DISTRICT DISASTER MANAGEMENT PLAN, PUNE 2025-26

Safe & Resilient Pune

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District Disaster Management Plan, Pune District 2025-2026

District Disaster Management Authority,
Office of the District Collector,
Pune, Maharashtra- 411001
Toll-Free No. 1077

Foreword

Dear Residents of Pune,

Disaster management department under the aegis of District Executive Committee is facilitating the mainstreaming of Flagship development program to reduce the risk of Disaster in the state. Department has taken several initiatives to strengthen the convergence between different line departments and institutions of excellence in District to develop sustainable strategy for various disasters in the state.

District Disaster Management Authority (DDMA) is constantly taking efforts to develop a sustainable mechanism for updating the hazard, risk and vulnerability status of the district as well as of the taluka. This is to develop a dynamic, contextual and quality plan for this.

District Disaster Management Plan focuses on the realistic assessment of the hazard risk and vulnerability status, capacity of the line departments, institutions, need for strengthening the disaster specific strategies for the district to develop collective response plan for the different disasters based on emergency support functions.

A follow plan will be developed with all the stakeholders to abide this plan in terms of their departmental plan as guiding plan to reduce the risk of Disaster in the state. The main vision of this document is to initiate coordinated efforts in between all the line departments to have an effective disaster management strategy for the district, which will reduce the risk of disasters. The other focus area of this document is to have an extremely quick, efficient and coordinated response and recovery plans in place from the vulnerable villages to the district level (village being the unit of planning) with a mechanism that will ensure increasing community participation in all disaster preparedness activities.

Jitendra Dudi (IAS)
District Collector &
Chairman (DDMA) Pune

Message from Residential Deputy Collector

In Pune district great care is essential for management both types of disasters - natural as well as the man-made. As the district has history of disasters of different magnitudes, guided and all out efforts are a must.

Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspect of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.

The District Disaster Management Plan included with district hazard profile, prevention and mitigation methods, preparedness measures, emergency response and mainstreaming of disaster management mechanisms. The **Incident Response System (IRS)** is also included in this plan to institutionalize an effective response. The IRS provides a standardized approach to managing emergencies, ensuring a coordinated and efficient response.

This DDMP discussed about the roles and responsibility of line departments which gone help to strengthen departmental SOP's. Apart from preparedness, response and recovery this document focused on mainstreaming of Disaster Risk Reduction which is current global phenomena.

In addition to preparedness, response, and recovery, the document emphasizes the mainstreaming of Disaster Risk Reduction (DRR), which is a current global phenomenon involving the integration of disaster risk considerations into sustainable development policies, planning, and programming at all levels.

Jyoti Kadam
Residential Deputy Collector &
CEO (DDMA) Pune

District Disaster Management Plan
Pune District
2025-2026

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Pune, Maharashtra- 411001

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Preface

The Pune District Disaster Management Plan (DDMP) is a comprehensive document designed to address the multifaceted challenges posed by both natural and man-made disasters. Pune, with its diverse geographical and industrial landscape, has experienced a range of disasters over the years, necessitating a robust and dynamic approach to disaster management.

This plan is a testament to our commitment to safeguarding the lives, property, and well-being of our citizens. It outlines a strategic framework for disaster preparedness, response, and recovery, ensuring that all stakeholders are well-equipped to handle emergencies effectively. The DDMP integrates the latest methodologies and best practices in disaster risk reduction, emphasizing the importance of prevention, mitigation, and resilience.

The plan includes a detailed hazard profile of the district, identifying potential risks and vulnerabilities. It also delineates the roles and responsibilities of various departments and agencies, fostering a coordinated and collaborative approach to disaster management. The inclusion of the Incident Response System (IRS) ensures a standardized and efficient response mechanism, enhancing our capacity to manage emergencies.

The **District Disaster Management Plan (DDMP)** encompasses several key components:

- **District Hazard Profile**: This section outlines the various hazards that the district is prone to, including natural disasters like floods, earthquakes, and droughts, as well as man-made disasters such as industrial accidents and fires.
- **Prevention and Mitigation Methods**: These strategies aim to reduce the risk and impact of disasters. This includes infrastructure improvements, public awareness campaigns, and regulatory measures to ensure safety standards are met.
- **Preparedness Measures**: This involves planning and training to ensure that the district is ready to respond effectively to disasters. It includes the development of emergency plans, conducting drills and simulations, and establishing early warning systems.

Furthermore, the DDMP underscores the significance of mainstreaming disaster risk reduction into development planning. By incorporating disaster resilience into our policies and programs, we aim to build a safer and more resilient Pune.

We extend our gratitude to all the departments, agencies, and individuals who have contributed to the development of this plan. Their dedication and expertise have been instrumental in creating a comprehensive and actionable document. We are confident that the DDMP will serve as a vital tool in our ongoing efforts to protect our district and its people from the adverse impacts of disasters.

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1 Introduction

1.1 Rationale

The District Disaster Management Plan (DDMP) for Pune is essential due to the district's significant vulnerability to both natural and man-made disasters. Pune's diverse geographical and industrial landscape exposes it to various hazards, including floods, earthquakes, landslide, droughts, and industrial accidents. This plan aims to provide a structured and systematic approach to disaster management, ensuring comprehensive preparedness, response, and recovery measures.

The Disaster Management Act, 2005 provides the legal framework for disaster management in India, outlining the roles and responsibilities of various agencies and authorities at the national, state, and district levels. **Section 30.2 (i)** of National Disaster Management Act, 2005 made it mandatory for every district to have a disaster management plan. Under the chairmanship of the Hon. District Collector, District Disaster Management authority of every district should prepare a disaster management plan including HRVA, prevention & mitigation measures, preparedness, response and recovery plan. **The National Disaster Management Guidelines** issued by the National Disaster Management Authority (NDMA), provide a comprehensive framework for disaster preparedness, response, and recovery.

The DDMP also provides a broad idea with clarity for rapid mobilization of resources and effective handling of disaster by the district disaster management authority. While it focuses primarily on the needs of the government agencies, it envisages all those involved in disaster management including community and non-government agencies as potential users. The DDMP provides a well-defined framework for disaster management covering scope of work and roles of relevant agencies along with their responsibilities and accountability necessary to ensure effective mitigation, develop preparedness, and mobilize adequate response

1.2 Vision

To create a resilient and safe Pune district that effectively mitigates, prepares for, responds to, and recovers from disasters.

1.3 Aims and Objectives of the DDMP

Aim:

To enhance disaster resilience, ensure effective preparedness and response, promote community awareness, and integrate disaster risk reduction into development planning.

Objectives:

The broad objectives of this plan are:

- Improvement in understanding of disaster – i.e. risk, hazard and vulnerabilities.
- Analysis of Hazard, Risk, Vulnerability and capacity of people in coping with disaster situation.

- Gather relevant information from all line departments and stakeholders related to management of disaster through a unified format.
- Prepare the resource data and maps for better preparedness and reducing response time.
- Understand the responsibilities of all stakeholders in management of disaster in all three phases.
- Setting up multi-tasking District level operation Centre, which will act as a coordination center and decision support centre in a normal scenario and in times of any kind of emergency convert as EOC.
- Prepare the guidelines and mechanism for the district operation centre.
- Prepare the Standard Operating Procedures (SOPs) in alignment with the Incident Response System (IRS) to transform the disaster management unit from reactive to proactive
- Integrate mitigation measures in all development's plans.
- Promote the culture of disaster risk reduction for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development.

1.4 Stakeholders and their responsibilities

Stakeholders in Pune district are as follows-

1. **District Administration:** Under the chairmanship of the Hon. District Magistrate, who is also the chairperson of the District Disaster Management Authority (DDMA) and serves as the Incident Commander during emergencies, the District Administration is responsible for overseeing and coordinating all disaster management activities.
2. **District Disaster Management Officer (DDMO):** DDMO is by and large responsible for day-to-day operations related to disaster management which includes conducting trainings, capacity building for stakeholders, management of EOC, and other administrative work such as coordination between other line departments, Liaison with the NGOs in all three phases of disasters.
3. **Municipal Corporations, Zilla Parishad and PRIs**: Pune district has 2 municipal corporations namely- Pune and Pimpri Chinchwad. In addition to this, 17 municipal councils and 3 cantonment boards fall under Pune district. All agencies stated above are expected to conduct their disaster management activities in coordination with DDMA.
4. **Regional Disaster Management Centre (RDMC)-**Pune Municipal Corporation provides infrastructure required for RDMC, which caters to needs in Pune and adjoining Satara district.
5. **All line departments and departments under Zilla Parishad (ZP)-** Education, Health, PWD, Irrigation, Animal husbandry, Agricultural, etc. all departments under ZP and other departments such as Police, State Transport, Forest, Food and Civil Supplies, etc.
6. Various projects such as Swatch Bharat Mission, MGNREGA, DRDA, PMRDA etc.

1.5 Plan review and updation: Periodicity

The District Disaster Management Plan is a vital document for implementation and response perspective. The state plan has consisted of the broader idea the vulnerability profile of whole state, but the district plan consists with the detailed assessment report. So, in case of any emergency, this document becomes very useful to respond quickly and mitigate the scenario.

As per the **DM Act 2005**, **Section 31 (7)** the district authority shall review the plan from time-to-time, the implementation of the plan and issue such instructions to relevant departments of the Government in the district as it may deem for the implementation thereof.

Following measures are taken while updating the DM plan:

- The plan should be reviewed on a regular basis to ensure updation and changes wherever necessary
- While updating the plan, the review date should be displayed on the review page of the plan.
- It must be ensured that all stakeholders have understood the changes completely.

DDMA is responsible for reviewing, updating and approval of the DDMP. This plan (DDMP) is further submitted to state disaster management unit (DMU) for the approval from SDMA.

1.6 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 danger, 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 environment 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.

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

1.7 Realigning the Plan

In light of evolving global frameworks and national mandates, it is crucial to realign the District Disaster Management Plan (DDMP) with key strategic documents such as the Maharashtra State Disaster Management Plan (MSDMP 2023), the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals (SDGs), the Paris Agreement under COP 21, and the Prime Minister's 10-Point Agenda for Disaster Risk Reduction.

The MSDMP 2023 serves as the primary blueprint for disaster management in Maharashtra, detailing comprehensive strategies and priorities for disaster preparedness, response, and recovery. Aligning the DDMP with the MSDMP 2023 ensures coherence and consistency in disaster management efforts, fostering synergy and collaboration across different administrative levels.

Integrating the principles and priorities of the Sendai Framework into the DDMP is vital for enhancing resilience and reducing disaster risk at the local level. This involves adopting a risk-informed approach to planning, strengthening early warning systems, and encouraging community participation in disaster risk reduction activities.

The SDGs offer a holistic framework for sustainable development, emphasizing the interconnectedness of social, economic, and environmental dimensions. Aligning the DDMP with relevant SDGs helps address underlying vulnerabilities and promotes inclusive and sustainable development, thereby enhancing disaster resilience.

The Paris Agreement, part of COP 21, underscores the urgent need for climate action to mitigate the impacts of climate change and reduce greenhouse gas emissions. Incorporating

climate resilience measures into the DDMP can help protect communities from climate-related disasters and contribute to global efforts to limit global warming.

Lastly, the Prime Minister's 10-Point Agenda for Disaster Risk Reduction outlines key priorities for enhancing disaster resilience across various sectors, including infrastructure, healthcare, and education. Realigning the DDMP with these priorities ensures that local disaster management efforts are in sync with national objectives and priorities.

In summary, realigning the District Disaster Management Plan with the Maharashtra State Disaster Management Plan (MSDMP 2023), the Sendai Framework, SDGs, COP 21, and the Prime Minister's 10-Point Agenda is essential for enhancing disaster resilience, promoting sustainable development, and achieving the overarching goal of building a safer and more resilient Pune.

2 District Profile

2.1 Brief History of Pune District

Pune District has a rich historical legacy, being renowned for its association with the Great Maratha King Chhatrapati Shivaji Maharaj, the Peshwas, and other notable leaders and reformers from the pre-independence era. It has always been at the forefront of reformative thoughts and concepts across various fields, including industrial, agricultural, social, economic, and political sectors. Known as the 'Oxford of the East,' Pune is celebrated for its educational, research, and development institutions, placing it prominently on the world map. The district is also referred to as the 'Queen of Deccan' due to its scenic beauty and abundant natural resources. Additionally, Pune is famous for its religious and historical sites, attracting numerous visitors. Pune holds significant importance as a major military base and is one of the most industrialized districts in Western Maharashtra, contributing substantially to the region's development and progress.

2.2 Geographical Location

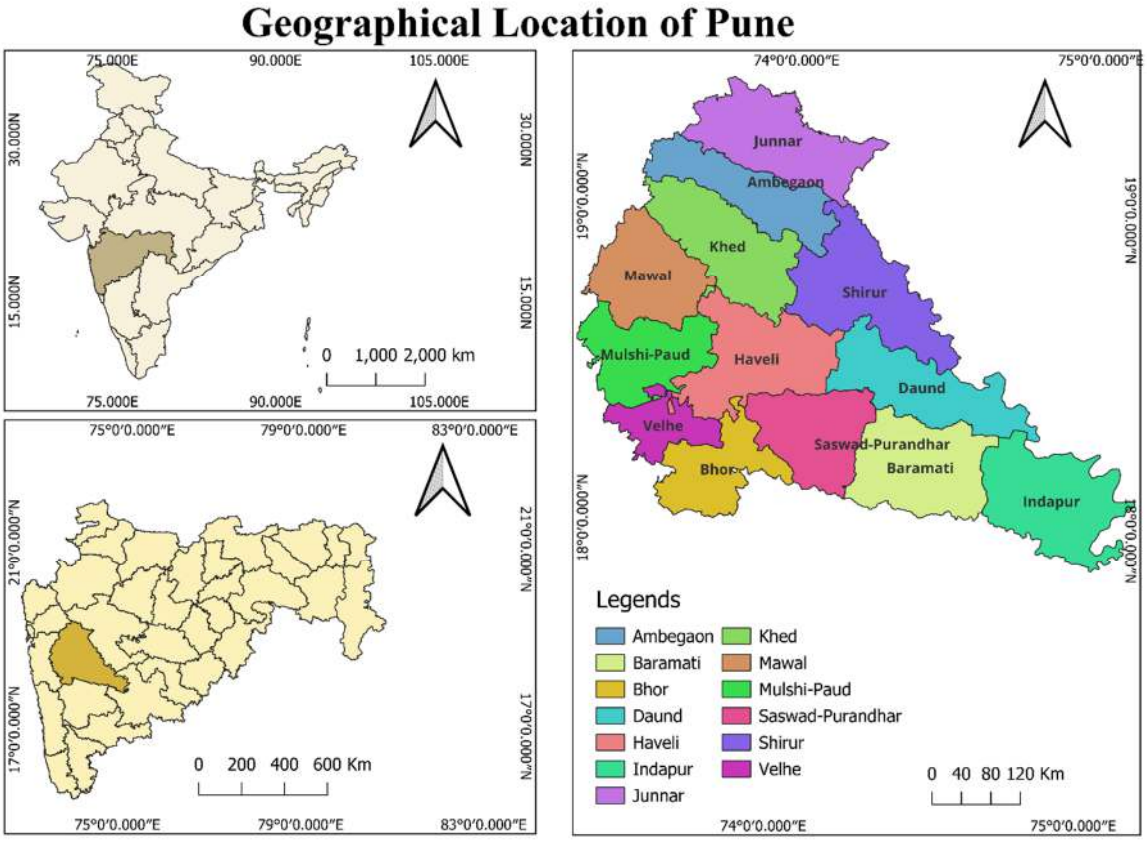


Figure 1 Location Map of Pune

Pune District is located between 17°54' and 19°24' North latitude and 73°19' and 75°10' East longitude. The district has a geographical area of 15,642 sq.km. In the west, along the Sahyadris, Pune has a breadth of approximately 112 to 128 kilometers. From this, it stretches about 209 kilometers southeast, sloping gradually from about 610 to 305 meters above sea

level, and narrowing in an irregular wedge shape to about 32 kilometers in the east. Pune District is bounded by several neighboring districts. To the north, it is bordered by Ahmadnagar. On the eastern side, it is flanked by Ahmadnagar and Solapur. The southern boundary is shared with Solapur and Satara. To the west, Pune is bordered by Raigad, Satara, and Thane.

It is the second largest district in the state and covers 5.10% of the total geographical area of the state. The landscape of Pune District is distributed triangularly in Western Maharashtra at the foothills of the Sahyadri Mountains and is divided into three parts: “Ghatmatha”, “Maval” and “Desh”. The district has a general slope from the West to the South-East.

2.3 Administrative Setup

Pune city is the divisional headquarter of Western Maharashtra and headquarter of the district. Administratively, Pune District is divided into 14 Taluka, 13 Panchayat Samitis (Blocks), 2 Municipal Corporations, 11 Municipal Councils, 3 Cantonment Boards and 1,844 villages (Table I).

