUNICIPALITY

S.No .	Name	Name of the chief officer	Traveling sound	Office Telephone	E- mail address
1	Municipal Administration Branch	Shri.Nagendra Mutkekar	9404852155	0231-2665814	daokolhapur@gmail.com
2		Shri.Devanand Dhekle	942359816	0231-2665814	daokolhapur@gmail.com
3		PA Sanjay Bhosle	9766202353		
4	Jaisingpur	Mrs.Tina Gawley	9834908119	02322- 225360	cojaysingpur@gmail.com
5	Kagal	Shri. Ajay Patankar	9765332928	02325- 243570	cokagal@gmail.com
6	Murgood	Mr. Sandeep Gharage	9975747263	02325- 264331	murgudnp@gmail.com
7	Vadgaon	Shri.Sumit Jadhav	7774944777	0230-2471147	covmcv@gmail.com
8	Kurudwad	Shri.Ashish Chauhan	9594911314	02322- 244530	co.kurundwadmccl@gmail.com
9	Gadhinglj	Shri. Sanjay Gaikwad	8169941198	02327- 222245	cogmcg@gmail.com
10	Malkapur	Mrs. Vidya Kadam	7588972712	02329- 224137	comalkapur@gmail.com
11	Panhala	Mr. Chetan Mali	9960186646	02328-235027	co.panhalahill@gmail.com
12	Hooper	Shri.Vishal Patil (Additional Charge)	9421359545	0230-2450215	hmch1104@gmail.com
13	Shirol	Shri. Nishikant Prachandrao	9960305252	02322-236469	npshirol2018@gmail.com

S.No .	Name	Name of the chief officer	Traveling sound	Office Telephone	E- mail address
14	Azra	Mr. Suraj Surve	8625812572	02325- 264331	citypanchayatajara@gmail.com
15	Chandgarh	Shri.Suraj Surve (Additional Charge)	8625812572	02320-224160	chandgadnagarpanchayat@gmail.com
16	Hand bracelets	Mr. Vishal Patil	9421359545	0230-2483172	nagarpanchayatathakanan@gmail.com
17	Ichalkaranji	Om Prakash Divate	9930606666	2302421451	
18	Ichalkaranji	P.S. a. Sadashiv Jadhav	9822674045		

TABLE 100: CONTACT DETAILS OF REGIONAL TRANSPORT OFFICER KOLHAPUR

S.No.	Name	Designation	Work	Mob no.
1	Shri. Deepak Patil	Deputy Regional Transport Officer	0231-2663131	7020739411
2	Shri. Rohit Katkar	Assistant Regional Transport Officer	0231-2663131	9960457990
3	Shri Vijay Ganpati Ingwale	Assistant Regional Transport Officer	0231-2663131	9987433888
4	Shri. where the devil	P.S. a.		9132675050

TABLE 101: CONTACT DETAILS OF DISTRICT LEVEL FLOOD CONTROL ROOM

S.No.	Name	Designation	Work	Mob no.
1	Shri. a. S.S. Mhetre	Superintendent of Engineering to. P.O. Man. Kolhapur	0231-2653182/2651260	9834765504
2	Mrs. S.S. C.S. That is	Work.Abhi.Co.Pa.V. (North) Kolhapur	0231-2654736	9158572264

TABLE 102: CONTACT DETAILS OF SENIOR GEOLOGIST GROUND WATER SURVEY AND DEVELOPMENT AGENCY KOLHAPUR

S.No.	Name	Designation	Work	Mob no.
1	Mr. Jayant Misal	Senior Geologist	0231-2658530	9423878297/8856964789
2	Mr. Rahul Khandare	Junior Geologist		9403159747
3	Shri. Sagar Desai	Junior Geologist	0231-2658530	8208524167

TABLE 103: CONTACT DETAILS OF KOLHAPUR RAILWAY STATION

S.No.	Name of the station	Contact Phone Number	Mob no.
1	Kolhapur Railway Station	0231-2653065	7219613937
2	Sajan Mehtar		9422628988

2024

Panhala Fort Disaster Management Plan



Fig. Panhala Fort and its surrounding area

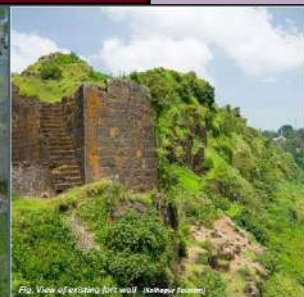


Fig. View of Panhala Fort wall - Kolhapur Fort



Fig. View of fort and surrounding area - Panhala Fort



Fig. View of Panhala Fort wall - Kolhapur Fort

District Disaster Management Authority
Kolhapur



**Government of Maharashtra
Disaster Management, Relief and Rehabilitation
Department**

**Panhala Fort Disaster Management Plan
Kolhapur District
2024-2025**

**Disaster Management Authority
District Collector's Office, Kolhapur District
Toll-Free No. 1077, Telephone No. 0231-2659232**

Shri. Amol Yedage (I.A.S)



**Collector and Chairman,
District Disaster
Management Authority,
Kolhapur, Maharashtra**

Message

India, with its rich cultural and historical legacy, faces a variety of natural and human-induced disasters. Over the years, the nation has significantly enhanced its disaster preparedness, response, and mitigation capabilities. With a strong emphasis on community participation and the involvement of all key stakeholders, we have developed frameworks that enable efficient disaster risk reduction. However, the protection of our heritage sites, such as forts and monuments, requires specific attention due to their historical significance, structural vulnerabilities, and the increasing footfall of tourists.

Forts like Panhala are not only symbols of our rich heritage but are also vulnerable to various hazards, including landslides, earthquakes, fires, and extreme weather events etc. Recognizing this, the NDMA has emphasized the development of disaster management plans that cater specifically to such heritage sites. A structured disaster management plan for Panhala Fort ensures that in the event of an emergency, there is a swift, coordinated, and effective response mechanism in place.

To adhere to the Disaster Management Act of 2005, regular consultations were held between the DDMO and PMU, Palladium. PMU, Palladium's experts spent several weeks on this project, engaging in detailed scientific research and comprehensive analysis. Their work culminated in the creation of this Panhala Fort Disaster Management Plan, aimed at reducing disaster risks and boosting the resilience of the Fort.

I sincerely thank all the government departments, local authorities, NGOs, and the local community for their continued cooperation in this initiative. Your collaboration is vital to the successful implementation of the Panhala Fort Disaster Management Plan.

I urge all stakeholders to remain vigilant, follow the guidelines laid out in the Panhala fort disaster management plan, and participate actively in awareness and training programs. Our collective efforts can significantly minimize the risk to life and property and ensure the continued protection of Panhala Fort, the pride of Kolhapur and the cherished monument of our history.

Let us work together to preserve both our people and our heritage.

District Collector,
District Disaster Management Authority,
Kolhapur, Maharashtra

Panhala Fort Disaster Management Plan Kolhapur District 2024 - 2025

Prepared By

District Disaster Management Authority,
Office of the District Collector
Kolhapur, Govt. Of Maharashtra

Knowledge partner

Palladium, India

PMU for Technical Support and Implementation of Comprehensive Disaster Planning, Management & Response for Disaster Management, Relief and Rehabilitation Department, Government of Maharashtra

The District Disaster Management Authority has taken all reasonable precautions to verify the information and ensure stakeholder consultation and input prior to its publication. The publisher welcomes suggestions for improving future editions.

Table of Contents

1.	Introduction.....	1
1.1.	Cultural Heritage Sites and Precincts in India.....	1
1.1.1.	Heritage Values/ Cultural Significance	1
1.2.	Disasters and their Impact on Cultural Heritage Sites and Precincts	2
1.3.	Existing Legislative Frameworks- An Overview	3
1.3.1.	Framework for Heritage Sites in India	3
1.4.	Framework for Disaster Management in India	4
1.5.	Rationale for Panhala Fort Disaster Management Plan.....	4
1.6.	Vision.....	4
1.7.	Aim	4
1.8.	Objectives.....	4
1.9.	Terminology of Disaster Management	6
2.	Panhala Fort Profile.....	7
2.1.	Location	7
2.2.	Transportation Network	8
2.3.	Geomorphology.....	8
3.	Hazard Risk Assessment and Vulnerability Analysis.....	10
3.1.	Identifying Hazard and Hazard History	10
3.2.	Hazard Profile.....	10
3.2.1.	Geological Hazards.....	11
3.2.2.	Climatic Hazards	13
3.2.3.	Human-Induced Hazards	13
3.2.4.	Vegetation Hazards	13
3.2.5.	Conservation Challenges	14
3.3.	Risk Assessment.....	14
3.3.1.	Natural Hazards	15
3.3.2.	Technological Hazards	16
3.3.3.	Human Hazards	16
3.3.4.	Key Observations.....	16
3.4.	Vulnerability Assessment	16
3.4.1.	Key Suggestions:	19
3.5.	Capacity	19
4.	Measures for Disaster Risk Prevention, Reduction and Mitigation	21
4.1.	Building and environment stabilization.....	21
4.2.	Other Prevention Measure	22
4.3.	Disaster Specific Mitigation measure	23
4.3.1.	Landslide.....	23
4.3.2.	Wildfire	24
4.3.3.	Flood	25
4.3.4.	Earthquake.....	26
4.3.5.	Fire	27
5.	Planning for Emergency Preparedness and Disaster Response	28
5.1.	Planning for Evacuation and Emergency Response.....	28
5.1.1.	Evacuation	29
5.1.2.	Key Roles and Responsibilities.....	29
5.1.3.	Evacuation Routes and Safe Zones	29

5.1.4.	Evacuation Communication Systems	29
5.1.5.	Visitor and Staff Evacuation Procedures	30
5.1.6.	Evacuation Protocols	30
5.1.7.	Others	30
5.2.	Monitoring and Early Warning Systems	31
5.3.	Emergency Response Mechanism	31
5.3.1.	Flood/ Heavy Rain/ Cyclone	32
5.3.2.	Wildfire	32
5.3.3.	Cyclone	33
5.3.4.	Landslide.....	34
5.3.5.	Explosion / Earthquake	34
5.3.6.	Bomb threat / Suspicious package	35
5.3.7.	Medical emergency	35
5.4.	Emergency Team / Disaster Response Team (DRT)	36
5.4.1.	Responsibilities	36
5.5.	Chain of command	40
5.6.	Communicating an emergency / disaster	40
5.7.	Emergency operations center	41
5.8.	Emergency Response Systems within the Site/Precinct: Automated and Manual	41
5.9.	Emergency Supplies and Equipment	42
6.	Post-disaster Assessment, Planning and Recovery Processes	43
6.1.	Post-Disaster Damage and Needs Assessment (PDNA).....	43
6.1.1.	Standardized procedures and methodologies	43
6.1.2.	Key Timeline	43
6.1.3.	PDNA Timeline.....	44
6.1.4.	Mobilizing resources for assessment.....	44
6.1.5.	Compiling the data in a meaningful way to inform the process of post-disaster recovery planning and action	44
6.1.6.	PDNA Committee members.....	45
6.2.	Emergency Stabilization- Approaches	45
6.3.	Post Disaster Repairs and Reconstruction	46
6.4.	Funding, Partnerships and Business Planning	46
6.5.	Linking Recovery to Risk Reduction	46
7.	Training, Capacity Building and Raising Awareness.....	47
7.1.	Capacity Building for Disaster Risk Management Professionals/ Emergency Responders	47
7.2.	Training of Site Staff and Management.....	48
7.3.	Raising Awareness among Local Communities, Residents and Visitors.....	49
8.	Conclusion and Action Plan.....	49
8.1.	Implementation and Revising the Plan.....	49
8.2.	Revising and Updating the Guidelines	50
9.	Annexure	50
9.1.	Important contact number	50
9.2.	Office staff contact number	50
9.3.	Panhala town office	51
9.4.	Other Offices	51
9.5.	PDNA Format	51

List of Figures

Fig. 1: Geographical Location of Panhala Fort.....	7
Fig. 2: Transportation Network of Panhala Fort; Source: Google Map	8
Fig. 3: Geomorphological Map of Panhala Fort.....	9
Fig. 4: Landslide Susceptibility Map of Panhala Fort as per IIT, Delhi.....	11
Fig. 5: Landslide Susceptibility Map of Panhala Fort as per GSI	12
Fig. 6: Earthquake Zonation Map of Panhala Fort	12
Fig. 7: Flood Susceptibility Map of Panhala Fort.....	13
Fig. 8: Hazard impact distribution on Panhala Fort	14
Fig. 9: Structure of Disaster Response Team	36
Fig. 10: Steps of PDNA as per NDMA.....	43

List of Tables

Table 1: Managing Risks at the cultural heritage sites in India: Key Issues and Challenges Aspect	2
Table 2: Hazard frequency and probability ranking of Panhala Fort	10
Table 3: Hazard Calendar of Panhala Fort.....	11
Table 4: Risk assessment matrix of Panhala Fort.....	14
Table 5: Buildings, surroundings and infrastructure vulnerability	17
Table 6: Visitor management, security system and infrastructure vulnerability	18
Table 7: List of search and rescue equipment at Panhala Fort.....	19
Table 8: survey timeline for PDNA	44
Table 9: Post disaster assessment process	44
Table 10: Training of Disaster Response Team (DRT) members	47
Table 11: Training programs for staff and management	48
Table 12: Awareness generation programs.....	49

List of Abbreviations:

DC:	District Collector
DDMA:	District Disaster Management Authority
DEOC:	District Emergency Operation System
DRR:	Disaster Risk Reduction
DRT:	Dister Response Team
GSI:	Geological Survey of India
IDRN:	India Disaster Resource Network
IMD:	Indian Meteorological Department
IRS:	Incident Response System
NDMA:	National Disaster Management Authority
NDMIS:	National Disaster Management Information System
NGO:	Non-Government Organization
PA:	Public Address
PDNA:	Post Disaster Need Assessment
PFOEC:	Panhala Fort Emergency Operation System
PPE:	Personal Protective Equipment
PWD:	Public Work Department
RDC:	Resident Deputy Collector
SDM:	Sub Divisional Magistrate
SDMA:	State Disaster Management Authority
ZP:	Zilla Parishad

1. Introduction

1.1. Cultural Heritage Sites and Precincts in India

Heritage is categorized and designated in numerous ways by stakeholders at national and international levels. Heritage may be divided into two categories: natural and cultural. India has a tremendous treasury of culture. Heritage varies greatly in historicity, magnitude, affiliation, expression, and style. However, huge portions of this cultural treasure are still unrecognized and safeguarded. The heritage that has been formally acknowledged and is legally protected by different agencies are also continually exposed to a variety of natural and man-made hazards.

Tangible legacy refers to historical structures, monuments, and artifacts that should be preserved for future generations. According to UNESCO (1972), culturally important items include those related to archaeology, architecture, science, and technology. Tangible and intangible cultural treasures are inextricably intertwined.

The Archaeological Survey of India (ASI), under the Ministry of Culture, is responsible for identifying, protecting, and managing culturally significant sites and items in India. It works through State Circles, Museums, Excavation, Prehistory, Epigraphy, and Science Branch, Horticultural Branch, Building Survey Project, Temple Survey Projects, and Underwater Archeology Wing. It operates under the requirements of the AMASR Act of 1958. Over 3683 locations have been identified as Centrally Protected Monuments and Sites.

Each state has its own legislative acts, as well as monuments and landmarks. They may also have specially designated regions under State Acts. Several cities' masterplans specify heritage precincts and notify zones that are under management through city administration. Therefore, the legal scope of constructed cultural heritage in India varies substantially depending on the jurisdiction.

1.1.1. Heritage Values/ Cultural Significance

Heritage values can generate revenue for cultural heritage sites through tourism, education, recreation, and other means. Quantifying historic values based on economic capital is a complicated procedure. There are substantial ties between cultural sites and local economies all over the country. Thus, while evaluating catastrophe threats to cultural sites, it is critical to include the possible impact of a calamity on heritage contributors. Heritage value also adds to shared memories and local, regional, and national identities, which play an important role in Recovery following a calamity.

When planning for disaster risk reduction for cultural heritage sites, it is vital to address threats not only to the site's lives and livelihoods, whether directly or indirectly, but also to the heritage values represented in the site. These values can be reflected by the physical fabric of the place, such as architectural or artistic characteristics, or by its use. In any scenario, conventional methods to disaster risk reduction may clash with the protection of these values, making it critical to identify, analyze, and prioritize them.

Furthermore, because cultural heritage sites may contribute to disaster mitigation through their planning, construction technologies, association with local stakeholders, and so on, they may be viewed as potential assets in overall disaster risk management planning at the neighborhoods, precinct, or city scales. Furthermore, the scale of heritage value is a significant component in determining its contribution. Cultural heritage sites and precincts may have significant value at various sizes.

Global: Globally, UNESCO World Heritage Sites have Outstanding Universal Value based on criteria defined by the 1972 World Heritage Convention.

National: The ASI recognizes sites of national significance in India. The Ministry of Urban Development recognizes historic cities and urban areas.

Regional: Regional historical sites are identified by state archaeology departments, INTACH state chapters, and master plans. The Ministries of Tourism and Rural Development have also designated several regions and sites at the regional level.

Local: INTACH, non-governmental organizations, and local municipal governments may recognize heritage sites that are locally significant. Cultural heritage places can have overlapping importance, resulting in multiple types of cultural value for different stakeholders at different sizes.

1.2. Disasters and their Impact on Cultural Heritage Sites and Precincts

In recent years, there has been an unprecedented increase in the frequency of disasters and their impact on lives, property, and livelihoods (UNISDR 2009). Rapid urbanization, rising population, climate change, and other factors have made nations more vulnerable, particularly developing countries like India.

Disasters have had an especially devastating impact on our country's cultural heritage in recent years. For example, the Bhuj Earthquake in 2001 devastated both rural and urban areas, destroying many nationally and state-protected monuments as well as vernacular structures. The earthquake caused considerable damage to the Bhuj City Palace, including the memorial chatris (cenotaphs). Similarly, the 2011 Sikkim earthquake devastated several Buddhist monasteries and temples. Flash floods in the lower Himalayas in 2013 and the Kashmir Floods in 2014 caused widespread damage to temples, palaces, historic gardens, and museums.

Such disasters have become more frequent because of unsustainable human activity and its consequences for ecosystems and the environment. Armed warfare, terrorism, and vandalism are reported from across the world. During sieges, cities typically lose their cultural legacy. Examples of similar operations in India include the recent attack on a UNESCO World Heritage site in Darjeeling. Cultural heritage has only lately been identified as an important component of comprehensive catastrophe risk reduction strategies. One of the most significant issues in this field is a general lack of understanding and prioritizing heritage. Disaster risk management for constructed cultural assets includes the following important aspects:

- ❖ Because of the variation in age, scale, and physical aspects of architectural heritage, it is difficult to apply conventional measures to disaster risk reduction.
- ❖ Disasters endanger not only the lives of those living, visiting, or managing cultural heritage sites and precincts, but also the heritage values embodied in the physical fabric.
- ❖ Poor management, neglect, and lack of awareness complicate disaster risk reduction for built heritage, as the structural integrity of such buildings often deteriorate over time.
- ❖ Interventions to mitigate risk to such sites may occasionally represent a threat to its heritage value and beauty.
- ❖ Built heritage can serve as a refuge area or demonstrate structural resilience through old technologies, which can aid in creating risk reduction techniques on a broader scale.

Furthermore, in India, constructed cultural property presents unique issues in disaster risk management.

Table 1: Managing Risks at the cultural heritage sites in India: Key Issues and Challenges Aspect

Aspect	Key Issues and Challenges
Risk Assessment	Continuously updated information regarding cultural heritage sites and precincts available in a streamlined manner, specifically with respect to hazard mapping and identifying vulnerabilities
	Identification of stakeholders and local communities, and including them in the decision-making process
Risk Mitigation	Multiple agencies dealing with different aspects of the same site or precinct, leading to inter-agency coordination issues

Aspect	Key Issues and Challenges
	Historic cities, settlements and precincts have high densities of built fabric and infrastructure that has grown and transformed in an ad-hoc manner with little or no documentation
	Poor management, neglect and lack of awareness further complicate disaster risk reduction for built heritage since often the structural integrity of such buildings gets compromised over time
	Interventions that would reduce risk to such sites may sometimes pose a threat to the heritage value and aesthetics
Emergency Preparedness and Response	Complex contextual scenarios in terms of accessibility and connectivity
	Many “Living” heritage sites or sites that are actively in use are at greater risk because of high levels of visitor footfall
	Most ‘standard’ preparedness and response procedures are impossible to implement in cultural heritage sites without significantly impacting the values of the heritage site
Post-Disaster Recovery and Rehabilitation	Normative ideas of ‘authenticity’ of material fabric often conflict with ideas of reconstruction within the Indian (and South Asian) context
	Since a large percentage of built heritage is not identified in official lists, assessment of damage and losses in a disaster scenario is extremely problematic
	There is a close relationship between traditional arts, crafts and cultural practices and built heritage, but much of it is unaccounted for. With the loss of built heritage, intangible aspects of cultural heritage are also put at risk

1.3. Existing Legislative Frameworks- An Overview

1.3.1. Framework for Heritage Sites in India

- ❖ “Any section of the citizens residing in the territory of India or any part thereof having a distinct language, script or culture of its own shall have the right to conserve the same” (Article 29 of the Constitution)
- ❖ “It shall be the obligation of the State to protect every monument or place or subject of artistic or historical interest, declared by or under law made by parliament, to be of national importance from spoliation, disfigurement, destruction, removal, disposal or export, as the case may be” (Article 49 of the Constitution)
- ❖ “It shall be the duty of every citizen of India to value and preserve the rich heritage of our composite culture” (Article 51 A (F) of the Constitution)

The Indian Constitution sets out the primary framework for identifying, valuing and conserving various tangible and intangible aspects of culture. The Apex Body for the implementation of this Framework with respect to cultural heritage is the **Ministry of Culture**, which acts through the **Archaeological Survey of India**. Under the aegis of the ASI and MoC, national legislations that apply to cultural heritage in India include the following:

- ❖ AMASR ACT 2010
- ❖ The Ancient Monuments and Archaeological Sites and Remains Act, 1958 and The Ancient Monuments and Archaeological Sites and Remains Rules, 1959
- ❖ The Antiquities and Art Treasures Act, 1972 and The Antiquities and Art Treasures Rules, 1973

Several states also have State legislations that apply to State Archaeology Monuments and Sites.

1.4. Framework for Disaster Management in India

In India, disaster management is overseen by the National Disaster Management Authority, which was established under the National Disaster Management Act (2005). The National Disaster Management Act of 2005 establishes the institutional, legal, financial, and coordinating frameworks for Disaster Management (DM) on the national, state, district, and local levels.

The second instrument is the National Policy on Disaster Management (NPDM) 2009, which states:

“Indigenous knowledge on disaster and coping mechanisms adopted by various States will be given due weightage with special focus on protection of heritage structures.”

In May 2016, the NDMA released the National Disaster Management Plan (NDMP), which outlines methods to strengthen disaster resilience at the national level via continuous action, prioritizing short-term, medium-term, and long-term objectives. The NDMP operates under the Sendai framework for Disaster Risk Reduction, to which India has signed, and aims to provide a structure and guidance to government entities throughout the disaster management cycle. The NDMP mandates that ministries and public entities establish disaster risk management plans and integrate them into their overall planning and administration. The NDMA is primarily responsible for developing disaster management policies, strategies, and recommendations for Central Ministries, Departments, and States. These recommendations serve as a framework for ministries and institutions to establish their own DM plans, which must be approved and reviewed by the NDMA (NDMA 2009). This comprises the sites and precincts controlled by the MoC and ASI.

1.5. Rationale for Panhala Fort Disaster Management Plan

Panhala Fort, a historically significant monument in Kolhapur, Maharashtra, faces a variety of potential disasters such as landslides, earthquakes, fires, and human-induced damage. These risks threaten not only the structural integrity of the fort but also the safety of the visitors and residents in the nearby areas. The increasing impact of climate change, rapid urbanization, and human activities near the fort magnify the risks. Therefore, the development of a comprehensive disaster management plan is crucial to protect the fort's heritage, minimize potential damage, and ensure the safety of all stakeholders.

1.6. Vision

To develop a disaster-resilient Panhala Fort by implementing sustainable management strategies, preserving its historical and cultural heritage, and ensuring the safety of both visitors and nearby residents through proactive disaster risk reduction, response, and recovery measures.

1.7. Aim

To minimize the risk and impact of natural and man-made disasters on Panhala Fort and its surrounding areas by developing a systematic disaster management framework that incorporates prevention, preparedness, mitigation, response, and recovery strategies.

1.8. Objectives

1.8.1. Risk Assessment and Vulnerability Mapping

- ❖ Conduct a detailed hazard assessment of the fort and its surrounding environment to identify potential risks such as landslides, earthquakes, floods, and fires.
- ❖ Map vulnerable areas within and around the fort, including structural weaknesses, visitor-prone areas, and nearby human settlements.

1.8.2. Strengthening Structural Resilience

- ❖ Implement structural reinforcement measures to enhance the fort's resilience against earthquakes, erosion, and other environmental stresses.
- ❖ Regularly monitor and maintain the fort's walls, gates, and infrastructure to address signs of deterioration or vulnerabilities.

1.8.3. Early Warning and Communication Systems

- ❖ Establish a robust early warning system that alerts authorities and visitors in case of impending natural disasters.
- ❖ Create clear communication protocols to ensure timely dissemination of information before, during, and after a disaster event.

1.8.4. Capacity Building and Training

- ❖ Conduct disaster preparedness and response training for local authorities, fort management, and residents.
- ❖ Form disaster response teams composed of local volunteers, staff, and emergency responders to act swiftly in the event of a disaster.

1.8.5. Emergency Response Plan

- ❖ Develop a comprehensive emergency response plan that outlines evacuation routes, medical assistance, firefighting measures, and crowd control protocols.
- ❖ Set up designated safe zones and shelters for evacuation in case of emergency.

1.8.6. Cultural Heritage Preservation

- ❖ Collaborate with archaeological experts to ensure that disaster mitigation efforts do not compromise the historical and cultural value of the fort.
- ❖ Develop post-disaster recovery plans to restore damaged areas while preserving the integrity of the monument.

1.8.7. Sustainable Tourism Management

- ❖ Implement visitor management strategies, such as limiting access to high-risk areas and improving tourism infrastructure, to reduce the strain on the fort's structural integrity.
- ❖ Educate tourists about the importance of disaster preparedness and safe behavior within the fort premises.

1.8.8. Community Engagement and Public Awareness

- ❖ Increase community participation in disaster risk management through education, workshops, and collaboration with local groups.
- ❖ Launch awareness campaigns to inform locals and visitors about the fort's disaster risks and safety protocols.

1.8.9. Coordination with Government Agencies and Experts

- ❖ Partner with disaster management authorities, heritage conservation experts, and environmental agencies to ensure a coordinated and multi-disciplinary approach.
- ❖ Regularly update and revise the disaster management plan based on new research, technology, and disaster occurrences.

By implementing this disaster management plan, Panhala Fort will be better equipped to withstand natural and man-made disasters, thereby safeguarding its heritage and ensuring the safety and well-being of future generations.

1.9. Terminology of Disaster Management

Disaster: A severe disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability, and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

Disaster Risk: The potential loss of life, injury, or destroyed or damaged assets that could occur to a system, society, or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability, and capacity.

Disaster Risk Reduction (DRR): Disaster risk reduction is aimed at preventing new and reducing existing disaster risks and managing residual risk, all of which contribute to strengthening resilience and, therefore, achieving sustainable development.

Early warning system: An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities, systems and processes that enable individuals, communities, governments, businesses, and others to take timely action to reduce disaster risks in advance of hazardous events.

Hazard: A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption, or environmental degradation.

Mitigation: Measures taken to reduce or prevent the adverse effects of hazards, including structural and non-structural interventions.

Preparedness: Refers to the level of readiness to manage an impending disaster situation or disaster and its associated effects.

Response: The activities and measures are taken to address the immediate impacts of a disaster, including search and rescue, emergency medical care, shelter provision, and humanitarian assistance.

Recovery: The restoring or improving livelihoods and health, as well as economic, physical, social, cultural, and environmental assets, systems, and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and “build back better”, to avoid or reduce future disaster risk.

Resilience: The ability of individuals, communities, and systems to withstand, adapt to, and recover from the impacts of disasters while maintaining essential functions and minimizing disruption and loss.

Rehabilitation: It refers to restoring or regaining the physical, mental, social, or economic well-being of individuals or communities affected by a disaster or other adverse event.

Vulnerability: The conditions determined by physical, social, economic, and environmental factors or processes that increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

2. Panhala Fort Profile

Panhala Fort, also known as Panhalgad and Panhalla (literally "the home of serpents"), holds a prominent place in the history of Maharashtra. Locally, it was known as the abode of serpents and was traditionally associated with the sage Parashar. The fort occupies a significant position in the history of the state and is also a favored destination as a hill station. Panhala Fort offers a panoramic view of the surrounding forts and hills in the Sahyadri mountain range. It is a magnificent sight, bearing witness to many mythological and historical events and legends. The fort was built by the Shilahara dynasty in the twelfth century and later passed through various rulers, including the Yadavas, Bahamani, Adilshahi, Mughals, and Marathas. It was constructed by King Bhoja II of the Shilahara dynasty between 1178 BCE and 1209 BCE to ensure proper administration of his empire. After King Bhoja II, the Yadava ruler Singhan Dev Yadav took control of the fort. In 1347, it was taken over by the Bahamani Sultanate of Gulbarga as one of their strongholds.

The Adilshahi Sultanate rulers of Bijapur made significant fortifications and constructed major building complexes, bastions, and ramparts, which lasted over 150 years. Many inscriptions on the fort's walls refer to the Adilshahi rulers. Panhala Fort has seen numerous battles and sieges, particularly during the Maratha Empire. The fort is notably linked with Chhatrapati Shivaji Maharaj, the founder of the Maratha Empire, who spent over seven months there before escaping the siege of Siddhi Johar in 1660. Today, Panhala Fort is a popular destination for tourists seeking to experience the rich heritage and culture of Maharashtra.

Mughal emperor Aurangzeb attacked and laid siege to the fort from 1691 to 1700. The fort was successfully defended under the able leadership of Tararani for nine long years. At that time, Panhala Fort was under the rule of Chhatrapati Rajaram. Afterward, Rajaram's second son, Sambhaji, took charge of the fort in 1714 and established autonomous rule, creating a separate state of Kolhapur with Panhala as its capital.

The fort was finally handed over to the British in 1827, but in 1844, British General Dela Motte was seized and held hostage inside the fort by some rebels. This led to British forces storming the fort and keeping it under guard until India's independence in 1947.

2.1. Location

Panhala Fort is part of the foothill region of the Sahyadri escarpment (Latitude: $16^{\circ} 48' 32''$ N and Longitude: $74^{\circ} 6' 33''$ E) in southern Maharashtra (Fig. 1). The area is primarily composed of compact basalt and amygdaloidal basalt flows, with some vesicular traps. These are separated by thin, ribbon-like red and green tachylitic bands, which are more extensive. Compact basalt flows dominate over the amygdaloidal basalt flows, and the surface exposure reveals moderately to deeply weathered rock in the form of a section.

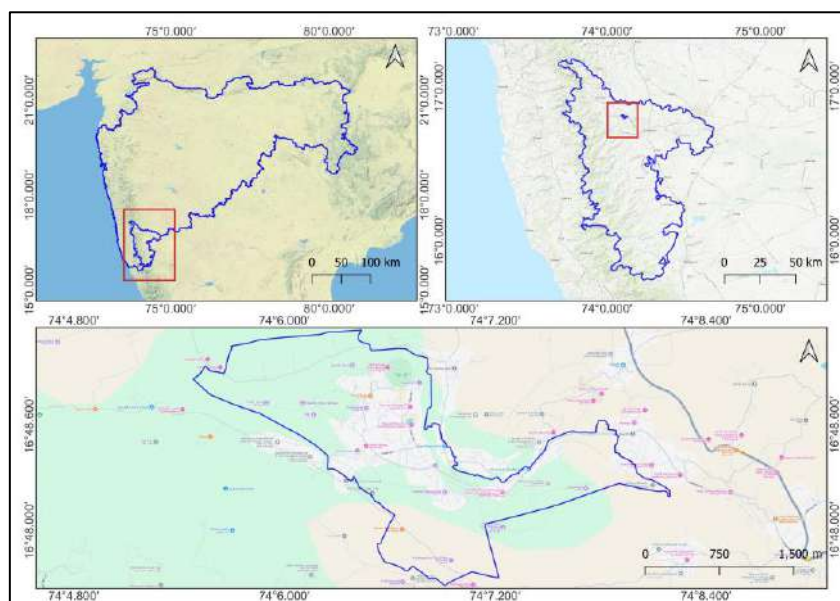


Fig. 1: Geographical Location of Panhala Fort

Located approximately 20 km from Kolhapur, Panhala Fort has excellent connectivity through road infrastructure linking it to nearby towns. It is built on an outlying spur of the Sahyadri range, rising more than 400 meters above the surrounding plain.

2.2. Transportation Network

Panhala Fort can be reached by road from major cities in Maharashtra and neighboring states (Fig. 2). It is located on the NH 4 highway, which connects it to cities like Mumbai, Pune, and Bangalore. Visitors can hire a taxi or take a bus from these cities to reach the fort. The distance and time taken to reach the fort by road from some nearby cities are:

- ❖ Mumbai to Panhala Fort: 375 km (6 hours)
- ❖ Pune to Panhala Fort: 230 km (4 hours)
- ❖ Bangalore to Panhala Fort: 610 km (10 hours)

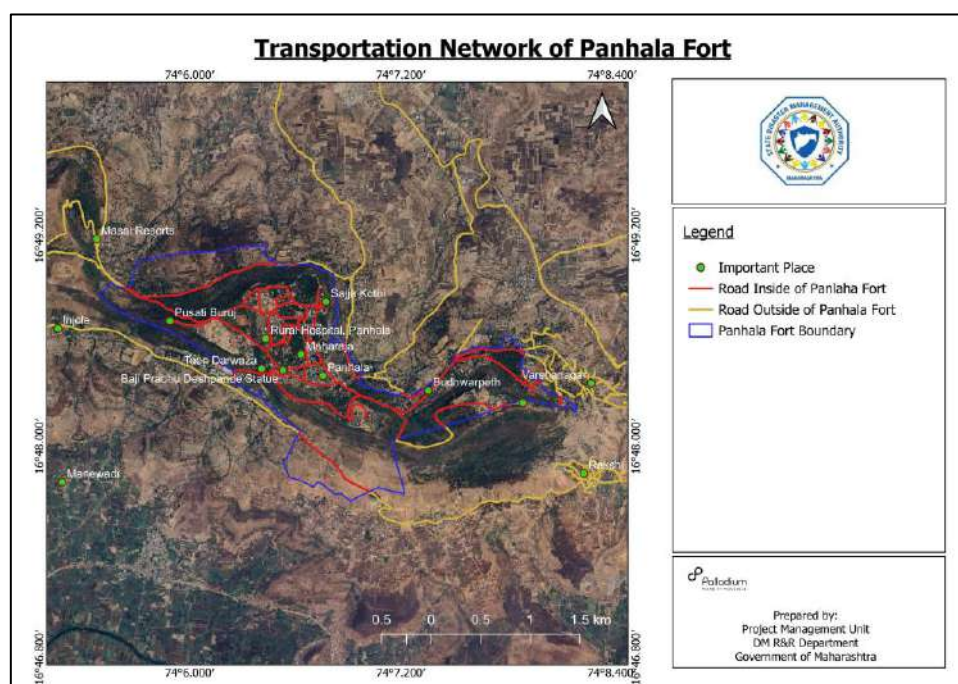


Fig. 2: Transportation Network of Panhala Fort; Source: Google Map

The fort can also be reached by rail from various parts of India. The nearest railway station to the fort is Kolhapur, which is about 25 km away. Kolhapur railway station is well-connected to other major railway stations in India, such as Mumbai, Pune, Delhi, Hyderabad, Chennai, and Kolkata. Visitors can take a train to Kolhapur railway station and then travel further by car or bus to Panhala Fort. Panhala Fort can also be reached by air from different cities in India. The nearest airport is Kolhapur Airport, about 30 km away. Kolhapur Airport has flights to and from Mumbai, Hyderabad, Bangalore, and Tirupati. Visitors can fly to Kolhapur Airport and then hire a cab or take a bus to the fort.