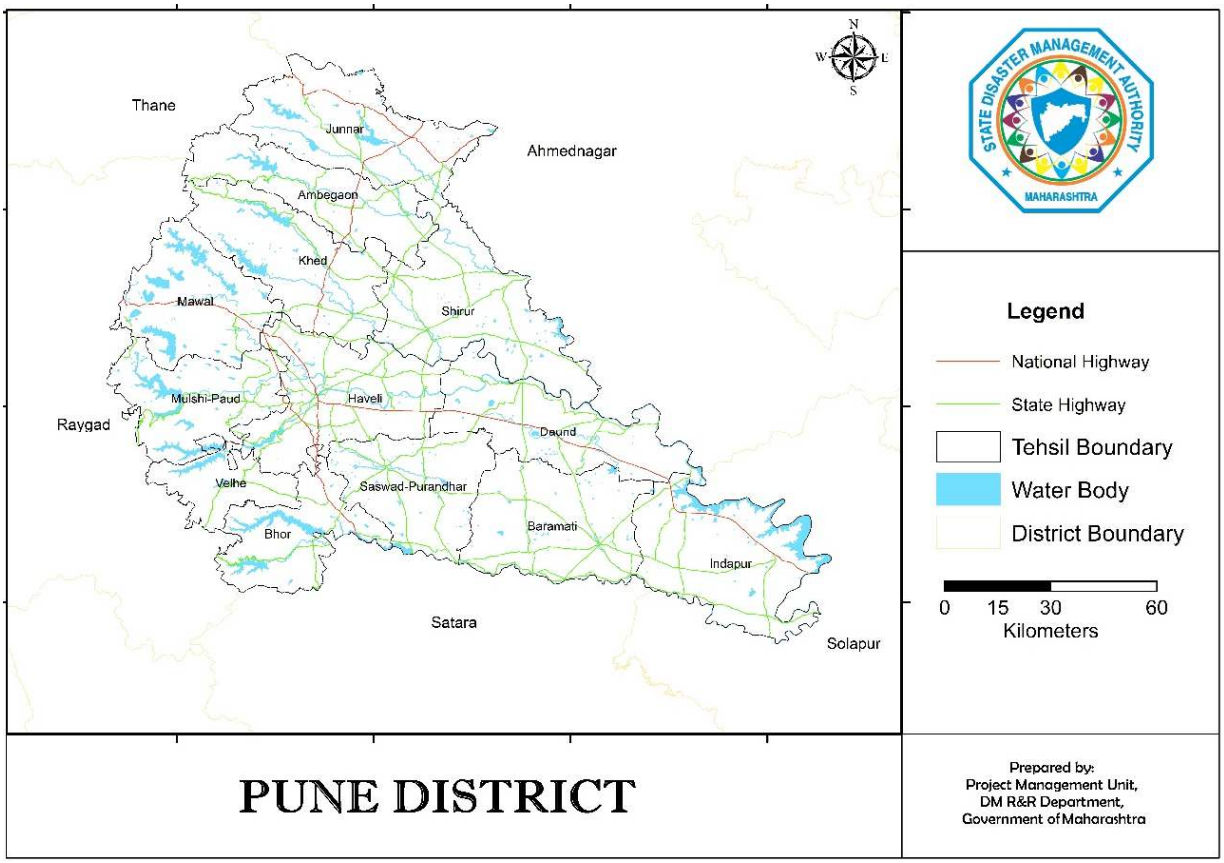


Figure 2 Base Map of Pune

2.3.1 Administrative Divisions of Pune District

Table 1 Urban Local Bodies of Pune District

Taluka Name	Area in sq.km.	Head quarter	No. of Villages	No. of Towns	Name of Municipal Corporation	Name of Municipal Council	Name of Cantonment Board
Pune City	184	Pune	0	3	Pune	……..	i) Pune ii) Khadki
Khed	1,400	Rajgurunagar	186	3	……	Alandi	……
Ambegaon	1,043	Ambegaon	143	1	……	…….	……
Junnar	1,385	Junnar	181	1	……	Junnar	……
Shirur	1,557	Shirur	117	1	……	Shirur	……
Daund	1,290	Daund	103	1	……	Daund	……
Indapur	1,468	Indapur	143	1	……	Indapur	……
Baramati	1,337	Baramati	117	1	……	Baramati	……
Purandhar	1,104	Sasvad	107	3	……	i) Sasvad ii) Jejuri	……
Haveli	1,337	Pune	102	3	Pimpri Chinchwad		Dehu Road
Bhor	892	Bhor	195	1	……	Bhor	……
Velhe	497	Velhe	128	0	……	……	……
Mulshi	1,039	Paud	141	1	……	……	……
Maval	1,131	Wadgaon	181	5	……	i) Talegaon - Dabhade ii) Lonavala	……
Total	**15,642**	**14**	**1,844**	**25**	**2**	**11**	**3**

2.4 Population Distribution

In 2011, Pune had population of 9,429,408 of which male and female were 4,924,105 and 4,505,303 respectively. In 2001 census, Pune had a population of 7,232,555 of which males were 3,769,128 and remaining 3,463,427 were females. Pune District population constituted 8.39 percent of total Maharashtra population.

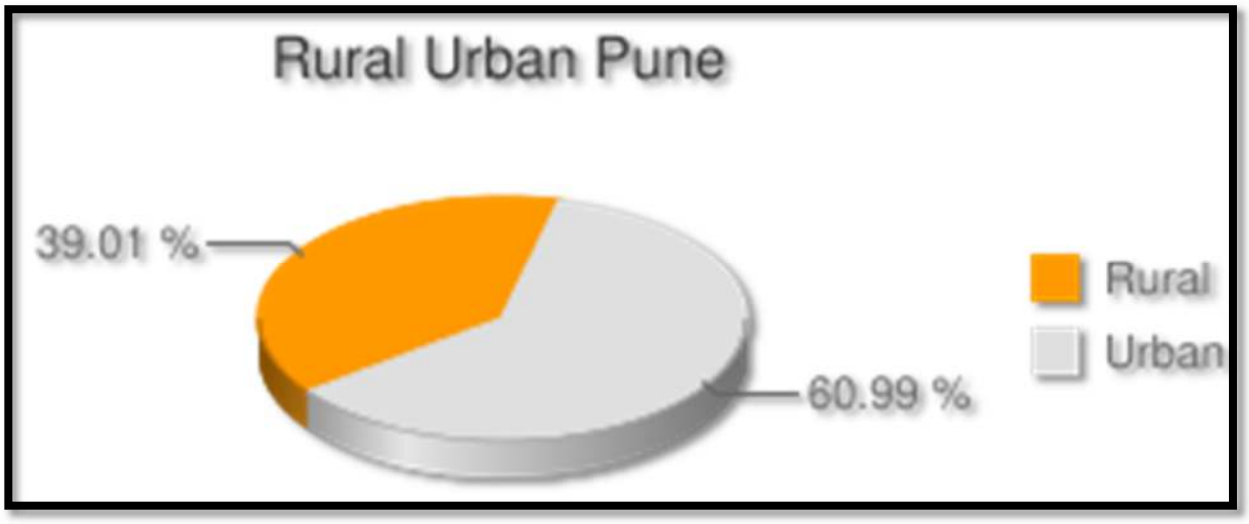


Figure 3 Rural and Urban Population Distribution

Table 2 Population Distribution

Year	2011	2001
Actual Population	9,429,408	7,232,555
Male	4,924,105	3,769,128
Female	4,505,303	3,463,427
Population Growth	30.37%	30.73%
Density/km2	603	462
Sex Ratio (Per 1000)	915	919
Child Sex Ratio (0-6 Age)	883	902
Average Literacy	86.15	80.45
Total Child Population (0-6 Age)	1,104,959	968,851
Male Literates	3,940,210	2,879,761
Female Literates	3,231,513	2,159,529
Child Proportion (0-6 Age)	11.72%	13.40%

Based on the 2011 Census, the population density across the talukas of Pune district varies significantly, reflecting diverse settlement patterns as per Fig 5. Pune City has the highest population density with 11,539 inhabitants per square kilometer, indicating a highly urbanized area. Haveli follows with 2,093 inhabitants per square kilometer, also reflecting substantial urbanization. Other talukas such as Khed, Baramati, Junnar, and Shirur have moderate population densities ranging from 247 to 329 inhabitants per square kilometer. Talukas like Indapur, Daund, Mawal, and Ambegaon have densities between 227 and 334 inhabitants per square kilometer, showing a mix of urban and rural characteristics. Purandhar and Bhor have slightly lower densities at 214 and 216 inhabitants per square kilometer,

respectively. Mulshi and Velhe have the lowest population densities, with 166 and 96 inhabitants per square kilometer, indicating more rural and less densely populated areas. These variations in population density are crucial for the District Disaster Management Plan (DDMP) as they influence the planning and allocation of resources for disaster preparedness, response, and recovery efforts across the district.

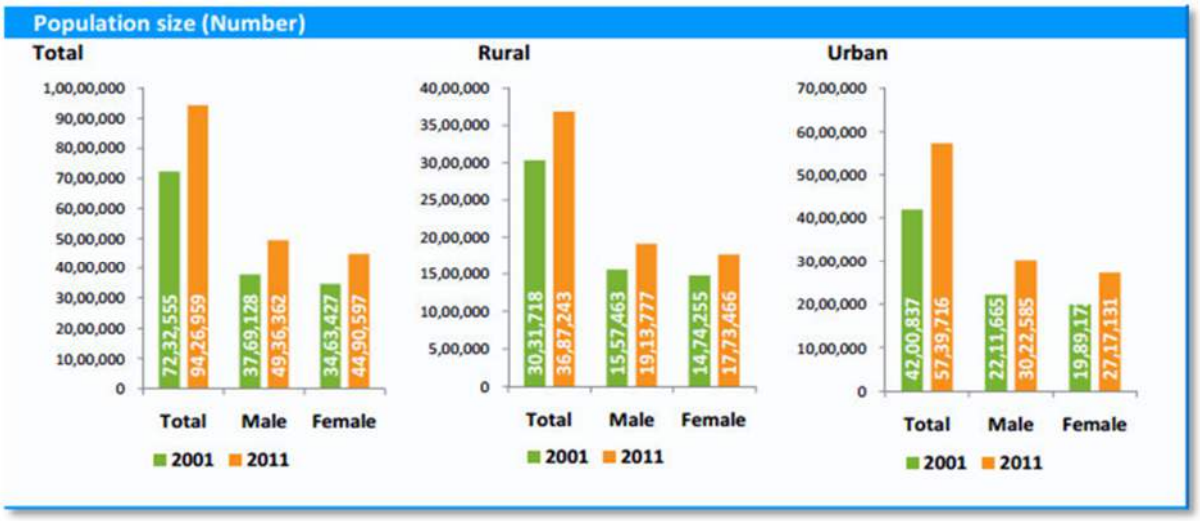


Figure 4: Population Distribution in Diagram

Source: Census 2011

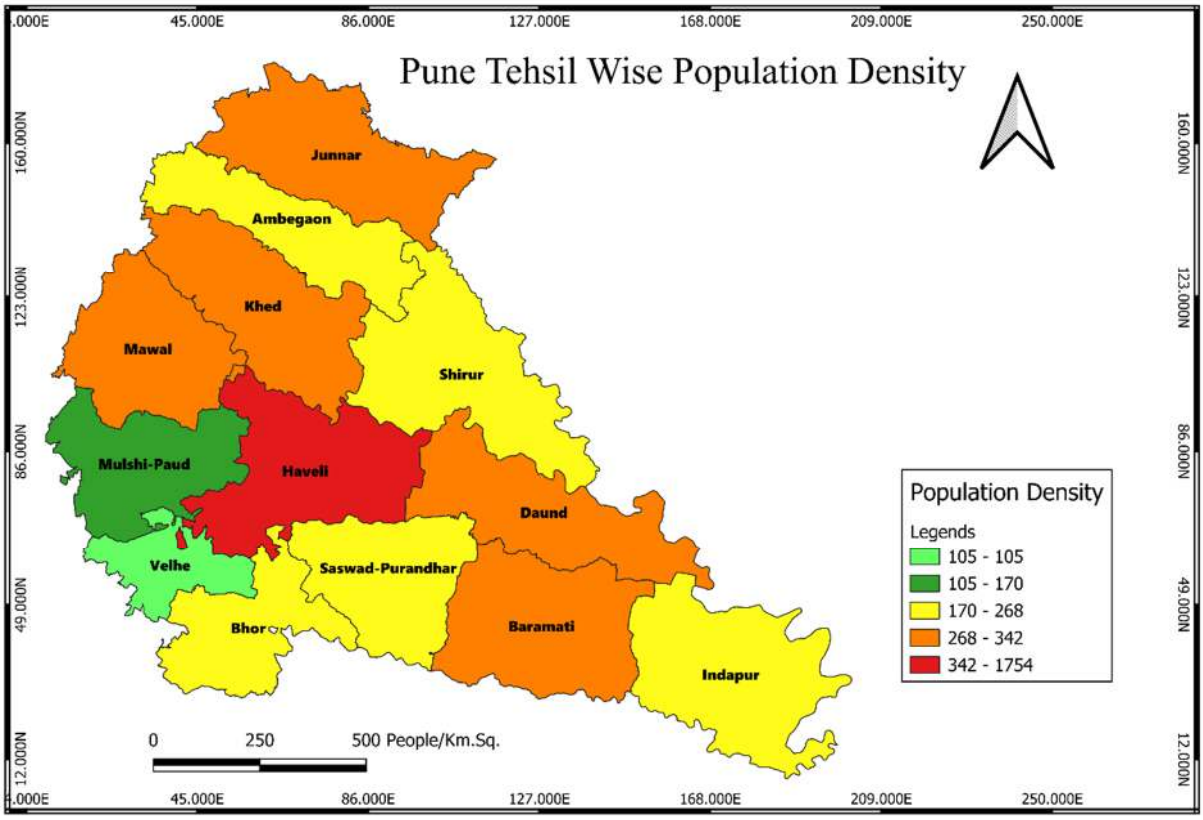


Figure 5 Tehsil wise Population Density Map of Pune

Source: Census 2011

2.5 Climate

Pune District, being part of the tropical monsoon region, experiences significant seasonal variations in temperature and rainfall. The western region of Pune enjoys a cool climate, while the eastern part is hot and dry. Its elevation above sea level, lack of alluvial deposits, and the prevalence of westerly breezes contribute to Pune's dry and refreshing climate. The air is lighter, the cold is more refreshing, and the heat is less oppressive than in many parts of Western or Southern India.

The Pune year may be divided into three seasons: the cold season from November to February, the hot season from March to June, and the wet season from June to October. The cold season begins in November and ends in February.

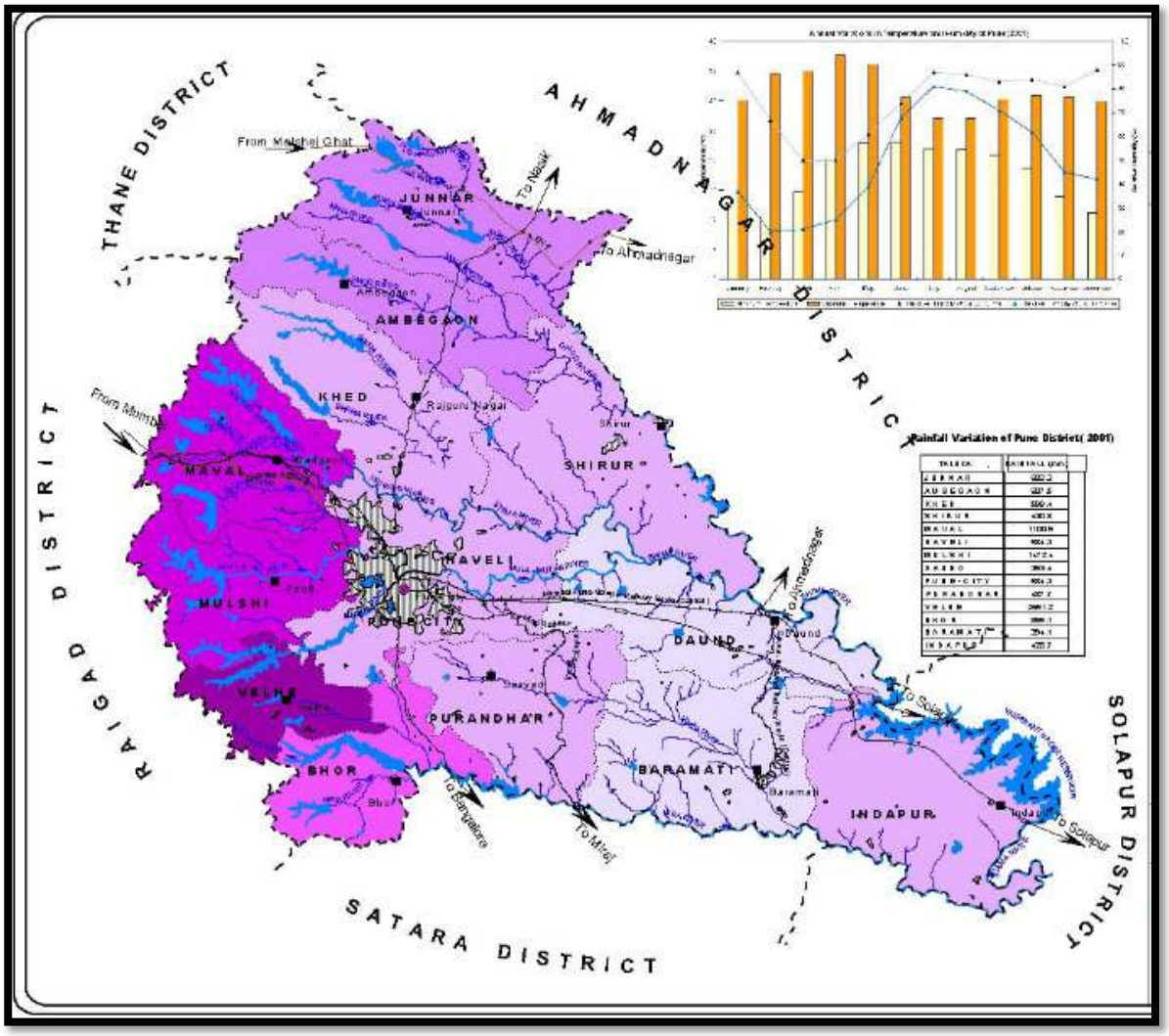


Figure 6 Climate Map of Pune

Source: District environmental Atlas

2.6 Rainfall

Due to the geographical conditions within Pune District, rainfall is unevenly distributed. The western part of the district, adjacent to the west coast, is a hilly area with forest cover, resulting in higher rainfall intensity compared to the eastern parts. Most of this rain is brought by the southwest monsoon winds during the summer, with about 87% of the annual rainfall occurring during the monsoon months. The monsoon typically arrives in June, with the heaviest rainfall in July and August. The decline in rainfall towards the east is due to the Sahyadri mountain range, which creates a rain shadow region approximately 100 kilometers east of the divide. The district is usually divided into three rainfall belts:

1. **Western Belt**: This belt varies from about 19 kilometers in breadth in the north to about 38 kilometers in the south. Its eastern limit passes through Junnar, Ghode, Khed, Talegaon-Dabhade, and Sinhagad, experiencing heavy and reliable rainfall.
2. **Central Belt**: With an average breadth of about 32 kilometers, this belt's eastern limit passes through Ana, Bela, Pabal, Loni, Sasvad, Jejuri, and Valhi, receiving moderate but regular rainfall.
3. **Eastern Belt**: This long stretch of land extends east from the central belt to Indapur, characterized by uncertain and irregular rainfall.