2.3. Geomorphology

On both sides of Panhala's fortification wall, steep cliffs form a huge complex of columnar joints with vertical and slightly inclined angles, which rise to great heights. These joints are interconnected, and their contact points create a continuous structure. The northern extension of Panhala, known as the Masai Plateau, is primarily used for plantation activity (Fig. 3). Both sides of the ridgeline are covered with beautiful, well-developed, highly elevated blocks of hexagonal, pentagonal, octagonal, and square-shaped columnar joints. These natural features add to the fort's natural beauty and enhance the importance of the plateau's natural

heritage. Along the east-west ridgeline, a steep slope is observed, and Panhala Fort was constructed along this parallel direction.

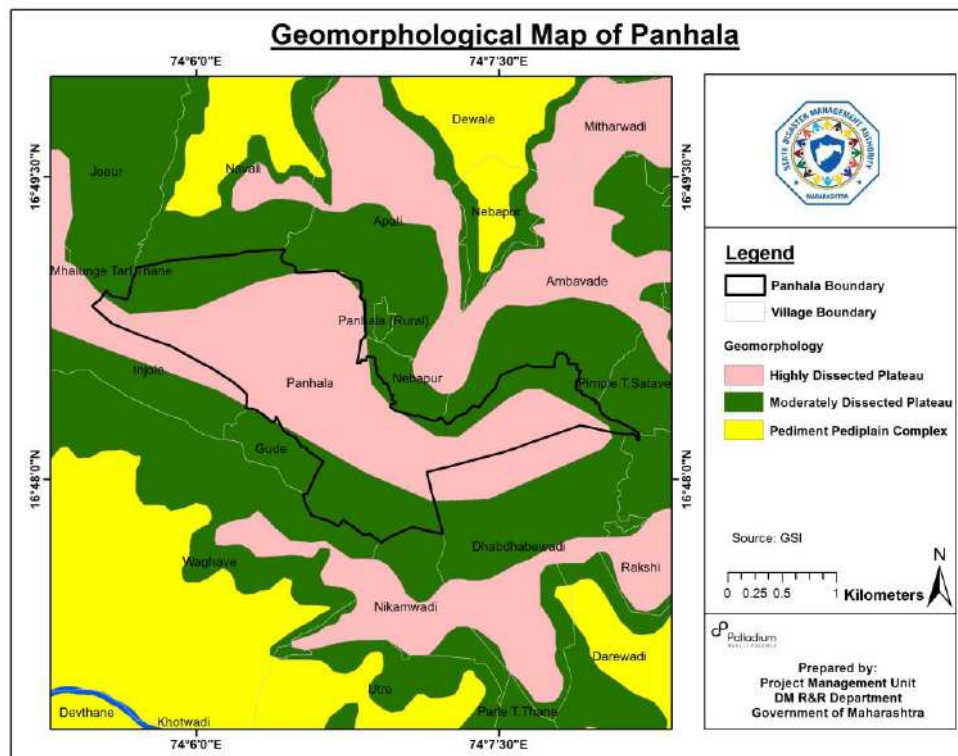


Fig. 3: Geomorphological Map of Panhala Fort

Panhala Fort is aligned along an east-west stretch, with offshoots of the Sahyadri running in the same direction. In a microtopography study, highlands of 9.60 and 9.30 meters are observed on the Panhala plateau, which stands 900 meters above mean sea level. Due to this ridgeline, the development of depressed land ranging from 780 to 600 meters takes place to the north and south of Panhala in an east-west direction. Along the highest elevated portion, a steep slope is observed, while in the lower elevated areas, a gentler slope is noticed. The slope along the east-west trend of the Panhala ridgeline controls the drainage characteristics of the region. The Panhala plateau acts as a source for the formation of radiating patterns of high-density drainage systems in the surrounding areas.

Most of the surface within the upper plateau region is exposed to atmospheric weathering conditions. As a result, the upper rock is highly dissected, with some micro and mega cracks developing in the rock bodies, creating channels for the movement of surface water into the deeper zones. This condition is highly conducive to groundwater recharge, as the area receives substantial rainfall during the rainy season. Consequently, the upper, highly dissected cap of the Panhala plateau serves as a source for the formation of springs in these areas. Due to the deep weathering, the upper part of the rock is transformed into fertile soil with high moisture content. Therefore, most of the land on the plateau is covered with evergreen forests, plantations, and grass.

The surrounding depressed areas consist of thick black cotton soil deposited by erosion from the highland source region of Panhala. This soil is widely used for agriculture. As a result, the geomorphology of Panhala features a highly dissected plateau in the top portion and a middle region with a sloping terrain.

According to the suitability of the landscape on the Panhala plateau, as well as along the sloping region and in the valley basement, different settlements have been established. The largest settlements were situated based on the availability of natural resources. In the study area, the largest settlement is Panhala town, located at the top of the plateau in the form of a fortified settlement. The second largest is Ambavade, situated in the northeastern extension of Panhala in the valley region. Settlements in the sloping region are comparatively less suitable, and therefore the population density in this area is relatively lower.

3. Hazard Risk Assessment and Vulnerability Analysis

3.1. Identifying Hazard and Hazard History

Panhala Fort has a rich history but also faces various hazards due to its geographical and environmental conditions. One of the most recurrent natural hazards in the area is the frequent occurrence of wildfires (Table 1), especially during the summer months. These fires, often fueled by dry trees and grass, pose a significant threat to the biodiversity and structural integrity of the fort, leading to the cracking of its ancient walls. In addition, the fort, like much of the world, was impacted by the COVID-19 pandemic, which brought about widespread health and social challenges. Human-induced hazards, particularly accidental fires, are also common, exacerbated by the dry landscape surrounding the fort. These events highlight the vulnerability of Panhala Fort, a historic monument, to both natural and human-caused hazards.

Table 2: Hazard frequency and probability ranking of Panhala Fort

Hazard	Frequency (Years)	Probability Rank	Probability Level
Natural Hazard			
Flood	0	0	Rare
Cyclone	5	2	Possible
Landslide	2	2	Possible
Earthquake	34	1	Rare
Heatwave	0	0	Rare
Drought	50	1	Rare
Wildfire	1	3	Almost Certain
Epidemic	5	2	Possible
Cloud Burst	6	2	Possible
Lightning	3	2	Possible
Pest Attack	0	0	Rare
Hailstorm	7	2	Possible
Wild Animal Attack	0	0	Rare
Technological Hazard			
Electrical Failure	2	2	Possible
Transportation Failure	2	2	Possible
Communications Failure	0	0	Rare
Information Systems Failure	0	0	Rare
Fire	1	3	Almost Certain
Structural Damage	1	3	Almost Certain
Human Hazard			
Stampede	0	0	Rare
Drowning	0	0	Rare
Mass Casualty Incident (trauma)	0	0	Rare
Terrorism	0	0	Rare
VIP Situation	0	0	Rare
Hostage Situation	0	0	Rare
Civil Disturbance	0	0	Rare
Missing Resident	0	0	Rare
Bomb Threat	0	0	Rare

3.2. Hazard Profile

Panhala Fort is one of the largest forts in the Deccan region. Its historical significance is intertwined with strategic military use, but today it faces several natural and anthropogenic hazards. Here's a Hazard calendar (Table 2) and detailed profile of hazards that affect Panhala Fort.

Table 3: Hazard Calendar of Panhala Fort

Disaster	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Earthquake	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floods						✓	✓	✓	✓			
Cyclones	✓	✓			✓	✓	✓	✓		✓	✓	✓
Landslide						✓	✓	✓	✓			
Heatwave			✓	✓	✓							
Epidemics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildfire			✓	✓	✓							
Fires	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Road accidents	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lightning					✓	✓	✓	✓		✓	✓	
Drought			✓	✓	✓							

3.2.1. Geological Hazards

Landslides and Rockfalls: The fort is situated on a hill that has steep cliffs and slopes. Lead towards high landslide susceptibility (Fi. 4 and Fig. 5). During the monsoon season, heavy rainfall increases the risk of landslides and rockfalls. The basaltic rock formation is vulnerable to weathering, leading to small-scale rockfalls.

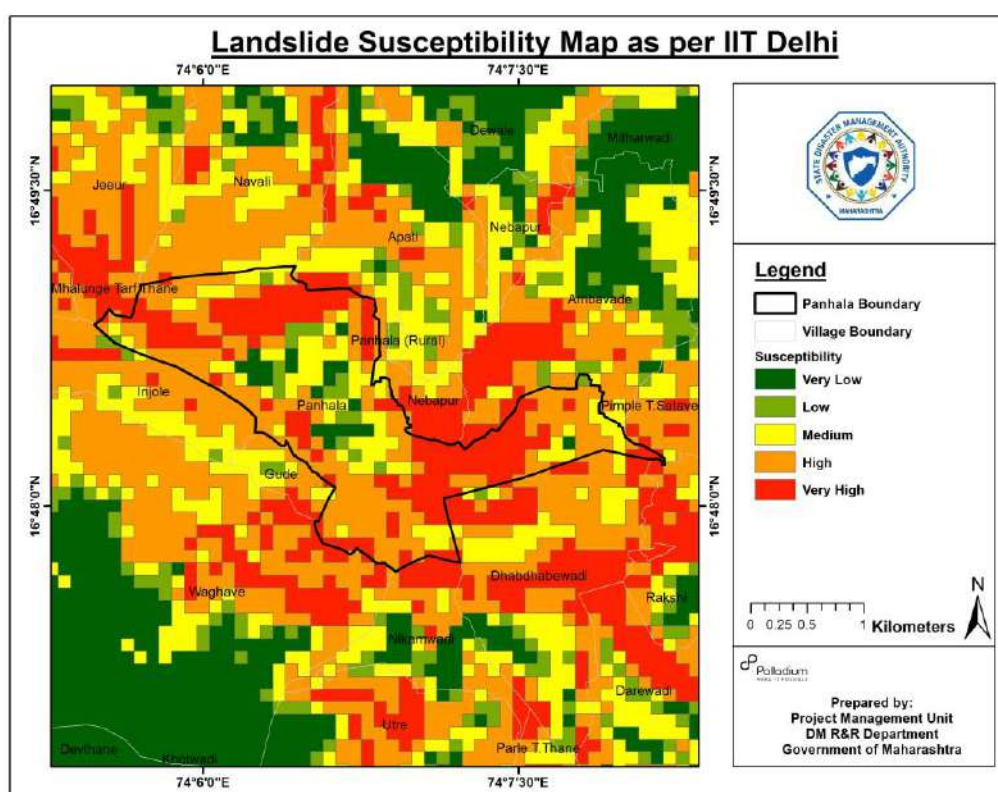


Fig. 4: Landslide Susceptibility Map of Panhala Fort as per IIT, Delhi

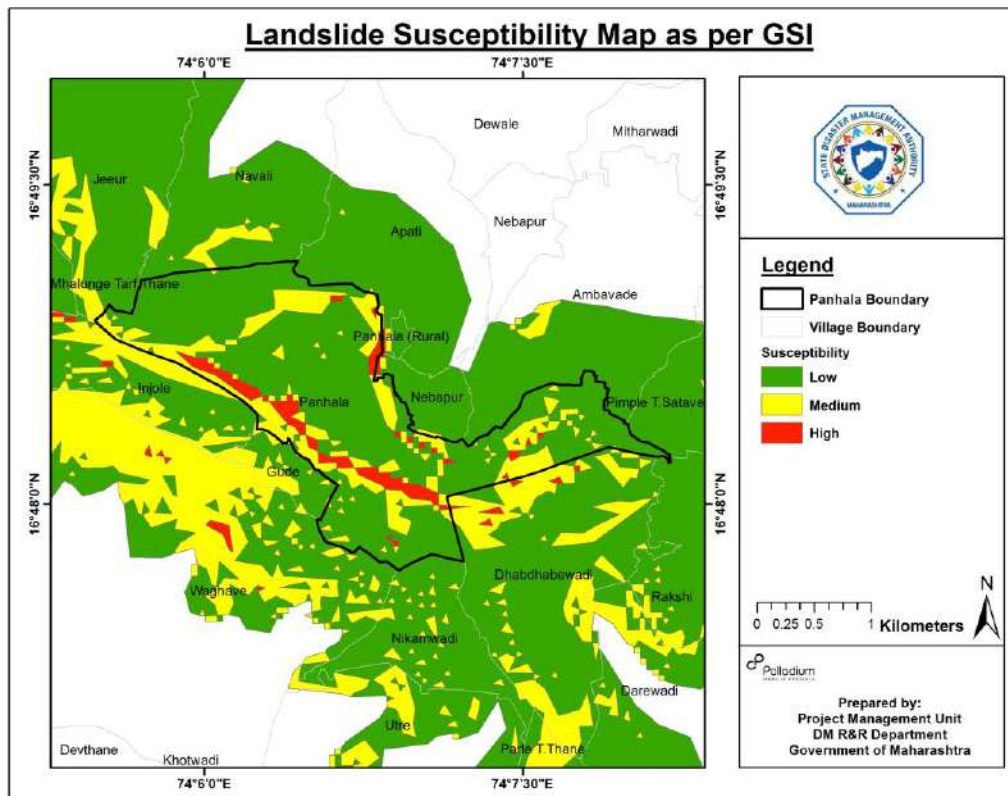


Fig. 5: Landslide Susceptibility Map of Panhala Fort as per GSI

Seismic Activity: Panhala Fort is located in a region that is categorized as Seismic Zone III, which is a moderate risk zone (Fig. 6). Although there is no significant history of earthquakes, the structures on the fort could be susceptible to tremors due to the age of the buildings and their current state of deterioration.

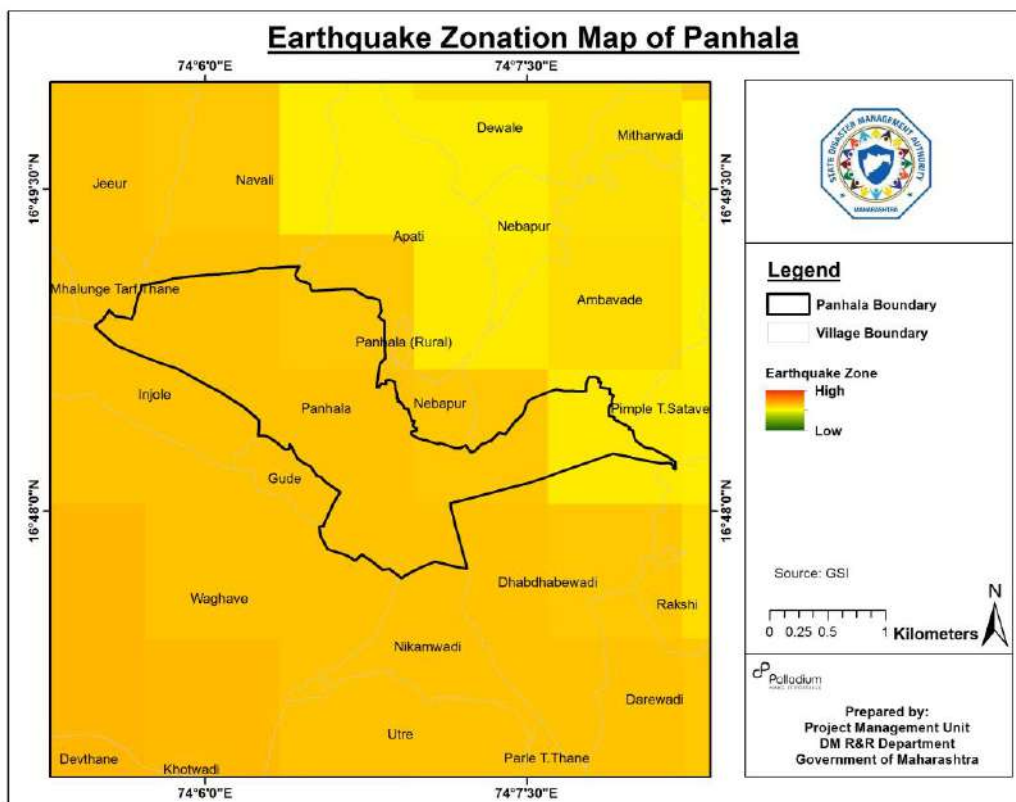


Fig. 6: Earthquake Zonation Map of Panhala Fort

3.2.2. Climatic Hazards

Heavy Rainfall and Flooding: The region experiences significant rainfall during the monsoon season (June to September) and lead to moderate flood susceptibility (Fig. 7). The combination of heavy rains and poor drainage systems around the fort leads to waterlogging in certain sections of the fort, causing structural erosion and weakening.

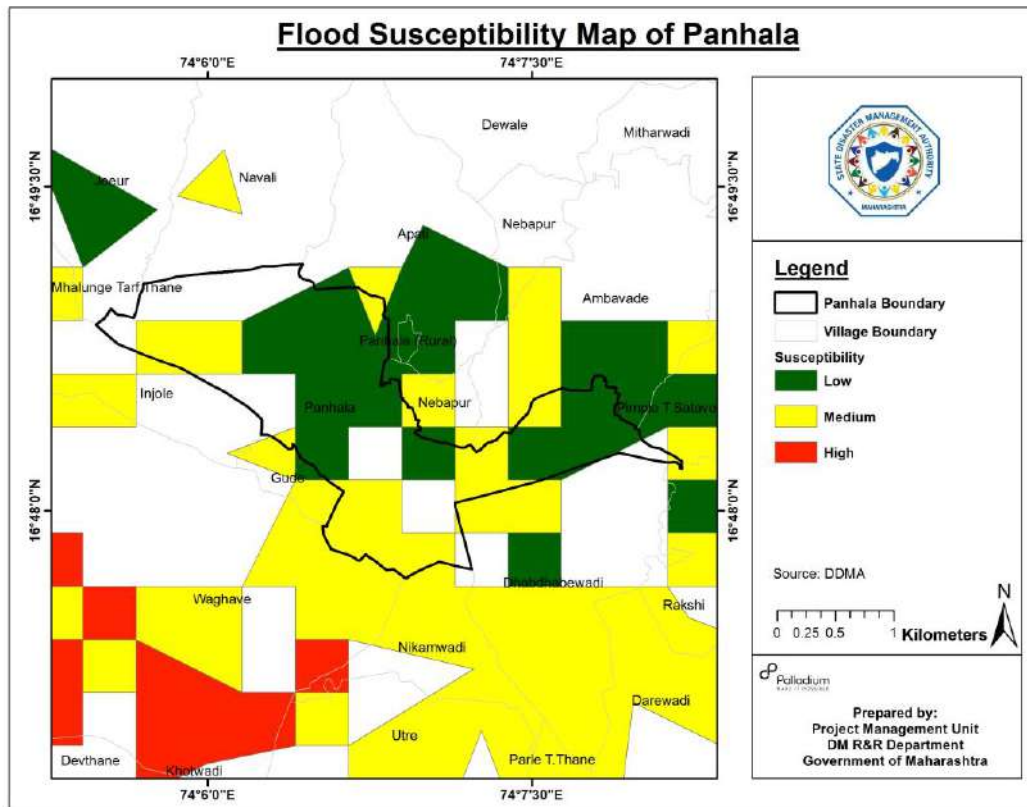


Fig. 7: Flood Susceptibility Map of Panhala Fort

Erosion: Continuous exposure to rain and winds has led to erosion of the fort walls and surrounding area. Rain-induced erosion is most prominent during the monsoon, and long-term impacts can weaken the fort's foundational strength.

3.2.3. Human-Induced Hazards

Tourism Pressure: Panhala Fort is a popular tourist destination. The footfall during peak tourism seasons can increase the load on the infrastructure, potentially leading to structural damage due to overcrowding, littering, and vandalism.

Unauthorized Construction: There has been unregulated development around the fort in recent years, with some structures being built illegally near heritage sections. This increases the risk of foundational instability and changes the water drainage patterns, exacerbating erosion.

3.2.4. Vegetation Hazards

Overgrowth and Root Penetration: Over time, uncontrolled vegetation growth has led to the penetration of tree roots into the walls of the fort. This can cause cracks in the masonry and weaken the fortifications. Monsoon seasons further enhance plant growth, which accelerates the deterioration process.

3.2.5. Conservation Challenges

Lack of Maintenance: The fort's heritage value is high, but the lack of systematic conservation efforts and preventive maintenance programs means the fort faces a high risk of deterioration. Proper restoration and preservation plans are needed to mitigate these risks.

Climate Change: Increasing temperatures and unpredictable weather patterns, including stronger monsoons and erratic rainfall, are also contributing to the accelerated deterioration of the fort.

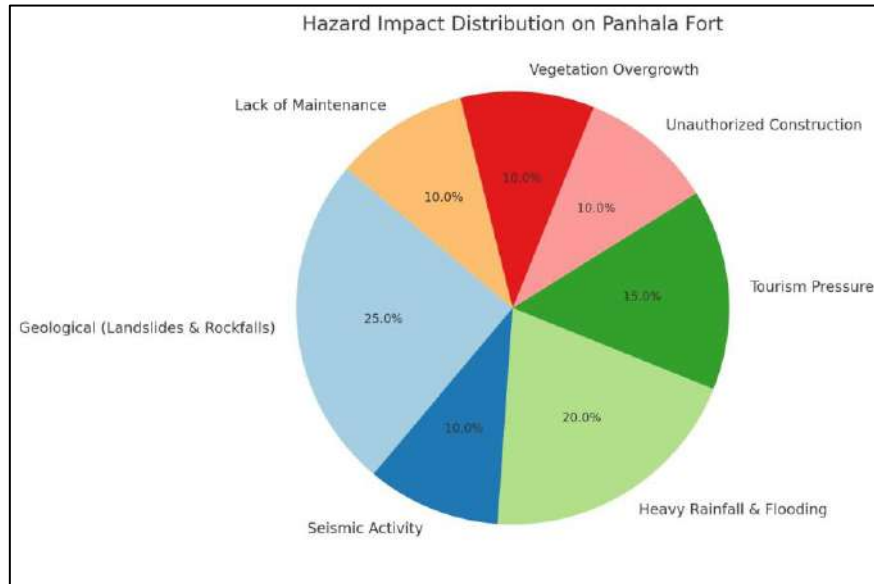


Fig. 8: Hazard impact distribution on Panhala Fort

Panhala Fort's hazard profile includes geological, climatic, and anthropogenic factors (Fig. 8). Landslides, seismic activity, heavy rainfall, erosion, tourism pressures, and vegetation overgrowth present considerable challenges to the fort's preservation. To ensure the longevity of this historical monument, detailed risk mitigation strategies and regular maintenance programs need to be implemented.

3.3. Risk Assessment

Table 3 provides a comprehensive risk assessment matrix categorized into Natural Hazards, Technological Hazards, and Human Hazards. The matrix evaluates risks based on several factors: probability, human impact, property impact, business impact, preparedness, internal response, and external response. The overall risk category for each event (ranging from low to high) offers insight into how these factors interplay in assessing the fort's vulnerability.

Table 4: Risk assessment matrix of Panhala Fort

Natural hazard								
Event	Severity = (magnitude - mitigation)							Risk category
	Probability	Human impact	Property impact	Business impact	Prepared ness	Internal response	External response	
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	Preplanning	Time, effectiveness, resources	Community/ mutual aid staff and supplies	
Score	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = high 2 = moderate 3 = low or none	0 = n/a 1 = high 2 = moderate 3 = low or none	0 = n/a 1 = high 2 = moderate 3 = low or none	Risk category
Flood	0	2	2	3	1	1	2	
Cyclone	2	0	2	2	2	2	2	
Landslide	2	1	2	2	2	2	3	
Earthquake	1	0	0	0	0	0	0	
Heatwave	0	0	0	0	0	0	0	
Drought	1	0	0	0	0	0	0	

Natural hazard								
Event	Probability	Severity = (magnitude - mitigation)						Risk category
		Human impact	Property impact	Business impact	Prepared ness	Internal response	External response	
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	Preplanning	Time, effectiveness, resources	Community/ mutual aid staff and supplies	
Score	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = high 2 = moderate 3 = low or none	0 = n/a 1 = high 2 = moderate 3 = low or none	0 = n/a 1 = high 2 = moderate 3 = low or none	
Wildfire	3	1	1	1	0	0	0	Low
Epidemic	2	2	1	1	1	1	2	Medium
Cloud burst	2	2	2	1	2	2	1	Medium
Lightning	2	1	1	1	2	2	1	Medium
Pest attack	0	0	0	0	0	0	0	Low
Hailstorm	2	2	3	0	0	0	0	Low
Wild animal attack	0	3	3	3	2	2	1	Low
Technological hazard								
Electrical Failure	2	3	0	1	1	1	1	Medium
Transportation Failure	2	0	0	0	1	1	1	Low
Communications Failure	0	0	0	0	1	1	1	Low
Information Systems Failure	0	0	0	0	1	1	1	Low
Fire	3	2	2	1	1	1	2	High
Structural Damage	3	1	1	2	1	1	1	Medium
Human hazard								
Stampede	0	1	1	1	1	1	1	Low
Drowning	0	3	0	1	1	1	1	Low
Mass Casualty Incident (trauma)	0	2	2	2	1	1	1	Low
Terrorism	0	0	0	0	0	0	0	Low
VIP Situation	0	1	1	1	0	0	0	Low
Hostage Situation	0	0	0	0	0	0	0	Low
Civil Disturbance	0	1	1	1	1	1	1	Low
Missing Resident	0	0	0	0	0	0	0	Low
Bomb Threat	0	0	0	0	0	0	0	Low

3.3.1. Natural Hazards

Landslides: Landslides are marked as high risk. Given the fort's hilltop location, landslides are a likely hazard, particularly during heavy rains. These hazards pose significant threats to human life, property, and business operations. It has moderate to high impact scores in human and property impact, suggesting that the fort's location or regional weather patterns make it susceptible to landslides. Preparedness and internal response are also rated moderately, indicating that response mechanisms may not be fully developed or effective.

Lightning, Cloud burst and Cyclone: With a moderate score, Lightning, Cloud burst, and Cyclone are a medium risk. Preparedness seems moderate, but the external response capacity is low, possibly due to geographical isolation.

Low-Risk Hazards: Hazards such as heatwaves, droughts, wildfires, and pest attacks are categorized as low risk. These events are less likely to affect the fort, given its geographical and environmental context, but preparedness and response measures for these risks should still be in place for potential worst-case scenarios.

3.3.2. Technological Hazards

Electrical Failures: Electrical failure is marked as medium risk, primarily due to the moderate preparedness and internal response scores. In historical sites like Panhala Fort, technological infrastructure, especially power lines and internal wiring, may not be up to modern standards, which increases vulnerability to electrical issues.

Fire: It stands out as a high-risk hazard, reflecting the absence or insufficiency of fire suppression and detection systems. This suggests an urgent need to upgrade fire safety systems, given the fort's historical value and vulnerability to fire outbreaks, which could cause significant damage.

Structural Damage: This hazard also carries a medium risk and is of particular concern for Panhala Fort due to the aging structure of the fortifications. A moderate score in property impact and preparedness points to the need for regular assessments and restoration work to prevent structural failures.

3.3.3. Human Hazards

Most human hazards, such as stampede, drowning, mass casualty, terrorism, hostage situations, and others, are marked as low risk. However, this does not eliminate their potential threat, especially during high tourist seasons or special events. The probability of incidents like mass casualties and trauma is low, but a moderate score in preparedness and response systems indicates a need for the fort to maintain well-trained personnel and emergency procedures in place.

Bomb Threat and Terrorism: These are marked with the lowest scores in probability, but given the fort's historical and cultural significance, a proactive security system (including surveillance and threat assessment protocols) should be in place.

3.3.4. Key Observations

- ❖ The most pressing risks are Landslide, fire, and structural damage. These high and medium risks highlight gaps in both preparedness and internal/external response.
- ❖ Across various hazards, the preparedness scores are generally in the moderate to low range. This shows that while some initial safety protocols might be in place, they are either outdated or insufficient to fully protect against certain risks, particularly fire and structural damage.
- ❖ The external response score is consistently low across all hazards, especially in technological and human hazards. This suggests the fort's reliance on external agencies (municipalities, fire services, etc.) might be delayed or inadequate during emergencies. Strengthening partnerships with emergency services could improve this.
- ❖ The fort's internal response mechanisms (such as manual security backups or emergency response teams) need strengthening, as the response to natural and human-induced hazards shows room for improvement.

3.4. Vulnerability Assessment

The vulnerability assessment of Panhala Fort, as depicted in Table 4 and Table 5, outlines various critical areas requiring attention to mitigate risks. Structural elements are highlighted as being susceptible to damage, particularly during emergencies, which necessitates regular inspections and reinforcement. The fort's layout and high-risk areas, such as those prone to overcrowding or difficult evacuation, need clear signage and designated evacuation routes. Electrical systems and drainage are noted as vulnerable, with recommendations for maintenance and upgrading to prevent failure during emergencies. Other issues, such as inadequate emergency lighting, insufficient access policies for restricted areas, and the lack of emergency supplies, further emphasize the need for improvements in infrastructure. Effective pest control, maintaining appropriate humidity levels, and managing vegetation are also critical to preserving the fort's structural integrity and preventing further deterioration. Collectively, these findings call for a comprehensive planning to enhance preparedness, ensure visitor safety, and protect the fort's historical value.

Table 5: Buildings, surroundings and infrastructure vulnerability

Category	Issue	Details	Action Needed
Structural Distress	Old heritage buildings showing distress	Examples include Naukhinicha Sajja and some bastions.	Structural repairs needed
Building Layout	Accessibility during emergencies is difficult	Populated regions like Machli Galli have poor accessibility during emergencies.	Improve emergency access
	Monitoring of all areas not an issue	Height regulations minimize monitoring difficulties.	No action required
High-Risk Areas	Buildings near fortification wall at risk	Landslides pose a danger to buildings near fort walls.	Reinforce and protect vulnerable buildings
Low-lying Areas	Soil saturation at Panhala	Mainly during the rainy season, the soil at Panhala is prone to saturation.	Monitor and improve drainage systems
Electrical Systems	Outdated and exposed systems	30-40% of the Distribution Panels (DPs) are outdated and need to be replaced.	Upgrade electrical systems
Drainage	Poor roof and terrace drainage	Inadequate maintenance of drainage from roofs and terraces.	Improve drainage maintenance
	Historical drainage outlets not functioning	Non-functioning drainage systems across the fort contribute to landslides.	Research and restore historical drainage
Sewage Systems	Outdated and not implemented	Development plans are ready, but land issues prevent implementation.	Resolve land issues and implement sewage plan
Ventilation	Adequate natural and mechanical ventilation	Both natural and mechanical ventilation systems are adequate.	No action required
Humidity & Temperature	Excessive humidity in the museum	Humidity is a problem in all areas of the museum.	Implement humidity control
Pest Control	Pest control procedures not implemented	Pest control is not consistently implemented in certain areas.	Regular pest control procedures needed
Lighting	Adequate lighting arrester is not installed	Lighting arresters are considered as not sufficient.	Identification of vulnerable buildings and installed adequate lightning arresters
Signage	Adequate signage for visitors	Signage is considered sufficient for visitors.	No action required

Category	Issue	Details	Action Needed
Access Points	Compliant with codes	Access points adhere to building codes.	No action required
Emergency Access	No blocked or unreachable exits	Access and exits are not blocked or unreachable.	No action required
Security of Restricted Areas	No risk of tampering with restricted areas	Access to restricted areas is not a concern.	No action required
Security Staff	Insufficient security systems in place	A dedicated security system is needed, though current staff is adequate.	Implement a dedicated security system
Managerial Staff	Adequate managerial staffing	The current level of managerial staff is deemed sufficient.	No action required

Table 6: Visitor management, security system and infrastructure vulnerability

Category	Issues	Details	Action Needed
Visitor Management and Security System	Security Staff	Inadequate training and no dedicated security system	Implement dedicated security system and train staff
	Managerial Staff	Sufficient staff from local municipal council are available	No action needed
	Automated Security System	Lack of automated security systems	Install modern security mechanisms (CCTVs, Public Addressing System, Siren)
	Chain of Command for Fort Operations	There is no chain of command exist at Panhala fort	Established a systematic chain of command mechanism
Critical Infrastructure	Backup Systems	No manual backup for security in emergencies	Establish manual backup system
	Emergency Protocol	No established emergency response protocol	Create and document emergency protocol
	Emergency Contacts	Emergency contacts list exists but not regularly updated	Ensure list is updated and easily accessible
	Staff Verification	No database for staff background verification	Implement staff background verification system
	Fire Detection and Suppression Systems	No fire detection or suppression systems available in most of the buildings	Install fire detection and suppression systems at critical buildings

Category	Issues	Details	Action Needed
	Evacuation Plan and Routes	No evacuation plan or displayed evacuation routes	Develop and display evacuation routes generally at most crowded areas
	Emergency Elevators and Fire Stairways	Emergency elevators and fire stairways don't meet codes	Upgrade stairways and elevators to meet safety standards
	Emergency Supplies	No emergency supplies available	Provide necessary emergency supplies
	Infrastructure Monitoring	Critical infrastructure not regularly checked or monitored	Appoint dedicated officials for regularly monitor and maintain infrastructure

3.4.1. Key Suggestions:

- ❖ Detect early signs of structural weakness or damage.
- ❖ Strengthen the fort's structure against mild earthquakes.
- ❖ Reduce the impact of human activity in the fort.
- ❖ Prevent damage from roots weakening the structure.
- ❖ Establish protocols for landslides and floods.
- ❖ Implement a dedicated and automated security system and ensure security staff are properly trained.
- ❖ Establish a clear emergency response protocol and manual security backups.
- ❖ Create a database for staff verification and maintain a regularly updated list of emergency contacts.
- ❖ Install fire detection and suppression systems across all required buildings.
- ❖ Develop a formal evacuation plan and ensure evacuation routes are clearly displayed.
- ❖ Upgrade fire stairways, doors, and emergency elevators to meet code standards.
- ❖ Regularly check and monitor critical infrastructure to prevent safety lapses.

3.5. Capacity

The fort is equipped with basic search and rescue tools to manage disasters (Table 6), but these are inadequate to establish strong disaster resilience. Developing advanced disaster monitoring and early warning systems, along with effective warning dissemination and preparedness drills, would significantly improve its overall disaster resilience.

Table 7: List of search and rescue equipment at Panhala Fort

Sr. No	Item	Qty
1.	Fire Water Tender Truck	1
2.	Water Mist Motor Bike (Bullet Bike)	1

Sr. No	Item	Qty
3.	Fire Rescue Cylinder Mounted Motor Bike (Bullet Bike)	1
4.	Backpack Extinguishing Device	1
5.	Automatic Fire RID	5
6.	Emergency Tower Light	1
7.	Smoke Exhauster	1
8.	Fire Extinguisher- Water CO2- 9 ltr	6
9.	Fire Extinguisher- Mechanical Foam- 9 ltr	6
10.	Fire Extinguisher- ABC Type -9 ltr	6
11.	Snake Catcher Stick and Carrying Bag	2
12.	Conical Traffic Cone 3 Feet height	10
13.	Hydraulic Wedge Jack	1
14.	Helmet Sikandar Type	10
15.	Rubber Knee and Ankle (Gum) Boots	10
16.	Carbide tipped blade Chain Saw	1
17.	Hand Torch - 2 Km Range	5
18.	Fire Hand Gloves - Basic	10
19.	Electric Spanner Gun - 220 V	1
20.	Spanner Set	1
21.	Fire Ball	10
22.	Portable Fire Pump (Petrol)	1
23.	Vehicle Search Light	1
24.	Tower Ladder 2 Section	1
25.	Fire Blanket	2
26.	Life Ring	4
27.	Scoop Stretcher	1
28.	Safeguard	4
29.	Bobster as per BSF Ballistic Goggles	2
30.	Life Jacket	4

4. Measures for Disaster Risk Prevention, Reduction and Mitigation

4.1. Building and environment stabilization

- ❖ Disaster Response Team (DRT) will coordinate with facility services and maintenance staff to assess the damage caused by any disaster (fire, flood, landslide or other disaster).
- ❖ Professional restoration services, especially those provided through insurance, should be involved under the supervision of the DRT. Insurance adjusters should also be a part of the review process.
- ❖ Designated staff from the fort conservation team will be responsible for documenting damage to the fort's structures.
- ❖ Documentation will include thorough photographic and video evidence, with written records detailing the impact on walls, gates, pathways, artifacts, and other structural elements.
- ❖ Use standard forms to record damages, such as a Post Disaster Need Assessment form.
- ❖ After controlling the disaster, prompt action should be taken to limit environmental damage.
- ❖ Water or moisture damage (from heavy rains or floods) should be addressed by:
 - Removing any standing water through mopping or pumping.
 - Removing wet debris or carpets.
 - Placing dehumidifiers and fans in affected areas to stabilize humidity.
- ❖ Aim to restore conditions to normal seasonal levels for humidity and temperature. If this is not possible due to the disaster's scale, focus on lowering humidity and temperature to slow down the development of mold, wood distortion, and corrosion.
- ❖ If the fort's security system is compromised, especially electronic systems, temporary increased security may be necessary. This is crucial to protect the fort from theft, vandalism, or unauthorized access.
- ❖ Coordination with disaster response team (DRT) will help ensure the fort's artifacts and structure are protected.
- ❖ Consider sealing off damaged areas or installing temporary surveillance cameras as necessary.
- ❖ Access to the damaged areas will be limited to authorized personnel, including fort staff, volunteers, restoration experts, and service providers.
- ❖ The Facility lead will monitor and control site access to avoid unnecessary disturbance or further damage.
- ❖ All entry points should be sealed to prevent biological infestations, especially in areas weakened by structural damage.
- ❖ Staff and workers should be trained to identify and report any signs of mold, insect infestations, or rodent activity. Immediate steps should be taken to quarantine affected areas or objects to prevent contamination.