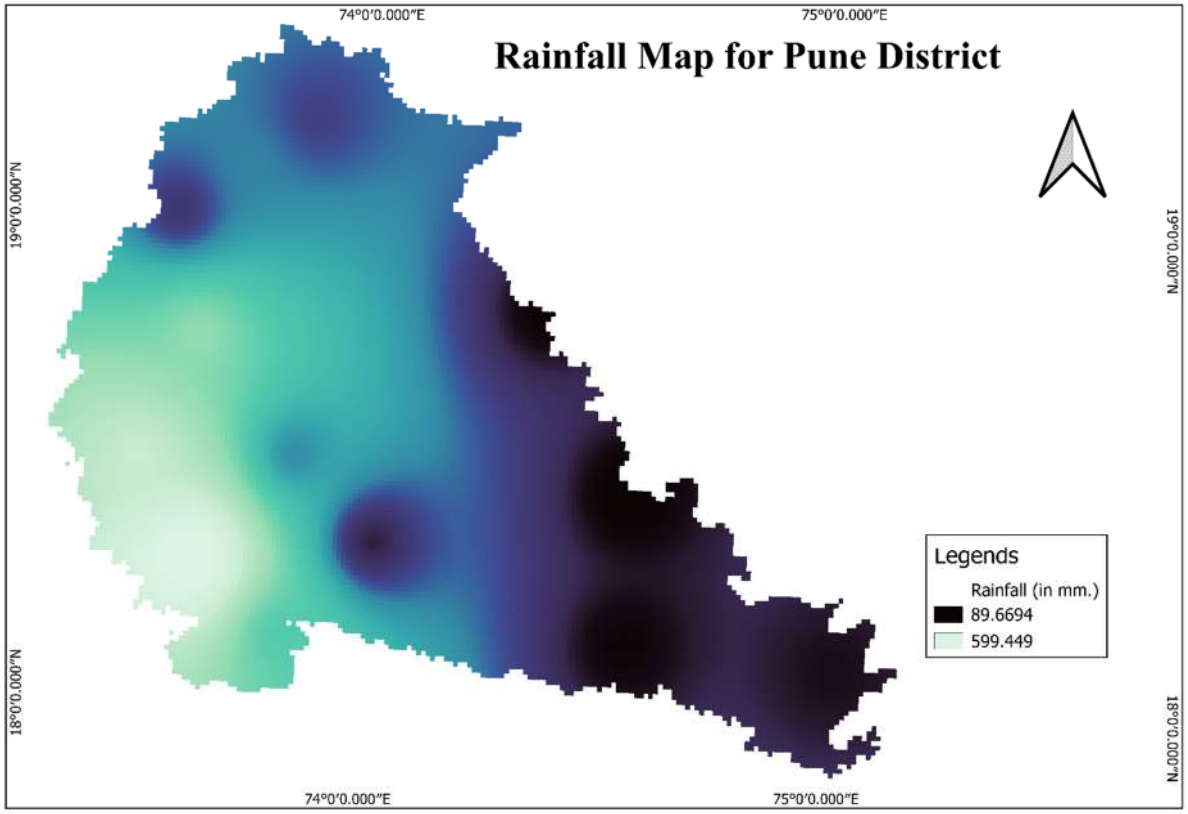


Figure 7 Rainfall Map

Source: IMD Rainfall Data

2.7 Temperature and Humidity

Temperature Conditions:

April and May are the hottest months in the district. Maximum temperature during these months often rises above 36-degree C. The Western region of Pune District i.e. Tal. Junnar, Ambegaon, Khed, Maval, Mulshi and Velhe are cool, whereas the Eastern part i.e. Tal. Shirur, Daund, Baramati and Indapur are hot and dry. December and January are the coolest months, when average monthly temperature falls as low as 11-degree C.

Humidity Conditions:

Humidity is low during the summer months due to increased evaporation losses from the atmosphere. The diurnal variations in humidity during this period are high, water vapour gets condensed due to falling nighttime temperatures and the daytime temperatures are high. In the Summer months the relative humidity ranges from a minimum of 20% to maximum of 67% during the day. During the monsoon period, the relative humidity varies from 68% to 87%. The relative humidity during winter shows maximum diurnal variation varying from 37% to 88%.

2.8 Majors Rivers in the District

Many rivers and streams flow through Pune District, originating in the Sahyadris and flowing east and south across the district. The main river is Bhima, which crosses part of the district and forms its eastern boundary for over approx 160 kms. The main tributaries of the Bhima are the Vel and the Ghod on the left, and the Bhama, the Indrayani, the Mula-Mutha, and the Nira on the right.

In addition to the Bhima and its tributaries, there are several other rivers: the Kukdi and Mina, which are tributaries of the Ghod; the Andhra, a tributary of the Indrayani; and the Shivganga and Karha, which are tributaries of the Nira. The Pushpavati, along with its feeder the Mandvi, flows into the Kukdi, while the Pauna is a feeder of the Mula.

During the rainy season, all these rivers swell with a magnificent volume of water, but during the hot season, they shrink to narrow threads in broad stretches of gravel. At intervals, barriers of rock cross the riverbeds, creating long pools.

Table 3 Rivers in Pune District

Sr No	Name of River	Starting Point	Length in km (starting to Adjoining Point)	Adjoining River	Place where River join
1	Mula	Mulshi Tiskari	50	Mula	Pune
2	Pawna	Bodshil	48	Mula	Fugewadi
3	Mutha	Wadi Begrewadi	70	Mula	Sangam Pul Pune
4	Moshe	Dapser	30	Mutha	Khadakwasla

5	Ambi	Ambeghar	26	Mutha	Khadakwasla
6	Ghod	Bhimashankar	125	Bhima	Tandali sangam
7	Mina	Mankeshwar	80	Ghod	Shingve paragon
8	Kukadi	Kukdeshwar Tal, Junner	95	Ghod	Annapur
9	Ramnadi	Khuni Pargaon	32	Kukadi	Yedgaon Dam
10	Bhima	Bhimashankar	300	Krishna	Rajya Seema
11	Andhra	AlegaonThokarwadi	25	Indrayani	Ambi
12	Hanga	Hanga Tal-parner	85	Ghod	Shirasgaon Phata
13	Nira	Hirdoshi	190	Bhima	Nira –Narsingpur
14	Yelwandi	Varuti	30	Nira	Sangvi
15	Gunjavne	Gunjavni	50	Nira	Shirval
16	Karha	Garade	95	Nira	Songaon
17	Bhama	Pardhyachi wadi, Tal-Khed	56	Bhima	Shelpimpalgaon
18	Indrayani	Lonavla	85	Bhima	Tulapur Markal
19	Man	Mhaswad	100	Bhima	Machnur

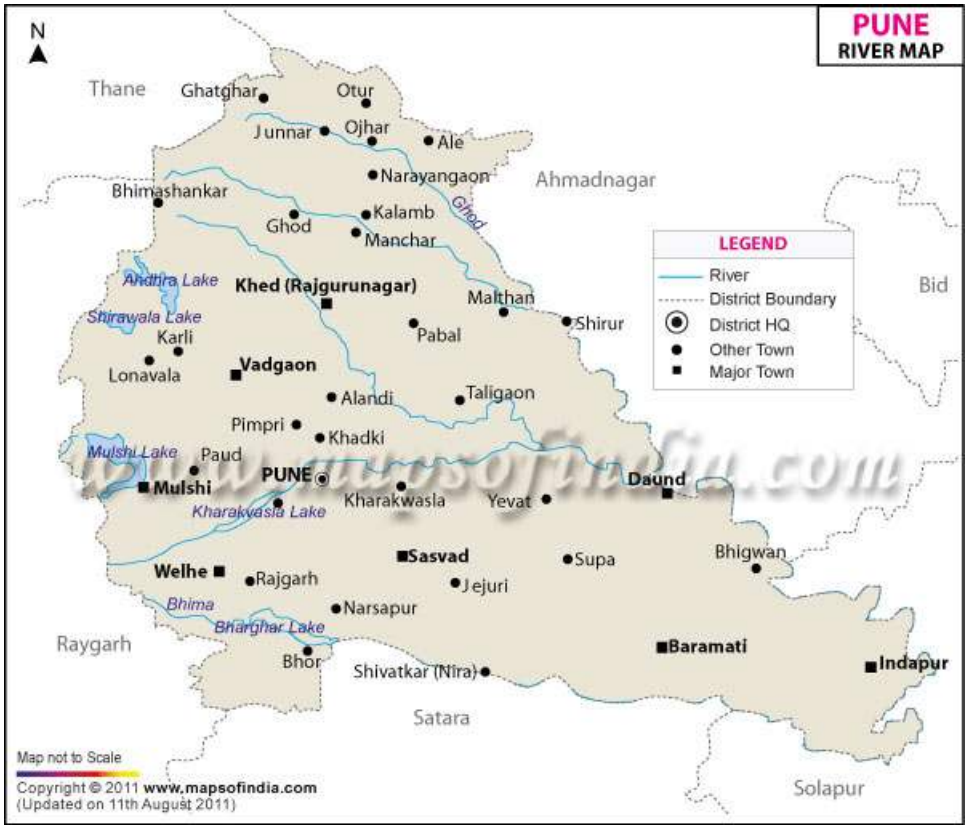


Figure 8 Map Showing Major Rivers of Pune District

More information is available on site http://www.punefloodcontrol.com/maps.html

2.9 Lakes

Pune District is home to six significant artificial lakes that provide a substantial water supply. Two of these artificial lakes are in Haveli, at Khadakwasla and Katraj. Three are in Bhimthadi, at Kasurdi, Matoba, and Shirsuphal. The sixth lake is at Bhadalvadi in Indapur.

In addition to these six main lakes, there are several notable reservoirs across the district. These include reservoirs at Baur, Kambra, Khandala, Karanjgaon, Karla, Mundharva, Talegaon-Dabhade, Uksan, and Valvhan in the Maval sub-division; at Jejuri in Purandhar; at Pashan in Haveli; at Patas in Bhimthadi; and at Indapur. Other significant lakes in Pune District include Pashan Lake, Mastani Lake, Model Colony Lake, Jambhulwadi Lake, Manas Lake, and Paud Lake.

Table 4 Reservoir in Pune District

Sr No	Sub –River Basin	Reservoir Name	Total Water store TMC	Future release Capasity in Qsecs
1	Bandagarden	Yedgaon	3.30	113149
2	Daund	Manikdoh	10.88	50808
		Dimbhe	13.50	74938
		Wadaj	1.27	52443
		Pimpalgaon Joge	8.31	25003
		Chlhewadi	1.00	57250
		Ghod	7.63	261000
2	Bhima Khore	Chaskaman	7.63	139918
		Andhra	2.92	107852
		Wadivle	1.13	26380
		Bhama Asked	2.91	61316
		Ujani	109.98	635670
		Pawna	10.77	44144
		Mulshi	18.47	67240
		Kasarsai	0.47	33000
		Temghar	2.27	12120
		Warasgaon	13.21	51948
		Panshet	10.70	41036
		Khadakwasla	3.04	97116
4	Nira Khore	Nira Dewghar	7.64	49450
		Bhatghar	22.77	56221
		Gunjawni	0.70	42375
		Veer	9.82	182154
		Nazre	0.59	63715

2.10 Agriculture Profile

The agricultural potential of a district is influenced by the nature and variety of soil, terrain, rainfall, and its duration. In the district, the mountainous terrain in the west, the slopes at the base of the Sahyadrian ranges, and the extensive plateau areas with thin soil cover and lateritic soils limit the area under cultivation. The cultivated areas often suffer from infertile soil and moisture deficiency, especially in the eastern part of the district, which receives less than 500 mm of rainfall annually.

Approximately 27% of the district's land is under cultivation, while the rest is covered by forests, fallow land, or classified as waste. The area under forest land is 171,708 hectares, barren and uncultivable land is 104,226 hectares, land put to agricultural uses is 62,938 hectares, cultivable wasteland is 32,918 hectares, permanent pasture and other grazing land is 65,577 hectares, and land under miscellaneous tree crops is 3,483 hectares.

Table 5 Land Use Categories 2023-24

Category	Area (hectares)
Forest Land	171,708
Barren and Uncultivable Land	104,226
Land Put to Agricultural Uses	62,938
Cultivable Wasteland	32,918
Permanent Pasture and Grazing Land	65,577
Land Under Miscellaneous Tree Crops	3,483

Source: District Socio-Economic Review 2023-24 for Pune

During the rabi season, the maximum area under cultivation is for wheat (71,793 hectares), followed by gram (43,680 hectares), safflower (19,428 hectares), and jowar (16,832 hectares). The talukas with the most land under cultivation during the rabi season are Shirur (38,924 hectares), Junnar (31,538 hectares), and Baramati (38,752 hectares). In the kharif season, the maximum cultivation area is in Taluka Khed (40,289 hectares) and Junnar (35,638 hectares). Major crops grown during the kharif season include rice (61,674 hectares), sugarcane (47,631 hectares), and groundnut (47,799 hectares), with cotton covering a low area of 376 hectares.

Table 6 Crop Cultivation Areas 2023-24

Season	Crop	Area (hectares)
Rabi Season	Wheat	71,793
	Gram	43,680
	Safflower	19,428
	Jowar	16,832
Kharif Season	Rice	61,674
	Sugarcane	47,631
	Groundnut	47,799
	Cotton	376

Source: District Socio-Economic Review 2023-24 for Pune

For the year 2023-24, the total land brought under horticulture in the district is 333.87 square kilometers. Significant areas include Taluka Shirur (33.46 sq. km.), Indapur (38.52 sq. km.), Baramati (32.96 sq. km.), and Purandhar (35.43 sq. km.). Predominant horticultural plantations include mango (149.94 sq. km.), chikku (33.92 sq. km.), pomegranate (31.34 sq. km.), and custard apple (35.89 sq. km.), along with other plantations like cashew nut, orange, tamarind, lemon, and bor. The maximum floriculture cultivation is in Purandhar Taluka (about 736 hectares), with a total area under floriculture in the district of about 2,771 hectares.

2.11 Forests

The Land use and Land cover Map of MRSAC, Nagpur (2001-02) show that the total land under forest is 3648 sq.km, which is 23.32% of the district. Hilly portion of Western side of the district is covered by the forestland and includes Taluka Junnar, Ambegaon, Khed, Maval, Mulshi, Bhor and Velhe. Small patches of forestland are also found in Taluka Purandhar and Haveli. The Taluka Shirur and Daund are having negligible forest cover, whereas Taluka Baramati and Indapur have no forest cover. Major portion of Taluka Mulshi, Velhe and Bhor is covered by forestland.

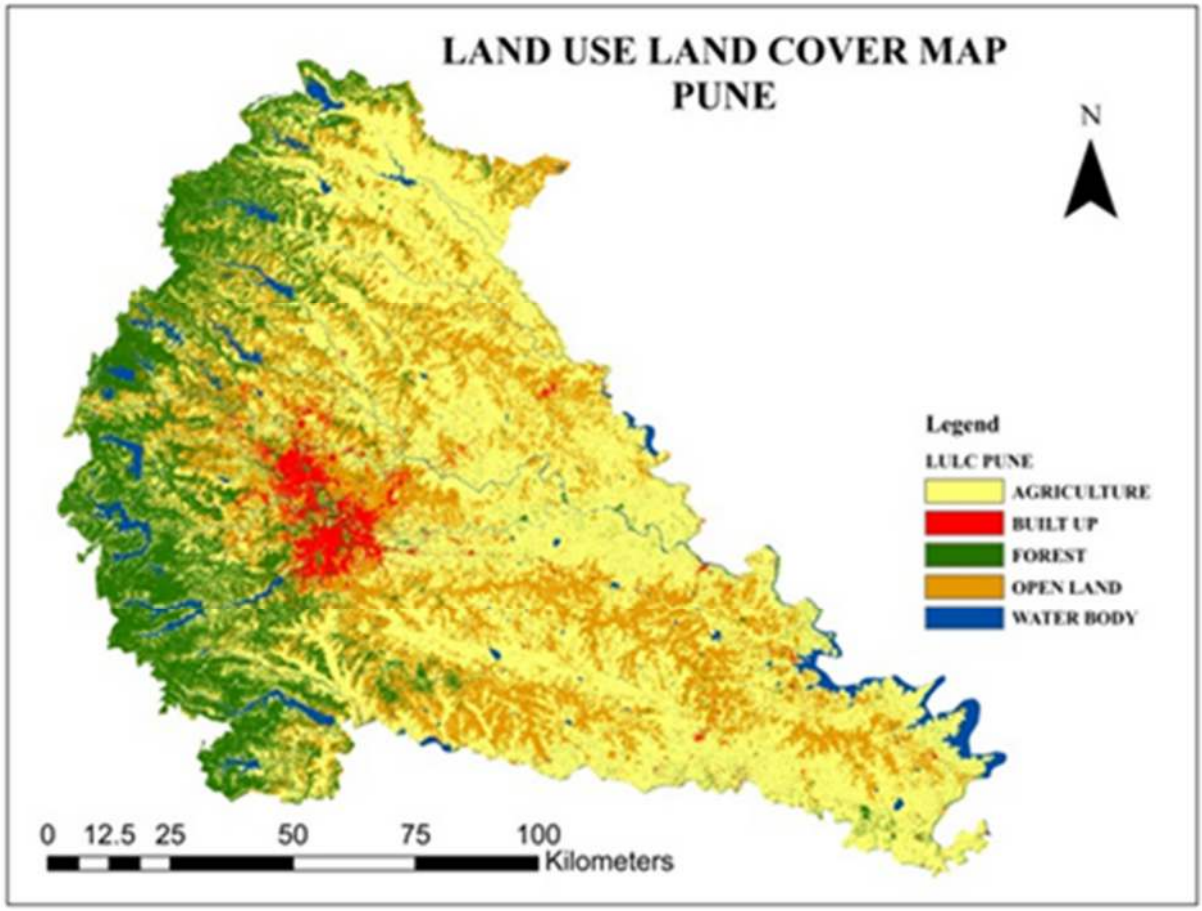


Figure 9 Land-Use Map

Source: Spatiotemporal change in urban landscape and its effect on behaviour of diurnal temperature range: a case study of Pune District, India,2022 - ResearchGate

2.12 Industries

Pune District is well developed as far as industrial growth is concerned. In the district there are 12 industrial estates and Information Technology (IT) Parks developed by the Maharashtra Industrial Development Corporation (MIDC) having overall area of 54.01 sq. km. (both existing and proposed). The industrial estates are located at Talegaon (Maval), Chakan and Rajgurunagar (Khed), Hinjavadi (Mulshi), Talavade and Chinchwad (Haveli), Jejuri (Purandhar), Kurkhumb (Daund), Pandare and Baramati (Baramati), Indapur (Indapur), Kharadi (Pune City). The industrial area covers industrial and residential area together at Hadapsar, Gultekdi, Parvati, Bhor and Lonavala. Also, within the district small-scale industries and other types of isolated industries are located at various places. Many of these small-scale industries are engaged in production of agricultural implements pump-set, engine, cotton mill, medicine, rubber, plastic material, soap, nylon, biscuits, electric material, wooden furniture, steel etc.

Table 7 Industry Statistics of Pune District

Sr. No.	Industry Category	Type of Industry			Grand Total
		Large	Medium	Small	
1	Red	206	129	1067	1402
2	Orange	32	87	1426	1545
3	Green	40	82	3436	3558
	Total	278	298	5929	6505

Source: MPCB

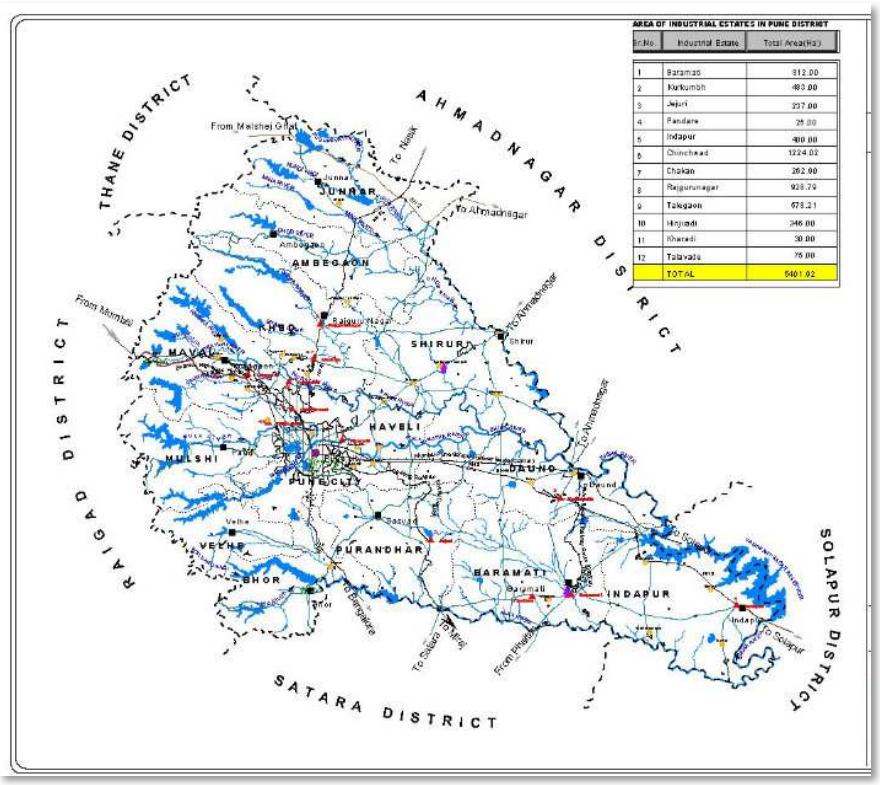


Figure 10 Industrial Distribution Map

Source: District environmental Atlas

2.13 Mines

Based on the information obtained from the District Geology and Mining officer, Pune, excluding the Taluka Pune city, there are in all about 141 open cast stone mines located in the different Taluka of the district having area of 262.4 sq.km. No other types of mines are present in the district. Due to rapidly increasing urbanization, Haveli Taluka has about 60 open cast stone mines. Most of these mines are for construction purposes. Junnar, Shirur, Daund and Maval Taluka also have sizable number of stone mines.

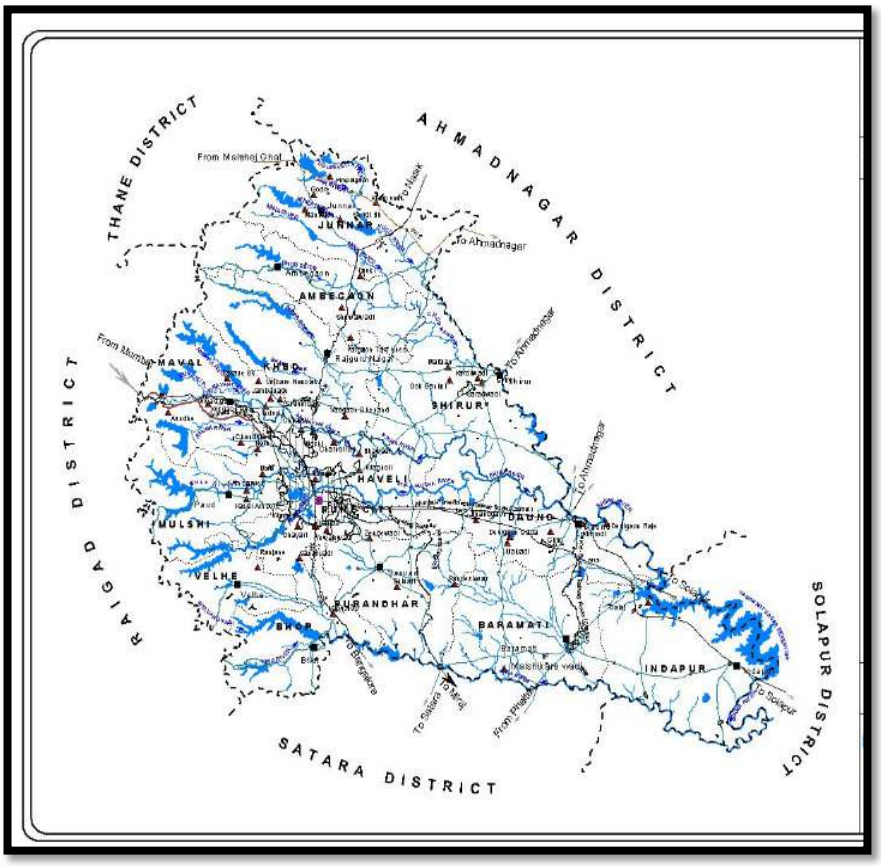


Figure 11 Mines Distribution Map

Source: District environmental Atlas

2.14 Major Settlements

Due to rapid urban growth, major settlements are taking place in and around Pune city as well as in Haveli taluka. Settlements are growing both vertically (multi-storey building culture) and horizontally (invasion of the peripheries) in this city because of job opportunities in industrial and commercial sectors.

Major settlements in the district are Pune city, Pimpri Chinchwad, Akurdi, Nigadi, cantonment Board etc. and taluka headquarters of Taluka Baramati, Indapur, Khed, Shirur, Daund and Mulshi. Distribution of urban population in the towns is disproportionate. The two

Class -I towns, viz. Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation are the most populated towns covering 85% urban population in the district.

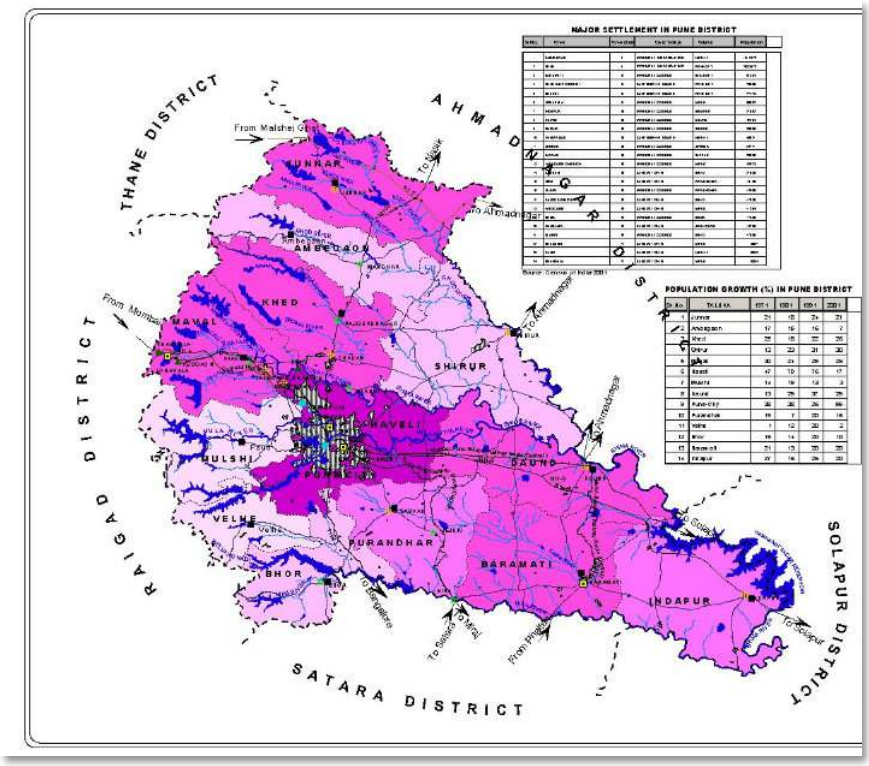


Figure 12 Settlement Distribution Map

Source: District environmental Atlas

2.15 Transport and Trade Linkages

The district is well connected with the State capital and surrounding district headquarters through road and rail linkages (except Nashik). The road network consists of Express Highways, National Highways, State Highways, and Major District Roads. The rail network includes both broad gauge (electrified and non-electrified) double track as well as single track lines.

The district headquarters have connectivity through airways for transport and trade to major airports within the country and to select international destinations. Pune Airport has recently launched new routes, including international flights to Bangkok and Dubai, and domestic flights to Chennai, Trivandrum, Kochi, Indore, Jalgaon, and Goa.

Despite the availability of perennial river stretches, there is no significant utilization of waterways in the district.

2.15.1 Road Network

The district has a total road length of 14,200 km (2025), of which 5,800 km are bituminous surface roads, 3,700 km are water-bound macadam surface roads, and 4,700 km are other surface roads (non-metalled roads).

The roads are classified according to their importance by the authorities who maintain them. Of the total road length in the district, 350 km is covered by National Highways and 1,400 km by State Highways. The Major and Other District Roads have a total length of 5,500 km, which passes through all the Talukas. Almost all the villages are well connected by water-bound macadam roads. The total length of village roads is 6,950 km.

Following are the National Highways passing through the district:

- **National Highway No. 4 (Mumbai-Bangalore)**: NH-4 passes through Khandala, Lonavala, Talegaon, Chinchwad, Pune, and Khed-Shivapur. It enters the district from Khopoli (Dist. Raigad) at Khandala (Tal. Maval) and exits from Sarole (Tal. Bhor) in Pune district, continuing towards the Satara district. The total length of NH-4 in the district is around 120 km.
- **National Highway No. 9 (Pune-Solapur-Hyderabad)**: NH-9 starts at Pune and passes through Loni, Bhigwan, and Indapur. NH-9 ends in the district at Hingangaon (Tal. Indapur) and continues towards the Solapur district. The total length of NH-9 in the district is around 152 km.
- **National Highway No. 50 (Pune-Nashik)**: NH-50 originates at Pune and passes through Chakan, Rajgurunagar, Manchar, Narayangaon, and Alephata, ending at Alekhind (Tal. Junnar) and continuing towards Sangamner in the Nashik district. The total length of NH-50 in the district is around 95 km.

The Mumbai-Pune Expressway connects Mumbai and Pune, passing through Khandala and Lonavala. It is a 100m concrete road with six lanes, divided in the center by a 7m wide divider. The length of the Expressway within the district is 44.5 km.

The total road length passing through the tribal area is 700 km.

2.15.2 Rail Network

The broad gauge (B.G.) single and double track rail length within the district has a total length of 320 km. Of these, the single line (B.G.) is 165 km in length and the double line (B.G.) is 155 km in length. Pune and Daund are the two main railway junctions in Pune district.

Following are the three main railway routes passing through the district:

- **Mumbai-Pune-Solapur Rail Route**: This route passes through Khandala, Lonavala, Talegaon, Pune Junction, Urali Kanchan, and Daund Junction.
- **Pune-Miraj Rail Route**: This route passes through Fursungi, Alandi (Mhatobachi), Shidwane, Jejuri, Dondaj, Walhe, and Nira.
- **Daund-Baramati Rail Route**: This route passes through Shirsuphal, Katphal, and Tandulwadi.

2.15.3 Airport

The airport located at Lohgaon, known as Pune International Airport, has significantly expanded its operations. It now handles both domestic and international flights, with new routes to destinations such as Bangkok, Dubai, and Singapore. Additionally, there are plans to develop an international air-cargo hub in the adjacent area to boost trade and logistics capabilities.

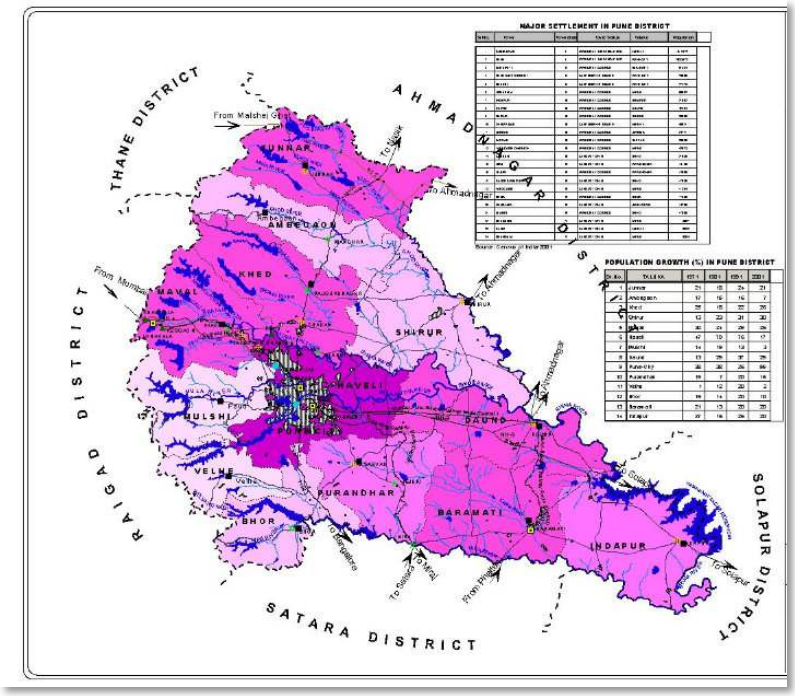


Figure 13 Settlement Map *Source: District environmental Atlas*

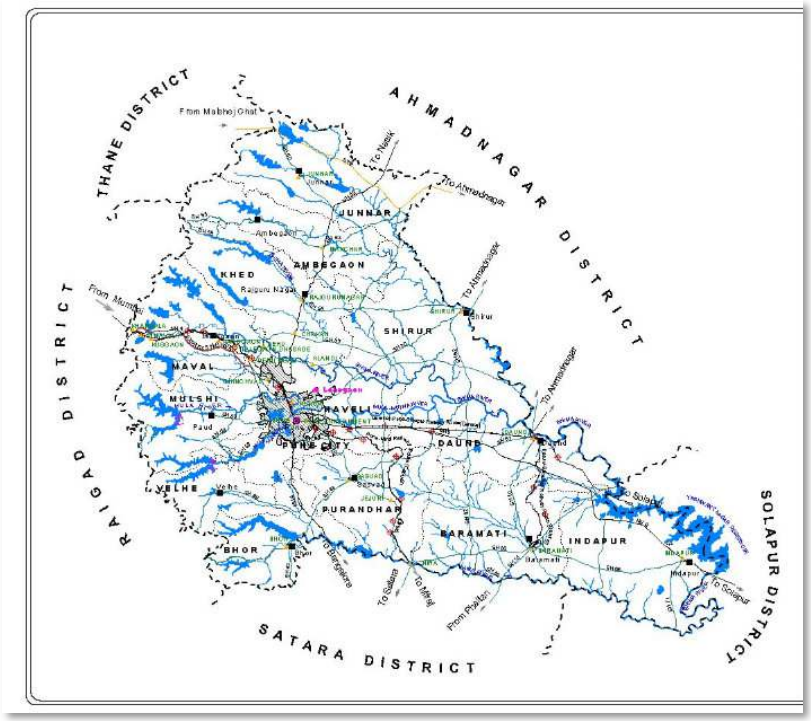


Figure 14 Transport Distribution Map *Source: District environmental Atlas*

2.16 Tourism

Pune District has a wide-ranging variety of historical, cultural and archaeological monuments (Forts, Palaces, Temples & Churches) which attract tourists in a large number. These areas include heritage sites and monuments of state or local significance. The locations are marked as sensitive zones for their religious, heritage, historical and cultural importance. The places of historical and cultural importance include forts and monuments like Sinhgad fort, Raigad fort, Torna fort, the birthplace and wada of Amartya Shivram Hari Rajguru etc. Places of tourist attraction are the Katraj snake park, Sambhaji Park, Appughar, Agakhan palace, Shaniwarwada, Jejuri, Ashtavinayak, Sarasbag, Alandi etc.

Religious Places and Pilgrim Centres

Pune District is famous from the historic days as the land of saints. The district has a sizable number of religious places and pilgrim centres at Parvati, Jejuri, Ashtavinayak, Sarasbag, Alandi, Bhimashankar etc.

3 Hazard Risk Assessment and Vulnerability Analysis

3.1 Hazard History & its Impact

Over the past decade, Pune district has encountered a variety of natural and man-made hazards, each leaving a significant impact on the community, infrastructure, and environment. These events have highlighted the district's vulnerability and the critical need for a robust disaster management plan. From severe floods and landslides to industrial accidents and the global COVID-19 pandemic, Pune has experienced a range of disasters that have tested its resilience and response capabilities. Understanding the history and impact of these hazards is essential for developing effective strategies to mitigate future risks and enhance the district's preparedness and recovery efforts.