4.2. Other Prevention Measure

- ❖ Continuous update and conduct micro level risk assessments and hazard mapping specific to Panhala Fort to identify vulnerable areas within the fort, such as weak walls, gates, and areas prone to landslides, flood, earthquake, erosion, etc.
- ❖ Update and Map out natural disaster risks like earthquakes, landslides, and flooding that could impact the fort's structure and surrounding environment.
- ❖ Establish an effective early warning system for potential natural disasters, such as landslides, floods or cyclones, to alert local authorities, fort staff, and visitors in advance.
- ❖ Coordinate with DDMA, SDMA, MAHAVED, MAHARAIN, IMD and GSI to receive timely warnings/updates on possible disasters.
- ❖ Review and implement strict building regulations specifically designed for the conservation of heritage structures like Panhala Fort.
- ❖ Regularly assess the fort's structural integrity and carry out necessary retrofitting, repairs, and reinforcements to prevent collapse during natural disasters.
- ❖ Invest in resilient infrastructure around the fort, including stormwater drainage systems, retaining walls, and flood barriers to protect against water damage.
- ❖ Ensure that walking paths, access roads, and visitor facilities are constructed with disaster resilience in mind.
- ❖ Implement sustainable land management practices around the fort to reduce risks like landslides and soil erosion.
- ❖ Conduct reforestation activities and promote vegetation in the surrounding areas to stabilize soil and reduce the risk of landslides.
- ❖ Prevent illegal activities, such as deforestation, which could weaken the fort's surrounding ecosystem.
- ❖ Organize regular awareness campaigns, drills and exercises for local residents, visitors, and staff on the risks of natural disasters and how to respond during emergencies.
- ❖ Provide capacity-building programs for local authorities, fort staff, and nearby communities to ensure they are trained in disaster preparedness, response, and evacuation protocols.
- ❖ Update fort disaster management plan every two years, and if necessary, modify roles and responsibilities for fort staff, local authorities, emergency services, and other stakeholders.
- ❖ Establish clear evacuation routes and safe zones for visitors in case of an emergency with the consultation of Archology department, Tourism Department, Fire Department, and PWD.
- ❖ Ensure communication protocols are followed to coordinate disaster responses efficiently.
- ❖ Strengthen vulnerable sections of the fort through retrofitting and reinforcement, particularly the walls, gates, and older structures prone to collapse.
- ❖ Facilitate partnerships and collaborations between government agencies, heritage conservation organizations, non-governmental organizations (NGOs), and local communities to ensure a unified disaster prevention approach.
- ❖ Engage with private sector entities for funding and support in implementing disaster prevention infrastructure.

- ❖ Regularly monitor and evaluate the effectiveness of the fort's disaster prevention measures, including structural health, early warning systems, and community preparedness.
- ❖ Update risk assessments and disaster management strategies based on new research, lessons learned from disaster or drills, and changing environmental conditions.

4.3. Disaster Specific Mitigation measure

4.3.1. Landslide

Panhala Fort, situated in the hilly terrains of Maharashtra, is prone to landslides due to its geographical location and seasonal heavy rainfall. To mitigate the risk of landslides and protect the fort's historical structures and surrounding areas, the following measures should be implemented:

Structural Measure

- ❖ Stabilize vulnerable slopes using engineering solutions such as retaining walls, terracing, and gabions to prevent soil erosion and landslides.
- ❖ Promote the growth of deep-rooted vegetation on slopes to enhance soil stability. Native plants and trees can help reduce soil erosion and improve slope resistance to rainfall.
- ❖ Install or improve drainage systems around the fort to ensure proper water management during heavy rains. Proper drainage channels will prevent water accumulation on slopes and reduce the chances of landslides caused by soil saturation.
- ❖ In areas where there is a high risk of rockfalls, install protective nets or fences to prevent falling debris from damaging the fort's structures or endangering visitors.
- ❖ Retrofit and reinforce walls, gates, and other key structures of the fort that could be affected by landslides. Ensure that the foundations of these structures are stable and able to withstand ground movement.
- ❖ Construct protective barriers or buffer zones in critical areas where landslides or debris flows could impact the fort's structures or pathways.

Non-Structural Measure

- ❖ Conduct detailed geotechnical studies to assess soil stability, slope angle, and geological conditions around the fort. Identify areas with weak soil, rock formations, and high-risk zones for landslides.
- ❖ Develop a micro level landslide hazard map for Panhala Fort, highlighting vulnerable areas, potential landslide-prone slopes, and critical zones for intervention.
- ❖ Implement a real-time landslide monitoring and early warning system using sensors and remote monitoring techniques. These systems can detect ground movements, soil moisture levels, and other indicators of an impending landslide.
- ❖ Work with local meteorological agencies (MAHAVED, MAHARAIN, IMD) to receive timely weather updates, allowing authorities to take precautionary actions during periods of heavy rainfall or storm activity.
- ❖ Enforce strict land use regulations to restrict construction or development in landslide-prone areas around the fort. Discourage any activities that may destabilize slopes, such as deforestation.
- ❖ Update and enforce building codes that include landslide-resistant construction practices, particularly for new buildings, roads, and other infrastructure near the fort.

- ❖ Conduct awareness campaigns for fort staff, local residents, and visitors to educate them about the risks of landslides and the importance of maintaining natural landscapes.
- ❖ Train local authorities, fort staff, and community members in landslide preparedness, emergency response, and evacuation procedures to ensure timely and effective action in case of a landslide.
- ❖ Identify and maintain safe evacuation routes from the fort and surrounding areas in case of a landslide. Clearly mark these routes and ensure they are accessible during emergencies.
- ❖ Conduct regular inspections of slopes, retaining walls, and drainage systems to ensure they are functioning effectively. Identify any new areas of concern and address them promptly to prevent landslide-triggering conditions.
- ❖ Monitor environmental changes, including deforestation, soil erosion, and changes in land use that may increase landslide risks. Take proactive measures to address these concerns.
- ❖ Collaborate with geologists, civil engineers, environmental scientists, and local government authorities to design and implement effective landslide mitigation strategies.
- ❖ Engage non-governmental organizations (NGOs) and local communities in the implementation of landslide mitigation measures, such as reforestation projects and slope monitoring programs.

4.3.2. Wildfire

Wildfires pose a significant risk to heritage sites like Panhala Fort, especially during dry seasons. Given the historical and cultural value of the fort, it is essential to implement comprehensive wildfire mitigation measures to protect the site, its surrounding environment, and visitors.

Structural Measure

- ❖ Establish firebreaks (clear zones) around the fort to act as a barrier against approaching wildfires. These can be strips of land cleared of vegetation that prevent the fire from spreading toward the fort.
- ❖ Where feasible, build fire-resistant barriers, walls, or fences around critical sections of the fort to shield it from fire or flying embers.
- ❖ Retrofit existing fort structures using fire-resistant materials. Apply fire-retardant coatings to wooden elements and ensure that roofs and gates are made of non-combustible materials such as metal or stone.
- ❖ Use fireproof storage for valuable historical artifacts or documents kept within the fort premises. Ensure that critical heritage elements are protected against both direct fire and smoke damage.

Non-Structural Measure

- ❖ Regularly clear dry grass, brush, and dead vegetation around the fort to reduce the risk of fire spread. Create a defensible space of at least 30-50 meters around the fort by removing potential fuel.
- ❖ Plant fire-resistant native species around the fort. These species should be less prone to ignition and help slow the spread of fire.
- ❖ Install wildfire detection and monitoring systems, such as infrared cameras, sensors, or drones, to detect heat, smoke, or flames in the surrounding forests or hills.
- ❖ Implement weather stations to monitor dry and windy conditions that can increase fire risk. Coordinate with local meteorological agencies to receive timely alerts on wildfire risks during dry seasons.
- ❖ Set up water storage tanks or reservoirs within and around the fort. Install an automated sprinkler system for fire suppression, particularly near vulnerable structures.

- ❖ Ensure that firefighting equipment, such as hoses, extinguishers, and water pumps, are available at key points around the fort. Train fort staff in using this equipment for emergency response.
- ❖ Establish a designated area for aerial firefighting support, such as a helipad or water source that can be used by helicopters for aerial water drops.
- ❖ Clearly mark and maintain safe evacuation routes for fort staff, visitors, and nearby communities. Ensure that these routes are free of vegetation and can be accessed quickly during an emergency.
- ❖ Conduct regular wildfire response drills for fort staff, local authorities, and visitors to ensure that all parties are aware of evacuation procedures and fire safety protocols.
- ❖ Set up an emergency communication system (e.g., loudspeakers, sirens, or mobile alerts) to quickly notify visitors and staff of a wildfire threat.
- ❖ Establish partnerships with local fire departments, forest services, and disaster management authorities for rapid response and resource sharing during wildfire events.
- ❖ Collaborate with wildfire experts and environmental agencies to conduct regular wildfire risk assessments. Use these assessments to refine and update the fort's wildfire mitigation and emergency plans.
- ❖ Raise awareness among local communities, visitors, and fort staff about wildfire risks, prevention, and response protocols. Conduct educational programs on how to avoid fire hazards (e.g., no smoking, no open flames) and report fires.
- ❖ Engage local communities in Firewatch programs, particularly during high-risk seasons. Volunteers can assist with fire lookout duties and report potential fire threats early.
- ❖ Ensure that access roads to and from the fort are fire-resistant and well-maintained. Clear flammable debris from these roads and create buffer zones along access routes.
- ❖ Ensure that any power lines running through the area are well-maintained, free from encroaching vegetation, and fire-resistant to reduce the risk of electrical sparks causing wildfires.
- ❖ Implement sustainable land use practices in surrounding areas, including afforestation with fire-resistant trees and controlled grazing to reduce the accumulation of dry grass.
- ❖ After a fire, implement erosion control measures to prevent soil erosion, which could compromise the fort's structural stability in the long term. This can be achieved through replanting trees and installing barriers.

4.3.3. Flood

Flooding poses a significant risk to the structural integrity and cultural heritage of Panhala Fort. To effectively manage and mitigate this risk, the following comprehensive mitigation measures should be implemented:

Structural Measures

- ❖ Strengthen existing structures, including walls and gates, to withstand floodwaters. This may involve reinforcing foundations and using water-resistant materials for repairs.
- ❖ Invest in efficient water drainage systems around the fort to facilitate the quick removal of excess water during heavy rains. This includes regular maintenance of existing drainage to prevent blockages.
- ❖ Construct temporary or permanent flood barriers or levees around the fort to redirect or block floodwaters, particularly in areas prone to heavy rainfall or runoff.

Non-Structural Measures

- ❖ Conduct detailed flood risk assessments to identify areas of the fort and its surroundings that are most vulnerable to flooding.
- ❖ Develop a flood hazard map that highlights potential flood zones based on historical data and future projections.
- ❖ Implement strict land use planning regulations in and around the fort to prevent construction in flood-prone areas. Encourage the preservation of natural landscapes that can absorb rainwater.
- ❖ Establish and enforce building codes that require flood-resistant construction techniques for any new structures or renovations in the fort and surrounding areas.
- ❖ Provide guidelines for local communities regarding flood preparedness and the importance of maintaining green spaces that can help absorb rainwater.
- ❖ Set up an early warning system to provide timely alerts about potential flooding, utilizing local meteorological data and community input to predict extreme weather events.
- ❖ Ensure that alerts are communicated effectively to fort staff, local community, and visitors to facilitate timely evacuations and preparations.
- ❖ Conduct awareness campaigns for fort staff, local community, and visitors about flood risks and preparedness measures. Provide training on evacuation procedures and emergency response.
- ❖ Establish clear evacuation routes and safe zones within the fort and nearby areas for visitors and staff in case of flooding.
- ❖ Facilitate partnerships between government agencies, NGOs, community groups, and academic institutions to collaboratively address flood risks and improve resilience.

4.3.4. Earthquake

Given the historical and cultural significance of Panhala Fort, it is critical to protect it from the potential impact of earthquakes. The following earthquake mitigation measures can help preserve the fort's structure and ensure the safety of visitors and staff:

Structural Measures

- ❖ Conduct micro-zonation study and create seismic map in earthquake prone location.
- ❖ Identify the vulnerable structure
- ❖ Adopt the building code and suggestion given by the micro- zonation study and properly designed, engineered and constructed structures — residential, service or infrastructure — built on well tested soil for adapting to suitable adjustments in design.
- ❖ Retrofitting old structures so that shortcomings in construction could be externally strengthened to a considerable extent to withstand the convulsions caused by earthquake.

Non-Structural Measures

- ❖ For getting the structural measures implemented with due earnestness, honesty of purpose and sense of compulsion host of non-structural measures in the form of policies guidelines and training have to be provided.
- ❖ Policy decisions about construction of structures with due approval from specified authorities have to be taken. The building codes etc have to be suitably formulated/amended and appropriately detailed and legal implications properly stated.

- ❖ Guidelines both for earthquake-resistant constructions as well as for retrofitting have to be formulated with specifications about site selection, foundation, construction, materials and workmanship making involvement of specialist architects, trained engineer and masons mandatory.
- ❖ The guidelines have to be formulated for the concerned authorities about land use planning, monitoring of construction work and controlling of settlements in hazard prone areas to avoid fatalities and loss of property.

Mitigation Strategy

- ❖ The desired implementation of mitigation measures requires a well-thought-out strategy. Implementation of mitigation measures, therefore, has to be multi-pronged: adoption wise attractive and cost wise comfortable.
- ❖ The Strategy for mitigation measures for the typical effects of earthquake involves.
- ❖ Awareness generation among the fort staff, visitors and local community about what details to look for or insist upon about the building, household fittings and equipment, in the houses they own or intend to purchase.
- ❖ Awareness among the stakeholders about the need to build/rebuild earthquake resistant houses/structures and keeping safe neighborhood.
- ❖ Capacity building of Architects/Engineers/Builders and even masons for construction of earthquake resistant houses/structures.
- ❖ Formulation of suitable building bye laws in fort or nearby areas and enforcement thereof.

4.3.5. Fire

Panhala Fort is an important historical monument that needs protection from the risk of fire, whether caused by natural factors or human activity. Given the fort's cultural and architectural significance, fire mitigation measures must be both preventive and responsive, aiming to protect the structure and ensure visitor safety.

Structural Measure

- ❖ Retrofit historic structures with fire-resistant materials where possible, without compromising the fort's heritage value. This includes using fire-retardant coatings on wooden elements, roofs, and doors.
- ❖ Store important historical artifacts and documents in fire-resistant storage areas or containers to protect them from fire damage.
- ❖ Install fire dampers in chimneys, vent systems, and other openings to prevent the spread of fire between different areas of the fort.
- ❖ Install water storage tanks and fire hydrants around the fort to ensure an adequate water supply for firefighting. Ensure that the water pressure is sufficient for fire suppression activities.
- ❖ Deploy closed-circuit cameras with fire-detection capabilities around the fort to monitor high-risk areas continuously.
- ❖ Place fire extinguishers at easily accessible locations throughout the fort, especially near wooden structures and entry points.
- ❖ Where feasible, install automated fire sprinkler systems in vulnerable areas of the fort to extinguish fires at an early stage.

Non-Structural Measure

- ❖ Conduct a detailed fire risk assessment to identify vulnerable areas within the fort, such as wooden structures, storage areas for artifacts, and places with dense vegetation.
- ❖ Create a fire hazard map of the fort and surrounding areas, identifying high-risk zones where the likelihood of fire ignition or spread is greater. This map will guide preventive actions.
- ❖ Regularly clear dry leaves, grass, and other flammable debris from around the fort, particularly near fort walls and gates. Maintain a defensible space around the fort to act as a firebreak.
- ❖ Install smoke detectors and heat sensors in key areas/buildings of the fort to detect fires early. These systems should be linked to a Fort Disaster Management plan to alert authorities and staff.
- ❖ Develop detailed evacuation plans for fort staff, visitors, and local communities. These should include clearly marked escape routes and safe assembly points away from potential fire hazards.
- ❖ Conduct regular fire drills to ensure staff and visitors are familiar with evacuation procedures. Include scenarios where access points are blocked to test the effectiveness of alternate routes.
- ❖ Set up well-equipped first-aid stations within the fort and train staff in basic fire emergency medical care.
- ❖ Conduct fire safety awareness campaigns for local communities, fort staff, and visitors. Educate them about the risks of fire and the importance of not engaging in hazardous activities like smoking or starting campfires near the fort.
- ❖ Train all fort staff in fire prevention, detection, and emergency response procedures. Ensure that they know how to operate firefighting equipment and how to safely evacuate visitors.
- ❖ Maintain clear, accessible roads leading to and from the fort for fire trucks and emergency vehicles. Ensure that these routes are wide enough for emergency services to access quickly during a fire.
- ❖ If feasible, establish a helipad or an area accessible to aerial firefighting units to facilitate rapid water drops or fire suppressant releases.
- ❖ Prohibit the use of open flames (e.g., bonfires, candles, cooking fires) within and around the fort unless in designated, controlled areas.
- ❖ Designate the entire fort and its surrounding areas as a no-smoking zone. Place clear signage to inform visitors of the fire risk associated with smoking.
- ❖ Implement strict controls or bans on fireworks and celebratory events involving fire near the fort, particularly during dry seasons.

5. **Planning for Emergency Preparedness and Disaster Response**

5.1. **Planning for Evacuation and Emergency Response**

In the case of a fire or other imminent threat to human safety, begin evacuation procedures as outlined in the Fire and Evacuation manual immediately. Follow instructions provided by the Chief Fire Officer.

In the case of a fire, activate the nearest fire alarm and evacuate the building. Gather at an outdoor Muster Point. Do not use elevators. Close doors and windows as you go. Do not open doors that are hot to the touch or take an alternate route if you encounter smoke. Stay low to the ground if there is smoke present. Use fire extinguishers only if the fire is small and it is safe to do so, or if it is required to clear a route out of the area. Call 101. Alert authorities of

- ❖ the nature of fire.
- ❖ the location of the fire.

- ❖ your name.
- ❖ any other relevant information

In all other situations, an evacuation can be ordered by PFEOC or the DRT.

Means of egress and Muster Points are clearly marked and should be used as learned in training and indicated on maps and signs.

In the case of a smaller scale emergency, where it is safe for staff to stay and initiate an emergency response, the DRT should determine if the public only should be evacuated from all or part of the fort.

The DRT should consider

- ❖ the possibility of a situation becoming dangerous for the public.
- ❖ the need for staff to focus on an emergency.
- ❖ the safety of visitors, and especially minors or disable person, if they were evacuated from the building

5.1.1. Evacuation

A well-structured disaster evacuation plan is essential for ensuring the safety of visitors, staff, and the local community at Panhala Fort during an emergency such as a fire, landslide, flood, or earthquake. This plan outlines the steps to safely evacuate people while minimizing confusion and panic, ensuring clear communication, and providing a safe and secure evacuation route.

5.1.2. Key Roles and Responsibilities

Facility lead: Coordinates all evacuation activities, including communication, crowd control, and liaison with local authorities.

Security Personnel: Assist in guiding visitors along safe evacuation routes, ensuring crowd control, and securing exits.

Staff Members: Assist in directing visitors to evacuation routes, providing first aid, and helping individuals with special needs.

Chief Medical Officer: Provide medical assistance and handle any injuries that may occur during the evacuation process.

5.1.3. Evacuation Routes and Safe Zones

- ❖ Clearly marked paths leading to designated safe zones outside the fort. These routes will be highlighted on maps available at entry points, information booths, and strategic locations throughout the fort.
- ❖ Open areas away from potential hazards such as steep cliffs, historical structures, or dense forests. These areas should be capable of accommodating large groups of people and providing basic shelter and first aid.
- ❖ Alternate routes in case primary exits are blocked or unsafe due to the nature of the disaster. These routes will be identified and regularly updated based on disaster risk assessments.

5.1.4. Evacuation Communication Systems

- ❖ Facility lead will install a loudspeaker system throughout the fort to communicate evacuation instructions in multiple languages (Marathi, Hindi, English). Regularly maintained and tested.

- ❖ Audible alarms to signal evacuation, with different alarm tones for different types of disasters.
- ❖ DEOC will prepare an SMS-based alert system to send real-time notifications to visitors and staff regarding the evacuation process.
- ❖ The facility lead will ensure the availability of walkie-talkies and handheld radios and distribution to key staff to ensure seamless communication during the evacuation process.

5.1.5. Visitor and Staff Evacuation Procedures

- ❖ Upon arrival, all visitors should be informed about evacuation procedures through signage, digital displays, and brochures.
- ❖ Visitors should follow the instructions of staff and security personnel during the evacuation.
- ❖ Individuals with mobility issues, elderly, and children will be given priority assistance.
- ❖ Staff members will be assigned specific roles, including guiding visitors to exits, assisting people with disabilities, and maintaining order.
- ❖ Staff should be familiar with all evacuation routes and designated safe zones.

5.1.6. Evacuation Protocols

- ❖ Once everyone has been evacuated, conduct a final headcount at the safe zones to ensure all visitors, staff, and personnel have safely exited the fort.
- ❖ After the disaster has been resolved, the fort should only be re-opened once authorities have deemed it safe. This includes conducting safety inspections and repairs where necessary.
- ❖ After the evacuation, provide counseling and support services for those affected, especially if the disaster has resulted in injuries or emotional trauma.
- ❖ The Facility lead will collaborate with local DEOC, fire services, police, and medical teams to ensure a coordinated response.
- ❖ Ensure emergency vehicles have clear access to the fort through pre-designated routes.
- ❖ Keep the local community informed of evacuation plans, especially if the fort's evacuation could affect nearby villages or settlements.

5.1.7. Others

- ❖ Regular evacuation drills should be conducted for staff and visitors to familiarize everyone with evacuation routes and procedures.
- ❖ Staff should be trained to handle emergencies, administer first aid, and guide individuals with special needs.
- ❖ Staff and security personnel should be trained to assist individuals with mobility impairments, ensuring they are evacuated quickly and safely.
- ❖ Assign specific staff members or volunteers to assist the elderly, children, or other vulnerable visitors who may require additional assistance.
- ❖ Facility lead/ alternate should keep a record of all individuals (staff and visitors) who have been safely evacuated and those who may still be inside.
- ❖ Conduct headcounts at safe zones to ensure everyone has safely exited the fort. This will be cross-referenced with the visitor tracking system.

- ❖ Restrict access to evacuated areas during a disaster. Only authorized personnel (DRT, Police, Fire man, and medical teams) should be allowed to enter high-risk zones.
- ❖ Security personnel should guide people away from disaster-prone areas and ensure that evacuation routes are not overcrowded, preventing stampedes or panic.
- ❖ Deploy additional security personnel at entry and exit points to manage traffic and prevent unauthorized access during an evacuation.
- ❖ Ensure first-aid stations are well-stocked with medical supplies such as bandages, antiseptics, and oxygen tanks. First-aid kits should be located at safe zones and with key personnel.
- ❖ Establish medical response teams to provide immediate assistance during the evacuation. These teams should be stationed at safe zones and along evacuation routes.
- ❖ Coordinate with local health center or call 101 to provide transport for seriously injured individuals to nearby hospitals.
- ❖ If the disaster occurs during adverse weather conditions (e.g., heavy rain or strong winds), evacuation routes may need to be adjusted accordingly. Ensure that safe zones provide adequate shelter from the elements.
- ❖ Panhala Fort has steep slopes and uneven pathways. In such areas, extra staff and resources (e.g., portable lighting, ropes, stretchers) should be available to help navigate these terrains safely.

5.2. Monitoring and Early Warning Systems

- ❖ If warning of an oncoming disaster can be obtained, the Fort should take all possible measures to prepare for the expected emergency. Potential situations where warning might be available include wildfires, heavy rainfall, flooding, cyclone, landslide or any other event which allows for some pre-emptive measures to prepare facilities and collections for an emergency. The following steps should be taken if there is any chance of facilities being affected:
- ❖ Put all DRT members and related staff on alert and warn them that their assistance may be required if an emergency should endanger the building or the infrastructure.
- ❖ Call in all DRT members to direct efforts to prepare the Fort for an emergency event and ensure that preventive measures are taken.
- ❖ Evacuate the building if the emergency will pose a threat to human life or safety.
- ❖ Assemble emergency supplies as needed.
- ❖ If it is safe to move inside the Fort, set up a schedule of frequent and thorough inspections. This should include a comprehensive survey of the whole Fort to ensure that all systems continue to function properly, and no leakage or damage occurs. Use the Post Disaster Need Assessment (PDNA) form to record any damage.

5.3. Emergency Response Mechanism

In a disaster situation requiring evacuation, follow the Fire and Evacuation Plan developed by the Chief Fire Officer. If it is safe for staff to remain on-site or to return to the site following an evacuation, proceed as below. If at any time the building becomes unsafe, people should be evacuated immediately. At no point should the safety of people be compromised. In the case of a smaller scale emergency, where it is safe for staff to stay and initiate an emergency response, the DRT should determine if the public should be evacuated from all or part of the Fort.

5.3.1. Flood/ Heavy Rain/ Cyclone

In the case of a flood/ heavy rain or cyclone

- ❖ Alert the facilities services and maintenance staff.
- ❖ Contact all DRT members.
- ❖ Monitor emergency alert services on Sachet App, Maharain, Mahaved, Indian Meteorological Department (IMD) portal and the radio.
- ❖ Prepare to evacuate; plan the route based on information available and initiate an evacuation if required. If you can, use the PA system to advise people where to gather and what to do.
- ❖ Staff should not walk through areas where water has accumulated until it has been deemed safe to do so by a qualified individual. Be aware of electrocution risks.
- ❖ Assume flood water contains contaminants and use appropriate Personal Protective Equipment (PPE).
- ❖ Locate the source of water and alert facilities services to stop or mitigate the flow of water if possible.
- ❖ Move computers and other electronic equipment off the floor and unplug electronic equipment and appliances in susceptible areas.
- ❖ Move vital records and archival collections out of low drawers and off of low shelves.
- ❖ Move all objects that can be moved off the floor and off of lower shelves.
- ❖ If flooding on lower levels is anticipated, move objects and records to a higher level.
- ❖ If it is safe to move about the building, initiate regular and thorough building inspection for leaks or damage. Use the PDNA form to record any damage.
- ❖ Prepare emergency supplies, Emergency Kits, Search and rescue equipment.

5.3.2. Wildfire

If a wildfire warning is issued,

- ❖ Contact all DRT members and establish communication with DEOC and PFOEC.
- ❖ Monitor emergency alert services on Sachet App, Indian Meteorological Department (IMD) portal and the radio.
- ❖ Notify staff and visitors regarding what action is required. If you are able to, use the PA system to advise people what to do.
- ❖ Prepare to evacuate and plan the route based on information available. Initiate an evacuation if required and assemble at Muster Point away from the danger where emergency responders can access evacuees.
- ❖ Release staff to secure vulnerable family members if they are under an evacuation alert.
- ❖ Close windows and doors.
- ❖ If it is safe to do so, evacuate vital records and high priority collection objects.
- ❖ Check readiness of battery-powered equipment and backup power sources.
- ❖ Turn on interior and exterior lights.

- ❖ Turn off exterior air intake.
- ❖ Move vulnerable outdoor objects inside if possible.
- ❖ Move combustibles away from the building. Consider furniture, landscaping such as woodchips or brushes, fallen leaves or branches, awnings, and banners.
- ❖ In a large-scale disaster, only use landlines and cell phones for emergency calls. Text messaging uses less space on the network than voice calls.
- ❖ Contact facility services / maintenance staff of Fort.
- ❖ Turn off gas.
- ❖ Immediately upon an evacuation order being issued, evacuate following directions from emergency authorities.

If you are trapped and unable to evacuate,

- ❖ If you can, contact the authorities or call 101 or 1077 so they know where you are and who is with you.
- ❖ Stay inside.
- ❖ Close but do not lock all windows and doors, and block gaps with damp towels.
- ❖ Remove flammable items like blinds, curtains, and awnings from windows, and move furniture that is near windows.
- ❖ Keep the lights on.
- ❖ Turn on exterior sprinklers to wet roofs, buildings, and grounds.
- ❖ Fill buckets and sinks to fight small interior fires.

5.3.3. Cyclone

- ❖ Monitor emergency alert services on Sachet App, Maharain, Mahaved, Indian Meteorological Department (IMD) portal and the radio for update and warnings.
- ❖ Contact all DERT members.
- ❖ Notify staff and visitors if / what action is required.
- ❖ If it is unsafe for people to leave the building, initiate shelter-in-place procedures and gather people in a safe interior space, away from windows and other hazards. Advise people to protect themselves beneath stairs or heavy furniture and by covering their neck and head with their arms.
- ❖ If it is safe to do so, alert facilities services / maintenance staff for assistance in preventing water pooling on the building and grounds.
- ❖ If safe to do so, initiate regular and thorough building inspection for leaks or damage. Use PDNA format to record any damage.
- ❖ If the cyclone involves severe winds, particular attention should be paid to trees and structures or furniture surrounding the building to ensure that they are stable and are not in a position to damage the building. If it is safe to do so, list items that should be moved indoors or secured. Close and seal all doors and windows. Monitor all windows for breakage. Windows may need to be boarded. Move valuable objects and people away from areas that might be impacted by falling or flying objects or debris.

- ❖ If it is safe to do so, locate Emergency Supplies Kits. Prepare additional emergency supplies, including buckets, polyethylene sheeting, mops and towels, Coroplast boxes for relocating affected objects or those which could potentially be harmed.

5.3.4. Landslide

If a landslide warning is issued

- ❖ Notify the facilities services, maintenance staff, and the Disaster Response Team (DRT).
- ❖ Ensure all DRT members are immediately informed and engaged in the response effort.
- ❖ Continuously monitor emergency alert services, including the Sachet App, Indian Meteorological Department (IMD) portal, Maharain, Mahaved, and radio updates for any relevant warnings or advisories.
- ❖ Based on the severity of the landslide or the threat of one, prepare to evacuate affected areas.
- ❖ Plan the evacuation route considering the terrain and possible hazards.
- ❖ Use the PA system to advise visitors and staff on where to gather and what safety protocols to follow.
- ❖ Staff and volunteers should avoid walking through areas impacted by landslides or debris until it has been declared safe by a qualified individual.
- ❖ Ensure everyone is aware of the risks associated with unstable ground, falling debris, and possible electrocution from damaged infrastructure.
- ❖ Use Personal Protective Equipment (PPE) when necessary.
- ❖ If possible, work with facilities services to mitigate any further hazards, such as stopping water flows that may contribute to landslides or clearing minor debris to prevent escalation.
- ❖ Move vital records, valuable instruments, and electronic equipment away from low-lying areas and off of lower shelves to minimize damage.
- ❖ Unplug and move electronic devices to safe areas and secure any valuable equipment.
- ❖ If it is safe to move through the building, initiate regular inspections to check for leaks, structural damage, or further risks.
- ❖ Use the Post-Disaster Needs Assessment (PDNA) form to record any damage.
- ❖ Prepare and distribute emergency supplies, including Emergency Kits and search and rescue equipment.
- ❖ Ensure that staff and volunteers have access to first aid supplies and set up a communication center to coordinate the response.
- ❖ Continue to monitor weather conditions and geological reports for any signs of further landslide activity.
- ❖ Update response and evacuation plans as necessary based on new information and risk assessments.

5.3.5. Explosion / Earthquake

- ❖ Drop, take cover under large stable furniture, supported door or archways or against an interior wall, cover your head and torso, and hold on. Do not move around. Stay away from windows and shelves.

- ❖ If shaking is severe or continuous, and you are able to do so, use the PA system to advise people to drop to their knees, cover their neck and head, take cover under large stable furniture, supported door or archways or against an interior wall, lock wheelchair wheels, and hold on.
- ❖ If you smell gas, get out of the building. Otherwise, do not go outside until the shaking or incident has stopped.
- ❖ Earthquakes often have secondary effects including aftershocks, fires resulting from gas leaks (also a risk after an explosion), landslides or rock fall. Listen to emergency authorities, get to safety.
- ❖ When the shaking has subsided, contact the DRT members to coordinate efforts to ensure human safety and prevent further object damage.
- ❖ Put on sturdy shoes and protective clothing to help prevent injury from debris, especially broken glass.
- ❖ When the building has been declared safe by authorities, thoroughly inspect all systems and building functions with qualified maintenance personnel to ensure that no damage was incurred or to address any damage that is found. Use the Post-Disaster Needs Assessment (PDNA) form to record any damage.

5.3.6. Bomb threat / Suspicious package

- ❖ The person who receives a phone call with a bomb threat should stay calm, be polite, and listen. Try to get as much information about the bomb as possible. Do not interrupt the caller and listen for details in the person's voice or in the background. If possible, initiate a call trace action and signal for a co-worker to call 100. If the call display displays any information, write it down.
- ❖ Use the Bomb Threat Telephone Procedures and Checklist and write down as much information as you can remember. Store a copy of this form with reception or anyone who answers general calls from the public.
- ❖ If you find a suspicious package, leave the area, take others with you, close the door, and call 100; immediately follow the directions provided by emergency service authorities.
- ❖ Do not shake, handle, smell, or taste a suspicious package or letter. If you have handled a suspicious package, wash your hands or shower with soap and water immediately after leaving the area as above. Carefully remove any clothing with powders or liquids on it and seal them in a plastic bag.
- ❖ If instructed to do so by emergency service authorities, evacuate the building as per the Fire and Evacuation Plan developed by Chief Fire Officer.

5.3.7. Medical emergency

- ❖ If a person is found to be in medical distress, including extreme emotional distress,
- ❖ Call 100/1077 and follow directions provided by emergency service authorities.
- ❖ Call first aid certified staff / security and alert the DRT.
- ❖ Clear the area of the public and, if it is safe to do so, assist first responders or first aid providers as requested. Be respectful of the individual's privacy and the needs of their family members or companions.
- ❖ In the case of a pandemic or community-wide outbreak of an infectious disease, contact medical authorities and proceed as instructed. The DRT and / or the Chief Medical Officer may be asked to provide advice to human resources staff regarding instructions to staff about reporting to work. Individuals who know they are contagious or that they have been exposed to an infectious disease should not come to the work site.

- ❖ If the incident requires a public statement, initiate procedures as described in Disaster Management Plan.

5.4. Emergency Team / Disaster Response Team (DRT)

All staff are familiar with emergency/disaster planning and their role in its execution, and have the resources, training, and authority to undertake their duties and responsibilities. There is a designated Disaster Response Team (DRT) established to guide the Panhala Fort's actions and response (Fig.9). In the event of an emergency, the key decision maker will be the Response Lead or their designate who will lead the DRT. All staff may be called on to assist in the preparedness, response and recovery effort, often in roles outside of their usual responsibilities.