Table 8 Hazard History of Natural Disaster

Sr. no.	Date of occurrence	Location	Type of disaster	Scale	Losses		
					Life	Livestock	Loss of property
1	2024	Pune City area	Urban Flood	Moderate	02	47	166
2	Mar 2020 to Sept 2022	Entire Pune District	COVID – 19 Pandemic	Very High	19642	Nil	Nil
3	Sept 2019	Pune city	Flood, overflow of Katraj Lake	Moderate	27	Nil	
4	June-Sept. 2018	Pune district	Lightning and heavy rains	Moderate	04	27	
5	July 2014	Vil. Malin Tal.Ambegaon	Landslide	High	151	285	48 houses totally damaged
6	July1989	Vil. Bhaje Tal. Maval	Landslide	High	40	0	80,000 sq.ft

Table 9 Hazard History of Manmade Disasters

Sr. no.	Date of occurrence	Location	Type of disaster	Scale	Losses		
					Life	Livestock	Loss of property
1	30/06/2024	Bhushi Dam, Tal Mawal	Drowned	High	5	Nil	Nil
2	21/05/2024	Kalashi, Tal. Indapur	Launch Drowned	High	6	Nil	Nil
3	08/02/2024	Solu, Tal Khed	Electric DP Blast	Moderate	4	Nil	Huge
4	17/04/2023	Ravet	Hoarding collapse	High	5 dead, 3 Injured	Nil	Nil
5	04/02/2022	Yervada, Pune City	Structure collapse at Blue Grass Construction	High	5	Nil	Structure collapse
6	07/06/2021	Paud	Fire at S.V.S	High	17	Nil	Total

		(Mulshi) MIDC	Aqua Company				Damage to Company Structure.
7	21/01/2021	Manjari, Tal Haveli.	Fire at Serum Institute	High	5	Nil	Few Damage to Company Structure.
8	22/05/2020	Kurkhumb MIDC (Daud)	Fire at Kusum Distillation and refinery	Low	Nil	Nil	Total Damage to Industrial building.
9	02/07/2019	Nare Ambegaon (Haveli)	Compound walls collapse due to heavy rains	High	6	Nil	4 huts totally damaged
10	29/06/2019	Kondhawa Pune	Compound walls collapse due to heavy rains	Very High	15	Nil	23 huts along the wall totally damaged
11	28/11/2018	Patil estate Shivajinagar	Fire	Moderate	00	Nil	95 huts totally destroyed
12	27/11/2018	Dandekar bridge Pune city	Mutha right Canal breach	Moderate	0	Nil	98 houses completely damaged, 661 partially
13	10/07/2014	Faraskhana Police stn, Pune city	Bomb blast	High	6 injured	Nil	Huge
14	01/08/2012	J.M. Road, Pune city	Serial blasts	Low	1 injured	Nil	Huge
15	13/02/2010	German bakery, Pune city	Bomb Blast	Very High	17 dead 39 injured	Nil	Huge

3.2 Seasonality of Disasters Disaster

Disaster	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Earthquake	■	■	■	■	■	■	■	■	■	■	■	■
Floods						■	■	■	■			
Cyclones	■	■			■	■	■	■		■	■	■
Heatwave						■	■	■	■			
Cold wave	■										■	■
Epidemics	■	■	■	■	■	■	■	■	■	■	■	■
Industrial Accidents	■	■	■	■	■	■	■	■	■	■	■	■
Fires	■	■	■	■	■	■	■	■	■	■	■	■
Road Accidents	■	■	■	■	■	■	■	■	■	■	■	■

Lightning												
Drought												
Human Animal Conflict												

3.3 Disaster Hazard Profile of the District

Damage	Earthquake	Flood	Cyclone	Epidemic	Industrial Accidents	Fires	Road Accidents	Landslide	Human Animal Conflict
Loss of lives	Medium	Medium	Low	Medium	Medium	Low	Medium	Medium	Medium
Damage to and Destruction to Property	Medium	Medium	Low	Low	Low	Low	Low	Medium	Low
Damage to Cattle and Livestock	Medium	Medium	Low	Medium	Low	Low	Medium	Low	Medium
Damage to subsistence and crops	Low	Medium	Medium	Low	Low	Medium	Low	Low	Low
Disruption of Lifestyle	Medium	Medium	Low	Low	Low	Low	Low	Medium	Low
Disruption of Community life	Medium	Medium	Low	Low	Medium	Low	Low	Medium	Medium
Loss of livelihood	Medium	Medium	Low	Low	Medium	Low	Low	Medium	Medium

3.4 Hazard Assessment

3.4.1 Earthquake

Earthquake prone areas are generally regarded as the most destructive among natural calamities. Due to the presence of many structured hills within Pune district, occurrences of earthquake often take place. Fault lines are scattered throughout the district and these areas may be considered as minor earthquake prone areas.

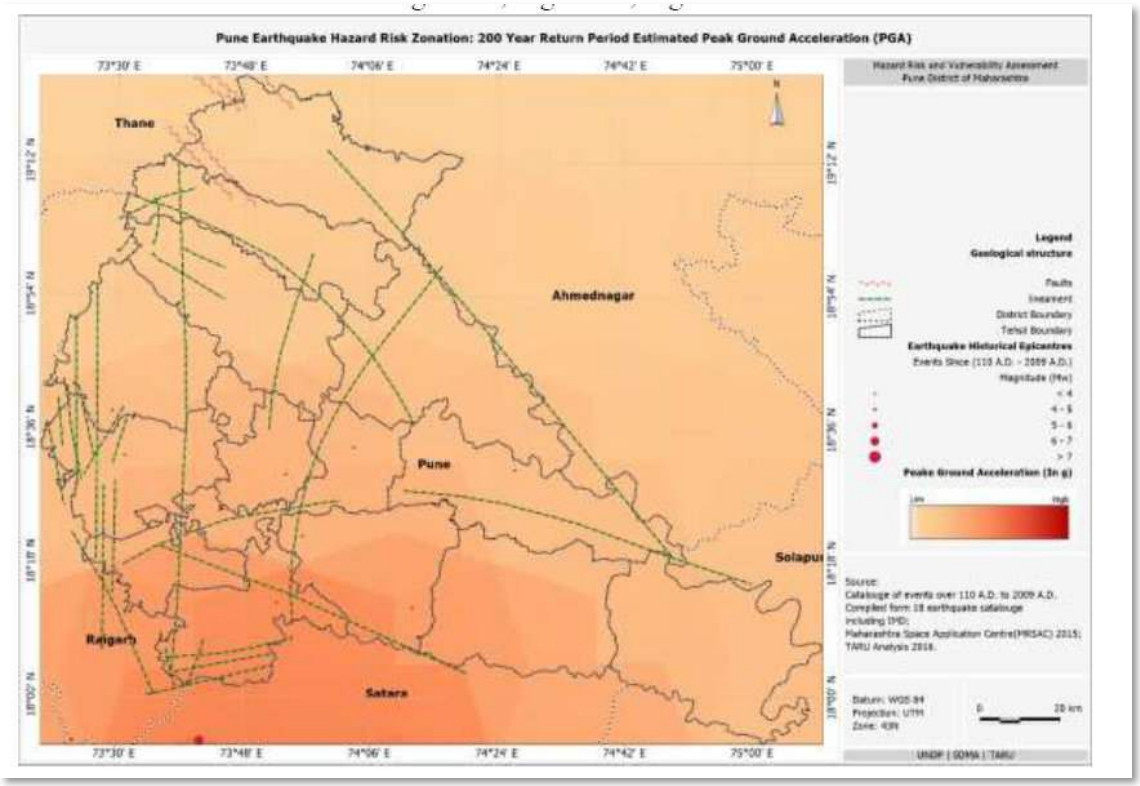


Figure 15 Earthquake Zonation Map

Source: TARU

According to the IS 1893 Part I, 2002, the state has been sub-divided into three earthquake damage risk zones. In Pune district, the South-West area of Taluka Bhor and Velhe fall into high damage risk zone, the Zone IV. The remaining part of the district falls under is a moderate damage risk zone, the Zone III. A major earthquake measuring 6.3 on the Richter scale, took place on the 30th of September 1993, at Killari in Latur District. The tremor of this earthquake was felt in 11 districts surrounding Latur including Pune.

3.4.2 Landslide

Pune district (especially the western ghat) is prone to landslides, rock-falls, debri-flows. Many studies have been conducted in the Western Ghats to understand the probable areas where such events are likely. Geological Survey of India has been carrying out many a study in this area, some of which are already completed. Specific studies have also been constituted to understand the risk of landslides along the transport corridors. Though landslides have been studied in this area earlier as well, since the event of Malin slide (of Ambegaon Tehsil), the importance of these studies has gone up. In the event of Malin, which occurred on the 30 July 2014 and claimed 151 lives, the susceptibility of moderate slopes and their dynamic interaction with the rainfall came to light. As per the GSI, the village and its surrounding areas are not on the highest slopes in the western ghats.

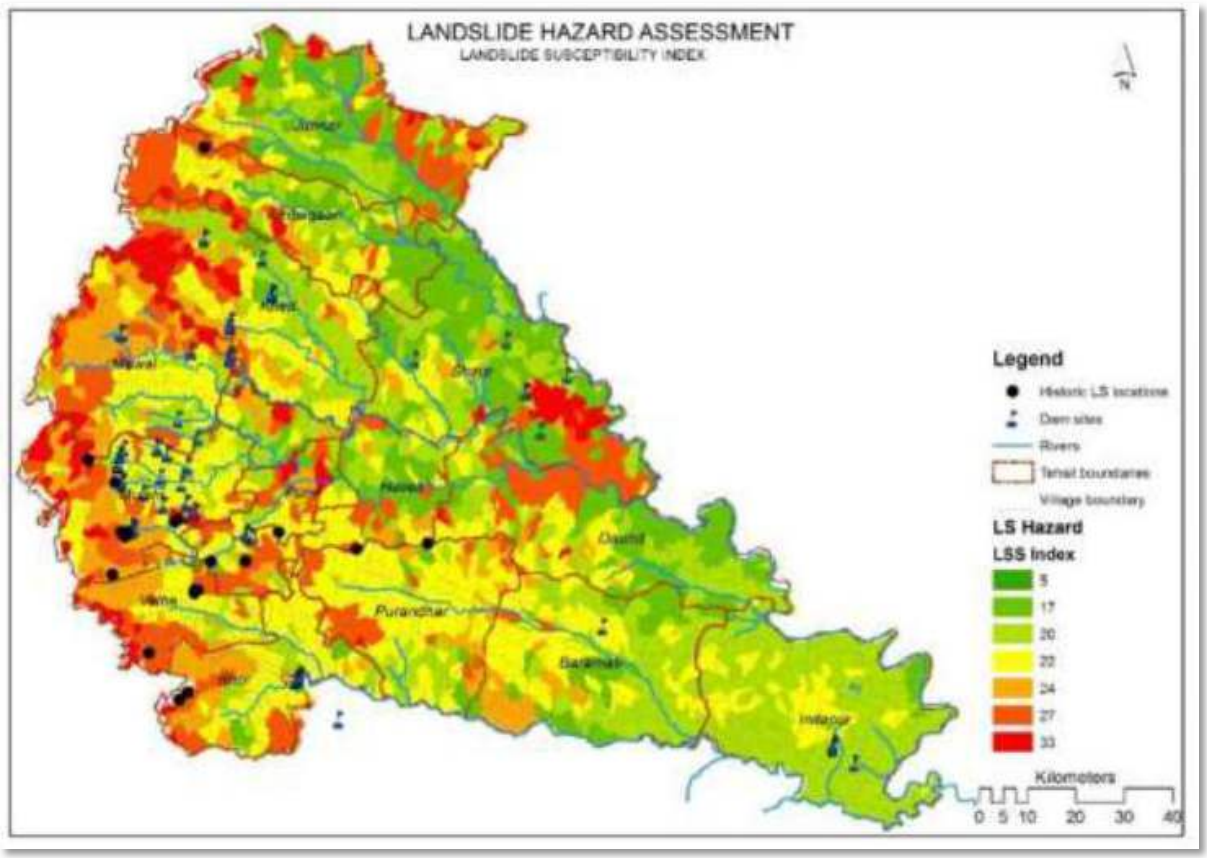


Figure 16 Landslide hazard Assessment Map

Source: TARU

Table 10 Landslide prone Villages

Tahsil Name	Landslide Prone Villages	Total
Ambegoan	Bhagatwadi, Kalewadi 1 & 2, Bendarwadi, Pasarwadi.	5
Khed	Padarwasti, Bhomale.	2
Mawal	Malwadi, Boraj, Tung, Taje, Lohgad, Maau, Mormachiwadi, Bhushi.	8
Bhor	Sonarwadi, Dehen, Korle, Dhanvali.	4
Mulshi	Ghutke	1
Velha	Ghol, Aambawane.	2
Junnar	Talmachi Wadi.	1
Total		23

3.4.3 Flood

Floods affect most of the Talukas within Pune district. As found in assessment study by TARU on their HRVA, 40 villages are likely to be affected by flood once 1 in 25 years, whereas 35 villages once in 100 years.

In River Mula, Mutha, Pauna, Indrayani and Bhima are flood prone and likely to cause flooding in Haveli Taluka. Other areas, which are prone to frequent floods in the district, are, Taluka Shirur, Daund, Indapur and Haveli (river Bhima), Pune City and Taluka Mulshi (river Mutha), Taluka Khed, and Maval (river Indrayani), Taluka Ambegaon (river Ghod), Taluka Junnar (river Mina and Pushpavati), Taluka Indapur, Baramati and Purandhar (river Nira). During the rainy season the landslide occure along the roads in the hilly area and ghats.

Table 11 Flood Prone Villages

Sr. No.	Taluka	River	Affected Village	No. of Villages
1	Pune City Haveli, Mulshi	Mutha	Yerwada Shantinagar, Indira Nagar, Shivajinagar (Patil Estate) Erendavane, (Pulachiwadi), Sangamwadi, Loni Kalbhor, Higne Khurda (Vithhalwadi, Anandnagar,) chande, Wakad, Hinjawadi,	9
2	Pune City Haveli	Mula	Bopadi, Aundh, Dapodi, Sangvi, Baner, Higanoari, Chinchwad, Pimpri	8
3	Haveli	Pawana	Kasarwadi, Phugewadi, Sangvi, Pimple Saudgar, Pmplegurav, Rahatani, Chowisawadi, Nirgudi, Dehu	9
4	Haveli, Maval Khed	Indrayani	Bawdi, Phugalon, Sangvi, Sandus, Vdhu Khurd, Lonawala, Kamshet, Maval, Sangurdi, Alandi	10
5	Haveli, Shirur, Daund , Indapur	Bhima	Pmpri sandus, Dogergaon, Burkegaon, Perne, Asthapur, Navisandus, Vadhu BK, Koregaon Bhima, Dugraj Wadi, vithal Wadi, Wadgaonrasai, VAdhu Budruk, Chapati, RajangaonSandus, Alegaonpaga, Nagargaon, Nadur, Wadgaon Kashimbe, Gonwadi Daund, Kharodi, Wadgaon Dere, Pedgaon, Sonwadi, multhan, Bawada, Geneshvasti, Bhadgaon,	30
6	Ambegaon	Ghod	Chandoli, Pargaon, Nirgudsar, Narodi, Hincholdi, Jawle Ganegaon, Dumala, Bhabulsar, Tandali, Shivtkarar Mahalungi	10
7	Junner	Mina	Narayangaon, Savergaion	2
8	Indapur,	Purander	Nira Pharati, Lumewadi, Nira	3
9	Daund, Shirur, Indapur	Bhima	Sangurdi, Nira	2
			Total No. of Villages	83

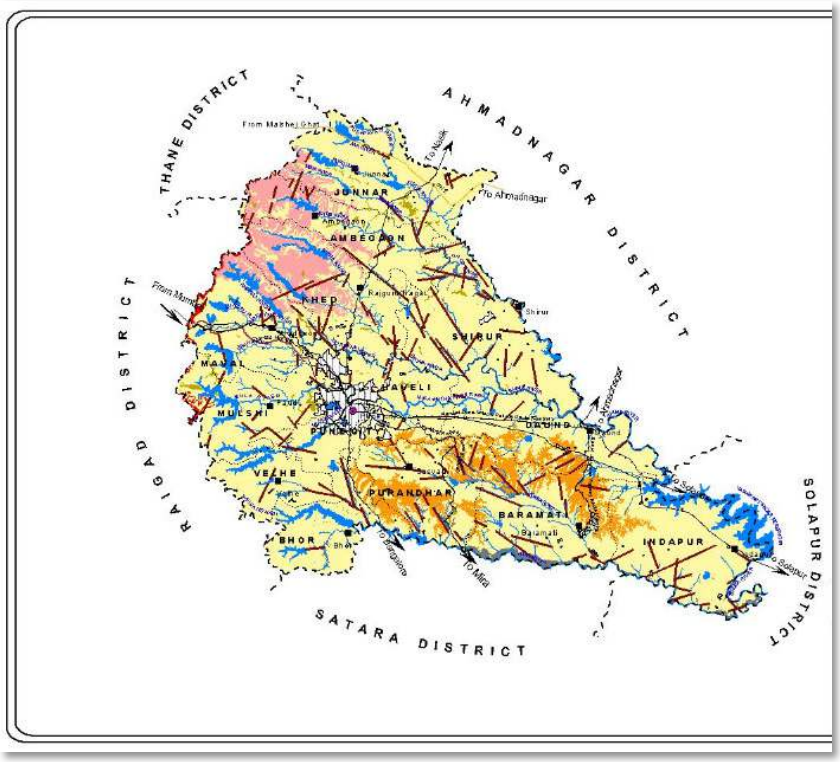


Figure 17 Hydro Morphology Map

Source: District environmental Atlas

As per TARU report about 40 villages across Junnar, Ambegaon, Khed, Bhor, Duand and Baramati tehsils have been on the flood plains of various rivers/rivulets, in a 25-year return period flood event. When we consider a 100-year return period, this number goes much beyond 100 villages. Apart from this, some villages are prone to landslides, usually during monsoon periods.

Twenty-five years before Malin, it was Bhaja village in Pune district that was covered in mud following a devastating landslide. 28 years before that, half of Pune city was submerged in floods of a scale never recorded before in history. Old people in the vicinity of Malin village were horrified by memories of the above-mentioned two disasters. On July 23, 1989, a landslide killed 39 people at Bhaja village in Mawal, 60 km from Pune city. The village was at the base of a mountain known for its 22 rock caves dating back to the second century BC. Overnight rain resulted in a very large portion of the mountain coming down and burying a group of houses around seven in the morning. The Pune flood of July 12, 1961, was caused by a 100-foot breach in the Panshet earthen dam following heavy rain. There is no official count for the casualties, but the river Mutha gushed into the city, submerged nearly half of it and left hundreds homeless in hours.

The changes in frequency of such events rose in Maval, Velhe, Mulshi, Khed and Ambegaon considerably in the period. The rest of the portion of the Pune district faced normal changes in frequency of such extremely wet events. These districts were facing increased precipitation levels as well as increased number of extreme wet events District averaged annual temperature gave us a general trend of change in monsoon season precipitation levels for the

period of 1951 - 2012, which suggested 0.560 mm per year change. With the exception of the monsoon of 2005, the rest of the monsoon season precipitation seems steady as indicated.

3.4.4 Drought

Drought is a normal, recurrent feature of climate and is observed in all the climatic zones. However, it has significantly different characteristics from one region to another. Drought differs from aridity. Aridity is a permanent feature of climate over regions where rainfall received is generally low. On the other hand, drought over a geographic area is a temporary condition caused by significantly less (deficient) rainfall for an extended period of time, usually during a season when substantial rainfall is normally expected over the area. For example, the primary rainy season for India is southwest monsoon season. However, in 2009, most parts of the north India experienced drought conditions due to lack of rainfall during major part of the southwest monsoon season. The deficiency in the rainfall is measured relative to the long-period average (LPA) of rainfall over the area. While considering the drought, it is also important to take into account the timing (i.e., principal season of occurrence, delays in the start of the rainy season) and the effectiveness (i.e., rainfall intensity, number of rainfall events) of the rains. The severity of the drought can also be aggravated by other climatic factors such as high temperature, high wind and low humidity.

Extreme precipitation related events are significant for the study of vulnerable area identification. In this study Standardized Precipitation Index (SPI) and Standardized Precipitation and Evapo-transpiration Index (SPEI) were used to identify such events. The SPI/SPEI values less than - 1.3 shows moderate to extreme drought events while such values greater than 1.3 shows moderate to extreme wet events. Since SPI does not take evapo-transpiration factors into account, SPEI is also used to taken into consideration, which is sensitive to the changes in temperature also. The SPI/SPEI values considered here are the four months SPI/SPEI values obtained at the end of September month of every year. The base period for all calculations for SPI and SPEI is 1971 - 2000.

While SPI based drought and wet spells are lesser, the SPEI based values show higher frequency of such events in the period of 1951 -2012. Tehsils such as Ambegaon, Khed, Maval, Mulshi and some parts of Haweli and Indapur shows higher number of wet spells between 8 - 10 and rest of the district faced fewer number,0 - 4, of such events, considering SPI. The SPEI values gives a little different picture where all tehsils received 3 - 10 extreme wet events, and where Maval, Mulshi, Haweli,Velhe Shirur and Indapur are at higher side of receiving such events. Western part experiences lower temperatures as compared to rest of the district. The changes observed show a negative trend in maximum, a slight negative trend in minimum and no change in mean temperatures in most parts of the district.

The picture portrayed by SPI and SPEI values for drought affected part is significantly different, shows most of the district faced zero droughts and rest were in the range of 1 - 3 drought events in the period 1951 - 2012, based on SPI values. The SPEI based drought frequency figures show that most of the district faced on average 6 such drought events and varied from 4 - 9 drought events in the same period.

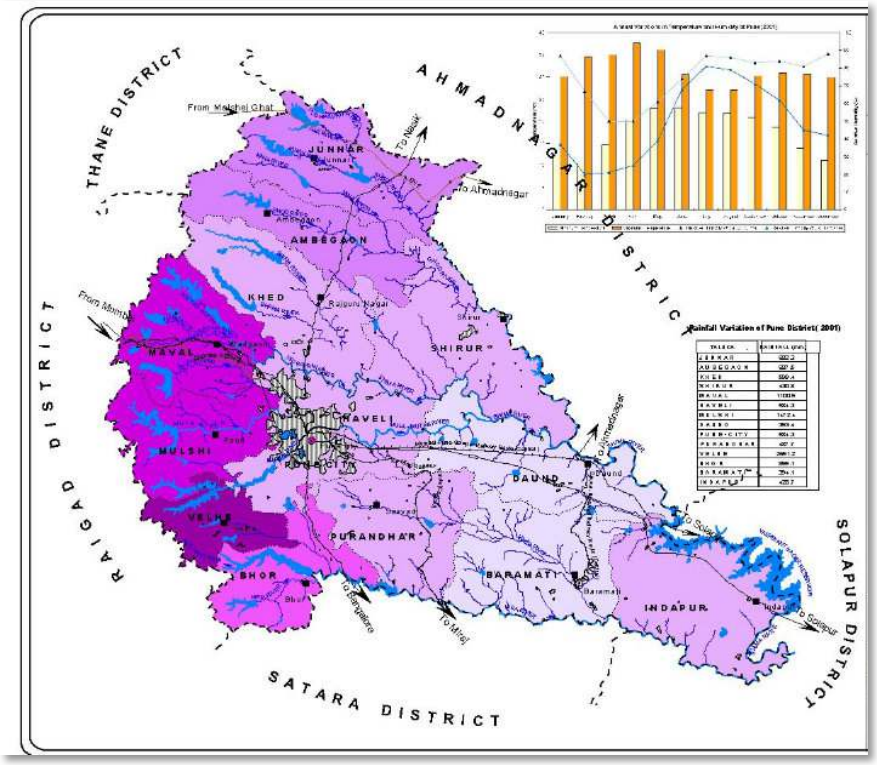


Figure 18 Climate Map

Source: District environmental Atlas

3.4.5 Industrial Hazard

Pune is home to automobiles, manufacturing equipment (defense, agricultural, electronic parts, etc), IT/ITES and chemical industries. Among them also there are some industries which store or process hazardous substances. TARU used the ALOHA model (Chemical air dispersion model) for studying industrial hazard. In Pune, these talukas chemical industries are located within MIDC premises –Ambegaon (4), Baramati (12), Bhor (14), Daund (54), Haveli (102), Indapur (8), Junnar (2), Khed (43), Mawal (12), Mulshi(45), Purandhar (17), and Shirur (12).

There are a total of 36 major accidents hazard (MAH) units elected for chemical hazard scenario model (ALOHA model) out of 325 chemical industries in 13 talukas of Pune district. All MAH units are produced / stored various types of hazardous chemicals like Acrylonitrile, Ammonia (Anhydrous), MMA (Anhydrous), Ethyl Alcohol, Nitrogen (Liquid), Hydrogen, Hydrogen Peroxide, Methyl Alcohol, Caustic flakes, toluene, MEA (Anhydrous), DEA, TEA, Furnace oil, Para Cumidine, Para Nitro Cumine, Pipiridine, Pyridine, Acetic acid, and Acetonitrile.

3.4.6 Fire

There has been no major industrial disaster in the area Pune city. However, minor industrial fires and domestic fires as well as cases of electrocution have been happening in Pune. Small incidents of accidents of tankers carrying hazardous materials have been happening in the city. Fire and emergency services of Pune are in the process of upgrading their capacities.

Notwithstanding that, the fires have been taking a regular toll of life and property in Pune. The city police and fire brigade attend these incidents.

3.4.7 Lightning

Lightning strikes in Pune district have become a significant concern due to their increasing frequency and severity. Over the past few years, the district has witnessed numerous lightning incidents, resulting in considerable loss of life and property. On average, Pune experiences around 30-40 lightning-related fatalities annually, with hundreds of incidents reported each year. The severity of these events is exacerbated by the region's climatic conditions, which often lead to intense thunderstorms. These lightning strikes not only pose a direct threat to human life but also cause substantial damage to infrastructure, including power lines, buildings, and communication networks. The district's authorities have been working diligently to mitigate these risks through public awareness campaigns, installation of lightning arresters, and improved early warning systems. Despite these efforts, the need for continuous monitoring and community education remains critical to reducing the impact of lightning in Pune.

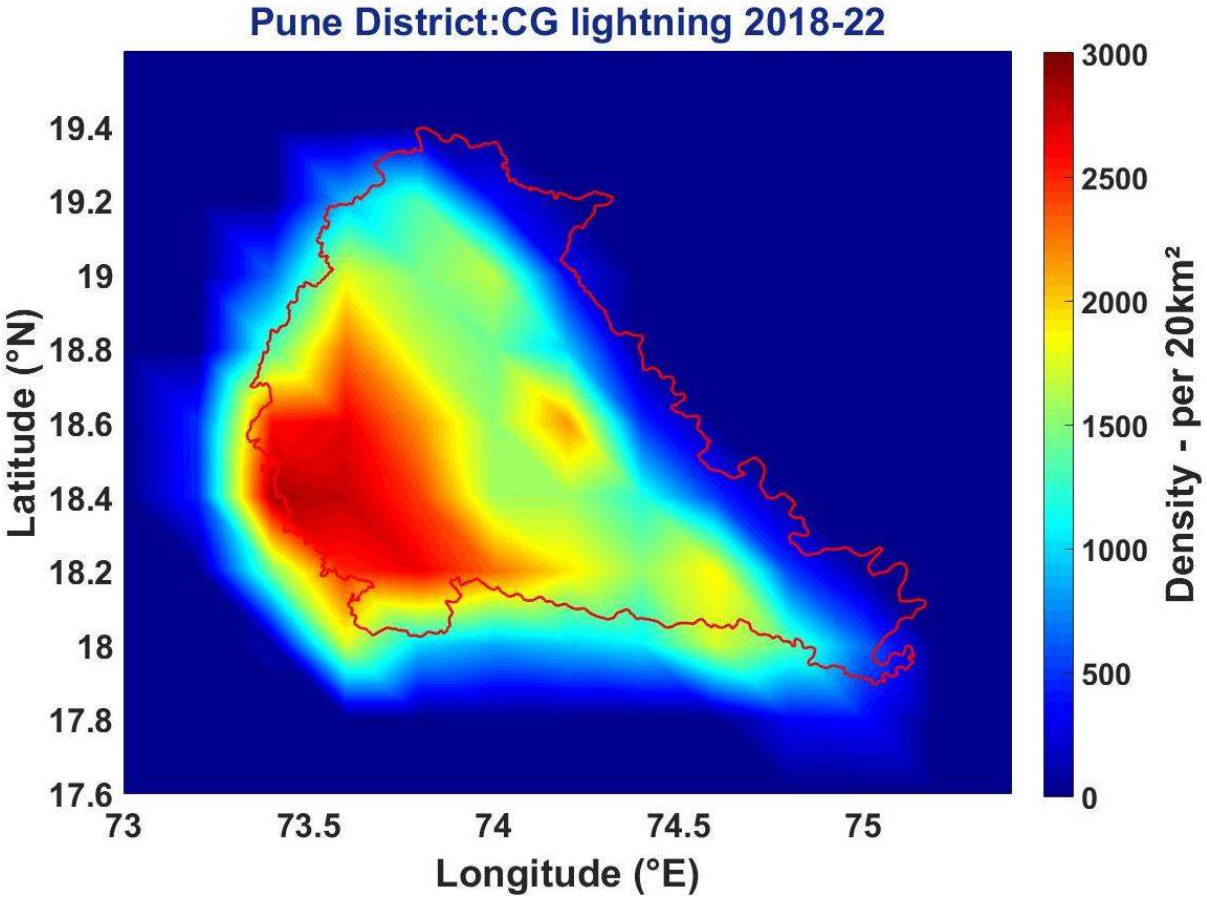


Figure 19 Lightning Density Map of Pune District

3.4.8 Terrorism and Political Violence

Pune has shown presence of 'Terrorist Sleeper Cells'. Being an industrial and economically important city, it would naturally attract wrath of terrorism. Recent German Bakery Blast, as act of terrorism, has opened a new chapter in Pune's statistics of hazards/ disasters. The entire

world has become a hotbed of terrorism and though the act does not essentially fall into the category of disasters yet, the effects of any such acts would be as severe, if not more, to any other disaster resulting from other forms of violence/ accidents. Pune is politically an active city ever since the struggle for independence. The political culture of Pune has been rapidly undergoing change and political violence cannot be ruled out.

3.4.9 Road accidents

Pune displays tremendous stress on the roads due to very high traffic densities. Road accidents are quite common in certain densely populated areas as well as astride the highways. Also, rail traffic and the presence of a busy airport and military airfield at Lohegaon is hazardous. As per the statistics compiled by Pune Police, the number of fatalities in road mishaps in the district has once again crossed the 1000- mark in one year. In 2012, as many as 1017 people died in road mishaps in the city, as against 849 who lost their lives in the year 2013.

3.4.10 Cold wave

Over the past decade, Pune district has faced significant cold wave events, with temperatures frequently dropping below 10°C in several areas. The lowest recorded temperature during this period was 8.6°C in Haveli in 2021, according to the India Meteorological Department (IMD). Other areas such as Shivajinagar, Pashan, and NDA have also experienced temperatures below 10°C. These cold waves typically lasted for 3 to 5 days, significantly impacting the region.

The cold waves have led to increased cases of respiratory issues, particularly among vulnerable populations such as the elderly and children, as reported in the annual disastrous weather reports by IMD Pune. The cold wave hazard assessment for Pune district, based on data from 1954 to 2022, categorizes talukas by the total number of cold wave days, determined by deviations from normal temperatures.

The assessment reveals that Shirur is the most affected taluka, with 108 cold wave days, followed by Junnar with 98 days, and Indapur with 80 days, indicating a significant number of cold wave events. Talukas such as Haveli, Daund, Baramati, Saswad, and Purandhar fall under the category experiencing between 51 to 70 cold wave days, facing moderate occurrences of cold waves. Meanwhile, Khed, Mawal, Mulshi, Velhe, and Bhor, with 30 to 50 cold wave days, indicate a lower but still notable risk.

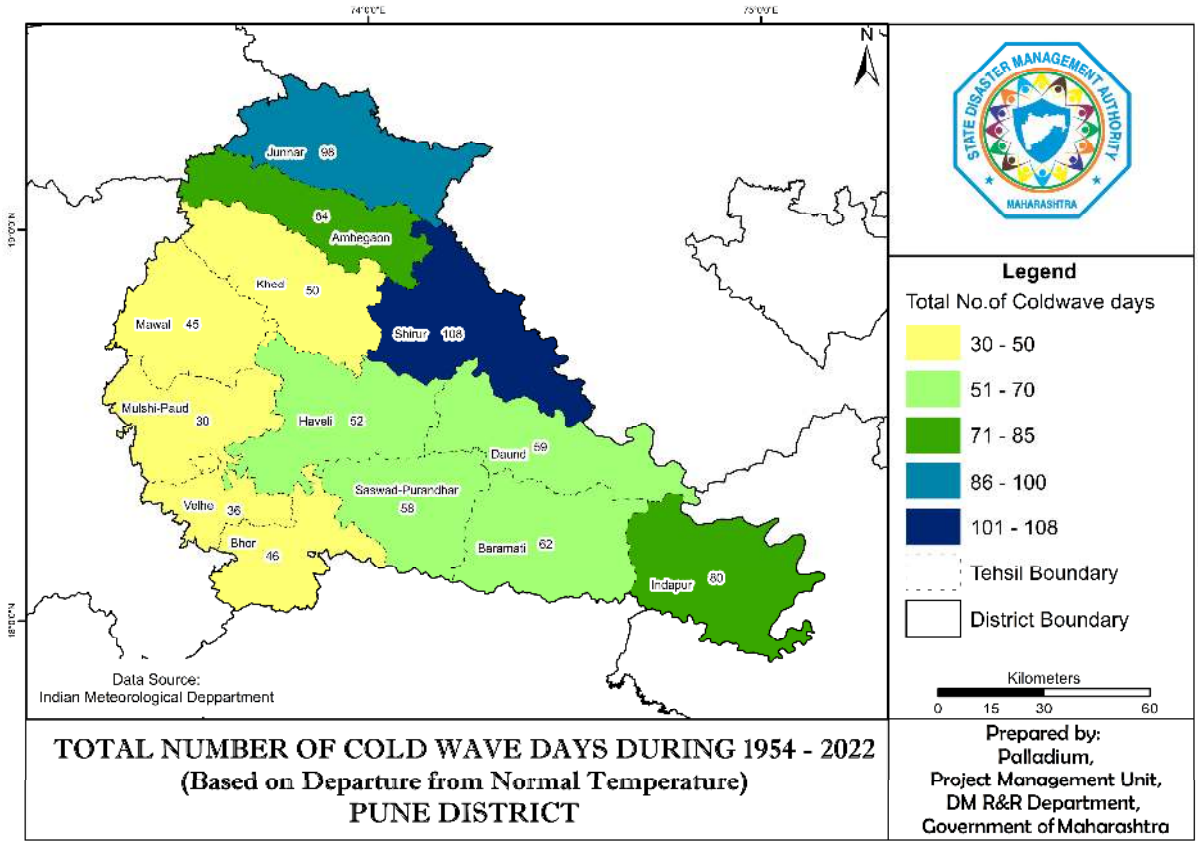


Figure 20 Taluka wise Total Number of Cold wave Days in Pune district

3.4.11 Heat wave

Over the past five years (2018-2022), Pune district has experienced significant heatwave events, with the average heat index and maximum temperatures indicating a notable vulnerability to heat stress. The heat index across various talukas ranges from 38°C to 51°C, while the maximum temperatures range from 35°C to 41°C. Talukas such as Shirur, Daund, Indapur, and Baramati are particularly vulnerable, experiencing severe heat stress with heat indices between 45°C and 51°C. Other talukas, including Khed, Haveli, Junnar, Bhor, Mawal, Velhe, Ambegaon, Mulshi-Paud, and Saswad-Purandhar, face moderate heat stress with heat indices between 38°C and 45°C.