To facilitate an efficient, organized, and prompt response in the event of an emergency/disaster, individuals have been designated with specific duties and responsibilities for which they will be trained in advance and prepared to undertake. The DRT includes staff in the following roles:

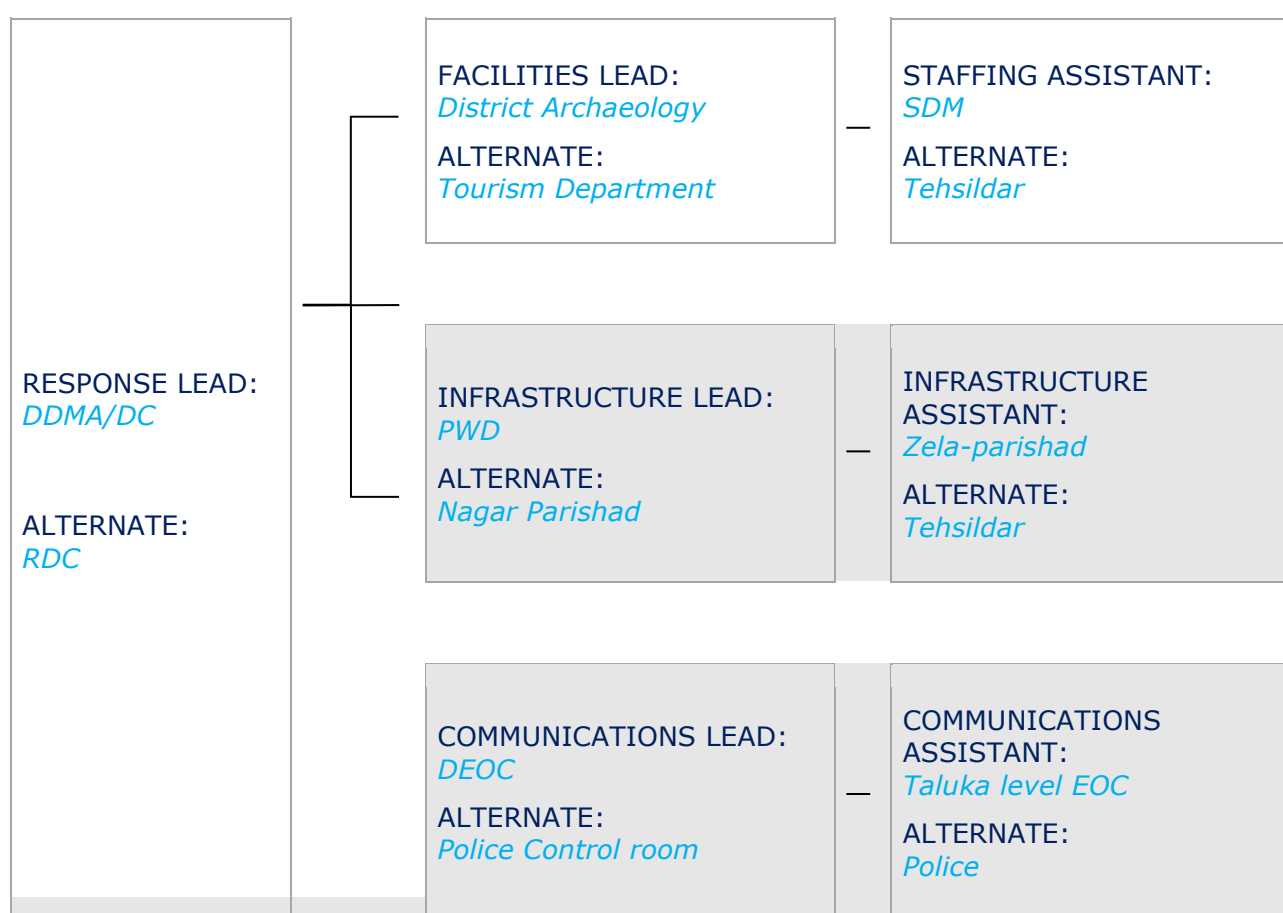


Fig. 9: Structure of Disaster Response Team

5.4.1. Responsibilities

Response lead: [DDMA/DC]

Alternate: [RDC]

Primary area of responsibility: [Management / Response]

The Response Lead

- ❖ Takes charge and coordinates emergency response and recovery.
- ❖ Declares emergency and implements the [Emergency and Disaster Plan] and evacuation procedures as per the [Fire and Evacuation Procedure].
- ❖ Contacts emergency services first responders (fire / police / ambulance).
- ❖ Works closely with first responders, team members and third-party contractors, and relays decisions to team members.
- ❖ Summons members of the DRT.
- ❖ With the Facilities Lead, works to ensure the safety of people and the security and integrity of the building.
- ❖ With the Infrastructure Lead and Assistant, works to ensure the safety of the infrastructural damage and vital records.
- ❖ With the Staffing Assistant, works to ensure the safety of staff and volunteers who are undertaking to restore operations and protect the infrastructure and assets.
- ❖ With the Communications Lead, responds to requests for information and media requests.
- ❖ With the Recording Assistant, ensures internal staff and volunteer communication is quick and effective and that records critical to the response are maintained.
- ❖ Makes and authorizes all decisions related to administrative and financial matters, in alignment with policy and procedure and in consultation with the [Executive Director and Board, or the appropriate authority] when required (i.e., personnel and administrative records, insurance claims, purchase of emergency supplies, equipment, and services).

Infrastructure Lead: [PWD]

Alternate: [Nagar Parishad]

Primary area of responsibility: [Infrastructure / Insurance / External Resources and Supplies]

The Infrastructure Lead

- ❖ Takes charge of structural audit in an advance warning situation.
- ❖ Takes charge of all aspects of structural damage.
- ❖ Evaluates the Fort environment and, in consultation with the Facilities Lead, determines measures to stabilize it;
- ❖ Evaluates damage to the structure and liaises with insurance adjusters.
- ❖ liaises with external conservation expertise.

Facilities lead: [District Archaeology]

Alternate: [Tourism Department]

Primary area of responsibility: [Facilities / External Services / Environmental Controls]

The Facilities Lead

- ❖ Takes charge of evacuating and securing the building.
- ❖ Takes charge of stabilizing and restoring the building.

- ❖ Controls access and movement of all personnel in and out of the building.
- ❖ Together with the Infrastructure Lead, arranges for safe shelter and work facilities where required.
- ❖ Arranges for transportation of tourist for evacuation
- ❖ Arranges security services for the response.
- ❖ Is knowledgeable about all aspects of building utilities and systems and works with the Infrastructure Lead to manage environmental conditions.
- ❖ Obtains and supervises building recovery services and contractors in consultation with the Infrastructure Lead with respect to building safety and environmental controls.
- ❖ Maintains copies of detailed and current blueprints and floor plans.

Communications lead: [DEOC]

Alternate: [Police Control Room]

Primary area of responsibility: [External and Internal Communications / Emergency Operations Centre / Media Relations]

The Communications Lead

- ❖ Takes charge of communications for the team, the staff, and external support during response / recovery operations.
- ❖ liaises with information technology staff to restore and maintain communications technologies and systems as well as access to vital records needed for response and recovery.
- ❖ Provides information to relevant levels of stakeholders to aid in the emergency response and recovery.
- ❖ Distributes information and responds to media, and if the disaster is large-scale, coordinates media response.
- ❖ Monitors news, weather and public services messages, including alert systems and social media notifications to collect information on pending and occurring disasters.
- ❖ Coordinates social media messages.
- ❖ Handles incoming and outgoing public messages, including calls for volunteers, supplies, and equipment as well as messaging when these needs have been filled.
- ❖ With Staffing Assistant, maintains communications among Volunteer Support Team.

Infrastructure assistant: [ZP]

Alternate: [Tehsildar]

Primary area of responsibility: [Infrastructure Stabilization and repair]

The Collections Assistant

- ❖ Coordinates the structural assessment, stabilization, and restoration.
- ❖ Is responsible for visual (photographic, video recording) and written documentation of damage and records recovery efforts for insurance and evaluation purposes.
- ❖ Works with the Infrastructure Lead to ensure safety and precaution related to structural damage.
- ❖ Prepares Post Disaster Need Assessment (PDNA) reports.

Staffing assistant: [SDM]

Alternate: [Tehsildar]

Primary area of responsibility: [Human Safety / Emergency Staffing]

The Staffing Assistant

- ❖ Always ensures the safety of staff and volunteers during an emergency.
- ❖ Ensures appropriate health and safety equipment is available and utilized.
- ❖ Attends wellness considerations such as fatigue, mental health, breaks, food, music, rest, and lengths of shifts.
- ❖ Liaises with human resources staff on Human Resources Policy and administration matters.
- ❖ Ensures staff and volunteers have access to psychological first aid, crisis counselling, or other mental health supports
- ❖ In a community-wide disaster, coordinates the dissemination of disaster response information and resources for employees and volunteers whose homes or families have been affected
- ❖ Contacts Volunteer Support Team, coordinating with the Communications Lead and the Infrastructure Lead for skilled volunteer services from the fort and archives community.
- ❖ Accepts or declines offers of volunteer support based on the fort's needs, each volunteer's skills and training, and health and safety considerations.
- ❖ Works with Infrastructure Lead to provide human resources needed for recovery/reconstruction effort.

Recording assistant: [Tourism Department]

Alternate: [Nagar Parishad]

Primary area of responsibility: [Documentation and Internal Communications]

The Recording Assistant

- ❖ Attends meetings of the DRT and all other response meetings—including staff and volunteer updates—and records decisions and action items.
- ❖ With the Communications Lead, is responsible for internal communication and disseminates information as required to the DRT and staff and volunteers.
- ❖ Ensures a photograph and video record of all response efforts is created and maintained and works with the infrastructure Assistant to coordinate the documentation of structural damage.
- ❖ Records meetings of the DRT.
- ❖ Maintains a document management system to secure and make accessible to the DRT the records associated with the response.

Other responsibilities

- ❖ The DRT will hold regular meetings to coordinate efforts and make decisions regarding the Fort's disaster preparedness and response. When possible, the key decision points and action items from these meetings will be recorded by the Recording Assistant. In an emergency situation, meetings will be held at least daily. DRT members will serve as team leads for disasters requiring a large-scale response. It is their responsibility to communicate decisions and action planning to their work groups.

- ❖ DRT members should be provided with the materials and equipment needed to facilitate communication and emergency responses. In particular, cell phones or walkie talkie should be made available and used. If required, additional fort cell phones or walkie talkie will be secured. DRT members with a Fort issued cell phone should ensure that contacts, alert systems, emergency response apps, and other information that is important in an emergency is stored on the device and, when possible, available without a cellular or Wi-Fi connection.
- ❖ In the case of a smaller scale emergency or an emergency localized to a particular area, the DRT may decide to operate with a modified team. This modified team will still ensure that the relevant position functions and plan objectives.

Volunteer support team

- ❖ A list of trained volunteers who may be called on in the event of an emergency to assist in recovery and cleanup operations. These volunteers should be included in the appropriate aspects of the Fort's disaster preparedness training/Mock drill.
- ❖ Volunteers, along with staff members without assigned duties, will provide assistance in areas determined by the DRT. The Volunteer Support Team will report to the Staffing Assistant.
- ❖ Unsolicited volunteer help will be accepted or assigned when their support is both needed and appropriate, and when it is safe to do so according to the direction of the DRT.
- ❖ Skilled volunteers from the fort and nearby community will be sought as required to undertake certain aspects of the response and recovery efforts.

5.5. Chain of command

All members of the Disaster Response Team will observe the Chain of Command as follows:

- ❖ All staff and volunteers will respond to any instructions or directions given by emergency/disaster service authorities including police, fire, and ambulance personnel.
- ❖ In the event of an evacuation, all staff and volunteers will respond to the directions provided by the Chief Fire officer and Fire officer.
- ❖ The DRT members (Infrastructure Lead, Facilities Lead, Communications Lead, Infrastructure Assistant, Staffing Assistant, and Recording Assistant) will report to the Response Lead.
- ❖ Volunteers and other staff not assigned specific duties will report to the Staffing Assistant, or once specified, their work team Leads.
- ❖ In the case of a community-wide disaster, the Response Lead will liaise with the district's Disaster response force as per the district disaster management plan.

5.6. Communicating an emergency / disaster

- ❖ A situation is declared an emergency or a disaster by the Response Lead in consultation with the relevant stakeholders. In the absence of the stakeholders, or if they cannot be reached, the Response Lead (or when unavailable, their Alternate) is authorized to declare an emergency and assemble the DRT.
- ❖ When a disaster or possible emergency is encountered by any member of the fort's paid or volunteer staff, the Response Lead should be contacted immediately. If the Response Lead is unavailable, any member of the DRT can be notified. If human safety is a concern, call 1077 first.
- ❖ When an emergency/disaster requiring full or partial evacuation is encountered, fire alarm and public address (PA) system protocols will be initiated according to the Fire and Evacuation Procedure. All

staff and volunteers will be trained to understand the PA system codes and the procedures that they trigger.

- ❖ In the case of a disaster/emergency declared after hours, especially one that causes the Fort to be closed to staff or where staff may be assigned different locations to work or a different role than usual, the following protocol will be initiated:
 - Internal messages will be developed according to the procedure described in the Communications Plan. This may involve the use of holding messages when more details are not available.
 - All staff will be contacted by WhatsApp / video conference / text message / phone / email. Staff will be asked to check in with their supervisor by WhatsApp / video conference / text message / phone / email by a specified time. Staff who have not checked in by that time will be contacted directly by their supervisor.
 - Once the emergency response has begun, and depending on their work function, supervisors may be assigned to another member of the DRT for communication purposes and work assignments.
 - If servers are non-functional or internet communication has been disrupted, phone calls will be used instead, and the organizational chart will act as a phone tree to facilitate a prompt process.

5.7. Emergency operations center

The District Emergency Operations Center (DEOC) plays a crucial role in coordinating disaster response and recovery efforts during emergencies at Panhala Fort. When a disaster requires a long-term response or evacuation, the DEOC can be activated to support the Panhala Fort Emergency Operations Center (PFEOC). Key responsibilities of the DEOC include:

- ❖ The DEOC serves as a command center, directing response and recovery efforts. It provides a space for meetings and acts as a hub for communication, ensuring all actions are well-coordinated.
- ❖ The DEOC stores and distributes necessary supplies and equipment for disaster response, such as search and rescue tools and safety gear.
- ❖ The PFEOC ensures the basic needs of response teams, including sanitation, food, rest, and first aid, are met to maintain effective operations.
- ❖ DEOC facilitates the use of advanced communication technologies and systems like the Incident Response System (IRS), India Disaster Resource Network (IDRN), and National Disaster Management Information System (NDMIS) to provide timely information and suggestions to the response lead for effective decision-making.
- ❖ The DEOC connects various line departments to ensure coordinated efforts across different sectors. It also disseminates warnings and alerts, ensuring all stakeholders are informed about ongoing situations and actions.
- ❖ The DEOC provides suggestions and guidance to the response lead to support the implementation of appropriate response and recovery actions based on real-time data and coordination efforts.

5.8. Emergency Response Systems within the Site/Precinct: Automated and Manual

Cultural heritage sites and precincts should be equipped with the following emergency response systems:

- ❖ **Fire suppression systems** that respond to the specific needs of the site or precinct. Fire suppression systems can be automated or manually operated or a combination of both depending on the typology of the site. However, it should be considered that in the case of many cultural heritage sites and precincts, standardized systems of fire suppression may not be compatible with the historic fabric and their installation/ and use may impact the heritage values of the site. Therefore, it is important to understand the material, construction and aesthetic value of the site as well as assess possible ignition sources before setting up a fire suppression system. All staff and management should be regularly trained in the usage of these systems, and these should be easily accessible and regularly serviced and replaced when needed
- ❖ **Public address systems** and provision for wireless communication in case of loss of telephonic networks and communication. This could include walkie-talkies, hand-held radios and intercom systems. Public address systems are particularly useful for large scale sites and heritage precincts with inhabitants.
- ❖ **Security systems** like automated door locking, cut-off for elevators systems and access to potentially hazardous areas within the building, cut-off for electrical supply and water supply systems. Basic physical barriers at entrances and exits, locking systems should be provided in every heritage site in both public spaces as well as storage and archive areas. These should be monitored regularly.
- ❖ **Emergency lighting and electrical back-up systems** that provide public areas with enough lighting in the scenario of a power failure, as well as protection of electrical equipment from power surges and fluctuations other response systems that respond to the specific hazards identified during the risk assessment stage should be incorporated as well. It is important to take the site requirements and limitations into consideration while implementing such systems.

5.9. Emergency Supplies and Equipment

An indicative (not comprehensive) list of emergency supplies and equipment is listed. Temporary salvage of sites may only be undertaken once the emergency has been declared as stabilized and the site is declared safe for re-entry. An assessment of stabilization equipment may be needed for complex sites. Potential suppliers and storehouses for such material can be arranged for, while creating the emergency plan.

For Evacuation of people

- ❖ Emergency lights, flashlights
- ❖ First aid kits
- ❖ Masks
- ❖ Wheelchairs and stretchers as needed

For temporary stabilization or salvage of building/site

- ❖ Hard hat or helmet
- ❖ Safety goggles
- ❖ Masks
- ❖ Flashlights and Emergency Lamps
- ❖ Assorted gloves including standard rubber gloves, acid resistant gloves, heat resistant gloves or mitts
- ❖ Assessment forms and clipboards with stationery
- ❖ Cameras with spare battery packs and spare memory cards
- ❖ Caution tape
- ❖ Labels and stick-on tags
- ❖ Duct tape
- ❖ String and Rope
- ❖ Basic toolbox
- ❖ Basic storage boxes and packing material including water-proof sheeting for temporary covering of exposed areas
- ❖ Basic hardware including timber battens, nails, screws, etc. for emergency stabilization

6. Post-disaster Assessment, Planning and Recovery Processes

6.1. Post-Disaster Damage and Needs Assessment (PDNA)

Post-disaster needs assessment is a crucial process conducted in the aftermath of a disaster to evaluate the impact on affected aspects and determine their immediate and long-term needs. This assessment involves gathering comprehensive information about the extent of damage caused by the disaster, including damage to infrastructure, local homes, livelihoods, and social services. Additionally, it identifies the vulnerabilities of the affected population and assesses their capacity to cope with the aftermath of the disaster. The needs assessment findings guide the development of response and recovery strategies, ensuring that assistance is targeted effectively to address the most pressing needs of the affected communities. Moreover, the assessment helps coordinate efforts among various stakeholders, including government agencies, humanitarian organizations, and local communities, to facilitate a comprehensive and coordinated response to the disaster.

6.1.1. Standardized procedures and methodologies

The post-disaster documentation and evaluation process varies based on the disaster's nature and effect on the vicinity. In general, a visual survey of the site/precinct is conducted in the initial stage to inform the subsequent comprehensive surveys and assessments. The visual survey can be a basic checklist to establish that the site/precinct is safe for re-entry and evaluation, or it can be used to determine whether immediate stabilization actions, such as shoring up structural components on the site and creating access through debris clearance, are required.

6.1.2. Key Timeline

The recent advancement in disaster assessment, particularly the adoption of the National Disaster Management Plan, 2016, by the Government of India, in line with the Sendai Framework for DRR (2015- 2030), puts greater emphasis on resilient recovery. For resilient recovery, the critical factor is assessing post-disaster damage and needs. The PDNA steps are explained in the PDNA Manual in more detail, but the key steps are presented below (Fig. 10).

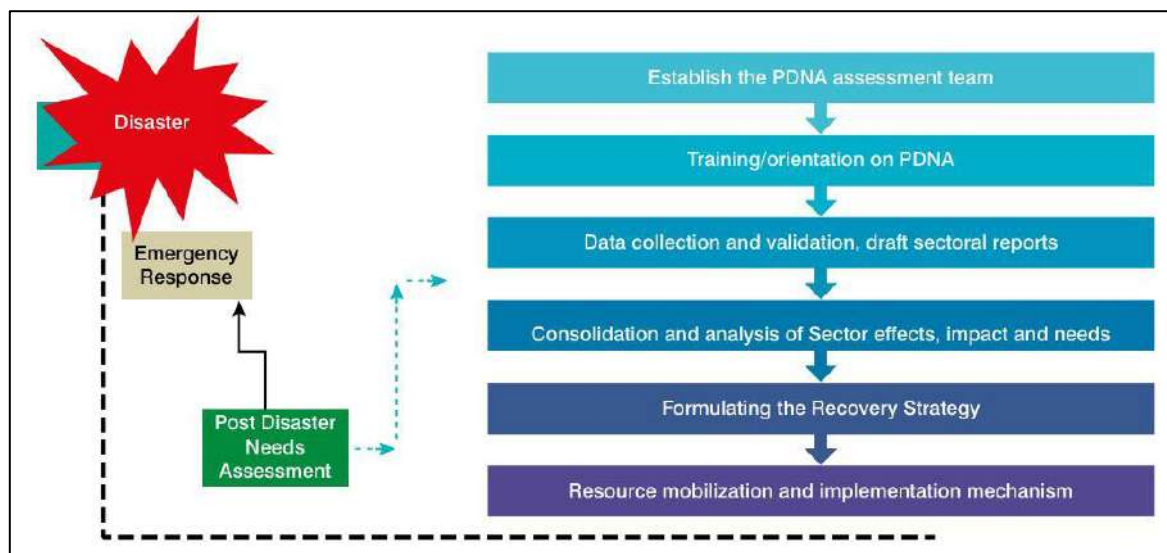


Fig. 10: Steps of PDNA as per NDMA

For each of the steps, the critical factor is the timeline. The agreed international methodology based on UN-ECLAC by the UN, EU and WB proposed the following timeline for a comprehensive assessment.

6.1.3. PDNA Timeline

Table 8: survey timeline for PDNA

Types	Week							
	1	2	3	4	5	6	7	8
Estimation of disaster effects								
Baseline data collection								
Field visit and survey								
Estimation of damage and production losses								
Aggregation of damage and production losses								
Estimation of disaster impact								
Micro-economic impact analysis								
Macro-social impact analysis								
Personal/household impact analysis								
Recovery needs								
Reconstruction needs								
Assessment report preparation								

6.1.4. Mobilizing resources for assessment

In cases of L2 and L3 category disasters, the damage to Fort may be extensive, making it impossible to conduct an evaluation using internal resources. To increase efficiency, consider using new technologies like crowd-based maps and ICT platforms that allow volunteers to exchange information. Trained volunteer teams can do fast visual assessments with specified tasks. Teams of trained volunteers can be assigned specific tasks to conduct rapid visual assessment.

6.1.5. Compiling the data in a meaningful way to inform the process of post-disaster recovery planning and action

Damage assessment and overall disaster losses should be communicated clearly and effectively to local stakeholders, management, and potential financing or donor organizations, allowing for efficient and transparent recovery planning. When conducting a post-disaster needs assessment, prioritize activities based on the highest risk elements of the location.

- I. Elements of the site which are at highest risk due to the disaster
- II. Elements which are of the highest significance and are the most vulnerable
- III. Elements that have suffered the greatest damage but are retrievable
- IV. Relatively stable aspects
- V. Irretrievably damaged elements

The basic procedures involved in post-disaster assessment are as follows:

Table 9: Post disaster assessment process

Processes	Descriptions
Assessment of the context	It is essential to ensure that the site/precinct and surroundings are safe for entering and working and that it is secure and that basic services are available
Evaluating initial assessment	An overall picture of the site damage will enable the rescue team to list out immediate needs and resources, gather permissions and assistance, set out criteria for salvage procedures and develop the initial plan
Secure and stabilize	Depending upon the scale of the disaster, it may be necessary to secure the location before undertaking any type of salvage operation

Processes	Descriptions
Salvage or transfer of collections based on initial assessment	Based on initial assessment, it may be deemed urgent to remove certain elements from their location and shift them to a secure temporary location
Detailed assessment	This should be undertaken by qualified professionals only. Detailed assessment should be accompanied with documentation, visual as well as descriptive to keep a detailed record of the condition of the object prior to any treatment

6.1.6. PDNA Committee members

The PDNA should be a well-coordinated inter-agency mechanism. Agreement on the management structure of the PDNA is essential. The management structure shall comprise of the following:

PDNA management team: depending on the DRT decision, the Facility Lead (Archaeology department) typically leads the management and assessment team. The management team shall meet regularly with DRT to oversee the assessment process, provide strategic guidance, take decisions, and ensure that the necessary resources are available for undertaking the evaluation.

Coordination team: the PDNA management team will agree to assign a few staff to provide coordination between the fort and logistics. The members can be from the Infrastructure Lead (PWD) or Staffing Assistant (SDM). The team shall be responsible for managing day-to-day planning, coordinating with the sector team members and DRT and donors in conducting the assessment, analyzing the data, preparing the reports, and developing the recovery and reconstruction framework under the guidance of the PDNA management team. The Coordination team shall be responsible for organizing the assessment's conduct and ensuring all logistical arrangements are in place.

Sector teams: The sector teams shall comprise designated technical representatives from PWD, ZP, or Nagar Parishad. The Staffing Assistant will assist during the visit to the affected area. The sector team will collect baseline data, damage, and loss data, undertake field visits to validate the data collected, analyses the data, and write the sectorial assessment report on damage and loss and proposed sector priorities for recovery and reconstruction.

Report Preparation Secretariat: the coordination team, with technical support from development partners (if required), shall coordinate with the sectorial team members for the report. The coordination team will then summaries the individual report into a consolidated report and share it with the management team.

6.2. Emergency Stabilization- Approaches

Before long-term repairs, recovery, and reconstruction can begin, interim measures to stabilize the Fort may be required to provide safe access and decrease disaster risks. A structural or conservation specialist (PWD/Archology expert) should be engaged to determine the least invasive technique to stability that guarantees the site/precinct's values are not endangered by such interventions.

Some temporary stabilization steps are outlined below:

- ❖ Installing a temporary shelter/roof for the structure to protect it from environmental harm, secure the internal areas, and stabilize working conditions for any interior spaces.
- ❖ Shoring, propping, anchoring, or bracing to provide temporary structural support to a building that has sustained impact or structural damage. Qualified experts are needed for these activities since improper support systems might cause further damage.
- ❖ Drying out structures or interiors with mechanical ventilations, fans, and dehumidifiers, depending on the level of water or moisture damage, to prevent biological assaults, extended humidity, and so on.
- ❖ Surfaces of high value and high risk can be cleaned dry or wet, depending on the materials.

- ❖ Structure dismantling may be a viable option if the system allows for re-assembling and there is comprehensive documentation.

Stabilization processes should be carried out only after the assessment step has been completed and stakeholders have agreed on action priorities.

Interim stabilization of the Fort is also important since it offers the site managers, local stakeholders and authorities time to get organized, raise funds and take considered decisions regarding post-disaster repairs and recovery exercises. Haste should be avoided at all costs since it can result in further adding to the loss of heritage value in the process of recovery and cause further damage.

6.3. Post Disaster Repairs and Reconstruction

Post-disaster repairs and reconstruction of damaged sites/precincts should be carried out only with proper documentation and evaluation processes. Poor reconstructing procedures create additional physical harm to heritage fabric while increasing its structural fragility.

In general, the following principles should be applied:

- ❖ For the Fort, a limited intervention approach should be followed, with any intervention being based on good documentation and study. Any endeavor at reconstruction, restoration, or retrofitting should begin with considerations of authenticity and visual integrity.
- ❖ Traditional skills and methods, if available, should be used to repair and restore damaged structures. This ensures the continuity of building and crafting traditions.
- ❖ Restoring cultural heritage sites/Fort can help restore a feeling of normalcy in disaster-affected areas. These factors should help with heritage conservation and rebuilding as part of the broader recovery strategy.
- ❖ Principles of 'build back better' form a central component of international frameworks such as the Sendai Framework. However, the notion of 'better' with respect to cultural heritage is yet not clearly defined. This means that retro fitting measures, which may increase the structural stability of cultural heritage sites, should be undertaken with caution and only after carrying out community consultation among stakeholders discussing clearly on the benefits as well as limitations of such an approach. Retrofitting may have a significant impact on integrity and value and this potential impact should be discussed and evaluated against the benefits.

6.4. Funding, Partnerships and Business Planning

Generating resources for post-disaster rehabilitation and recovery requires the contribution of local, regional, national as well as international partners and institutions, which often makes the task of fund raising as well as the task of effectively utilizing the funds a complex process.

A sound business plan of the Fort with clear objectives and timelines should be prepared by the Archology department, considering the views of local stakeholders, and used for raising funds. Funds are typically financed and disbursed through the State exchequer, in coordination with the Centre and/or international funding agencies. The usage of funds will be determined through the Ministry of Culture.

6.5. Linking Recovery to Risk Reduction

Recovery, rehabilitation, and reconstruction activities should be connected to risk reduction and mitigating the effect of future disasters. The concept of 'building back better' supports this approach. Post-disaster recovery operations may often give insight into risk and emergency management while also highlighting shortcomings in the prior disaster risk management method. Risks that were previously unaddressed can be integrated, and detected vulnerabilities can be removed or mitigated by proper rebuilding, restoration, or even reassignment

of usage. The recovery phase should also be used as an opportunity for building capacity among professionals and local stakeholders for better risk reduction.

7. Training, Capacity Building and Raising Awareness

Training, fostering capacity, and increasing awareness are critical components of disaster risk management and must be carried out at numerous levels. To effectively manage disaster risk at Panhala Fort, institutions and government agencies should collaborate to design effective training modules that address several strategic norms. Training and capacity building should have the following primary objectives:

- ❖ Highlight the need for holistic approach towards disaster risk management that responds to the specific needs of Fort
- ❖ Enable Facility lead and site staff to carry out basic risk assessment for the Fort independently and build systems for management, through risk reduction measures, emergency response protocols and recovery processes
- ❖ Stakeholders including Facility lead and local communities should be equipped to implement, monitor and update disaster risk management plans in their assigned capacity
- ❖ Networks between different agencies responsible for the management and administration of Fort should be established to build institutional capacity and cooperation
- ❖ Highlight specific issues that deal with a hazard that emerges due to specific geographical and cultural context

The mandate for training and capacity building for disaster risk management is primarily with the Kolhapur DDMA.

7.1. Capacity Building for Disaster Risk Management Professionals/ Emergency Responders

Table 10: Training of Disaster Response Team (DRT) members

Program	Description	Duration
Introduction to Panhala Fort: Concerns and Issues	This module introduces the specific concerns and scope of cultural heritage and challenges of disaster risk reduction involved	2-3 days
Disaster Risk Management for Panhala Fort	This type of course will provide interdisciplinary training for participants to equip them to undertake integrated disaster risk assessment of Panhala fort, build comprehensive systems for disaster risk management incorporating various measures aimed at reducing risks, respond to disasters and recovering from them to be able to formulate disaster risk management plans for cultural heritage sites and precincts	1-2 weeks
Emergency Response and Stabilization Fort	This module will train emergency responders in the appropriate emergency response procedures applicable for Panhala Fort, highlight the processes for retrieval of artefacts and collections, illustrate measures for temporary stabilization that will not adversely affect cultural heritage sites and so on	3 d a y s - 1 week
Disaster Risk Assessment Methodologies	This module will explore the basic relationships between hazards, vulnerabilities and disaster risks, illustrating each	2 -3 days

Program	Description	Duration
	stage in the disaster risk management process. Building upon this base, approaches and methods for risk assessment will be introduced	
Post Disaster Assessment	This module will focus on post-disaster assessment methodologies for Panhala Fort, and equip Fort staff with the tools needed for carrying out assessments at various scales and in various scenarios of disaster	2-3 days
Planning for Disaster Risk Recovery	This module explores actions that are involved in post disaster recovery and rehabilitation of cultural heritage sites and precincts	2-3 days
Role of recent Technology in DRR	This module will explain the benefit of using the advance technology for HRVA, Recovery and Reconstructions	1-2 days

7.2. Training of Site Staff and Management

The following programs should be integrated within the annual/monthly calendars for sites with pre-existing management plans or systems:

Table 11: Training programs for staff and management

Program	Description	Duration	Frequency	Participants
Basic Security Protocol Delivery	Basic training to security and staff about critical infrastructure, security and standard responses	1 Hour	Once in a month	Particularly security staff, managers
Risk Assessment Training	Participant should be able to undertake basic risk assessment of the building, infrastructure, management, etc.	2-3 days	Once in a Year	Site manager and staff members. May be in coordination with the heritage practitioners involved in the conservation/management of the site
Tabletop Exercise	A Tabletop Exercise is a paper drill intended to demonstrate the working and communication relationships of functions found within the disaster management organizational plan	½ Day	Once in 3 months	The exercise is intended primarily for the administrators, managers and personnel who could conceivably be placed into an officer's position upon activation of the disaster management plan
Emergency Drill or Workshop	A drill that engages the entire staff and management and prepares the site or precinct for likely disaster scenarios and the appropriate responses	1 day	Once in 6 months	Ideally visitors should also be participants in this drill to raise awareness but also provide a realistic scenario to staff and management

7.3. Raising Awareness among Local Communities, Residents and Visitors

Due to the specialized concerns and challenges of addressing disaster risk management for cultural heritage sites and precincts, it is important to tailor activities for raising awareness for disaster risk management for local communities that reside within and around these sites as well as visitors and tourists. Local communities can also be mobilized as volunteers during and after a disaster, so prior training will ensure a robust response and also streamline coordination.

Awareness can be raised through the following actions:

Table 12: Awareness generation programs

Program	Description	Duration	Frequency	Participants
Off-site Interpretation/ Orientation/ Fixed Literature	Online or Printed literature that highlights the emergency plan for the Panhala fort. This can be interactive or in the form of brochures and maps	N/A	N/A	All local stakeholders, visitors to the site should be able to access this information freely and widely
Basic Emergency Protocol Delivery	Basic training to engage security and emergency responder in the area about acceptable routes, procedures	½ day	Once in 3 months	All stakeholders that spend extended periods of time on the site
Emergency Drill or Workshop	A drill that engages the entire staff and management and prepares the site or precinct for likely disaster scenarios and the appropriate responses	1 Day	Once in 6 months	Residents, visitors and other stakeholders should be participants in this drill to raise awareness but also provide a realistic scenario to staff and management

8. Conclusion and Action Plan

The Panhala Fort Disaster Management Plan establishes a comprehensive framework aimed at safeguarding the fort's structural integrity and protecting lives in the event of a disaster. By identifying and addressing potential risks such as landslides, earthquakes, fires, and floods, the plan provides a multi-layered approach to disaster preparedness. It ensures resilience through structural reinforcement, early warning systems, and regular training for staff and local communities. Sustainable tourism management is also integrated to maintain a balance between heritage preservation and visitor safety. Overall, the plan empowers local authorities, stakeholders, and the community to collectively respond to emergencies, thereby preserving Panhala Fort's historical significance for future generations.

8.1. Implementation and Revising the Plan

Some of the provisions for Panhala Fort have been detailed in this plan need to be undertaken with immediate effect, while the implementation of longer-term strategies and changes may require time and resources. The implementation of the of this Plan requires coordinated efforts from various stakeholders, including local authorities, government agencies, and community members. It involves regular training programs, mock drills, and establishing response protocols that ensure preparedness at all levels. Additionally, specific disaster response teams are tasked with managing emergencies and conducting real-time evaluations.

8.2. Revising and Updating the Guidelines

This document is a dynamic document and will be updated periodically based on new technological advancements, research, and post-disaster assessments. Regular audits and feedback from disaster response drills will guide these revisions. Incorporating lessons learned from real-world disaster events will enable the continuous enhancement of the plan, thereby maintaining the fort's resilience against evolving threats.

9. Annexure

9.1. Important contact number

Sl.no	Organization Name	Contact Details
1.	Nagar Parishad	(02328) 235027,235047
2.	Panhala Police Station	(02328) 235024
3.	Archaeological Survey of India, Sub circle Panhala	(02328) 235247
4.	Rural Hospital, Panhala	(02328) 235049
5.	Water Supply	(02328) 235330, 235331
6.	Maharashtra State Electricity Board, Panhala Branch	(02328) 235053
7.	President, Hotel Association	(02328) 235072

9.2. Office staff contact number

Sl.no	Name	Contact Details
1.	Mr. Chetan Kumar Dhanappa Mali, Administrator and Principal	9960186646
2.	Mr. Amit Hindurao Mane, Administrative Officer and Tax Inspector	9518968582
3.	Mr. Tanaji Nanavare, Accounts	7387943382
4.	Smt. Snehal Ramesh Panhalkar, Water supply and Sanitation supervisor	9156020880
5.	Smt. Jayashree Balaso Devkule, Civil Engineer	8329325534
6.	Mr. Biswas B Ramane, Clerk	9763917607
7.	Mrs. Madhura Maruti Gawli, Tax Inspector	7499590943
8.	Smt. Surekha Ashok Vadar, Tax Inspector	7768931225
9.	Mr. Asuman Gaikwad, Assistant Town Planner	7083981095
10.	Mr. Mukul B Chavan, Junior Engineer	9503649879
11.	Mr. Gurunath B Kamble, Barnishi	9923112071
12.	Mr. Ajit D Choury, City Coordinator	8888449036

9.3. Panhala town office

Sl.no	Organization Name	Contact Details
1.	Tehsildar Office	(02328) 235026
2.	Medicine (Rural Hospital)	(02328) 235049
3.	PWD (Circuit House)	(02328) 235038
4.	Panhala Police Station	(02328) 235024
5.	Archeological Accountant	(02328) 235247
6.	Water Supply Department	(02328) 235330, 235331
7.	Maharashtra State Electricity Board, Panhala	(02328) 235053, 235043
8.	Telecom Corporation, Panhala	(02328) 235001, 235100, 235400

9.4. Other Offices

Sl.no	Organization Name	Contact Details
1.	Kolhapur Collector Office	2665814, 2665813
2.	DEOC, Collector Office	2665812
3.	Subdivisional Officer, Panhala Subdivision	(02328) 235023
4.	Assistant Director, Town Planning Kolhapur	2342565
5.	Deputy Engineer, Kolhapur	2537019

9.5. PDNA Format

Name of Officer:

Date of Disaster:

Type of Disaster:

Duration of Disaster:

a) Electrical Facilities

Item/Services	No. of unit damage	Population affected	Recovery measure
Feeder			
Transformer			
HT lines			
LT line			
Electric poles			

b) Human lives

Items	Particulars	Total
Human lives lost	Male	
	Female	
A person who suffered grievous injurious	Male	
	Female	
A person who suffered minor injuries	Male	
	Female	

c) Water Facilities

Type	No. of units affected	Population affected	Recovery measure
Well			
Bore Well			
Water Supply Disrupted			
Contamination			
ESR damaged			
GLR			
Damaged			
Sump Damaged			
Pipelines damaged			
Stand Post damaged			
Hand Pump			

d) Structural facilities

Location of the Structure: Lat-

Long-

Element	Extent of Damage				Reference/Comment
	Extensive (>75%)	Major (50- 75 %)	Moderate (25 – 50%)	Minor (<25%)	
Foundation					
Vertical supports columns, walls, etc.					
Horizontal supports beams, lintels, etc.					
Partitions, nonstructural walls					
Openings-windows, doors, etc.					
Floors, ceilings, etc.					
Decorative elements					
Others					

Items	Particulars	Total
Fully Damage structure	Number	
	Estimated Loss in Rs.	
Partly damaged structure	Number	
	Estimated Loss in Rs.	
No. of nearby house damaged	Number of Houses	
	Estimated Loss in Rs.	
Roads (All)	Number	
	Estimated Loss in Rs.	
State Roads	Number	
	Estimated Loss in Rs.	
District Roads	Number	
	Estimated Loss in Rs.	
Local Roads	Number	
	Estimated Loss in Rs.	
Bridges	Number	
	Estimated Loss in Rs.	
Culvert	Number	
	Estimated Loss in Rs.	
Office Buildings	Number	
	Estimated Loss in Rs.	
Shops	Number	
	Estimated Loss in Rs.	

Items	Particulars	Total
Others	Number	
	Estimated Loss in Rs.	

e) Animal lives

Items	Particulars	Total
Milch animal lost (Buffalo/Cow)	No	
	Estimate loss (Rs.)	
Milch Animal lost (Sheep/Goat)	No	
	Estimate loss (Rs.)	
Draught animal lost (Horse/Bullock)	No	
	Estimate loss (Rs.)	
Draught animal lost (Calf/Donkey/Pony/Mule)	No	
	Estimate loss (Rs.)	
Poultry Lost (Chick/Duck)	No	
	Estimate loss (Rs.)	
Others	No	
	Estimate loss (Rs.)	

District Disaster Management Plan, Kolhapur 2024 - 2025

Key Addition to DDMP 2024 - 2025

1. HRVA – Hazard, Risk, Vulnerability Analysis
2. Hazard wise SOP
3. Annual Training Calendar
4. Technology in DM (IRS, IDRN, EWS)
5. PDNA Requirement and Formats
6. Social Inclusion in DRR
7. DRR Funding Arrangements
8. Disaster Risk Governance
9. IEC Dissemination Strategy
10. Maps: Hazard,
Rainfall, Temperature, Public and Health Facilities, Land
Use Land Cover, Dam and Rivers, Transportation Network

District Disaster Management Plan of Kolhapur District 2024-2025



**Disaster Management Authority
District Collector's Office, Kolhapur District
Toll-Free No. 1077, Telephone No. 0231-2659232**

Contents

District Disaster Management Plan of Kolhapur District 2024

Prepared By

District Disaster Management Authority,
Office of the District Collector
Kolhapur, Govt. Of Maharashtra

Knowledge partner

Palladium, India
PMU for Technical Support and Implementation of Comprehensive Disaster Planning,
Management & Response for Disaster Management, Relief and Rehabilitation Department,
Government of Maharashtra

The District Disaster Management Authority has taken all reasonable precautions to verify the information and ensure stakeholder consultation and input prior to its publication. The publisher welcomes suggestions for improving future editions.

01

Introduction

02

District Profile

03

HRVA

04

Capacity Building and Training Measure

05

Response Relief Measure

06

Preparedness Strategy

07

Rehabilitation, Reconstruction and Recovery Measure



INTRODUCTION

01



VISION

The vision is to build a disaster-resilient community by prioritising effective mitigation, preparedness, and response to any disaster or hazard while continuously advancing in disaster risk reduction and risk financing endeavours.

AIM AND OBJECTIVE

- To evaluate the nature, severity, and repercussions of all disasters and hazards prevalent in the district.
- To develop micro-level vulnerability assessments and mapping exercises.
- To identify vulnerable villages and communities for rehabilitation, as well as safe routes and locations.
- To evaluate social and economic vulnerabilities at the village level and propose appropriate mitigation measures.
- To implement efficient mechanisms for disaster risk reduction.
- To incorporate cost-effective nature-based solutions for disaster risk reduction strategies.
- To enhance preparedness, prevention, and mitigation measures at the district level.



AIM AND OBJECTIVE

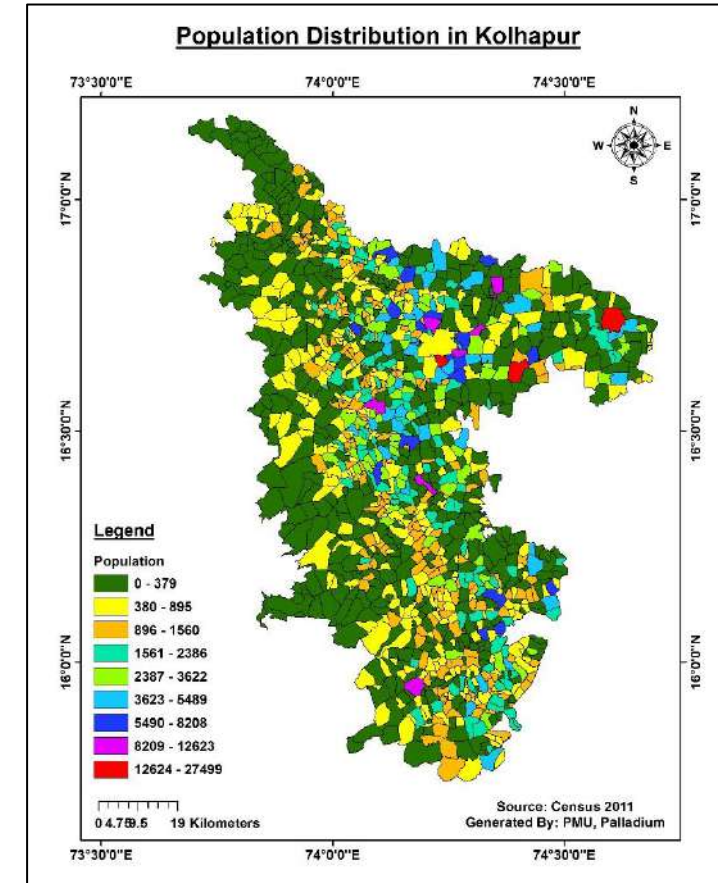
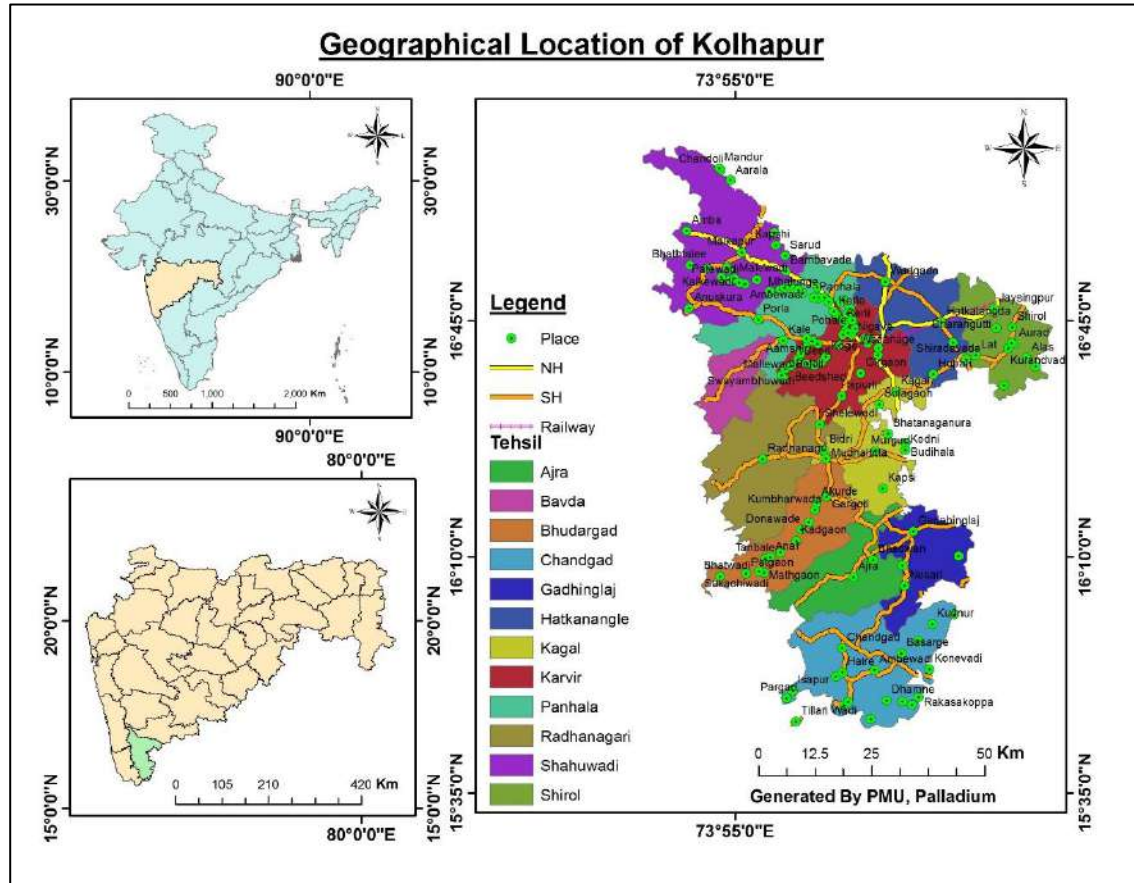
- To assign responsibilities to government departments at the district level and local authorities within the district.
- To evaluate and enhance the capacity of government departments, civil society, NGOs, and community members for disaster risk reduction.
- To analyse the adequacy and procurement of essential resources and ensure regular upgradation in Disaster Response Networks.
- To strengthen the District Emergency Operations Centre (DEOC) for early warnings, effective communication, search & rescue operations, and efficient recovery efforts.
- To develop an effective strategy for disseminating Information, Education, and Communication (IEC) materials.



DISTRICT PROFILE 02

DISTRICT PROFILE

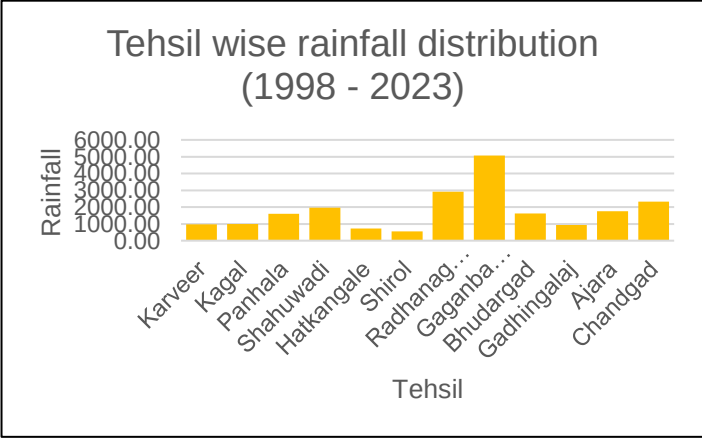
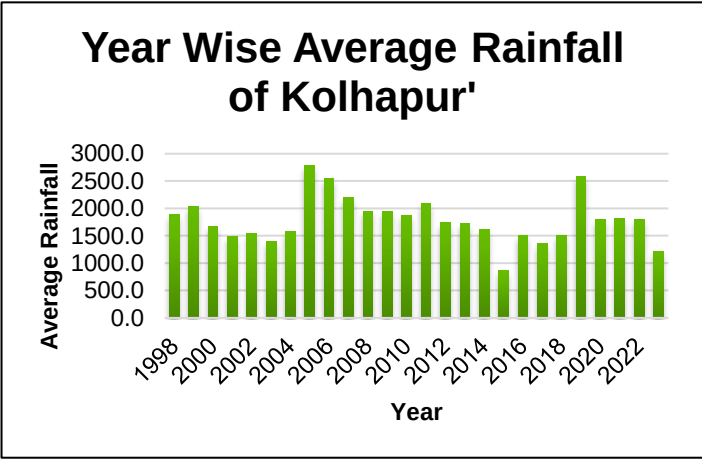
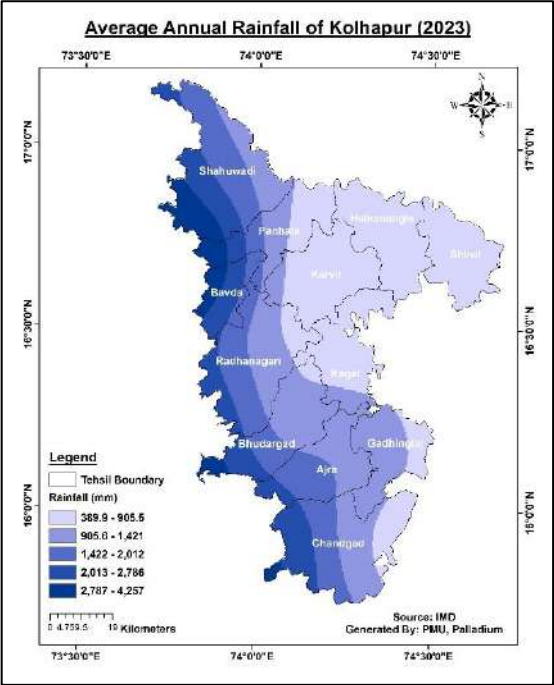
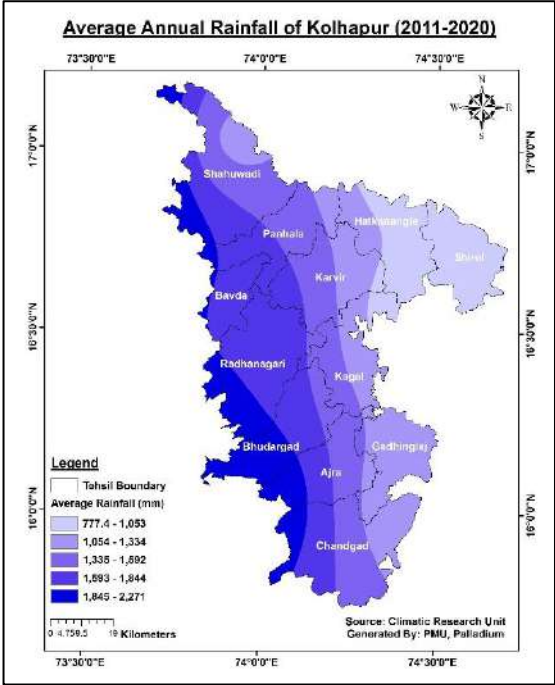
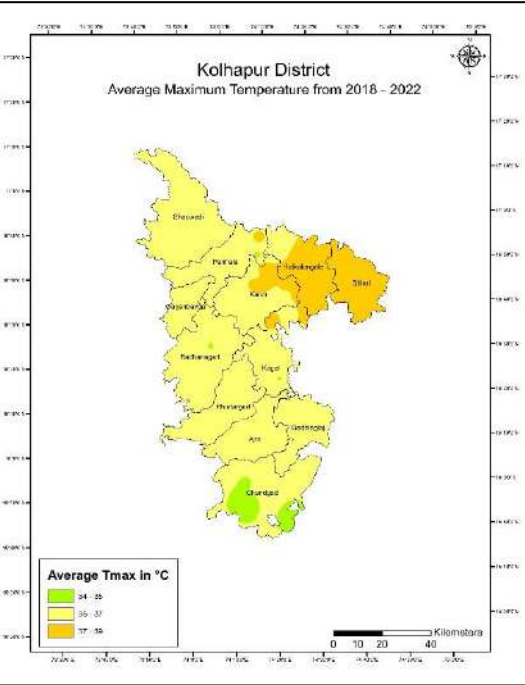
Kolhapur district is situated in the extreme southern part of Maharashtra state. It lies between 15°43' and 17°17' North latitude and 73°40' and 74°42' East longitude. It is surrounded by Sangli district to the north, Belgum district of Kamataka state to the east and south, and Ratanagiri and Sindhudurg districts to the west. The Sahyadri ranges to the west and the Wama River to the north form the natural boundaries.



CLIMATE AND RAINFALL

The climate of the Kolhapur district is generally temperate. The western part of the district, near the sahyadries it is always cooler than the eastern part which is liable to hot winds during April and May. The nights over the entire districts are generally cool.

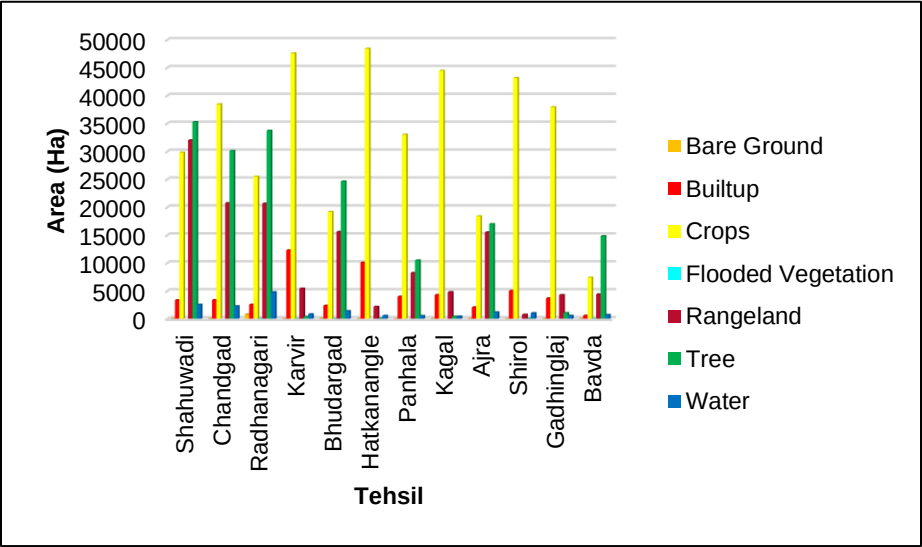
The western tehsils like Gaganbawada, Radhanagari, and Chandgad experience the highest rainfall, often exceeding 3000 mm annually, due to their proximity to the Western Ghats. In contrast, eastern tehsils such as Hatkanangle and Shirol receive comparatively less rainfall, around 1500-2000 mm per year.



LAND USE/LAND COVER

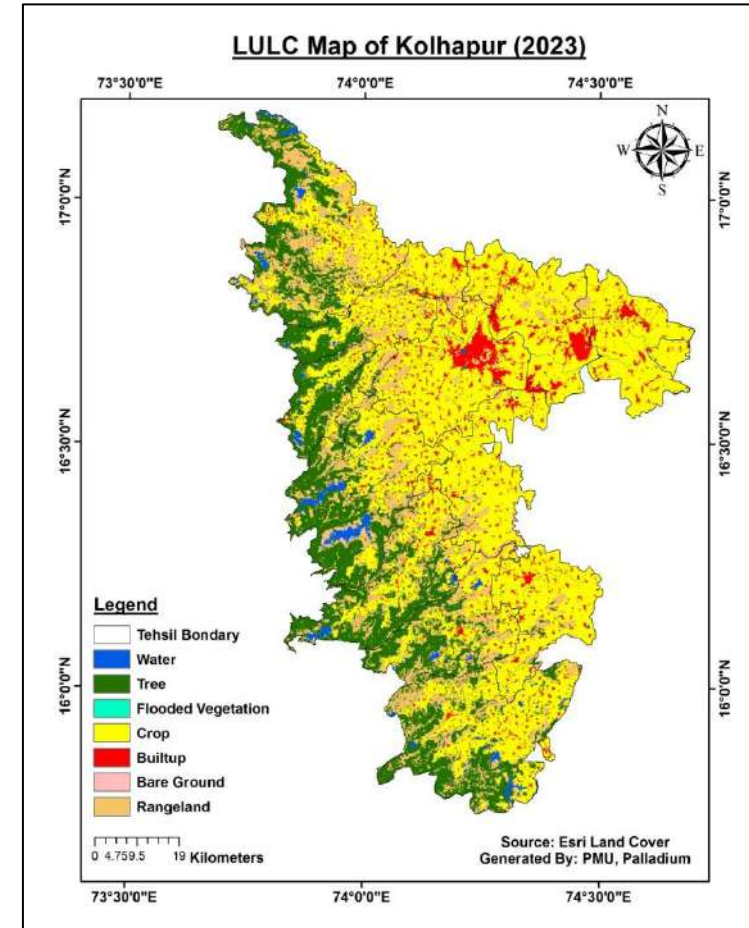
The land use/land cover (LULC) derived from ESA Sentinel-2 imagery at 10m resolution. Each year is generated from Impact Observatory’s deep learning AI land classification model used a massive training dataset of billions of human-labelled image pixels developed by the National Geographic Society. The global maps were produced by applying this model to the Sentinel-2 scene collection on Microsoft’s Planetary Computer, processing over 400,000 Earth observations per year.

Tehsli	Bare Ground Area (Ha)	Built-up Area (Ha)	Crops Area (Ha)	Flooded Vegetation Area (Ha)	Rangeland Area (Ha)	Tree Area (Ha)	Water Area (Ha)
Shahuwadi	4	3367	29802		32010	35279	2566
Chandgad	5	3378	38462		20756	30093	2278
Radhanagari	802	2569	25494	1	20669	33725	4794
Karvir	1	12313	47590	0	5434	402	855
Bhudargad	46	2396	19177	1	15601	24629	1401
Hatkanangle	0	10090	48410		2189	79	566
Panhala	2	3994	33018		8243	10504	552
Kagal	0	4305	44481		4827	420	447
Ajra	6	2088	18396		15513	17006	1197
Shirol	0	5039	43182		765	20	1038
Gadhinglaj	0	3698	37950		4276	1071	569
Bavda	13	601	7413	0	4405	14832	725
Grand Total	880.37	53838.19	393374.19	2.13	134688.50	168060.19	16986.41



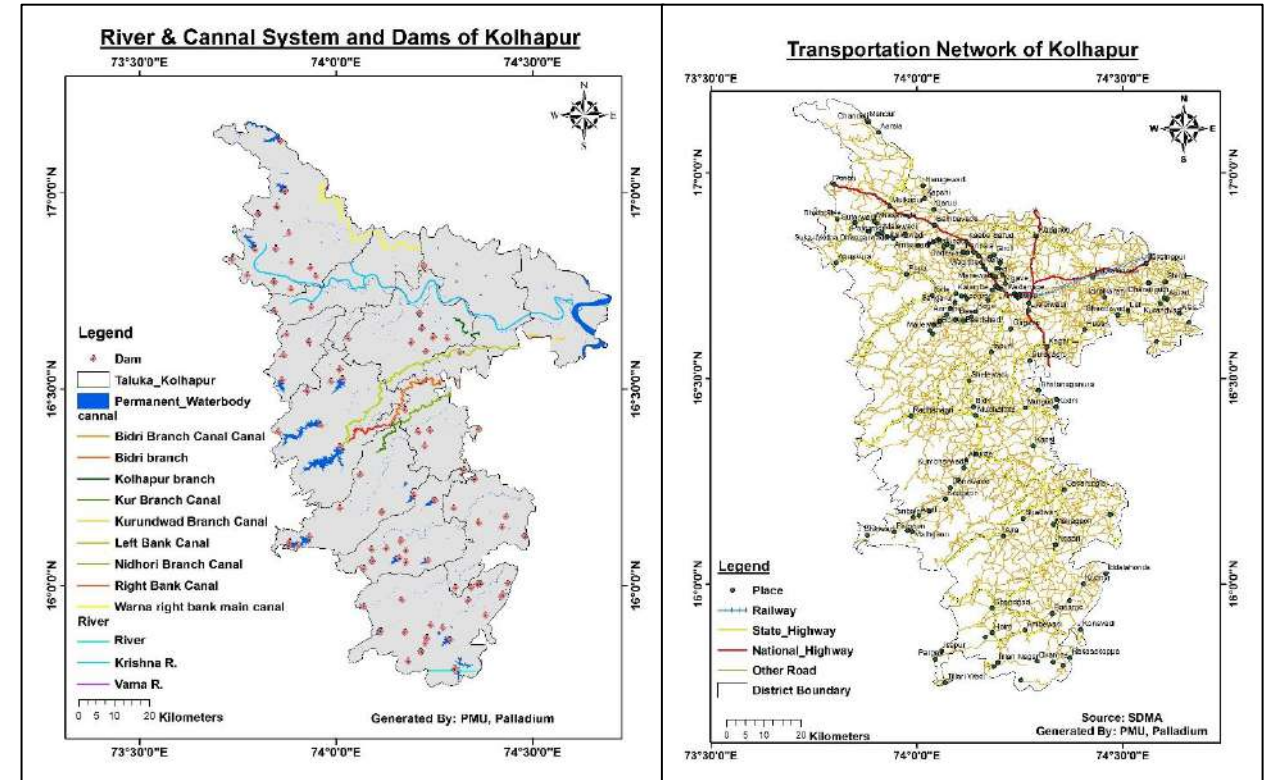
Key Insights

- The analysis indicates that agriculture (Crops) and forested areas (Trees) are the predominant land uses across most tehsils, reflecting a strong agricultural economy and significant forest cover.
- Builtup areas, although smaller compared to Crops and Trees, show considerable urbanization, especially in tehsils like Karvir and Chandgad.
- Flooded Vegetation is virtually absent, suggesting limited wetland areas or seasonal flooding.
- Rangeland usage is significant in several tehsils, providing insights into grazing and natural vegetation areas.



RIVER AND DAM & TRANSPORTATION NETWORK

- A succession of river valleys draining the district towards the east characteristics the landscape of the districts from the Warana valley in the north to the upper tributaries of the Gataprabhain in the south. The Krishna basin is located in the northern part of the district and covers the entire tahsil of Shirol and parts of Hatkanangale and Panhala.
- The district headquarters, i.e., Kolhapur, has been joined to Mumbai by a broad-gauge railway line of the south-central division of Indian railways. There are six railway stations with 37.68 km. of railway line. Daily train services are available from Mumbai and many other important places to Kolhapur.





HAZARD RISK ASSESSMENT AND VULNERABILITY ANALYSIS

03

HAZARD HISTORY AND IMPACT

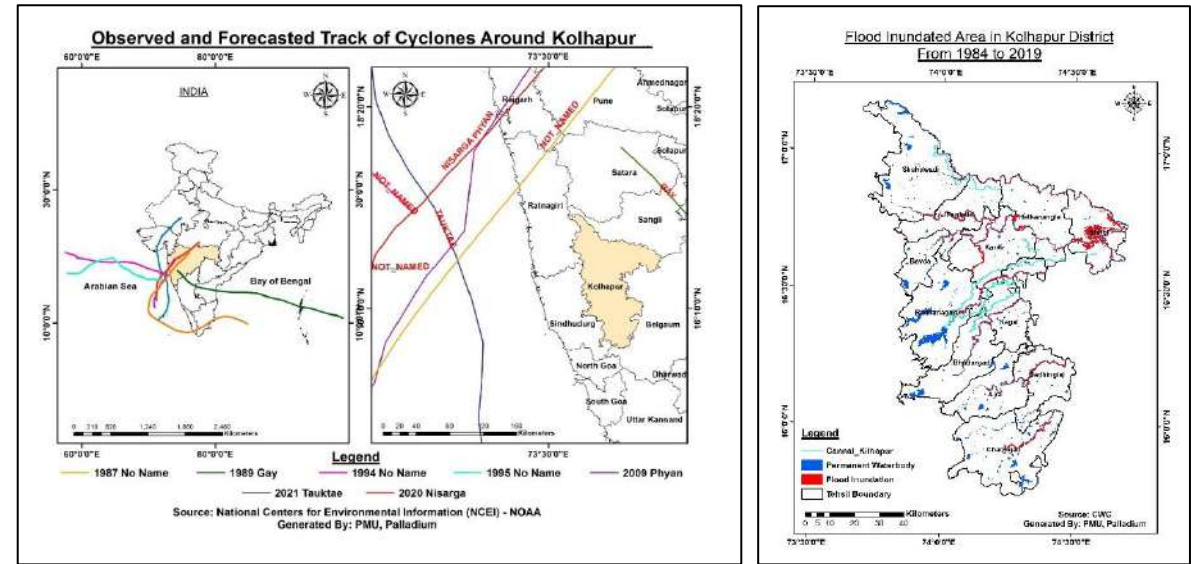
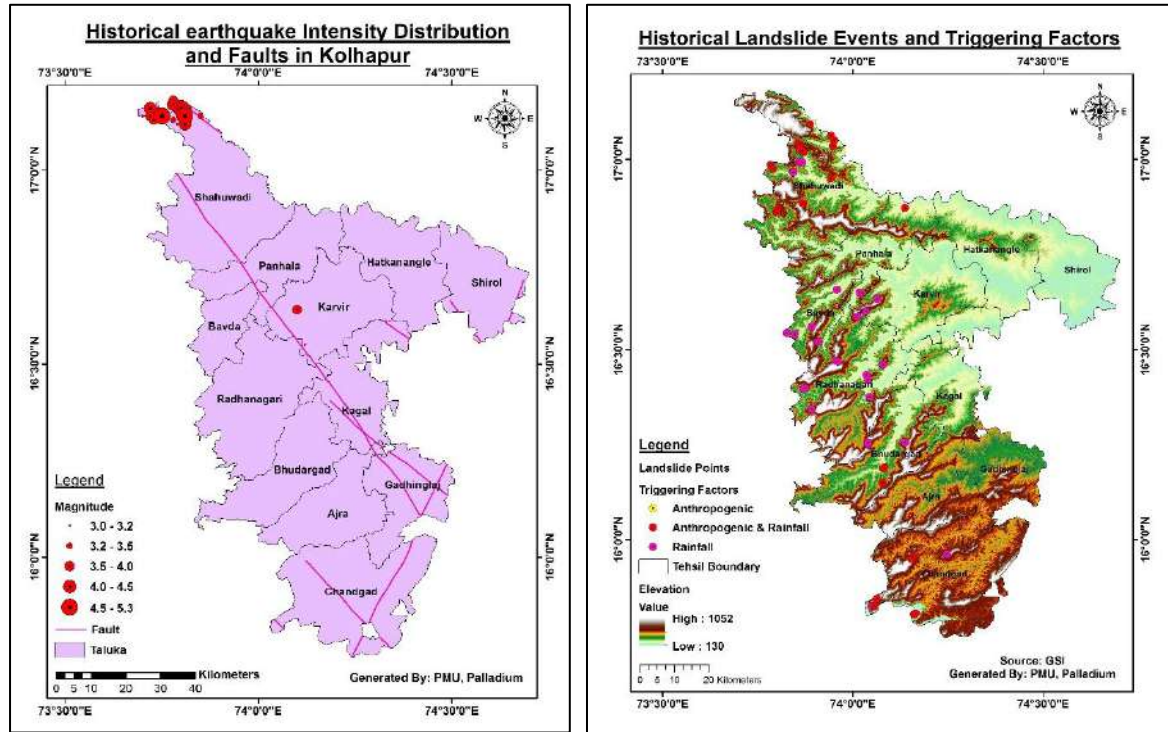


TABLE: DETAILS OF HUMAN AND ANIMAL DEATHS DUE TO NATURAL DISASTER DURING THE FINANCIAL YEARS 2023-2024

Name of the Disaster	Human deaths	Animal deaths
Flood	0	10
Landslide	0	0
Lightning	2	1
Cyclone	1	1
Earthquake	0	0
Cloudburst	0	0
Hailstorm	0	0

SEASONALITY OF DISASTERS AND HAZARD PROFILE

TABLE: SEASONALITY OF DISASTER

Disaster	Ja n	Fe b	Ma r	Ap r	Ma y	Ju n	Ju l	Au g	Se p	Oc t	No v	Dec
Earthquake												
Floods												
Cyclones												
Landslide												
Heatwave												
Epidemics												
Industrial and chemical accidents												
Fires												
Road accidents												
Lightning												
Drought												

TABLE 21: HAZARD PROFILE OF KOLHAPUR

Hazard	Frequency (Years)	Probability Rank	Probability Level
Natural Hazard			
Flood	1	3	Almost Certain
Cyclone	5	2	Possible
Landslide	5	2	Possible
Earthquake	34	1	Rare
Heatwave	0	0	Rare
Drought	50	1	Rare
Wildfire	5	2	Possible
Storm Surge	0	0	Rare
Tsunami	0	0	Rare
Epidemic	5	2	Possible
Cloud Burst	1	3	Almost Certain
Lightning	1	3	Almost Certain
Pest Attack	0	0	Rare
Hailstorm	5	2	Possible
Wild Animal Attack	1	3	Almost Certain
Technological Hazards			
Electrical Failure	1	3	Almost Certain
Generator Failure	1	3	Almost Certain
Transportation Failure	1	3	Almost Certain
Fuel Shortage	0	0	Rare
Communications Failure	1	3	Almost Certain
Information Systems Failure	3	2	Possible
Fire	1	3	Almost Certain
Hazmat Exposure	5	2	Possible
Supply Shortage Failure	0	0	Rare
Structural Damage	1	3	Almost Certain
Human Hazard			
Stampede	0	0	Rare
Drowning	1	3	Almost Certain
Mass Casualty Incident (trauma)	1	3	Almost Certain
Mass Casualty Incident (medical/infectious)	1	3	Almost Certain
Biological	1	3	Almost Certain
VIP Situation	0	0	Rare
Hostage Situation	0	0	Rare
Civil Disturbance	0	0	Rare
Missing Resident	0	0	Rare
Bomb Threat	0	0	Rare
Hazardous Materials			
Mass Casualty Hazmat Incident (From historic events at your area with >= 5 victims)	1	3	Almost Certain
Small Casualty Hazmat Incident (From historic events at your area with < 5 victims)	1	3	Almost Certain
Chemical Exposure	1	3	Almost Certain
Terrorism, Chemical	0	0	Rare
Radiologic Exposure, External	0	0	Rare
Terrorism, Radiologic	0	0	Rare

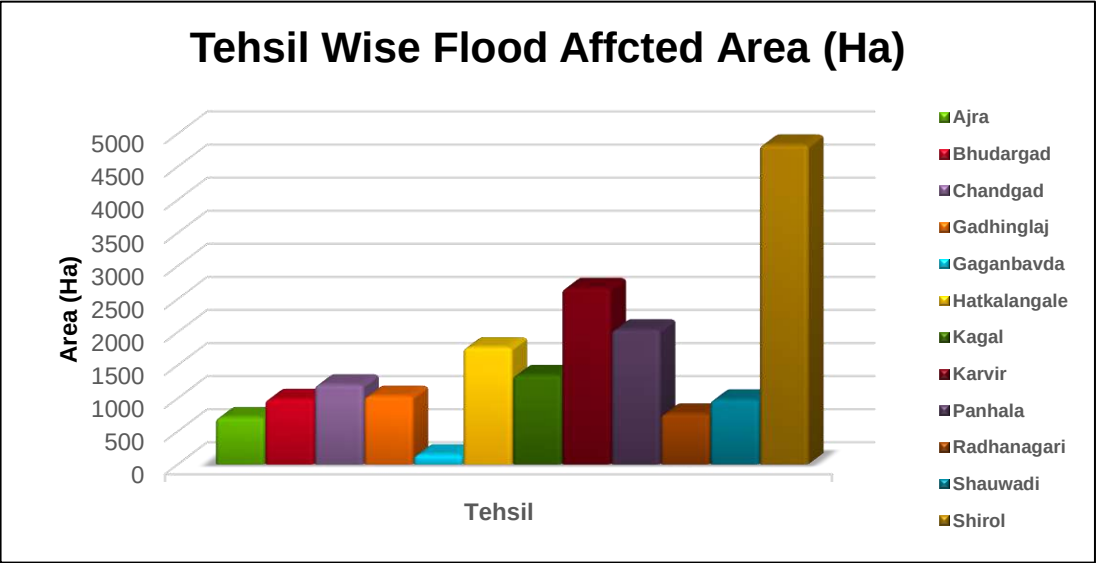
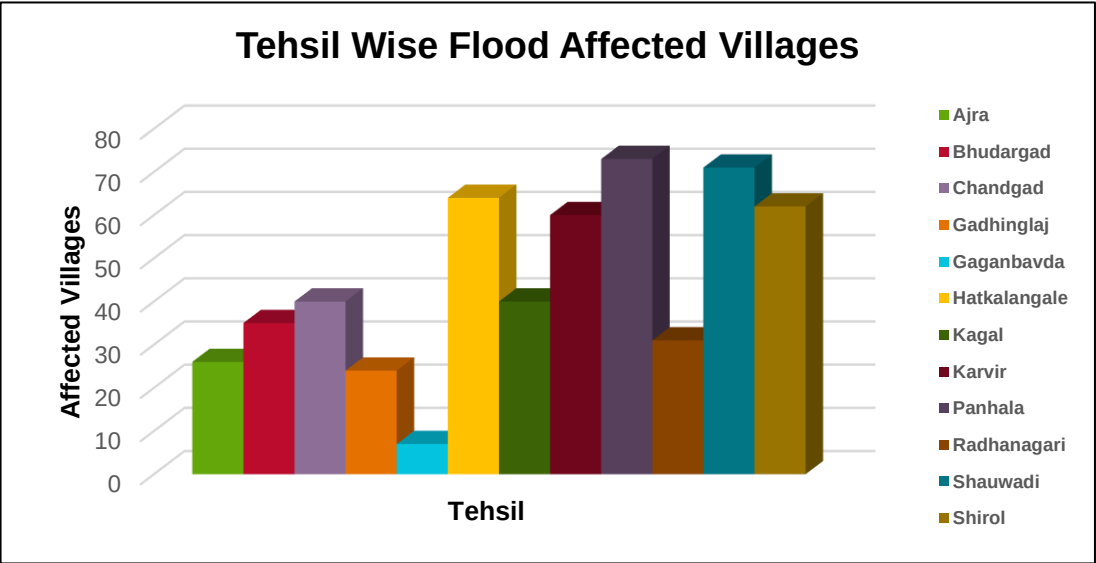
HAZARD MAPPING - FLOOD

Flood Impact on Area:

- The flood has affected a total of 18,846.42 hectares across the tehsils, with Shirol bearing the brunt, having 4,832.47 hectares submerged or otherwise impacted. This could imply that Shirol has large tracts of agricultural land or other areas highly susceptible to flooding, which could have severe implications for the local economy, particularly agriculture.
- In contrast, Gaganbavda has the smallest affected area (148.64 hectares), correlating with the low number of affected villages, further emphasizing its relative resilience to flooding.