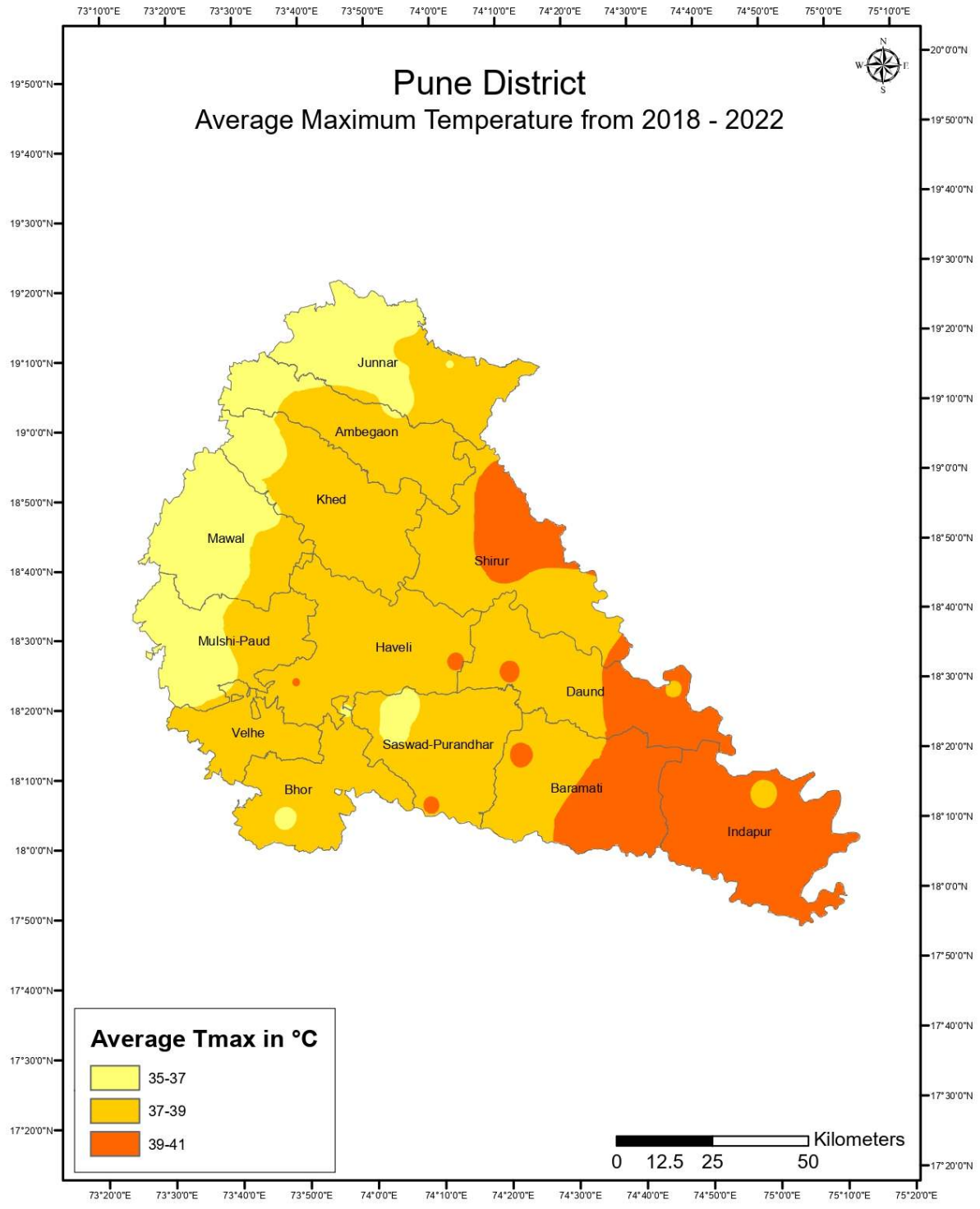


Figure 21 Average Maximum Temperature of Pune District

The high heat index and maximum temperatures in these areas have led to increased cases of heat-related illnesses, particularly among vulnerable populations such as the elderly, children, and outdoor workers. The impact includes health issues like heat exhaustion, heatstroke, and dehydration, as well as adverse effects on agriculture and water resources, leading to increased demand for water and potential shortages.

3.4.12 Human Animal Conflict

In Pune district, the rise in human-leopard conflicts has become a critical issue, resulting in loss of lives, economic damage, and stress on biodiversity conservation efforts. The conflict has intensified, particularly in the Junnar Forest Division, where 233 villages have been declared "highly sensitive" to leopard-related disasters. Over the past five years, there have been 40 serious injuries and 16 fatalities due to leopard encounters. The increasing leopard population, estimated at 400-450 in Junnar and surrounding talukas, has led the forest department to propose declaring Junnar as a "leopard disaster zone."

The District Disaster Management Authority (DDMA) Pune has taken significant steps to mitigate the risk related to man-animal conflict, including public awareness campaigns, improved wildlife management practices, and the establishment of rapid response teams. Since 2019, human-wildlife conflicts have been on the rise, with recorded deaths increasing each year: 39 deaths in 2019-20, 87 in 2020-21, 84 in 2021-22, 105 in 2022-23, and 15 deaths recorded by March 2024.

As per the section 34 of the Disaster Management Act 2005, the DDMA has classified this issue as a district disaster, emphasizing the need for sustainable and effective mitigation strategies to protect both human and wildlife populations.

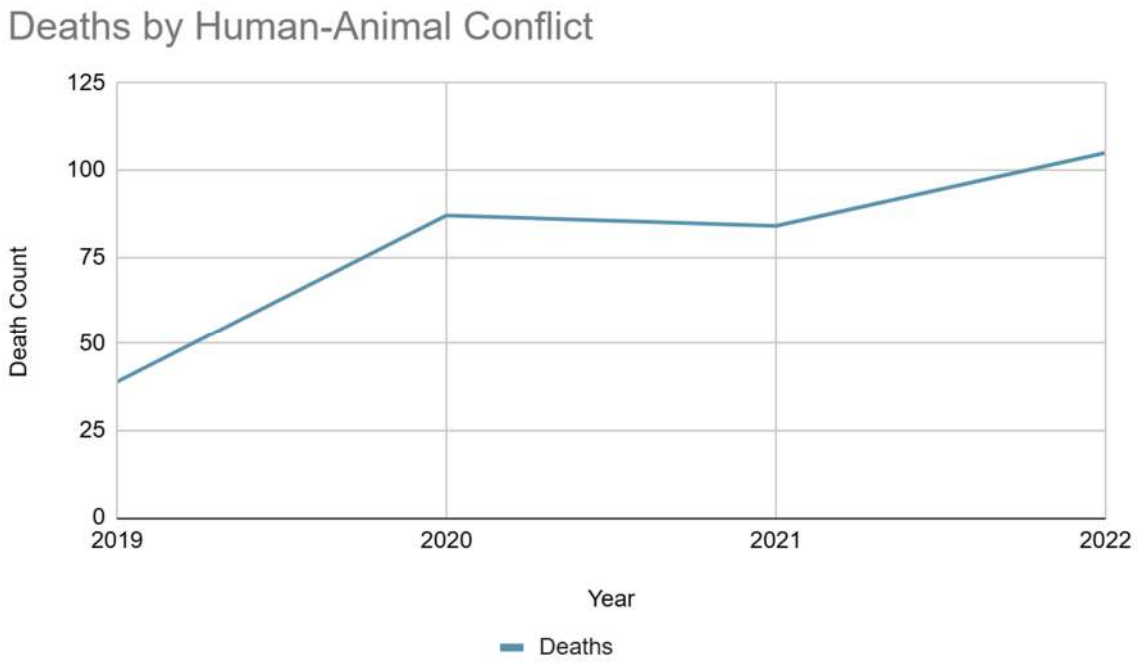


Figure 22 Number of Deaths by Human Animal Conflict in Pune District

Source: DDMA Pune

3.5 Social, Economic, and Environmental Vulnerability Analysis

3.5.1 Social Vulnerability

In Pune district, social vulnerability varies significantly across tehsils, reflecting a complex interplay of socio-economic factors and geographical characteristics. Urban areas such as Pune City and Pimpri-Chinchwad face higher vulnerability due to their dense populations and the challenges of providing essential services during disasters. Additionally, rural and hilly tehsils like Velhe, Bhor, and Mulshi may experience challenges related to landslides and limited access to healthcare and education. Socio-economic indicators such as poverty levels, access to education and healthcare, and employment opportunities also contribute to social vulnerability. Tehsils with lower socio-economic development and higher dependency on agriculture may be more susceptible to shocks and stresses. Moreover, marginalized communities such as Scheduled Tribes and Scheduled Castes may face heightened vulnerability due to historical inequalities and limited access to resources and support systems. Understanding and addressing tehsil-wise social vulnerability is crucial for designing effective risk reduction and resilience-building strategies tailored to each community's specific needs and priorities within Pune district.

3.5.2 Environmental Vulnerability

In Pune district, environmental vulnerability varies across tehsils and is influenced by diverse ecological settings and human activities. Tehsils with hilly terrain and dense forests, such as Velhe, Bhor, and Mulshi, face deforestation, soil erosion, and landslides, particularly in areas with unsustainable land-use practices and inadequate infrastructure. Urban tehsils like Pune City and Pimpri-Chinchwad may experience environmental vulnerability due to pollution, insufficient waste management, and urban sprawl, impacting public health and quality of life. Additionally, tehsils with significant agricultural activities, such as Baramati and Daund, are vulnerable to droughts and water scarcity, affecting crop yields and livelihoods. Addressing tehsil-wise ecological vulnerability in Pune district requires integrated approaches that prioritize ecosystem conservation, sustainable land management, and community resilience-building initiatives tailored to the unique environmental context of each tehsil.

3.5.3 Economic Vulnerability

The economic vulnerability of Pune district is influenced by several factors, including its dependence on agriculture, industry, and services, as well as socio-economic indicators such as poverty levels, employment opportunities, and access to essential services. The district's economy is diverse, with agriculture being a significant source of livelihood for many rural communities. However, the agriculture sector is susceptible to various risks, including droughts, floods, and pest infestations, which can impact crop yields and farmer incomes. In addition to agriculture, the industrial sector, particularly in areas like Pimpri-Chinchwad and Chakan, plays a crucial role in the district's economy. However, industrial accidents and environmental pollution pose significant risks to economic stability and public health. The services sector, including IT and tourism, is another important economic driver in Pune district. However, this sector is vulnerable to economic downturns and disruptions caused by natural disasters and socio-political instability. Addressing economic vulnerability in Pune

district requires holistic approaches that promote sustainable and adaptive agriculture, industrial safety, and eco-tourism development while addressing socio-economic inequalities and building resilience to external shocks and stresses. Collaboration between government agencies, civil society organizations, and local communities is essential to enhance economic opportunities, reduce poverty, and improve livelihoods in the district.

3.6 Gap Assessment

3.6.1 Capacities

Institutional Framework: Pune has a well-established disaster management cell and control rooms. The presence of National Disaster Response Force (NDRF) and Central Reserve Police Force (CRPF) units in the city enhances its disaster response capabilities.

Community Involvement: Organizations like the National Cadet Corps (NCC) and National Service Scheme (NSS) actively participate in disaster preparedness and response activities. This community involvement is crucial for effective disaster management.

Infrastructure: The district has critical infrastructures such as dams and reservoirs, which are regularly monitored. Additionally, there are efforts to improve flood forecasting and management.

Training and Drills: Regular training programs and mock drills are conducted to ensure that officers and employees are well-prepared for emergencies.

3.6.2 Gaps

Advanced Equipment and Technology: There is a need for more advanced equipment and technology to enhance disaster response capabilities. This includes better communication tools and rescue equipment.

Public Awareness: While there are ongoing efforts to promote disaster preparedness, there is still a need for greater public awareness and participation. More comprehensive awareness programs can help ensure that residents are well-prepared for potential disasters.

Risk Analysis and Mitigation: The district needs to update its hazard, vulnerability, and risk assessments regularly to reflect current conditions and potential threats. This will help in better planning and mitigation measures.

Coordination and Communication: Effective disaster management requires seamless coordination between various agencies and stakeholders. There is a need to improve communication channels and protocols to ensure timely and efficient response during emergencies.

Addressing these gaps can significantly enhance Pune's disaster management capabilities and ensure better preparedness and resilience in the face of potential disasters.

3.7 Capacity Assessment

3.7.1 Identification of district stakeholders

District Collector Office Pune					
Sr. No.	**Officer's Name**	**Department**	**Designation**	**Mobile Number**	**Telephone Number**
1	Dr. Jitendra Dudi	District Collector Office Pune	District Collector and District Magistrate	9783802020	020-26114949
2	Mr. Suhas Mapari		Additional District Collector	9689931508	020-26124137
3	Mrs. Jyoti Kadam		Resident Deputy Collector	7796277777	020-26122114
4	Dr. Rajendra Bhosale	Pune Municipal Corporation Pune	Commissioner		020-25501103
5	Mr. Shekhar Singh	Pimpri Chinchwad Municipal Corporation	Commissioner		020-27425511/12/13
6	Mr. Amitesh Kumar	Pune Police Commissioner Office	Police Commissioner	9823133300	020-26125396
7	Mr. Vitthal Banote	Disaster Management Cell	District Disaster Management Officer	8975232955	020-26123371
Zila Parishad Officers					
Sr. No.	**Officer's Name**	**Office Name**	**Designation**	**Mobile Number**	**Telephone Number**
1	Mr. Gajanan Patil	Zilla Parishad Pune	Chief Executive Officer		
2	Mr. Chandrakant Waghmare	Zilla Parishad Pune	Additional Chief Executive Officer		020-26051478
3	Mrs. Shalini A. Kadu	District Rural Development Agency	Project Director		020-26131784
4	Mr. Shrikant Kharat	General Administration	Deputy Chief Executive Officer (General Administration)		020-26134806
5	Mr. Mahesh Avatade	Finance Department	Chief Accounts and Finance Officer		020-26135426
6	Mr. Vijaysingh Nalawade	Gram Panchayat Department	Deputy Chief Executive Officer (Village)		020-26131984
7	Mrs. Bhagyashree Bhosale	Zilla Parishad Pune	Assistant Group Development Officer		020-26131984
8	Mr. Ashok Barku Pawar	Agriculture Department	District Agriculture Development Officer		020-26133626
9	Mr. Appasaheb Gujar	District Water and Sanitation Mission	Deputy Chief Executive Officer (Water and Sanitation)		020-26052938
10	Mr. Jamsingh Bijesingh Girase	Women and Child Welfare Department	District Program Officer (Women and Child Development)		020-26054299
11	Mr. Baburao Pawar	Construction Department South	Executive Engineer (South)		020-26133425
12	Mr. Shankar Darade	Construction Department North	Executive Engineer (North)		020-26133485

13	Mr. Gaurav Borkar	Minor Irrigation Department	District Water Conservation Officer (Minor Irrigation)		020-26131605
14	Mr. Sanjay Naikade	Primary Education	Education Officer (Primary)		020-26137144
15	Mr. Bhausaheb Karekar	Secondary Education	Education Officer (Secondary)		020-26050733
16	Mr. Amit Patharwat	Rural Water Supply Department	Executive Engineer (Rural Water Supply)		020-26055129
17	Mr. Praveen Korgantiwar	Social Welfare Department	District Social Welfare Officer		020-26131774
18	Mr. Sachin Desai	Health Department	District Health Officer		020-26129965
19	Mr. Ganesh Dhere	Mechanical Department	Deputy Engineer (Mechanical)		020-26052771

Sub-Divisional Officers

Sr. No.	Officer's Name	Office Name	Designation	Mobile Number	Telephone Number
1	Mr. Sanjay Asawale	Sub-Divisional Officer Haveli	Deputy Collector	8852800664	020-26330832
2	Mrs. Sneha Kisve-Devkate	Sub-Divisional Officer Pune City, Shirur	Deputy Collector	9604146186	020-26060472
3	Mr. Surendra Navale	Sub-Divisional Officer Maval, Mulshi	Deputy Collector	7020046461	020-26122239
4	Mr. Vikas Kharat	Sub-Divisional Officer Bhor, Velha	Deputy Collector	8830333748	02113-224456
5	Mrs. Varsha Landge	Sub-Divisional Officer Purandar	Deputy Collector	8408089376	02115-222079
6	Mr. Minaj Mulla	Sub-Divisional Officer Daund	Deputy Collector	7620448001	02115-222079
7	Mr. Govind Shinde	Sub-Divisional Officer Junnar, Ambegaon	Deputy Collector	9423116611	02133-223044
8	Mr. Jyogendra Katayare	Sub-Divisional Officer Khed	Deputy Collector	8007711711	02135-222039
9	Mr. Vaibhav Navadkar	Sub-Divisional Officer Baramati, Indapur	Deputy Collector	8308637322	02112-224385

Tehsil Offices

Sr. No.	Officer's Name	Office Name	Designation	Mobile Number	Telephone Number
1	Mr. Suryakant Yewale	Tehsil Office Pune City	Tehsildar	9422948008	020-24472850
2	Mr. Kiran Survase	Tehsil Office, Haveli	Tehsildar	9004995999	2024472348
3	Mrs. Archana Nikam	Tehsil Office, Pimpri Chinchwad	Tehsildar		020-27642233
4	Mr. Vikram Deshmukh	Tehsil Office, Maval	Tehsildar	8888113931	02114-235440
5	Mr. Ranjit Bhosale	Tehsil Office, Mulshi	Tehsildar	9850030074	020-22943121
6	Mr. Balasaheb Mhaske	Tehsil Office, Shirur	Tehsildar	9209134616	02138-222147
7	Mr. Sachin Patil	Tehsil Office, Bhor	Tehsildar		

3.7.2 Assessment of Existing Capacity

S.No.	Taluka	Rescue Boat	OBM Engine	Life Jacket	Life buoy	Rope	Search Light	Satellite Phone	Safety Helmet
1	Mulshi	2	2	10	10	4	1	1	0
2	Bhor	2	2	15	5	7	1	1	0
3	Daund	2	2	10	10	4	1	1	0
4	Ambegaon	1	1	5	5	2	1	1	0
5	Indapur	2	2	10	10	4	1	0	0
6	Shirur	1	1	5	5	2	1	0	0
7	Junnar	1	1	5	5	2	1	1	0
8	Baramati	1	1	5	5	2	1	1	0
9	Mawal	1	1	5	5	2	1	1	0
10	Aalandi Municipal Council	1	1	5	5	2	0	0	0
11	Pune Metropolitan Region Development Authority	1	1	5	5	2	0	0	0
12	Police Superintendent, Rural	2	2	10	10	4	0	0	0
13	DDMA Pune	0	0	25	25	45	0	0	300
	Total	**17**	**17**	**115**	**105**	**82**	**9**	**7**	**300**

4 Institutional Arrangements for Disaster Management

This section describes the organizational structure that exists at the District, Block, Gram Panchayat, Municipality and community levels for DM. It would include information about composition of the above institutions and their functions as per the DM Act, 2005 and the National Policy on Disaster Management 2009. District Disaster Management Authority (DDMA) may also identify functions of other institutions which they consider important such as Disaster Management Teams, Crisis Management Group / Incident Response System (IRS), Emergency Operation Centres (EOCs) and their operation, Site Operation Centres, Platforms such as inter-agency groups that would facilitate partnerships with NGOs, private sector, elected representatives, Community based Organisations (CBOs), other academic and technical institutions. Major industrial /service / infrastructure establishments and fair capability plans should be listed (detailed in annexure)

4.1 DM organizational structure at the national level

National Disaster Management Authority (NDMA) is the highest authority in the country under the chairmanship of Hon. Prime Minister of India along with some experts. The authority is regularly monitors and provides guidance to the state authorities regarding various issues related to disaster management in reference to DM Act 2005.