Key Insights:

- The disparity between the number of affected villages and the area affected suggests that some tehsils, like Shirol, experience more extensive flood damage over larger areas, while others like Panhala may have more affected villages but over smaller or concentrated areas.
- The graph highlights the need for targeted flood mitigation strategies, particularly in heavily affected tehsils like Shirol, Karvir and Panhala, to reduce future vulnerabilities.



HAZARD MAPPING - LANDSLIDE

Landslide Susceptibility as per IIT Delhi

The landslide susceptibility assessment classified into different susceptibility levels: Safe, Low, Medium, High, and Very High. The key observations are:

Areas with High and Very High Susceptibility:

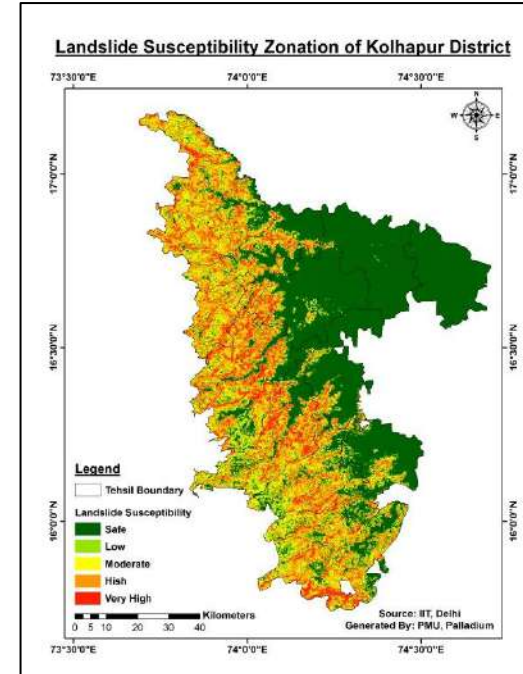
- Radhanagri and Shahuwadi has the highest area under Very High susceptibility (15,891.23 ha and 13,678.26 ha), indicating a significant risk of landslides in this tehsil.
- Chandgad also has a substantial area under Very High susceptibility (11,772.31 ha), making it another high-risk region..

Areas with Moderate to High Susceptibility:

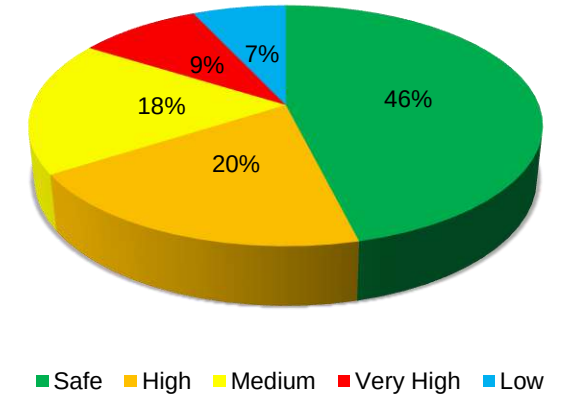
- Shahuwadi and Radhanagri have large areas classified under High susceptibility (34,586.88 ha and 25,675.92 ha respectively).
- Chandangad have significant portions under medium susceptibility, with 25,937.89 ha.

Smaller Areas Under Very High Risk:

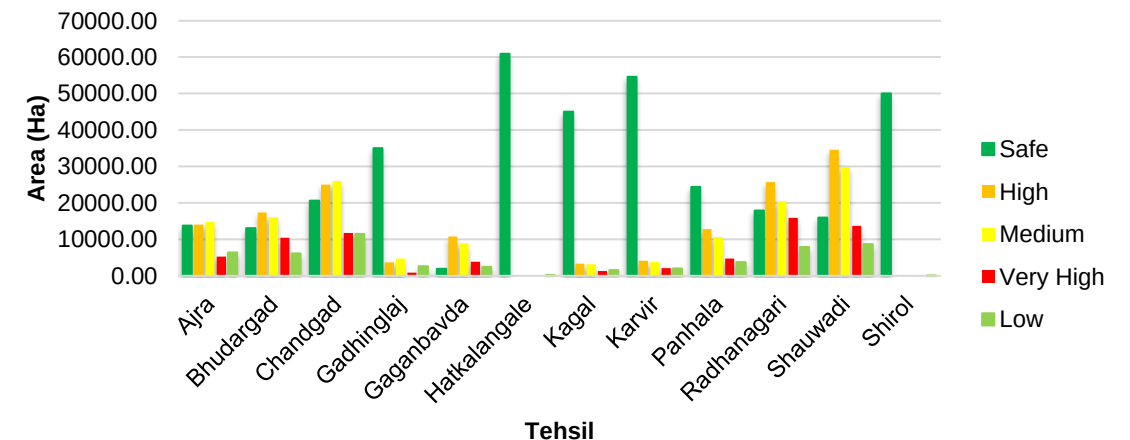
- Tehsils like Hatkalangale (1.2 hectares) and Gadhinglaj (882 hectares) have relatively smaller areas under Very High susceptibility but still present considerable landslide risks.



Total Landslide Susceptibility Area Coverage as per IIT, Delhi



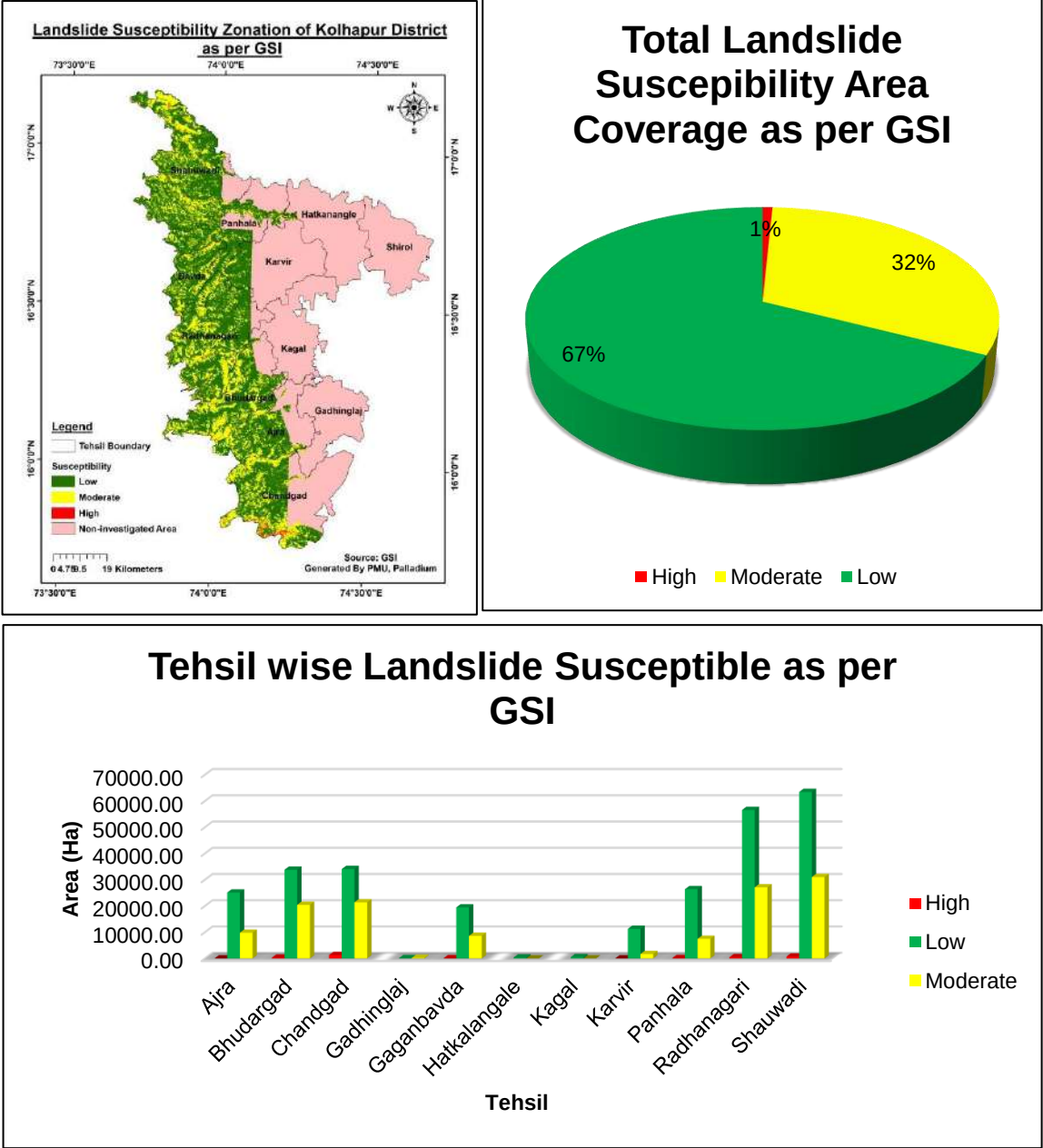
Tehsil Wise Landslide Susceptibility Area



HAZARD MAPPING - LANDSLIDE

Landslide Susceptibility as per GSI

- This GSI study examines the distribution of land areas in various tehsils, categorized by susceptibility levels: High, Low, and Moderate. The data provides insights into the total hectares (Ha) allocated to each susceptible category, helping to understand regional profiles and inform future land management and policy decisions.
- The majority of the land across tehsils falls under the low-susceptible category, suggesting a comparatively safer zone. However, certain regions have substantial areas categorized as moderate or high susceptible, necessitating focused risk management and mitigation strategies.
- Tehsils like Shauwadi and Radhanagari not only have large total areas but also significant portions under moderate and high risk, highlighting the need for tailored interventions in these regions. The study also shows that 1% of investigated area of GSI falls under high landslide susceptibility zone and 32% under moderate and the remaining 67% in low susceptibility zone.



HAZARD MAPPING - LANDSLIDE

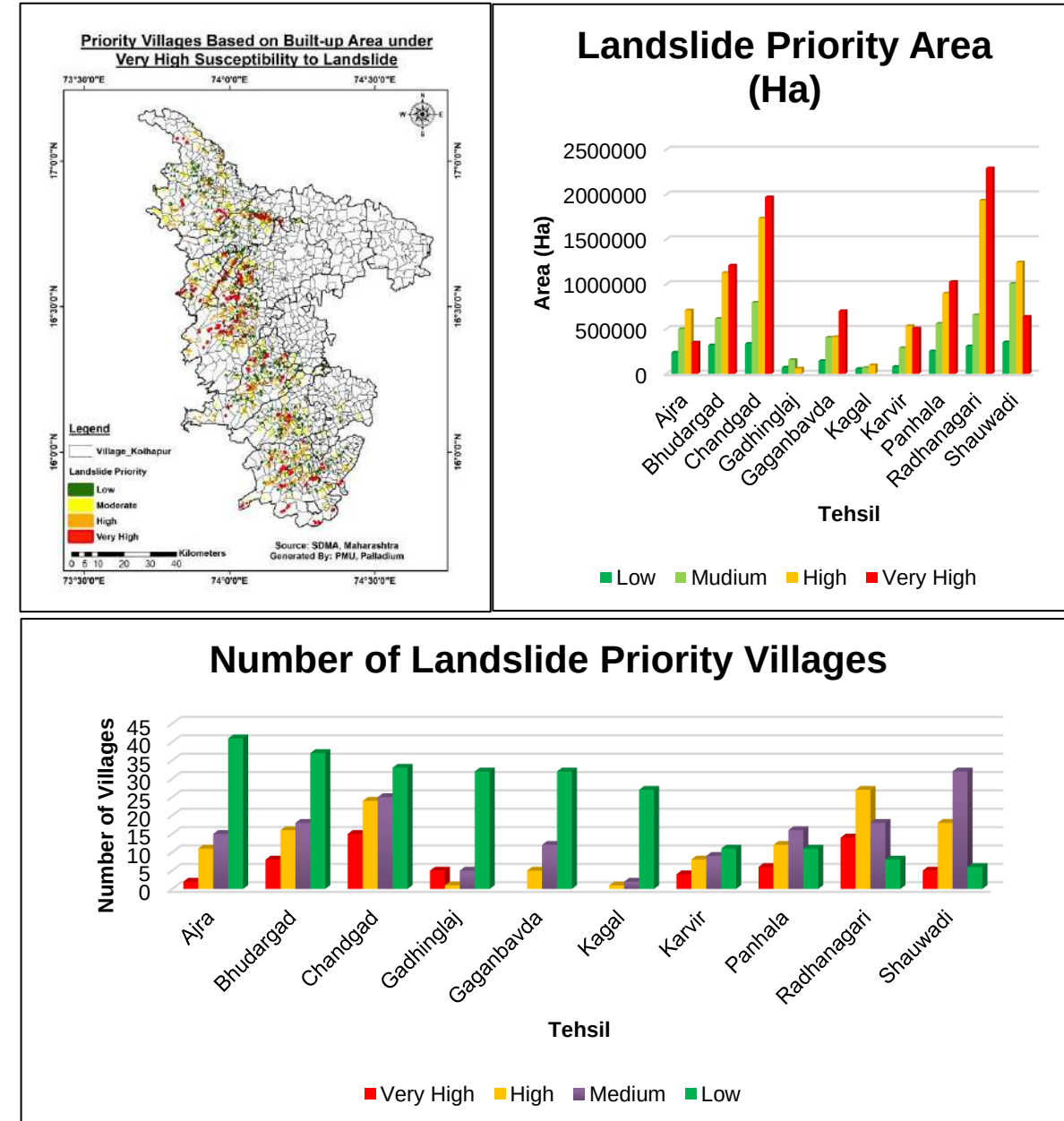
Landslide Priority Villages and Area

Landslide Priority Area (Ha):

- Radhanagri and Chandangad has the largest area under landslide risk, with 2292175 hectares classified as Very High susceptibility and 1970014 hectares as Very High susceptibility. This makes it the most vulnerable tehsil in terms of area affected.
- Panhala and Bhudargad also have significant areas under High and Very High susceptibility. Panhala has 533,855 hectares under High and 1,025,523 hectares under Very High susceptibility. Bhudargad has 1,125,594 hectares under High and 1,208,964 hectares under Very High susceptibility.

Number of Landslide Priority Villages:

- Chandangad again stands out with the highest number of villages (15) under Very High susceptibility and 24 under High susceptibility. It is followed by Radhanagri with 14 villages under Very High susceptibility and 27 under High susceptibility.
- Bhudargad has 8 villages under Very High susceptibility, but Bhudargad has more villages under priority (79 villages) after Chandangad (97 villages)



HAZARD MAPPING - EARTHQUAKE

The Shahuwadi tehsil again stands out with the highest area in very high risk (31619.91 Ha), reflecting significant vulnerability.

Radhanagari:

- With the highest area in the medium risk zone (45,451.93 Ha), this tehsil needs moderate attention in earthquake preparedness.

Karvir:

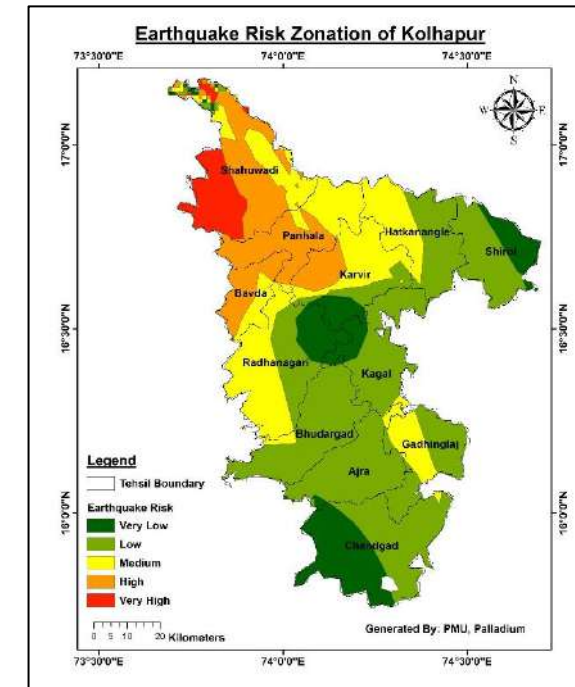
- This tehsil is particularly concerning with significant areas in high (14,086.30 Ha) and very high-risk zones (14,086.30 Ha).
- Disaster management strategies must prioritize **Karvir** for risk mitigation and rapid response planning.

Gadhinglaj and Gaganbav:

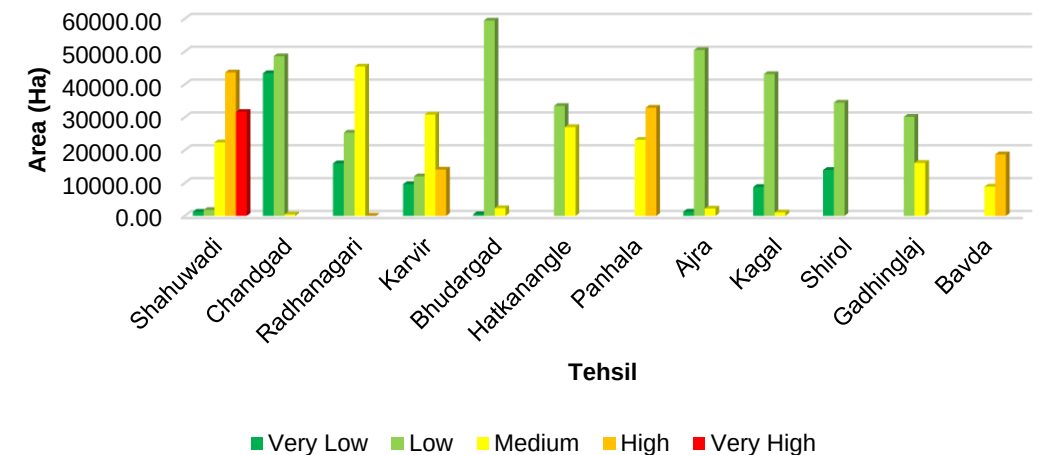
- These tehsils have the highest areas in very low and low-risk zones, indicating a relatively safer profile in terms of earthquake vulnerability.

Gadhinglaj and Bhudargad:

- Both tehsils show moderate to high risk, necessitating careful planning and resource allocation for effective disaster management.



Tehsil Wise Earthquake Risk Area (Ha)



HAZARD MAPPING - LIGHTNING

Key Observations

High-Risk Areas

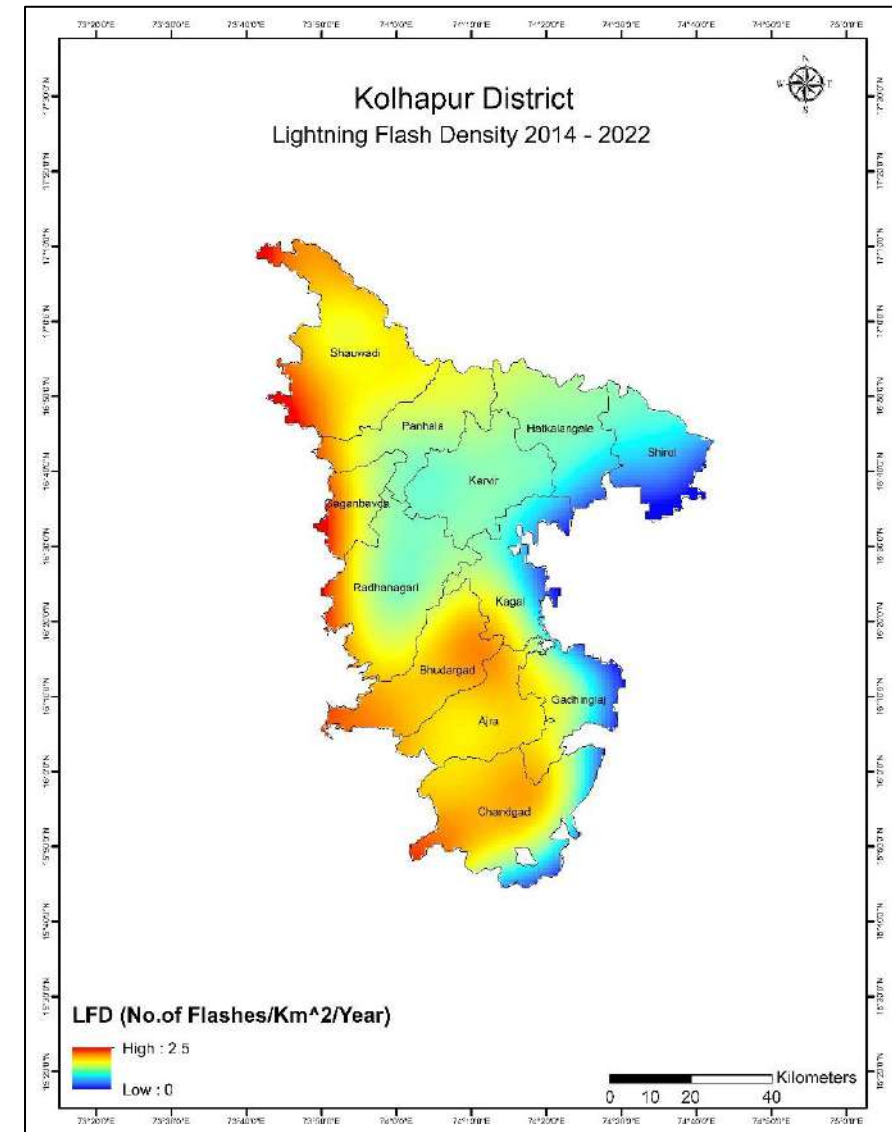
- The western and southwestern parts of Kolhapur district exhibit the highest lightning flash density, with values up to 2.5 flashes/km²/year.
- Tehsils such as **Shauwadi**, **Radhanagari**, and **Gaganbavda** fall within these high-risk zones, indicating a higher likelihood of lightning-related incidents.

Moderate-Risk Areas

- Central regions, including parts of Ajra, Bhudargad, and Chandgad, display moderate lightning flash density. These areas have moderate exposure, with flash densities between 1.0 to 2.0 flashes/km²/year.
- These tehsils should implement precautionary measures and public awareness programs to reduce potential lightning hazards.

Low-Risk Areas

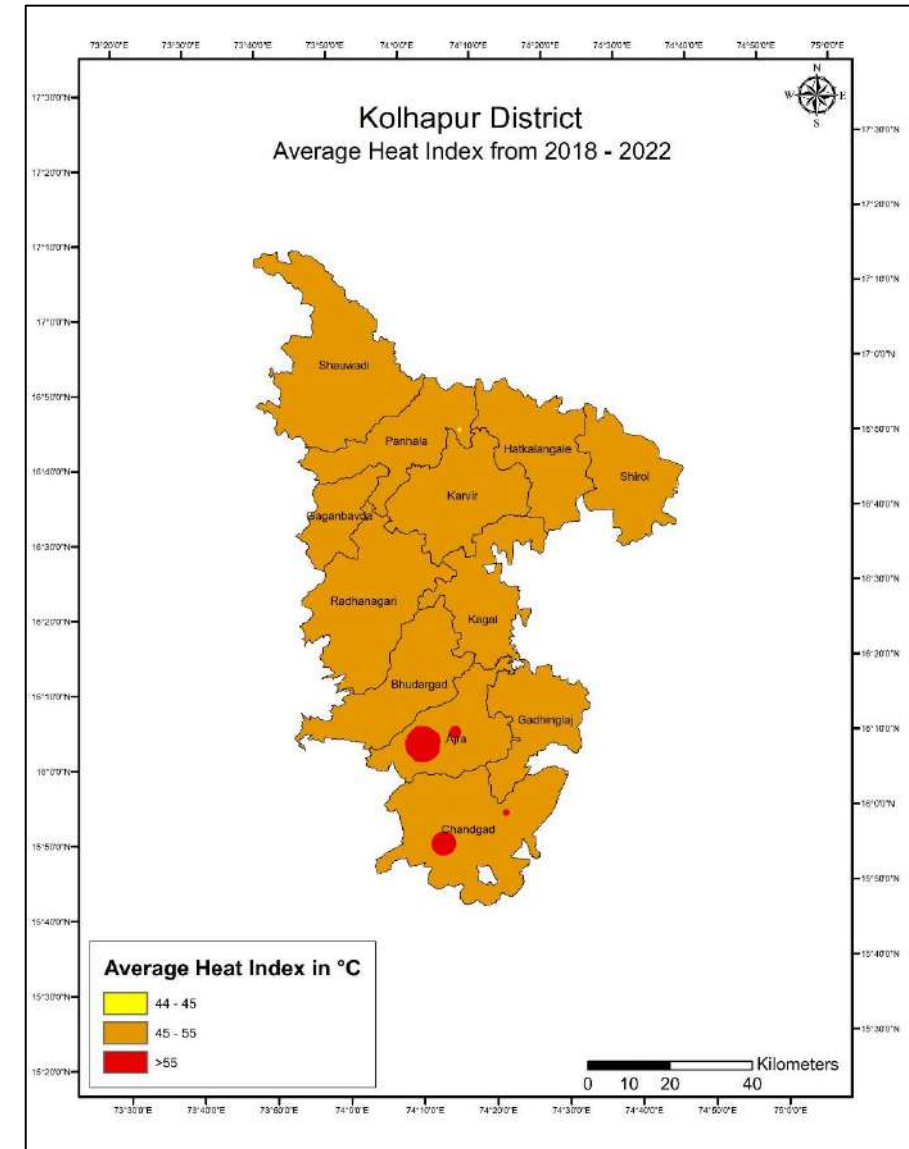
- The eastern and northeastern parts of Kolhapur district, encompassing tehsils like Karvir, Hatkalangale, Kagal, and Gadhinglaj, show the lowest lightning flash densities, with values closer to 0 flashes/km²/year.



HAZARD MAPPING - HEATWAVE

Key Observations

- The heatwave risk in Kolhapur district highlights significant variations in vulnerability across the region.
- Central and eastern tehsils such as **Ajra and Chandangad** are particularly high susceptible to heatwaves due to their lower elevation and rapid urbanization, which contribute to higher temperatures.
- Conversely, western tehsils like Shauwadi and Radhanagari, characterized by higher altitudes and dense vegetation, exhibit relatively lower heatwave risk.
- Nonetheless, increasing deforestation and climate change impacts are gradually heightening their susceptibility.
- To mitigate heatwave risks, it is essential to implement region-specific strategies, such as enhancing green cover, promoting water conservation, and establishing heat action plans, especially in the more vulnerable central and eastern tehsils.



RANKING AND PROBABILITY OF DISASTERS IN THE DISTRICT

NATURAL HAZARD								
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interuption of services</i>	<i>Preplanning</i>	<i>Time, effectivness, resouces</i>	<i>Community/ Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Flood	3	2	2	3	1	1	2	Extreme
Cyclone	2	0	2	2	2	2	2	Medium
Landslide	2	1	2	2	2	2	3	High
Earthquake	1	0	0	0	0	0	0	Low
Heatwave	0	0	0	0	0	0	0	Low
Drought	1	0	0	0	0	0	0	Low
Wildfire	2	1	1	1	0	0	0	Low
Storm Surge	0	0	0	0	0	0	0	Low
Tsunami	0	0	0	0	0	0	0	Low
Epidemic	2	2	1	1	1	1	2	Medium
Cloud Brust	3	2	2	1	2	2	1	High
Lightning	3	1	1	1	2	2	1	High
Pest Attack	0	0	0	0	0	0	0	Low
Hailstorm	2	2	3	0	0	0	0	Low
Wild Animal Attack	3	3	3	3	2	2	1	Extreme
AVERAGE SCORE	1.60	0.93	1.13	0.93	0.80	0.80	0.80	Low

RANKING AND PROBABILITY OF DISASTERS IN THE DISTRICT

TECHNOLOGIC HAZARD								
EVENT	PROBABILIT Y	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED- NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interuption of services</i>	<i>Preplanning</i>	<i>Time, effectivness, resouces</i>	<i>Community/ Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Electrical Failure	3	3	0	1	1	1	1	
Generator Failure	3	0	0	0	1	1	1	
Transportation Failure	3	0	0	0	1	1	1	
Fuel Shortage	0	0	0	0	1	2	1	
Communications Failure	3	0	0	0	1	1	1	
Information Systems Failure	2	0	0	0	1	1	1	
Fire	3	2	2	1	1	1	2	
Hazmat Exposure	2	0	0	0	1	1	2	
Supply Shortage	0	0	0	0	1	1	1	
Structural Damage	3	1	1	2	1	1	1	Medium
AVERAGE SCORE	2.20	0.60	0.30	0.40	1.00	1.10	1.20	

RANKING AND PROBABILITY OF DISASTERS IN THE DISTRICT

HAZARD AND VULNERABILITY ASSESSMENT								
HUMAN RELATED HAZARD								
EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	PREPARED-NESS	INTERNAL RESPONSE	EXTERNAL RESPONSE	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interuption of services</i>	<i>Preplanning</i>	<i>Time, effectiveness, resouces</i>	<i>Community/ Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Stampede	0	1	1	1	1	1	1	Low
Drowning	3	3	0	1	1	1	1	Medium
Mass Casualty Incident (trauma)	3	2	2	2	1	1	1	High
Mass Casualty Incident (medical/infectious)	3	0	0	0	1	1	1	Low
Biological	3	0	0	0	0	0	0	Low
VIP Situation	0	1	1	1	0	0	0	Low
Hostage Situation	0	0	0	0	0	0	0	Low
Civil Disturbance	0	1	1	1	1	1	1	Low
Missing Resident	0	0	0	0	0	0	0	Low
Bomb Threat	0	0	0	0	0	0	0	Low
AVERAGE	1.20	0.80	0.50	0.60	0.50	0.50	0.50	Low

RANKING AND PROBABILITY OF DISASTERS IN THE DISTRICT

HAZARD AND VULNERABILITY ASSESSMENT								
HAZARD INVOLVING HAZARDOUS MATERIALS								
EVENT	PROBABILI	SEVERITY = (MAGNITUDE - MITIGATION)						Risk Category
	TY	HUMAN	PROPERTY	BUSINESS	PREPARED-	INTERNAL	EXTERNAL	
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interruption of services</i>	<i>Preplanning</i>	<i>Time, effectiveness, resources</i>	<i>Community/ Mutual Aid staff and supplies</i>	
SCORE	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = Low 2 = Moderate 3 = High	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	0 = N/A 1 = High 2 = Moderate 3 = Low or none	
Mass Casualty Hazmat Incident (From historic events >= 5 victims)	3	1	0	1	1	1	0	Medium
Small Casualty Hazmat Incident (From historic events < 5 victims)	3	1	0	0	1	1	0	Low
Chemical Exposure	3	0	0	0	0	0	0	Low
Terrorism, Chemical	0	0	0	0	0	0	0	Low
Radiologic Exposure, External	0	0	0	0	0	0	0	Low
Terrorism, Radiologic	0	0	0	0	0	0	0	Low
AVERAGE	1.50	0.33	0.00	0.17	0.33	0.33	0.00	Low

SOCIAL VULNERABILITY

High Vulnerability Tehsils

- **Karvir and Hatkalangale:** These tehsils have high population densities and significant urban areas, which can exacerbate the impact of disasters. The presence of economically disadvantaged communities, coupled with inadequate infrastructure, increases their vulnerability. Enhanced disaster preparedness, community education programs, and improved healthcare facilities are essential to reduce risks.
- **Panhala:** With a mix of rural and semi-urban populations, this tehsil faces challenges related to limited access to healthcare and education. Strengthening social services and infrastructure will be vital in improving resilience.

Moderate Vulnerability Tehsils

- **Ajra, Bhudargad, and Gaganbavda:** These tehsils have moderate social vulnerability due to their rural nature, where communities may have strong social ties but limited access to critical services. Focused efforts on improving rural healthcare, education, and economic opportunities can help mitigate their vulnerability.
- **Chandgad and Gadhinglaj:** These regions also exhibit moderate vulnerability, with economic activities primarily based on agriculture. Diversifying livelihoods and enhancing disaster awareness can significantly improve resilience.

Recommendations

- Promote **community-based disaster risk reduction** programs that empower local populations to respond effectively to emergencies.
- Invest in **resilient infrastructure**, particularly in high and moderate vulnerability tehsils, to withstand various disaster scenarios.
- Enhance access to **healthcare and education** across all tehsils, focusing on building capacities to manage disaster impacts.
- Support initiatives that **diversify economic activities**, reducing dependency on single sectors and increasing overall resilience.

ENVIRONMENT VULNERABILITY

High Vulnerability Tehsils

- **Chandgad and Ajra:** These tehsils are characterized by extensive forest cover and hilly terrain, making them prone to landslides and soil erosion. Deforestation and unplanned development further exacerbate these risks. Implementing stringent land use regulations and reforestation programs are crucial to mitigate these vulnerabilities.
- **Radhanagari:** Home to the Radhanagari Wildlife Sanctuary, this tehsil faces threats from habitat destruction. Protecting natural resources and promoting sustainable tourism practices can help reduce environmental vulnerability.

Moderate Vulnerability Tehsils

- **Panhala and Gaganbavda:** These regions experience moderate environmental risks, primarily due to their mixed landscape of agricultural land and forested areas. Soil degradation and water management are key concerns. Adopting sustainable agricultural practices and efficient water management systems can enhance their resilience.
- **Shauwadi:** While it has significant forested areas, the tehsil faces challenges from illegal logging and encroachment. Strengthening enforcement of environmental regulations and promoting community-based conservation efforts are essential.

Recommendations

- Initiate large-scale **reforestation** projects and soil conservation measures, particularly in high vulnerability tehsils, to prevent soil erosion and landslides.
- Promote **sustainable agricultural practices**, including crop diversification, organic farming, and efficient water use, to reduce environmental stress in moderate and low vulnerability areas.
- Develop comprehensive **water management plans** to address water scarcity and promote rainwater harvesting and watershed management.
- Strengthen **urban planning frameworks** to address pollution, waste management, and green space preservation in urbanized tehsils.
- Engage local **communities in conservation efforts**, providing education and resources to support sustainable practices and environmental stewardship.

ECONOMIC VULNERABILITY

Shahuwadi Tehsil

Economic Base: Predominantly agricultural, with a focus on rice, sugarcane, and horticulture. Forest resources also play a role.

- High reliance on monsoon-dependent agriculture increases vulnerability to droughts and floods.
- Limited industrial activity and infrastructure, leading to lower economic diversity and resilience.
- Forest areas may be susceptible to landslides during heavy rains.

Assessment: High vulnerability due to agricultural dependency and limited economic diversification.

Ajara Tehsil

Economic Base: Agriculture dominates, with rice and horticulture being significant. There is also forest-based economic activity.

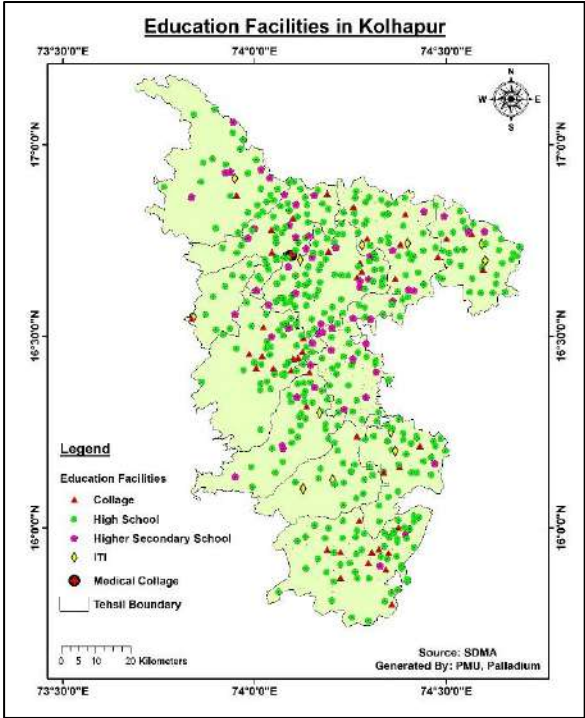
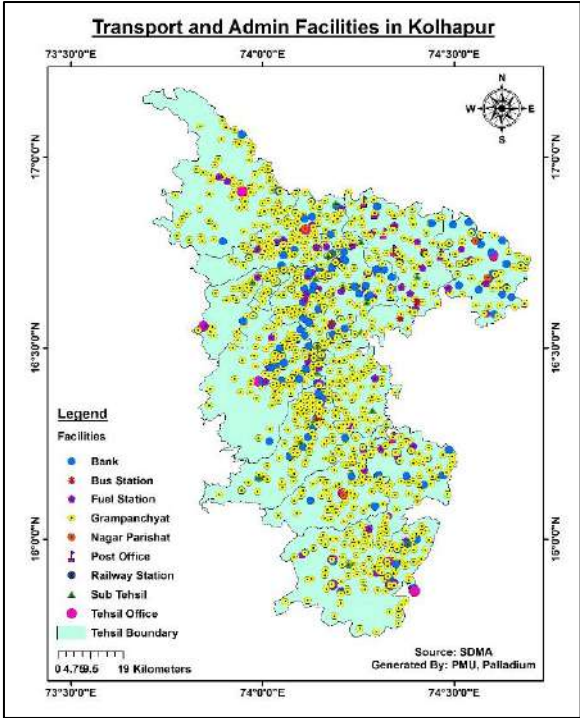
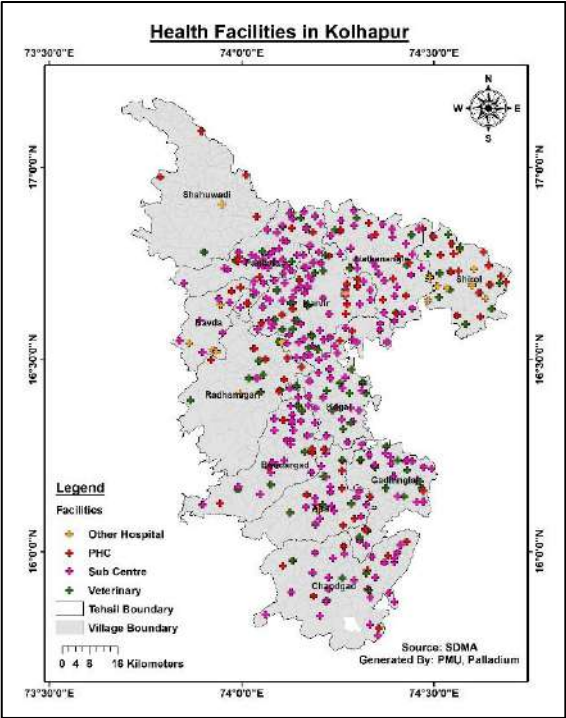
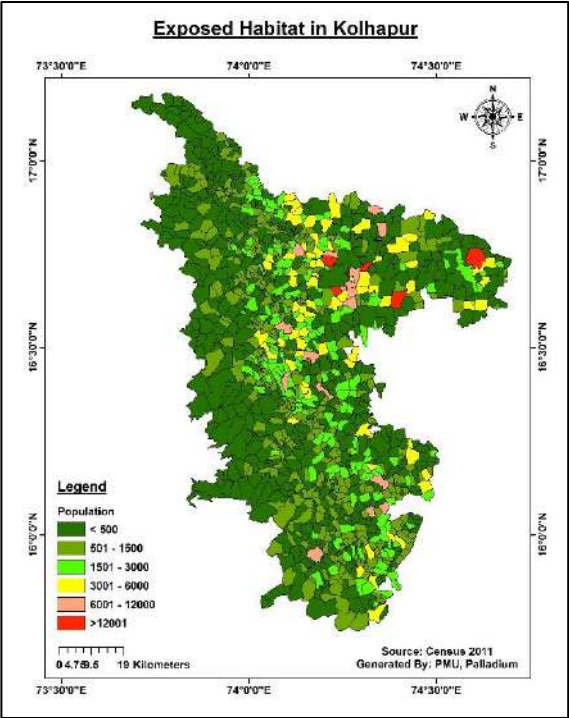
- High vulnerability to landslides and floods due to hilly terrain and heavy monsoon rains.
- Agriculture is highly susceptible to seasonal changes and extreme weather events.
- Poor infrastructure and limited industrial activity reduce economic resilience.

Assessment: High vulnerability, particularly in terms of natural hazards impacting agriculture and infrastructure.

Recommendations

- Promoting crop diversification and **climate-resilient farming** practices to reduce dependency on single crops, particularly in tehsils like **Shahuwadi and Gadhinglaj**.
- Improving **flood protection infrastructure**, especially in urbanized and industrial areas like **Karveer** and **Hatkanangle**, to mitigate the impact on key economic sectors.
- Encouraging the development of disaster-resilient industrial practices, particularly in emerging industrial zones across the district.
- Strengthening community-based disaster management programs that focus on building local capacities and improving access to financial services, particularly in rural and high-vulnerability tehsils like Ajara and Radhanagari.
- In **Panhala and Radhanagri**, developing sustainable tourism practices that can adapt to seasonal and disaster-related disruptions.
- Conducting regular economic vulnerability assessments to monitor changes and adapt strategies accordingly, ensuring that the district disaster management plan remains relevant and effective.

ELEMENT AT RISK



Radhanagari:

- Hazards: Floods (Bhogavati, Dudhganga rivers), Landslide.
- Gaps: Limited landslide and flood management and preparedness; inadequate early warning systems.
- Suggestions: Strengthen river embankments, install automated rain gauges for better monitoring, Retaining wall, slope stabilization and create awareness programs for local communities.
- **Karveer:**
- Hazards: Floods (Bhogavati, Kumbhi, Kasari, Panchaganga rivers), Earthquakes (3.1 to 4.0 magnitude).
- Gaps: Lack of structural resilience to floods and earthquakes; poor community training on disaster management.
- Suggestions: Retrofitting of vulnerable buildings, training programs on earthquake response, and enhanced flood control measures like levees and drainage improvements.

Panhala:

- Hazards: Floods (Kasari, Kumbhi rivers), Landslides.
- Gaps: Insufficient landslide monitoring; inadequate drainage infrastructure.
- Suggestions: Implement slope stabilization techniques, expand landslide early warning systems, and improve drainage systems to reduce waterlogging.

Gaganbavada:

- Hazards: Landslides, Cyclones.
- Gaps: Lack of robust slope management; limited disaster communication networks.
- Suggestions: Promote afforestation to prevent soil erosion, establish cyclone shelters, and improve communication channels for timely warnings.

Kagal:

- Hazards: Floods (Dudhganga, Vedganga rivers).
- Gaps: Inadequate flood mitigation infrastructure; poor coordination between local authorities during disasters.
- Suggestions: Develop comprehensive flood response plans, enhance coordination among stakeholders, and introduce river desilting programs.

Shirol:

- Hazards: Floods (Dudhganga, Warana, Panchaganga, Krishna rivers).
- Gaps: Insufficient community awareness on flood risks; poor evacuation planning.
- Suggestions: Conduct regular flood drills, improve community-based disaster risk reduction (CBDRR) programs, and establish permanent evacuation centres.

Bhuradgad:

- Hazards: Floods (Vedganga river).
- Gaps: Limited capacity to handle recurring floods; outdated infrastructure.
- Suggestions: Modernize flood control infrastructure and implement resilient agricultural practices for flood-prone areas.

Shahuwadi:

- Hazards: Landslides, Earthquakes (up to 5.3 magnitude), Cyclones.
- Gaps: Poor landslide response planning; insufficient earthquake-resistant structures.
- Suggestions: Strengthen building codes, introduce community landslide monitoring teams, and increase awareness about retrofitting homes for seismic resilience.

Hatkalangale:

- Hazards: Floods (Warana, Panchaganga rivers).
- Gaps: Inefficient flood management; lack of awareness regarding flood risks.
- Suggestions: Install flood gauges along critical river points, introduce a mobile-based flood alert system, and carry out regular community training on flood response.

General Suggestion:

- Enhance local capacity through regular training and drills for communities, local authorities, and first responders.
- Retrofit critical infrastructure to withstand floods, landslides, and moderate earthquakes.
- Improve early warning systems, especially in landslide-prone and flood-prone areas.
- Promote community-based DRR initiatives focusing on hazard-specific awareness, particularly for floods and landslides.
- Strengthen inter-departmental coordination during disaster events and improve information sharing.



PREPAREDNESS STRATEGIES

04

TABLE: LIST OF FESTIVAL AND SUITABLE IEC

No.	Festival	The focus of IEC Material
1	Ganesh Chaturthi	Drowning, Fire, Stampede
2	Navratri and Dussehra or Vijayadashmi	Fire, Stampede
3	Diwali	Fire
4	Janmashtami	Stampede
5	Ram Navami and Hanuman Jayanti	Stampede
6	Gudi Padwa or Chaitra Pratipada: The Harvest Festival of Maharashtra	Fire
7	Ramzan-Id (Id-ul-Fitr), Bakri-Id (Id-ul-Zuha)	Stampede
8	Narali Purnima	Drowning
9	Makar Sankranti	Accidents
10	Ashadhi Ekadashi	Stampede, Landslide, flood
11	Holi	Water-related

Special events can be organized on significant dates

List of Previous Major Disaster in Maharashtra and India (not a complete list)-

- Malin Landslide, 2014
- 26/11 Terrorist Attack
- Mumbai Flood 2005
- Latur Earthquake 1993
- Cyclone Nisarga, Tauktae, Phailin, etc.
- Mandhera Devi temple stampede, 2005
- Kumbh Mela Stampede, 2003
- Irshalwadi Landslide, 2023
- Marathwada drought, 1972
- Bhopal Gas Tragedy, 1984
- Jammu and Kashmir Earthquake, 2015
- Balasore Train Accident, 2023
- Chasnala mining disaster, 1975

TABLE: LIST OF IMPORTANT DAYS FOR IEC INTERVENTION

No.	Day	Date	Significance	Tentative Topic
1	Balika Din	3 January	Birth anniversary of Savitribai Phule	Gender Inclusive Disaster Management
2	Patrakar Din	6 January	Birth Anniversary of Balshastrri Jambhekar	Role of Media in Disaster Management
3	Sinchan Din	26 February	In memory of Shankarrao Chavan Memory	Water Security, Drought, Sustainable Water Management
4	Marathi Rajbhasha Din	27 February	Birth Anniversary of Kusumagraj (V. V. Shirvadkar)	Language access in emergency and disaster preparedness Language as a Tool for Disaster Management Importance of IEC in Local Language
5	Udyog Din	10 March	In memory of Laxmanrao Kirloskar	Entrepreneurship in Disaster Management The Role of Disaster Entrepreneurship in Disaster Risk Reduction Role of Businesses, MSMEs in DRM Disaster Risk Management and the Role of the Corporate Sector BCM, ESG, CSR role in DRM
6	Samata Din	12 March	Birth anniversary of Yashwantrao Chavan	Diversity, equity-focused DRM
7	Shikshak Hakk Din (Teacher’s Rights Day)	11 April	Birth anniversary of Mahatma Phule	Inclusive Disaster Risk Management Role of Teachers and Educators in DRM
8	Dyan Diwas (knowledge day)	14 April	Birth anniversary of Dr. B. R. Ambedkar	Role of Education in DRM Role of Research and Dissemination in Strengthening DRM Role of Educational Institutions in Disaster Knowledge Creation
9	Maharashtra Day	1 May	Also, an international labour day	Resilient Maharashtra: from present to future for all Labor Safety Industrial Disasters, including mining
10	Samajik Nyay Din (Social Justice Day)	26 June	birth anniversary of Shahu Maharaj	Role of Leadership in Disaster Management Grassroots leadership and DRM Social and Environmental Justice Disaster Justice Social Inclusion and DRM
11	Krishi Din	1 July	birth anniversary of Vasantrao Naik	Agriculture-related disasters and relevant topics, soil erosion, Sustainable Agriculture, natural farming, Climate-resilient farming, etc
12	Shetkari Din	29 August	in the memory of Vitthalrao Vikhe Patil	Empowering farmers for DRM Relevant schemes, programmes and interventions
13	Shram Pratishtha Din	22 Sept	In the memory of Karmavir Bhaurao Patil	
14	Rajya Mahiti Adhikar Din	28 Sept	Awareness about the Right to Information	EWS, EWDS, Database management and mapping.
15	Rangbhumii Din	5 Nov	Birth Anniversary of Vishnudas Bhawe	Indigenous community, culture, traditions and DRR Role of Dance, Drama and other cultural activities in Disaster Awareness Role of art in Disaster mental Health and providing Psycho-social Support
16	Vidyarthi Din (Student Day in Maharashtra)	7 Nov	In the memory of Dr. B. R. Ambedkar	Child Centric DRR, School Safety, Role of School Students in Disaster Management Disaster Management in Schools
17	Jaiv Tantradyan Din	14 Nov	Biotechnology Day	Biohazards, pest attacks, pandemics, etc



CAPACITY BUILDING AND TRAINING MEASURES

05

INSTITUTIONAL CAPACITY BUILDING AND TRAINING NEED ASSESSMENT

TABLE 37: LIST OF TRAINING METHOD AND APPROACHES FOR CAPACITY BUILDING

Sl.no.	Task	Method	Nodal agency	Supporting Agency
1	Information dissemination regarding various hazards and their respective do's and don'ts should be prioritised, with an emphasis on preparing community-based disaster management plans in these areas. Schools, industrial clusters, slums, and resettlement colonies are identified as first-priority locations, given their high vulnerability. The second priority should be given to communities residing on the district's outskirts, particularly in villages.	Natak, Film Shows, Rallies, Media, Newspaper, Media, Posters, and Pamphlets, Group discussions and workshops etc	District Administration	Non-Government Organisations (NGOs), Schools and colleges volunteers, NSS, NCC, Sports groups, etc.
2	Constitution of Community Based Disaster Management Committees and Taskforces	Through Community level meeting	District Administration	Aapadamitra, Members, Local Volunteers etc.
3	Capacity Building of Community Members	Through mock drills, preparation of Community plans, trainings and workshops on disaster specific topics	District Administration	Civil Defence, Police, Fire, CBOs and NGOs
4	Training to the task forces and committee members, including first aid and trauma counselling, search and rescue and firefighting, warning dissemination, etc.	Training and workshops	Revenue Department along with Health, Police and Fire Departments	Civil Defence, Police, Fire, CBOs, and NGOs
5	Post-disaster epidemic problems	Seminars and community meetings	Health Department	Local health departments, and NGOs
6	Training programs focusing on constructing seismic-resistant buildings and retrofitting existing structures will be conducted. The target participants include contractors, masons, engineers, architects, and local communities.	Showing Films, videos, distributing posters and brochures, reading materials, etc. in training and workshops.	District Administration	PWD, Private contractors and NGOs etc

INSTITUTIONAL CAPACITY BUILDING AND TRAINING NEED ASSESSMENT

TABLE 38: ANNUAL TRAINING CALENDAR OF DISTRICT DISASTER MANAGEMENT AUTHORITY, KOLHAPUR, (2024-25)

No.	Name of Training Programs	Target Audiences	Duration of Program	No of Participants	No Training programs are required
1	Training of Nodal officers of district line departments about their roles and responsibilities in disaster/climate risk management and the DM planning process, developing disaster mitigation proposals and their implementation.	Nodal officers of district line departments	2 Days	30	2
2	Orientation of Tehsildar and BDOs on disaster/climate risk management and nature-based solutions	Tehsildars, BDOs	1 Day	30	2
3	Training Program on Urban Disaster Resilience and Climate Risk Mitigation in urban areas	SDO, BDO, CEO-Municipality	1 Day	20	1
4	Training program on Urban Risk Reduction and Resilience: Focus on flood risk management, Solid Waste Management and Drainage System	Line department	1 Day	30	1
5	Training program on Lightning Risk Management and Safety Measures at the Taluka level	Farmers, NGO, Agriculture department	1 Day	30	1
6	Training Program on Crowd Management and Stampede Risk Reduction at Taluka level	Taluka level Police, Home guard, Aapada Mitra	1 Day	30	1
7	Training program on Effective Involvement of CBOs, NGOs, CSOs and private sector stakeholders in Disaster Risk Management at Taluka level Levels	CBOs, NGOs, CSOs and private sector stakeholders	1 Day	20	1
8	Training on Child-Centric DRR	School	1 Day	30	1
9	Training on River Basin Management	Irrigation Dept, PWD, CWC, WRD, Tehsildar	1 Day	30	1
10	Training on mental health and psycho-social wellbeing in DM at Taluka level	Health dept, NGO	1 Day	30	1
11	Training on gender-inclusive DRR	Fire, Civil society, WCD, SJD	1 Day	30	1
12	Training on Industrial and Chemical Disaster Management, CBRN	Local industries	2 Days	30	2
13	Training of trainers for Life-saving techniques in disasters, Triage, Rainwater Harvesting and Energy Conservation.	Aapda Mitra, Local Youth, Schools	1Days	35	4
14	Training on handling tourists during emergency	Tourism, Travel agency, Coast Guards, Aapada Mitra, NGO	1 Day	30	1
15	Training on school safety and security at the Taluka level	Schools	1 Day	30	1



RESPONSE AND RELIEF MEASURES

06

RESPONSE AND RELIEF MEASURES

TABLE: LIST OF STAKEHOLDERS RESPONSIBLE OF EMERGENCY PLANNING

Sr. No.	Emergency Management Function / Tasks	Function /Task Lead	Support function officer/agencies
1	Direction	DM	DDO, SP, Resident Dy. Collector and Tahsildar
2	Control, Coordination Information Collection, Analysis and Damage Survey	DM	DDO, SP, Resident Dy. Collector (RDC), Tahsildar, DIC, Dy. DDO, Ex. Engr, R&B, DAO
3	Communication	RDC	Dy. Tahsildar, Mobile Operators, TV, Radio, Police, Forests, Fire
4	Alert and Warning	RDC / SP	EOC / Disaster Tahsildar, District Information Officer (DIO)
5	Transport (ESF, Evacuation, Relief Supply)	RTO / DTO	RDC, DDO, DSO, SP, DMHO
6	SAR (Search and Rescue)	SP / Civil defence/SDRF /NDRF	Fire, civil defence, Home Guards & SDRF (when the magnitude of any disaster is beyond the coping capabilities of these response agencies, NDRF may be requisitioned for search & rescue operations.)
7	Emergency Public Information	DIO	EOC / Police/ Transport/ Forest
8	Law and Order/Public Protection	SP	Dy. SP, Home Guards Commandant, NGOs, Paramilitary and Armed Forces
9	Public Works	Ex. Eng.	Irrigation, Ex. Engr., Panchayat, NGOs, Water Supply Board, Municipalities, Home Guards, Police
10	Mass Care / Emergency Assistance /Shelters	Dist. Primary Education Officer	School Principal, Teachers, Health, PHC, State Transport, Water Supply, RTO, Tahsildar, TDO
11	Health and Medical Services, Psychosocial	District Health Officer (DHO)	Supt. Govt. Hospital, Municipality, PHCs, CHCS, Red Cross, Fire Brigade, Civil



REHABILITATION, RECONSTRUCTION AND RECOVERY MEASURES

07

POST DISASTER NEED ASSESSMENT

Name of Department:

Dated:

Type of Hazard:

Power Supply Department

Table 41: Damage Assessment Matrix for Power Supply Department

TABLE: DAMAGE ASSESSMENT MATRIX FOR HEALTH DEPARTMENT

Sl. no	Name of Tehsil	Name of Village	Items	Particulars	Total
			PHCs (Damaged/ Destroyed)	No. of buildings	
				Estimate loss (Rs.)	
			CHC's (Damaged/ Destroyed)	No. of buildings	
				Estimate loss (Rs.)	
			Other Buildings (Damaged/ Destroyed)	No. of buildings	
				Estimate loss (Rs.)	
			Human lives lost	Male	
				Female	
			A person who suffered grievous injurious	Male	
				Female	
			A person who suffered minorinjuries	Male	
				Female	

TABLE: SURVEY TIMELINE FOR PDNA

Types	Week							
	1	2	3	4	5	6	7	8
Estimation of disaster effects								
Baseline data collection								
Field visit and survey								
Estimation of damage and production losses								
Aggregation of damage and production losses								
Estimation of disaster impact								
Micro-economic impact analysis								
Macro-social impact analysis								
Personal/household impact analysis								
Estimation of post-disaster needs								
Recovery needs								
Reconstruction needs								
Assessment report preparation								

STANDARD OPERATING PROCEDURES & CHECKLISTS

- Sop for Revenue department
- Sop for Police department
- Sop for Irrigation & water resource department
- Sop for Nagarpalika
- Sop for Health department
- Sop for Zila parishad health department
- Sop for Public works department
- Sop for Telecommunication department
- Sop for Railway department
- Sop for Agriculture department
- Sop for District information office
- Sop for State transport department
- Sop for Maharashtra state electricity board

THANK YOU

Dr. Maniruzzaman Sk

District Disaster Management Support

Kolhapur, Ratnagiri, Sindhudurg

Palladium, India

PMU for Technical Support and Implementation of Comprehensive Disaster Planning, Management
& Response for Disaster Management, Relief and Rehabilitation Department,
Government of Maharashtra



Panhala Fort Disaster Management Plan

Prepared By

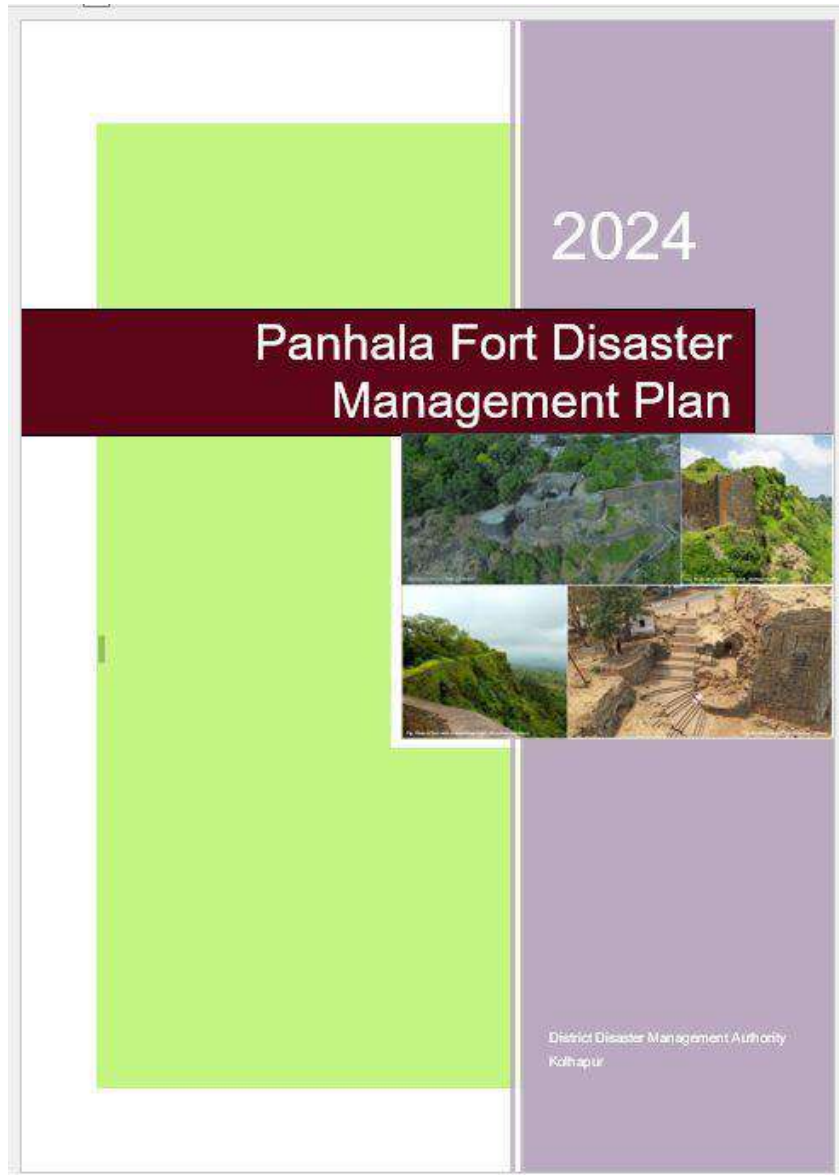
District Disaster Management Authority,
Office of the District Collector
Kolhapur, Govt. Of Maharashtra

Knowledge partner

Palladium, India

PMU for Technical Support and Implementation of Comprehensive
Disaster Planning, Management & Response for Disaster Management,
Relief and Rehabilitation Department, Government of Maharashtra

Table of Contents



- 01** Introduction
- 02** Fort Profile
- 03** HRVCA
- 04** Measures for Disaster Risk Prevention, Reduction and Mitigation
- 05** Planning for Emergency Preparedness and Disaster Response
- 06** Post-disaster Assessment, Planning and Recovery Processes
- 07** Training, Capacity Building and Raising Awareness
- 08** Conclusion and Action Plan
- 09** Annexure



Introduction

01

Introduction

Rationale for Panhala Fort Disaster Management Plan

- Panhala Fort, a historically significant monument in Kolhapur, Maharashtra, faces a variety of potential disasters such as landslides, earthquakes, fires, and human-induced damage. These risks threaten not only the structural integrity of the fort but also the safety of the visitors and residents in the nearby areas. The increasing impact of climate change, rapid urbanization, and human activities near the fort magnify the risks. Therefore, the development of a comprehensive disaster management plan is crucial to protect the fort's heritage, minimize potential damage, and ensure the safety of all stakeholders.

Vision

- To develop a disaster-resilient Panhala Fort by implementing sustainable management strategies, preserving its historical and cultural heritage, and ensuring the safety of both visitors and nearby residents through proactive disaster risk reduction, response, and recovery measures.

Aim

- To minimize the risk and impact of natural and man-made disasters on Panhala Fort and its surrounding areas by developing a systematic disaster management framework that incorporates prevention, preparedness, mitigation, response, and recovery strategies.

Objectives

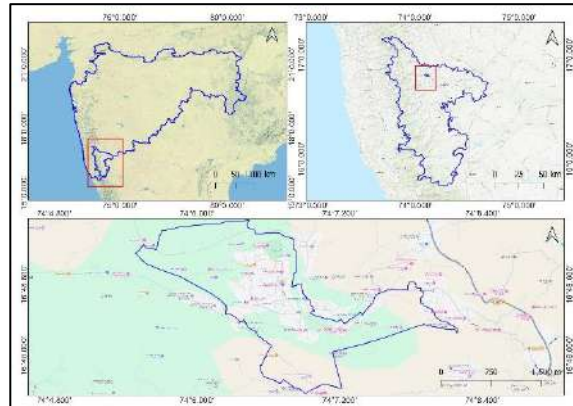
- Risk Assessment and Vulnerability Mapping
- Strengthening Structural Resilience of the fort
- Robust an effective Early Warning and Communication Systems
- Enhance Capacity Building and Training
- Immediate and time effective Emergency Response Plan
- Cultural Heritage Preservation
- Sustainable Tourism Management
- Community Engagement and Public Awareness
- Coordination with Government Agencies and Experts



Fort Profile

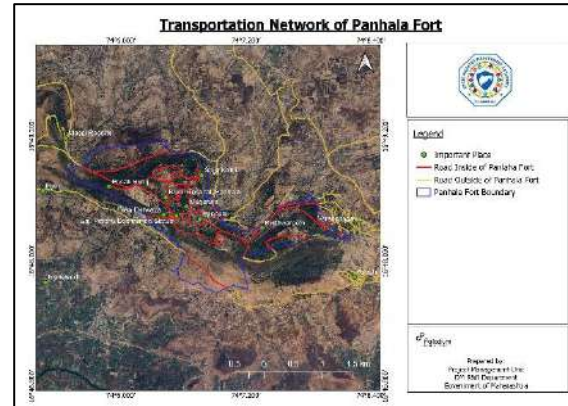
02

Panhala Fort Profile



Location

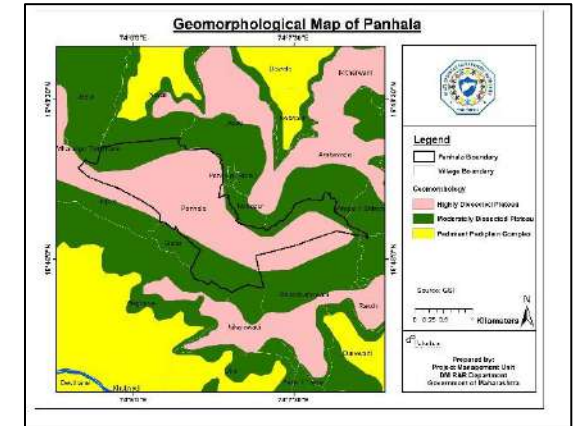
- Panhala Fort is part of the foothill region of the Sahyadri escarpment (Latitude:16°48'32"N and Longitude :74°6'33"E) in southern Maharashtra. The area is primarily composed of compact basalt and amygdaloidal basalt flows, with some vesicular traps. These are separated by thin, ribbon-like red and green tachylitic bands, which are more extensive. Compact basalt flows dominate over the amygdaloidal basalt flows, and the surface exposure reveals moderately to deeply weathered rock in the form of a section.



Transportation Network

Panhala Fort can be reached by road from major cities in Maharashtra and neighboring states (Fig. 2). It is located on the NH 4 highway, which connects it to cities like Mumbai, Pune, and Bangalore. Visitors can hire a taxi or take a bus from these cities to reach the fort. The distance and time taken to reach the fort by road from some nearby cities are:

- Mumbai to Panhala Fort: 375 km (6 hours)
- Pune to Panhala Fort: 230 km (4 hours)
- Bangalore to Panhala Fort: 610 km (10 hours)



Geomorphology

On both sides of Panhala's fortification wall, steep cliffs form a huge complex of columnar joints with vertical and slightly inclined angles, which rise to great heights. These joints are interconnected, and their contact points create a continuous structure. The northern extension of Panhala, known as the Masai Plateau, is primarily used for plantation activity (Fig. 3). Both sides of the ridgeline are covered with beautiful, well-developed, highly elevated blocks of hexagonal, pentagonal, octagonal, and square-shaped columnar joints.



HAZARD RISK ASSESSMENT AND VULNERABILITY ANALYSIS

03

HAZARD HISTORY

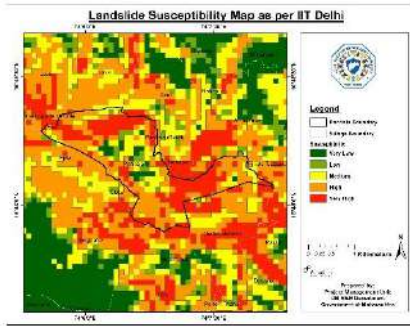
Table: Hazard frequency and probability ranking of Panhala Fort

Hazard	Frequency (Years)	Probability Rank	Probability Level
Natural Hazard			
Flood	0	0	Rare
Cyclone	5	2	Possible
Landslide	2	2	Possible
Earthquake	34	1	Rare
Heatwave	0	0	Rare
Drought	50	1	Rare
Wildfire	1	3	Almost Certain
Epidemic	5	2	Possible
Cloud Burst	6	2	Possible
Lightning	3	2	Possible
Pest Attack	0	0	Rare
Hailstorm	7	2	Possible
Wild Animal Attack	0	0	Rare
Technological Hazard			
Electrical Failure	2	2	Possible
Transportation Failure	2	2	Possible
Communications Failure	0	0	Rare
Information Systems Failure	0	0	Rare
Fire	1	3	Almost Certain
Structural Damage	1	3	Almost Certain
Human Hazard			
Stampede	0	0	Rare
Drowning	0	0	Rare
Mass Casualty Incident (trauma)	0	0	Rare
Terrorism	0	0	Rare
VIP Situation	0	0	Rare
Hostage Situation	0	0	Rare
Civil Disturbance	0	0	Rare
Missing Resident	0	0	Rare
Bomb Threat	0	0	Rare

Table : Hazard Calendar of Panhala Fort

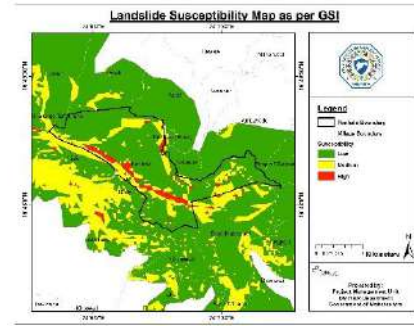
Disaster	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Earthquake	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floods						✓	✓	✓	✓			
Cyclones	✓	✓			✓	✓	✓	✓		✓	✓	✓
Landslide						✓	✓	✓	✓			
Heatwave			✓	✓	✓							
Epidemics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildfire			✓	✓	✓							
Fires	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Road accidents	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lightning					✓	✓	✓	✓		✓	✓	
Drought			✓	✓	✓							

Hazard Zonation



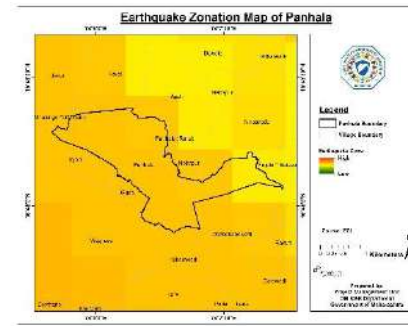
Landslide Susceptibility as per IIT Delhi

The fort is situated on a hill that has steep cliffs and slopes. Lead towards high landslide susceptibility. During the monsoon season, heavy rainfall increases the risk of landslides and rockfalls..



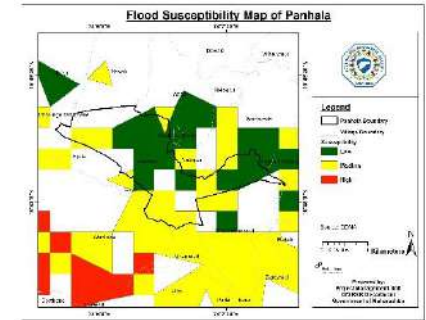
Landslide Susceptibility as per GSI

The basaltic rock formation is vulnerable to weathering, leading to small-scale rockfalls.



Earthquake Risk Zonation

Panhala Fort is located in a region that is categorized as Seismic Zone III, which is a moderate risk zone. Although there is no significant history of earthquakes, the structures on the fort could be susceptible to tremors due to the age of the buildings and their current state of deterioration.

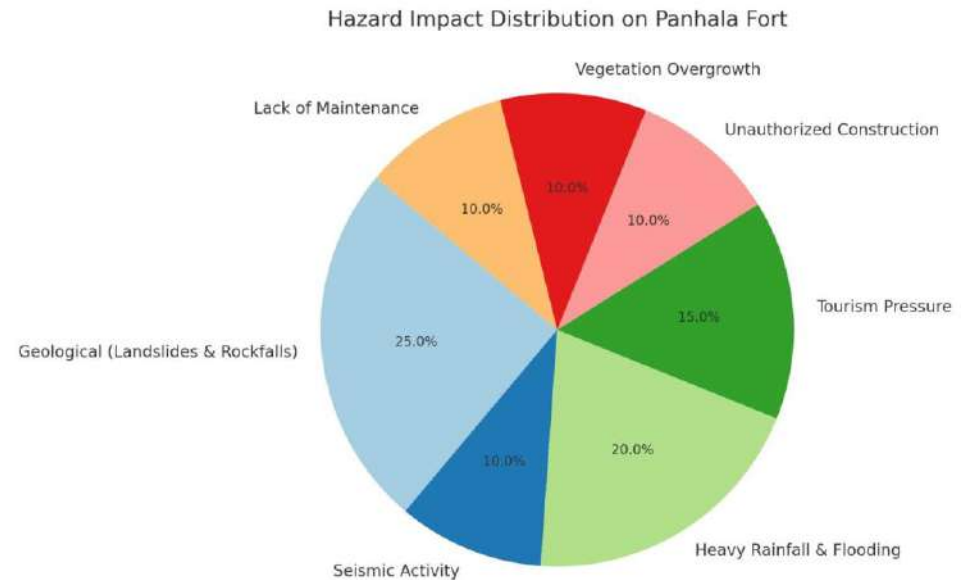


Flood Susceptibility

The region experiences significant rainfall during the monsoon season (June to September) and lead to moderate flood susceptibility (Fig. 7). The combination of heavy rains and poor drainage systems around the fort leads to waterlogging in certain sections of the fort, causing structural erosion and weakening.

Other Hazards

- **Tourism Pressure:** Panhala Fort is a popular tourist destination. The footfall during peak tourism seasons can increase the load on the infrastructure, potentially leading to structural damage due to overcrowding, littering, and vandalism.
- **Unauthorized Construction:** There has been unregulated development around the fort in recent years, with some structures being built illegally near heritage sections. This increases the risk of foundational instability and changes the water drainage patterns, exacerbating erosion.
- **Overgrowth and Root Penetration:** Over time, uncontrolled vegetation growth has led to the penetration of tree roots into the walls of the fort. This can cause cracks in the masonry and weaken the fortifications. Monsoon seasons further enhance plant growth, which accelerates the deterioration process.
- **Lack of Maintenance:** The fort's heritage value is high, but the lack of systematic conservation efforts and preventive maintenance programs means the fort faces a high risk of deterioration. Proper restoration and preservation plans are needed to mitigate these risks.
- **Climate Change:** Increasing temperatures and unpredictable weather patterns, including stronger monsoons and erratic rainfall, are also contributing to the accelerated deterioration of the fort.



Risk Assessment

Natural hazard								
Event	Probability	Severity = (magnitude - mitigation)						Risk category
		Human impact	Property impact	Business impact	Prepared ness	Internal response	External response	
	Likelihood this will occur	Possibility of death or injury	Physical losses and damages	Interruption of services	Preplanning	Time, effectiveness, resources	Community/ mutual aid staff and supplies	
Score	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = low 2 = moderate 3 = high	0 = n/a 1 = high 2 = moderate 3 = low or none	0 = n/a 1 = high 2 = moderate 3 = low or none	0 = n/a 1 = high 2 = moderate 3 = low or none	
Flood	0	2	2	3	1	1	2	Low
Cyclone	2	0	2	2	2	2	2	Medium
Landslide	2	1	2	2	2	2	3	High
Earthquake	1	0	0	0	0	0	0	Low
Heatwave	0	0	0	0	0	0	0	Low
Drought	1	0	0	0	0	0	0	Low
Wildfire	3	1	1	1	0	0	0	Low
Epidemic	2	2	1	1	1	1	2	Medium
Cloud burst	2	2	2	1	2	2	1	Medium
Lightning	2	1	1	1	2	2	1	Medium
Pest attack	0	0	0	0	0	0	0	Low
Hailstorm	2	2	3	0	0	0	0	Low
Wild animal attack	0	3	3	3	2	2	1	Low
Technological hazard								
Electrical Failure	2	3	0	1	1	1	1	Medium
Transportation Failure	2	0	0	0	1	1	1	Low
Communications Failure	0	0	0	0	1	1	1	Low
Information Systems Failure	0	0	0	0	1	1	1	Low
Fire	3	2	2	1	1	1	2	High
Structural Damage	3	1	1	2	1	1	1	Medium
Human hazard								
Stampede	0	1	1	1	1	1	1	Low
Drowning	0	3	0	1	1	1	1	Low
Mass Casualty Incident (trauma)	0	2	2	2	1	1	1	Low
Terrorism	0	0	0	0	0	0	0	Low
VIP Situation	0	1	1	1	0	0	0	Low
Hostage Situation	0	0	0	0	0	0	0	Low
Civil Disturbance	0	1	1	1	1	1	1	Low
Missing Resident	0	0	0	0	0	0	0	Low
Bomb Threat	0	0	0	0	0	0	0	Low

Key Observations

- ❖ The most pressing risks are Landslide, fire, and structural damage. These high and medium risks highlight gaps in both preparedness and internal/external response.
- ❖ Across various hazards, the preparedness scores are generally in the moderate to low range. This shows that while some initial safety protocols might be in place, they are either outdated or insufficient to fully protect against certain risks, particularly fire and structural damage.
- ❖ The external response score is consistently low across all hazards, especially in technological and human hazards. This suggests the fort's reliance on external agencies (municipalities, fire services, etc.) might be delayed or inadequate during emergencies. Strengthening partnerships with emergency services could improve this.
- ❖ The fort's internal response mechanisms (such as manual security backups or emergency response teams) need strengthening, as the response to natural and human-induced hazards shows room for improvement.

Vulnerability Assessment

Table: Buildings, surroundings and infrastructure vulnerability

Category	Issue	Details	Action Needed
Structural Distress	Old heritage buildings showing distress	Examples include Naukhinicha Saja and some bastions.	Structural repairs needed
Building Layout	Accessibility during emergencies is difficult	Populated regions like Machli Galli have poor accessibility during emergencies.	Improve emergency access
	Monitoring of all areas not an issue	Height regulations minimize monitoring difficulties.	No action required
High-Risk Areas	Buildings near fortification wall at risk	Landslides pose a danger to buildings near fort walls.	Reinforce and protect vulnerable buildings
Low-lying Areas	Soil saturation at Panhala	Mainly during the rainy season, the soil at Panhala is prone to saturation.	Monitor and improve drainage systems
Electrical Systems	Outdated and exposed systems	30-40% of the Distribution Panels (DPs) are outdated and need to be replaced.	Upgrade electrical systems
Drainage	Poor roof and terrace drainage	Inadequate maintenance of drainage from roofs and terraces.	Improve drainage maintenance
	Historical drainage outlets not functioning	Non-functioning drainage systems across the fort contribute to landslides.	Research and restore historical drainage
Sewage Systems	Outdated and not implemented	Development plans are ready, but land issues prevent implementation.	Resolve land issues and implement sewage plan
Ventilation	Adequate natural and mechanical ventilation	Both natural and mechanical ventilation systems are adequate.	No action required
Humidity & Temperature	Excessive humidity in the museum	Humidity is a problem in all areas of the museum.	Implement humidity control
Pest Control	Pest control procedures not implemented	Pest control is not consistently implemented in certain areas.	Regular pest control procedures needed
Lighting	Adequate lighting arrester is not installed	Lighting arresters are considered as not sufficient.	Identification of vulnerable buildings and installed adequate lightning arresters
Signage	Adequate signage for visitors	Signage is considered sufficient for visitors.	No action required
Access Points	Compliant with codes	Access points adhere to building codes.	No action required
Emergency Access	No blocked or unreachable exits	Access and exits are not blocked or unreachable.	No action required
Security of Restricted Areas	No risk of tampering with restricted areas	Access to restricted areas is not a concern.	No action required
Security Staff	Insufficient security systems in place	A dedicated security system is needed, though current staff is adequate.	Implement a dedicated security system
Managerial Staff	Adequate managerial staffing	The current level of managerial staff is deemed sufficient.	No action required

Table: Visitor management, security system and infrastructure vulnerability

Category	Issues	Details	Action Needed
Visitor Management and Security System	Security Staff	Inadequate training and no dedicated security system	Implement dedicated security system and train staff
	Managerial Staff	Sufficient staff from local municipal council are available	No action needed
	Automated Security System	Lack of automated security systems	Install modern security mechanisms (CCTVs, Public Addressing System, Siren)
	Chain of Command for Fort Operations	There is no chain of command exist at Panhala fort	Established a systematic chain of command mechanism
Critical Infrastructure	Backup Systems	No manual backup for security in emergencies	Establish manual backup system
	Emergency Protocol	No established emergency response protocol	Create and document emergency protocol
	Emergency Contacts	Emergency contacts list exists but not regularly updated	Ensure list is updated and easily accessible
	Staff Verification	No database for staff background verification	Implement staff background verification system
	Fire Detection and Suppression Systems	No fire detection or suppression systems available in most of the buildings	Install fire detection and suppression systems at critical buildings
	Evacuation Plan and Routes	No evacuation plan or displayed evacuation routes	Develop and display evacuation routes generally at most crowded areas
	Emergency Elevators and Fire Stairways	Emergency elevators and fire stairways don't meet codes	Upgrade stairways and elevators to meet safety standards
	Emergency Supplies	No emergency supplies available	Provide necessary emergency supplies
	Infrastructure Monitoring	Critical infrastructure not regularly checked or monitored	Appoint dedicated officials for regularly monitor and maintain infrastructure

Suggestions from HRVCA

Key Suggestions

- ❖ Detect early signs of structural weakness or damage.
- ❖ Strengthen the fort’s structure against mild earthquakes.
- ❖ Reduce the impact of human activity in the fort.
- ❖ Prevent damage from roots weakening the structure.
- ❖ Establish protocols for landslides and floods.
- ❖ Implement a dedicated and automated security system and ensure security staff are properly trained.
- ❖ Establish a clear emergency response protocol and manual security backups.
- ❖ Create a database for staff verification and maintain a regularly updated list of emergency contacts.
- ❖ Install fire detection and suppression systems across all required buildings.
- ❖ Develop a formal evacuation plan and ensure evacuation routes are clearly displayed.
- ❖ Upgrade fire stairways, doors, and emergency elevators to meet code standards.
- ❖ Regularly check and monitor critical infrastructure to prevent safety lapses.

Table: List of search and rescue equipment at Panhala Fort

Sr. No	Item	Qty
1.	Fire Water Tender Truck	1
2.	Water Mist Motor Bike (Bullet Bike)	1
3.	Fire Rescue Cylinder Mounted Motor Bike (Bullet Bike)	1
4.	Backpack Extinguishing Device	1
5.	Automatic Fire RID	5
6.	Emergency Tower Light	1
7.	Smoke Exhauster	1
8.	Fire Extinguisher- Water CO2- 9 ltr	6
9.	Fire Extinguisher- Mechanical Foam- 9 ltr	6
10.	Fire Extinguisher- ABC Type -9 ltr	6
11.	Snake Catcher Stick and Carrying Bag	2
12.	Conical Traffic Cone 3 Feet height	10
13.	Hydraulic Wedge Jack	1
14.	Helmet Sikandar Type	10
15.	Rubber Knee and Ankle (Gum) Boots	10
16.	Carbide tipped blade Chain Saw	1
17.	Hand Torch - 2 Km Range	5
18.	Fire Hand Gloves - Basic	10
19.	Electric Spanner Gun - 220 V	1
20.	Spanner Set	1
21.	Fire Ball	10
22.	Portable Fire Pump (Petrol)	1
23.	Vehicle Search Light	1
24.	Tower Ladder 2 Section	1
25.	Fire Blanket	2
26.	Life Ring	4
27.	Scoop Stretcher	1
28.	Safeguard	4
29.	Bobster as per BSF Ballistic Goggles	2
30.	Life Jacket	4



Measures for Disaster Risk Prevention, Reduction and Mitigation

04

Building and environment stabilization

- ❖ Disaster Response Team (DRT) will coordinate with facility services and maintenance staff to assess the damage caused by any disaster (fire, flood, landslide or other disaster).
- ❖ Professional restoration services, especially those provided through insurance, should be involved under the supervision of the DRT. Insurance adjusters should also be a part of the review process.
- ❖ Designated staff from the fort conservation team will be responsible for documenting damage to the fort's structures.
- ❖ Documentation will include thorough photographic and video evidence, with written records detailing the impact on walls, gates, pathways, artifacts, and other structural elements.
- ❖ Use standard forms to record damages, such as a Post Disaster Need Assessment form.
- ❖ After controlling the disaster, prompt action should be taken to limit environmental damage.
- ❖ Water or moisture damage (from heavy rains or floods) should be addressed by:
 - Removing any standing water through mopping or pumping.
 - Removing wet debris or carpets.
 - Placing dehumidifiers and fans in affected areas to stabilize humidity.
- ❖ Aim to restore conditions to normal seasonal levels for humidity and temperature. If this is not possible due to the disaster's scale, focus on lowering humidity and temperature to slow down the development of mold, wood distortion, and corrosion.
- ❖ If the fort's security system is compromised, especially electronic systems, temporary increased security may be necessary. This is crucial to protect the fort from theft, vandalism, or unauthorized access.
- ❖ Coordination with disaster response team (DRT) will help ensure the fort's artifacts and structure are protected.
- ❖ Consider sealing off damaged areas or installing temporary surveillance cameras as necessary.
- ❖ Access to the damaged areas will be limited to authorized personnel, including fort staff, volunteers, restoration experts, and service providers.
- ❖ The Facility lead will monitor and control site access to avoid unnecessary disturbance or further damage.
- ❖ All entry points should be sealed to prevent biological infestations, especially in areas weakened by structural damage.
- ❖ Staff and workers should be trained to identify and report any signs of mold, insect infestations, or rodent activity. Immediate steps should be taken to quarantine affected areas or objects to prevent contamination.

Other Preventive Measures

- ❖ Continuous update and conduct micro level risk assessments and hazard mapping specific to Panhala Fort to identify vulnerable areas within the fort, such as weak walls, gates, and areas prone to landslides, flood, earthquake, erosion, etc.
- ❖ Update and Map out natural disaster risks like earthquakes, landslides, and flooding that could impact the fort's structure and surrounding environment.
- ❖ Establish an effective early warning system for potential natural disasters, such as landslides, floods or cyclones, to alert local authorities, fort staff, and visitors in advance.
- ❖ Coordinate with DDMA, SDMA, MAHAVED, MAHARAIN, IMD and GSI to receive timely warnings/updates on possible disasters.
- ❖ Review and implement strict building regulations specifically designed for the conservation of heritage structures like Panhala Fort.
- ❖ Regularly assess the fort's structural integrity and carry out necessary retrofitting, repairs, and reinforcements to prevent collapse during natural disasters.
- ❖ Invest in resilient infrastructure around the fort, including stormwater drainage systems, retaining walls, and flood barriers to protect against water damage.
- ❖ Ensure that walking paths, access roads, and visitor facilities are constructed with disaster resilience in mind.
- ❖ Implement sustainable land management practices around the fort to reduce risks like landslides and soil erosion.
- ❖ Conduct reforestation activities and promote vegetation in the surrounding areas to stabilize soil and reduce the risk of landslides.
- ❖ Prevent illegal activities, such as deforestation, which could weaken the fort's surrounding ecosystem.
- ❖ Organize regular awareness campaigns, drills and exercises for local residents, visitors, and staff on the risks of natural disasters and how to respond during emergencies.
- ❖ Provide capacity-building programs for local authorities, fort staff, and nearby communities to ensure they are trained in disaster preparedness, response, and evacuation protocols.
- ❖ Update fort disaster management plan every two years, and if necessary, modify roles and responsibilities for fort staff, local authorities, emergency services, and other stakeholders.
- ❖ Establish clear evacuation routes and safe zones for visitors in case of an emergency with the consultation of Archology department, Tourism Department, Fire Department, and PWD.
- ❖ Ensure communication protocols are followed to coordinate disaster responses efficiently.
- ❖ Strengthen vulnerable sections of the fort through retrofitting and reinforcement, particularly the walls, gates, and older structures prone to collapse.
- ❖ Facilitate partnerships and collaborations between government agencies, heritage conservation organizations, non-governmental organizations (NGOs), and local communities to ensure a unified disaster prevention approach.
- ❖ Engage with private sector entities for funding and support in implementing disaster prevention infrastructure.
- ❖ Regularly monitor and evaluate the effectiveness of the fort's disaster prevention measures, including structural health, early warning systems, and community preparedness.
- ❖ Update risk assessments and disaster management strategies based on new research, lessons learned from disaster or drills, and changing environmental conditions.



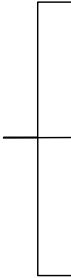
Planning for Emergency Preparedness and Disaster Response

05

Emergency Team / Disaster Response Team (DRT)

Key Roles and Responsibilities for Evacuation

- **Facility lead:** Coordinates all evacuation activities, including communication, crowd control, and liaison with local authorities.
- **Security Personnel:** Assist in guiding visitors along safe evacuation routes, ensuring crowd control, and securing exits.
- **Staff Members:** Assist in directing visitors to evacuation routes, providing first aid, and helping individuals with special needs.
- **Chief Medical Officer:** Provide medical assistance and handle any injuries that may occur during the evacuation process.

RESPONSE LEAD: DDMA/DC ALTERNATE: RDC		FACILITIES LEAD: District Archaeology ALTERNATE: Tourism Department	STAFFING ASSISTANT: SDM ALTERNATE: Tehsildar
		INFRASTRUCTURE LEAD: PWD ALTERNATE: Nagar Parishad	INFRASTRUCTURE ASSISTANT: Zela-parishad ALTERNATE: Tehsildar
		COMMUNICATIONS LEAD: DEOC ALTERNATE: Police Control room	COMMUNICATIONS ASSISTANT: Taluka level EOC ALTERNATE: Police

Chain of command

Chain of command

- All members of the Disaster Response Team will observe the Chain of Command as follows:
- All staff and volunteers will respond to any instructions or directions given by emergency/disaster service authorities including police, fire, and ambulance personnel.
- In the event of an evacuation, all staff and volunteers will respond to the directions provided by the Chief Fire officer and Fire officer.
- The DRT members (Infrastructure Lead, Facilities Lead, Communications Lead, Infrastructure Assistant, Staffing Assistant, and Recording Assistant) will report to the Response Lead.
- Volunteers and other staff not assigned specific duties will report to the Staffing Assistant, or once specified, their work team Leads.
- In the case of a community-wide disaster, the Response Lead will liaise with the district's Disaster response force as per the district disaster management plan.

Communicating an emergency / disaster

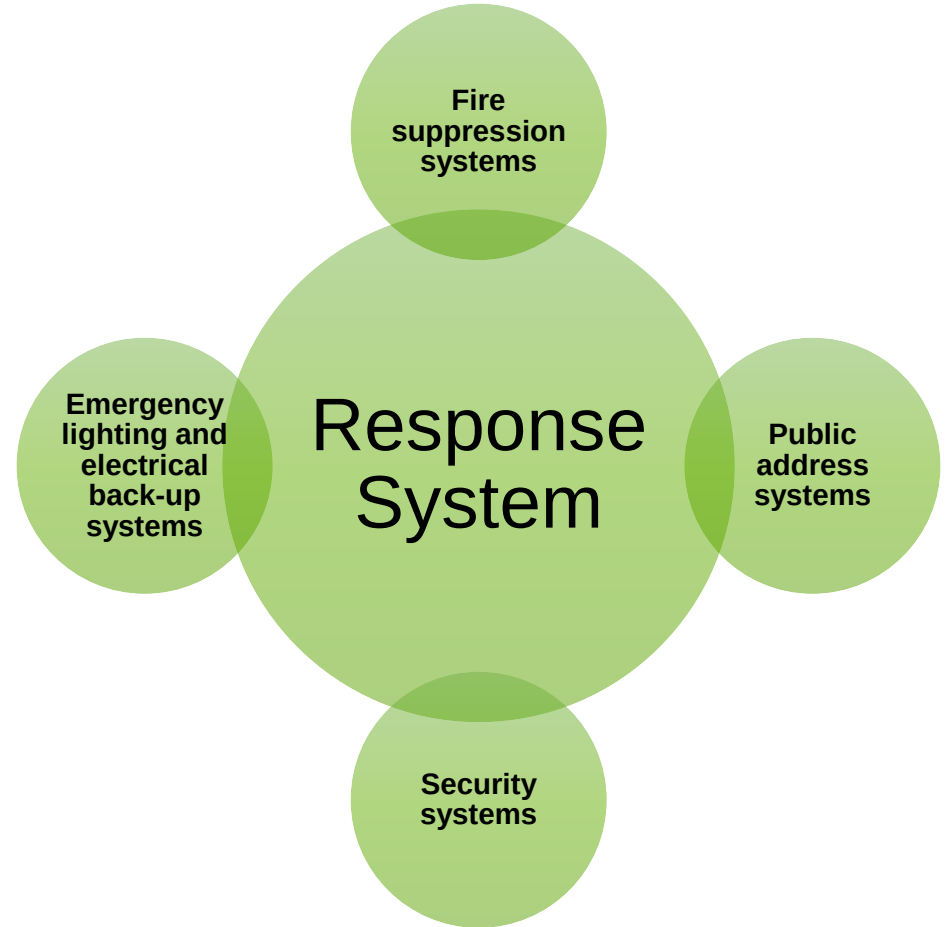
- A situation is declared an emergency or a disaster by the Response Lead in consultation with the relevant stakeholders. In the absence of the stakeholders, or if they cannot be reached, the Response Lead (or when unavailable, their Alternate) is authorized to declare an emergency and assemble the DRT.
- When a disaster or possible emergency is encountered by any member of the fort's paid or volunteer staff, the Response Lead should be contacted immediately. If the Response Lead is unavailable, any member of the DRT can be notified. If human safety is a concern, call 1077 first.
- When an emergency/disaster requiring full or partial evacuation is encountered, fire alarm and public address (PA) system protocols will be initiated according to the Fire and Evacuation Procedure. All staff and volunteers will be trained to understand the PA system codes and the procedures that they trigger.

In the case of a disaster/emergency declared after hours, especially one that causes the Fort to be closed to staff or where staff may be assigned different locations to work or a different role than usual, the following protocol will be initiated:

- Internal messages will be developed according to the procedure described in the Communications Plan. This may involve the use of holding messages when more details are not available.
- All staff will be contacted by WhatsApp / video conference / text message / phone / email. Staff will be asked to check in with their supervisor by WhatsApp / video conference / text message / phone / email by a specified time. Staff who have not checked in by that time will be contacted directly by their supervisor.
- Once the emergency response has begun, and depending on their work function, supervisors may be assigned to another member of the DRT for communication purposes and work assignments.
- If servers are non-functional or internet communication has been disrupted, phone calls will be used instead, and the organizational chart will act as a phone tree to facilitate a prompt process.

Emergency Operation Centre & Response System

- ❖ The DEOC serves as a command center, directing response and recovery efforts. It provides a space for meetings and acts as a hub for communication, ensuring all actions are well-coordinated.
- ❖ The DEOC stores and distributes necessary supplies and equipment for disaster response, such as search and rescue tools and safety gear.
- ❖ The PFEOC ensures the basic needs of response teams, including sanitation, food, rest, and first aid, are met to maintain effective operations.
- ❖ DEOC facilitates the use of advanced communication technologies and systems like the Incident Response System (IRS), India Disaster Resource Network (IDRN), and National Disaster Management Information System (NDMIS) to provide timely information and suggestions to the response lead for effective decision-making.
- ❖ The DEOC connects various line departments to ensure coordinated efforts across different sectors. It also disseminates warnings and alerts, ensuring all stakeholders are informed about ongoing situations and actions.
- ❖ The DEOC provides suggestions and guidance to the response lead to support the implementation of appropriate response and recovery actions based on real-time data and coordination efforts.

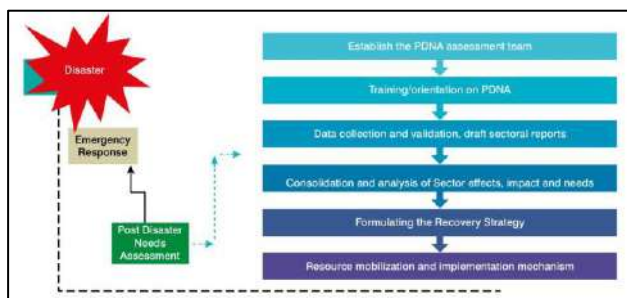




Post-disaster Assessment, Planning and Recovery Processes

06

Post-disaster Assessment, Planning and Recovery Processes



Key Timeline for PDNA

Table: survey timeline for PDNA

Types	Week							
	1	2	3	4	5	6	7	8
Estimation of disaster effects								
Baseline data collection								
Field visit and survey								
Estimation of damage and production losses								
Aggregation of damage and production losses								
Estimation of disaster impact								
Micro-economic impact analysis								
Macro-social impact analysis								
Personal/household impact analysis								
Recovery needs								
Reconstruction needs								
Assessment report preparation								

Table: Post disaster assessment process

Processes	Descriptions
Assessment of the context	It is essential to ensure that the site/precinct and surroundings are safe for entering and working and that it is secure and that basic services are available
Evaluating initial assessment	An overall picture of the site damage will enable the rescue team to list out immediate needs and resources, gather permissions and assistance, set out criteria for salvage procedures and develop the initial plan
Secure and stabilize	Depending upon the scale of the disaster, it may be necessary to secure the location before undertaking any type of salvage operation
Salvage or transfer of collections based on initial assessment	Based on initial assessment, it may be deemed urgent to remove certain elements from their location and shift them to a secure temporary location
Detailed assessment	This should be undertaken by qualified professionals only. Detailed assessment should be accompanied with documentation, visual as well as descriptive to keep a detailed record of the condition of the object prior to any treatment



Training, Capacity Building and Raising Awareness

07

Training, Capacity Building and Raising Awareness

Table: Training of Disaster Response Team (DRT) members

Program	Description	Duration
Introduction to Panhala Fort: Concerns and Issues	This module introduces the specific concerns and scope of cultural heritage and challenges of disaster risk reduction involved	2-3 days
Disaster Risk Management for Panhala Fort	This type of course will provide interdisciplinary training for participants to equip them to undertake integrated disaster risk assessment of Panhala fort, build comprehensive systems for disaster risk management incorporating various measures aimed at reducing risks, respond to disasters and recovering from them to be able to formulate disaster risk management plans for cultural heritage sites and precincts	1-2 weeks
Emergency Response and Stabilization Fort	This module will train emergency responders in the appropriate emergency response procedures applicable for Panhala Fort, highlight the processes for retrieval of artefacts and collections, illustrate measures for temporary stabilization that will not adversely affect cultural heritage sites and so on	3 d a y s - 1 week
Disaster Risk Assessment Methodologies	This module will explore the basic relationships between hazards, vulnerabilities and disaster risks, illustrating each stage in the disaster risk management process. Building upon this base, approaches and methods for risk assessment will be introduced	2 -3 days
Post Disaster Assessment	This module will focus on post-disaster assessment methodologies for Panhala Fort, and equip Fort staff with the tools needed for carrying out assessments at various scales and in various scenarios of disaster	2-3 days
Planning for Disaster Risk Recovery	This module explores actions that are involved in post disaster recovery and rehabilitation of cultural heritage sites and precincts	2-3 days
Role of recent Technology in DRR	This module will explain the benefit of using the advance technology for HRVA, Recovery and Reconstructions	1-2 days

Table: Training programs for staff and management

Program	Description	Duration	Frequency	Participants
Basic Security Protocol Delivery	Basic training to security and staff about critical infrastructure, security and standard responses	1 Hour	Once in a month	Particularly security staff, managers
Risk Assessment Training	Participant should be able to undertake basic risk assessment of the building, infrastructure, management, etc.	2-3 days	Once in a Year	Site manager and staff members. May be in coordination with the heritage practitioners involved in the conservation/management of the site
Tabletop Exercise	A Tabletop Exercise is a paper drill intended to demonstrate the working and communication relationships of functions found within the disaster management organizational plan	½ Day	Once in 3 months	The exercise is intended primarily for the administrators, managers and personnel who could conceivably be placed into an officer's position upon activation of the disaster management plan
Emergency Drill or Workshop	A drill that engages the entire staff and management and prepares the site or precinct for likely disaster scenarios and the appropriate responses	1 day	Once in 6 months	Ideally visitors should also be participants in this drill to raise awareness but also provide a realistic scenario to staff and management

Table: Awareness generation programs

Program	Description	Duration	Frequency	Participants
Off-site Interpretation/ Orientation/ Fixed Literature	Online or Printed literature that highlights the emergency plan for the Panhala fort. This can be interactive or in the form of brochures and maps	N/A	N/A	All local stakeholders, visitors to the site should be able to access this information freely and widely
Basic Emergency Protocol Delivery	Basic training to engage security and emergency responder in the area about acceptable routes, procedures	½ day	Once in 3 months	All stakeholders that spend extended periods of time on the site
Emergency Drill or Workshop	A drill that engages the entire staff and management and prepares the site or precinct for likely disaster scenarios and the appropriate responses	1 Day	Once in 6 months	Residents, visitors and other stakeholders should be participants in this drill to raise awareness but also provide a realistic scenario to staff and management



Conclusion and Action Plan

08

Conclusion and Action Plan

Conclusion

- The Panhala Fort Disaster Management Plan establishes a comprehensive framework aimed at safeguarding the fort's structural integrity and protecting lives in the event of a disaster. By identifying and addressing potential risks such as landslides, earthquakes, fires, and floods, the plan provides a multi-layered approach to disaster preparedness. It ensures resilience through structural reinforcement, early warning systems, and regular training for staff and local communities. Sustainable tourism management is also integrated to maintain a balance between heritage preservation and visitor safety. Overall, the plan empowers local authorities, stakeholders, and the community to collectively respond to emergencies, thereby preserving Panhala Fort's historical significance for future generations.

Implementation and Revising the Plan

- Some of the provisions for Panhala Fort have been detailed in this plan need to be undertaken with immediate effect, while the implementation of longer-term strategies and changes may require time and resources. The implementation of the of this Plan requires coordinated efforts from various stakeholders, including local authorities, government agencies, and community members. It involves regular training programs, mock drills, and establishing response protocols that ensure preparedness at all levels. Additionally, specific disaster response teams are tasked with managing emergencies and conducting real-time evaluations.

Revising and Updating the Guidelines

- This document is a dynamic document and will be updated periodically based on new technological advancements, research, and post-disaster assessments. Regular audits and feedback from disaster response drills will guide these revisions. Incorporating lessons learned from real-world disaster events will enable the continuous enhancement of the plan, thereby maintaining the fort's resilience against evolving threats.

THANK YOU

District Disaster Management Authority

Kolhapur

Annexure

Important Contact Numbers

Sl. no	Organization Name	Contact Details
1.	Nagar Parishad	(02328) 235027,235047
2.	Panhala Police Station	(02328) 235024
3.	Archaeological Survey of India, Sub circle Panhala	(02328) 235247
4.	Rural Hospital, Panhala	(02328) 235049
5.	Water Supply	(02328) 235330, 235331
6.	Maharashtra State Electricity Board, Panhala Branch	(02328) 235053
7.	President, Hotel Association	(02328) 235072

Sl. no	Organization Name	Contact Details
1.	Kolhapur Collector Office	2665814, 2665813
2.	DEOC, Collector Office	2665812
3.	Subdivisional Officer, Panhala Subdivision	(02328) 235023
4.	Assistant Director, Town Planning Kolhapur	2342565
5.	Deputy Engineer, Kolhapur	2537019

Sl. no	Name	Contact Details
1.	Mr. Chetan Kumar Dhanappa Mali, Administrator and Principal	9960186646
2.	Mr. Amit Hindurao Mane, Administrative Officer and Tax Inspector	9518968582
3.	Mr. Tanaji Nanavare, Accounts	7387943382
4.	Smt. Snehal Ramesh Panhalkar, Water supply and Sanitation supervisor	9156020880
5.	Smt. Jayashree Balaso Devkule, Civil Engineer	8329325534
6.	Mr. Biswas B Ramane, Clerk	9763917607
7.	Mrs. Madhura Maruti Gawli, Tax Inspector	7499590943
8.	Smt. Surekha Ashok Vadar, Tax Inspector	7768931225
9.	Mr. Asuman Gaikwad, Assistant Town Planner	7083981095
10.	Mr. Mukul B Chavan, Junior Engineer	9503649879
11.	Mr. Gurunath B Kamble, Barnishi	9923112071
12.	Mr. Ajit D Choury, City Coordinator	8888449036

Sl. no	Organization Name	Contact Details
1.	Tehsildar Office	(02328) 235026
2.	Medicine (Rural Hospital)	(02328) 235049
3.	PWD (Circuit House)	(02328) 235038
4.	Panhala Police Station	(02328) 235024
5.	Archeological Accountant	(02328) 235247
6.	Water Supply Department	(02328) 235330, 235331
7.	Maharashtra State Electricity Board, Panhala	(02328) 235053, 235043
8.	Telecom Corporation, Panhala	(02328) 235001, 235100, 235400