4.1.1 DM organizational structure at the state level including IRS in the State

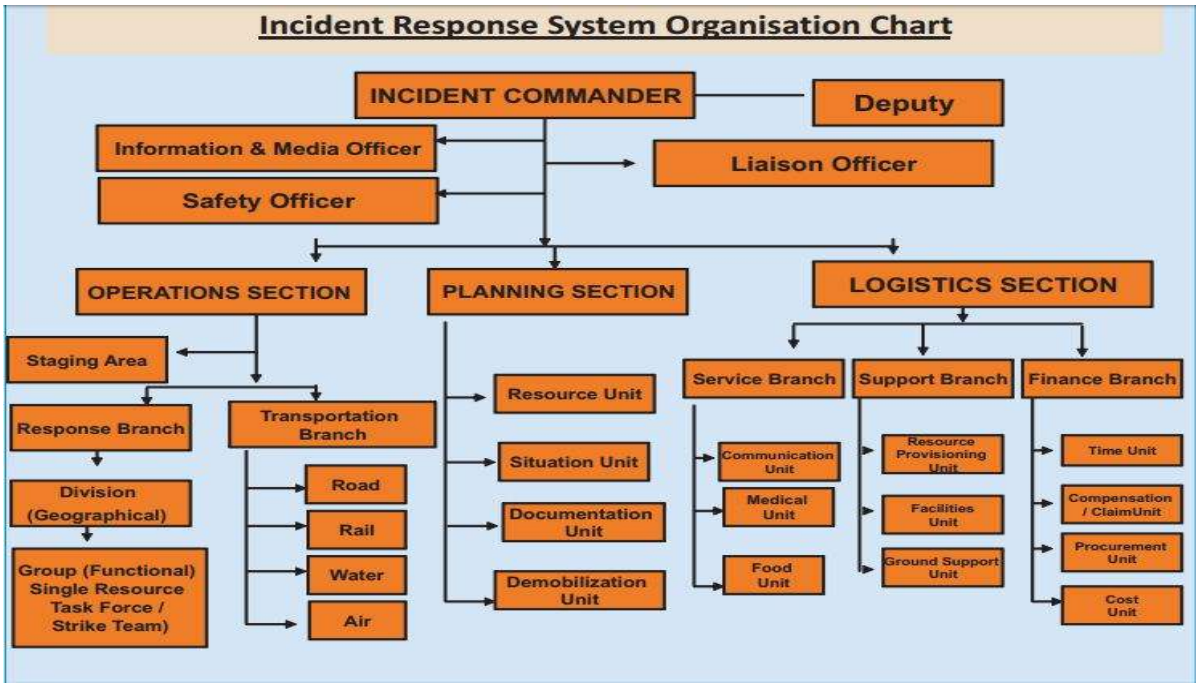


Figure 23 Incident Response System Organisation Chart

At the state level, SDMA is headed with the Chief Minister, who also acts as Incident Commander. It is assisted with department head deputed for the purpose depending upon type and nature of disaster, its intensity and chances of spreading; which will help to bring the situation under control.

4.2 DM organizational structure at the district level

The DDMA has been constituted under section 25 (1) of the Disaster Management Act 2005 under the chairmanship of District Collector with the following officers as its members: -

Table 12: DDMA Composition

(A)

Sr.	Position in DDMA	Designation
1	Chairperson	District Collector, Pune District Collectorate
2	Jt. Chairperson	Chairman Zilla Parishad Pune
3	Member	Chief Officer Zilla Parishad Pune
4	Member	Superintendent of Police (Pune District)
5	Member	Civil Surgeon (Pune District)
6	Member	Superintending Engineer PWD
7	Member	Superintending Engineer, Irrigation Dept.
8	Chief Executive Officer (Member-Secretary)	Residential Deputy Collector

Special Invitees (B)

Sr.	Designation	Office
1	Municipal commissioners	Pune & Pimpri Chinchwad Municipal Corporation
2	Commissioner of Police	Pune & Pimpri Chinchwad
3	Metropolitan Commissioner	PMRDA
4	Chief Officers	Pune, Khadki & Dehu road Cantonment

The institutional mechanism for disaster management at the district level is as follows: -

4.2.1 District Disaster Management Committee

Besides this, Committees at three levels are formed under Disaster Risk Management Programme with task forces for assistance. Disaster Management Committee undertakes the following functions:

- Reviewing the threat of disasters
- Vulnerability of the district to such disasters
- Evaluating the preparedness
- Considering the suggestions for improvement of the response document DDMP Committee meeting is convened once a year under the chairmanship of District Collector consisting of the following functionaries:

District Collector	Chairman
District Superintendent of Police	Member
Chief Executive Officer, Zilla Parishad	Member
Additional Collector	Member
Chief Fire Officer Municipal Corporation	Member
District Health Officer	Member
District Agriculture Officer	Member
District Animal Husbandry Officer	Member
Civil Surgeon	Member
Executive Engineer, P.W.D.	Member
Executive Engineer, Irrigation Department	Member
Executive Engineer, Minor Irrigation Division	Member
Executive Engineer, M.S.E.D.C.	Member
Executive Engineer, MWSSB	Member
Deputy Director of Education	Member
Divisional Manager, Railways	Member
Regional Transport Officer	Member
Regional Manager, M.S.R.T.C.	Member
District Publicity Officer	Member
District Supply Officer	Member
Local Station Director, A.I.R.	Member
Local Station Director, Doordarshan	Member
Resident District Collector	Member-Secretary

Duration of membership may vary as per occurrence of disaster.

4.2.2 Sub Divisional Disaster Management Committee

Under the chairmanship of Tahasildar, Nayab Tahasildar, Panchayat samiti Sabhapati, Tahasil level officers responsible from line departments and 2 or 3 NGOs will form Tahasil level D.M. committee, the details are reflected in Tahasil level plans.

This committee shall be constituted at every subdivision under the Chairmanship of Sub-Divisional Officer and the following members: -

1) Dy. SP
2) Tahasildar
3) Block Development Officer
4) Block Medical Officer
5) Executive Engineers PWD, IPH, Electricity
6) Divisional Forest Officer
7) Sub divisional fire officer
8) All other Sub Divisional Officers

Non-Official Members
1) Chairman /Vice chairman Panchayat Samiti
2)All members of Panchayat Samiti
3)Selected NGO/Volunteers /CBO in the subdivision.

This Committee will prepare the Sub divisional level disaster management Plans. In case of more than two sub-divisions, the response plan is in accordance with District Disaster management plan and will identify the hazards encountered by the people in past and send the data so collected to the District Disaster Management Authority for further updation in the disaster plan.

4.2.3 Village level Disaster Management Committee

Under the chairmanship of Sarpanch (Patwari) the committee is formed involving upsarpanch, Teacher, Police Patil, Gram Sevek, NGOs e.g SHG, Ganesh mandal, Krida Mandal etc. This is reflected and detailed in the village level plans prepared. This committee will be responsible for the preparation of village level plan including identifying hazards and with special responsibility to for village level task force who can attend to the local emergencies.

4.2.4 District Crisis Management Group (CMG)

4.2.4.1 District Disaster Management Committee and Task Forces.

In order to implement the District Disaster management Plan in the district the following committee has been constituted under the chairmanship of Deputy Commissioner as below: -

All the departments will identify the experts and willing personnel to be part of the district level task force. These members of the task force will respond to emergency situations depending upon type of disaster.

At the district level, chairperson of DDMA i.e. District Magistrate works as Incident Commander, while relevant department heads are deputed depending upon type of disaster,

intensity and chances of spreading which will help to bring the situation under control, as well as assist the vulnerable groups.

4.3 EOC setup and facilities available in the district

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 central government located within the district
- Non-officials viz; Guardian Minister of the district, Mayor, ZP President, MPs, Local units of the Defence Services

4.4 District has following EOC's established

1. Divisional Commissioner office
2. District Collector office
3. RDMC Pune Municipal Corporation
4. All Tahasil Headquarters. (operational only during the Monsoon period) however the desk clerk responsible for D.M. at Tahasil level can be contacted by using his personal contact number.

4.5 Alternate EOC if available and its location

Addition to above mentioned EOCs,

1. Police
2. Fire and emergency services
3. 108 National ambulance service
4. MIDCs
5. Pune Municipal Corporation
6. Divisional Commissioner Office.
7. State ATI YASHADA

The above Listed Organizations have EOCs dedicated for their own operations. These EOCs can also be used as alternate EOCs in case of emergency.

4.6 Public-Private Partnership

The PPP model was very successfully used during Malin landslide, which is considered as the best example in the country. Entire Malin village was relocated, and shelters were constructed by involving public-private partnership.

Public and private emergency service facilities are available in the district

Many of the housing societies larger than 400 flats or more have their own task force in many cases including fire engine equipped with staff and infrastructure.

4.7 Forecasting and warning agencies

The list of the agencies competent for issuing warning or alert is given below:

Forecasting-

Indian Meteorological Department (IMD) and Irrigation department are main information centres, which forecast the likely occurrence mainly that of flood, cyclones, and heavy rains.

Warning-

Mainly early warning system is activated through local tahsildar and is percolated through the chain of government functionaries working up to village level.

Police, home guard, civil defence are also called upon to dissipate forecast/warning under directives issued by DDMA or by SDMA.

Table 13 Forecasting & Related Agencies

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

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

Culture of prevention refers to the action that needs to be taken at all levels to save lives before a disaster strikes. Prevention also refers to the activities and measures that are taken to avoid existing and new disaster risks. While certain disaster risks cannot be eliminated completely, prevention measures aim at reducing vulnerability and exposure. The key elements to prevention and mitigation are preventive planning and integration of disaster risk reduction measures in developmental planning. Disaster Prevention & Mitigation measures are guards of hazard impact. They stand against the intensity of the hazard impact and reduce the risk involved. The report states that the major responders in disaster situations, the state governments are responsible for organizing an effective disaster response mechanism as well as preparedness and mitigation measures. The first step towards this is the strengthening of the organizational structure of disaster management at various levels and revising/updating codes, manuals and disaster plans.

The HPC carried out a series of consultations with Government, non- Government, National and international agencies and media organizations on their findings regarding disaster management scenario in their respective areas. This formed the basis for planning process of prevention, preparedness and response plans for all administrative levels.

The importance of physical as well as socio-economic vulnerability is emphasized. The prevailing social and economic conditions and its effect on human activities affect the capacities of people to deal with the physical components of vulnerability. Thus, the prevention and mitigation measures undertaken by the various levels of governance need to take into account both these aspects simultaneously. Policies that do not take into account both these aspects often fail to protect the populations they were created for. A good example of this is resettlement projects that do not take into account the traditional livelihood options of the people and fail to explore its viability in the new area or introduce alternate options.
Without a thorough vulnerability assessment, it is impossible to create a preparedness and mitigation plan. The following steps were stated as imperative for the same –

- Identification of hazard prone areas.
- Preparation of vulnerability profiles that map physical as well as socioeconomic hazards.
- Vulnerability and risk assessment of existing buildings and the initiation of retrofitting activities.
- The creation and implementation of technical guidelines for hazard resistant construction of buildings through techno-legal regimes.

This is an important aspect of prevention and mitigation activities as unplanned and inadequate developmental activity is one of the major causes of increased losses during disasters. Unchecked urbanization increases risks as communities live in high-density areas with poorly built and maintained infrastructure. Unplanned and unscientific urbanization,

poor land use patterns and deforestation are discussed in the report as a major cause for losses of human life and infrastructure in the aftermath of a disaster.

The report explores the disasters that India is vulnerable to in detail and divides it into geophysical regions based on topographic and climactic characteristics that make them susceptible to different types of disasters. In addition, it looks at overarching issues of global warming and climate change, which it states will supersede all local environmental issues as it has the ability to completely change the face of the earth. It has been statistically proven that the Himalayan glaciers are shrinking steadily which means that entire water systems of the country will be affected. It is predicted that in the next 50 to 60 years the glaciers will stop producing the water levels that we witness and depend on. This will drastically cut down the water available downstream and adversely affect agricultural economies, which will cause tremendous social upheaval in areas already suffering from poverty.

Due to rapid population growth and urbanization in disaster prone areas, more and more people are vulnerable to disasters. Natural occurrences such as floods, earthquakes, cyclones etc. cannot be avoided completely as it is a part of the environment we live in, however it's impact can be reduced and its worst effects prevented. A natural hazard turns into a disaster when it affects people and causes economic damage, i.e. when it hits a community and disrupts its normal functioning.

An emphasis has been made on the need to link disaster mitigation measures with developmental plans, effective communication systems, use of the latest information technology, insurance, extensive public awareness, and education campaigns. This can be done only through the strengthening of institutional mechanisms, international cooperation, and the involvement of the private sector.

The report looks at diversification of land systems as a strategy for providing insurance against risks caused by unexpected weather and erosion, while ensuring sustainable production of the land on a long-term basis. It also looks at agroforestry, a technique of growing food crops in association with woody perennials, to optimize the use of natural resources and minimizing the need for inputs derived from nonrenewable resources. A form of multiple unit's land management, agroforestry has the potential to ensure stability and sustainability in production and provide ecological and economic security. The method can control soil degradation, desertification, floods, droughts, reduce pollution of groundwater, increase biodiversity in farming systems, check deforestation, reduced pressure on forests through on farm supply of fuel wood, fodder and other forest products.

The following are brief guidelines for prevention and mitigation of disasters –

- Take a proactive approach by emphasizing means to prepare for and prevent disasters thus reducing their effects on human life.
- Examine the relation between environmental degradation and vulnerability to disasters, and their combined effects on both natural and manmade habitats that will assist in creating long term prevention and mitigation plans.
- Utilize remote sensing data while conducting risk analysis and mapping.
- Adopt as a point of policy retrofitting of buildings and structures as a component of

disaster management and earmark funding for the purpose.

- Create a knowledge base by linking disaster research and education institutions to create a space for collaborative strategic thinking that can allow continuous revision of disaster prevention and mitigation plans.
- Initiate research that will collate local traditional disaster knowledge. This knowledge should be studied and examined alongside disaster information and scientific knowledge to create better prevention and mitigation plans.
- Record data about disaster events in a structured and systematic manner so that current measures and plans can be evaluated for effectiveness and amended as needed.
- Apply meteorological, climatological and hydrological knowledge in disaster management that will assist in the assessment of risk, land-use planning and the designing of structures that greatly contribute to disaster mitigation.
- Consider the cascading nature of disasters to create more effective prevention and mitigation strategies.
- Identify and strengthen existing centers of excellence to improve disaster prevention, reduction and mitigation capabilities.
- Create a culture of prevention by introducing measures for intensive training for building up human resources to improve disaster awareness and capabilities.
- Initiate public disaster awareness and training programs that cater to the need's vulnerable groups like women, children, elderly and disabled to build up society's resilience towards disasters.
- Community mobilization in disaster situations is extremely important. Panchayats and Urban Local Bodies should be involved in activities towards community level coordinated action, disaster mitigation education etc.

5.2 Hazard Specific Structural and non-structural Mitigation Measures

5.2.1 Earthquake

An earthquake is a violent and sudden shaking of the earth's crust due to collusion or breaking or moving away of tectonic plates at the top of which the whole of human civilization is perched. The joining of the tectonic plates is known as fault-lines and where the disturbances weaken the surface of the plate almost to the breaking point is known as sub-surface fault lines. The earthquake is caused by the release of energy through these fault lines and sub-surface fault lines. The intensity of this energy ranges from 0 to 10 and is measured on Richter scale.

The typical impact of the tremor known as earthquake varies from its intensity to intensity and the distance of the area from its epicentre. It ranges from shaking of structures to the changing of very landscape. Its typical impact is in the form of physical damage, destruction of infrastructure and loss of property. Physical damages may be in terms of damages or destruction of structures or damages or destruction by fire or floods due to dam failures caused by earthquake. Casualties will be due to damage or destruction of structures etc. It will be much higher in areas nearer to the epicentre and densely populated area with weak

buildings traditionally constructed with earth, rubble, bricks etc; urban settlements in poorly constructed apartments and in proximity of high rise buildings.

5.2.1.1 Prevention & Mitigation Measures

In case of earthquake as a hazard no prevention measures are there to be taken. However, mitigation measures for earthquake impact reduction are there to be taken. They consist of structural and non-structural measures.

Structural Measures: The prime structural mitigation measures that are expected to considerably reduce the impact of earthquake are:

- Conduct micro-zonation study and create seismic map in earthquake prone location.
- Identify the vulnerable structures
- 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 in old structures so that shortcomings in construction could be externally strengthened to a considerable extent to withstand the convulsions caused by earthquake.

5.2.1.2 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.

5.2.1.3 Mitigation Strategy

The desired implementation of mitigation measures requires a well thought 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.

- Training of A, B, C, D, E, F, G, H and M; Architects, Builders. Contractors, Designers, Engineers, Financers, Government functionaries and masons.
- Awareness generation among the house owners 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.

- Computer based information dissemination about the area-wise nature of soil, the kind of construction appropriate in the area, the certifications about the house/flat one is about to buy.
- The empanelment of specialist architects, trained engineers and masons by urban bodies and works departments for building earthquake resistant structures.
- The Certification of commercial buildings by Fire Dept and urban regulatory bodies both at the planning and completion stages.

But all these put together shall not be sufficient to make mitigation measures people-centred and motivating enough to observe norms. It can, however, be done through

- Awareness among the stakeholders about the need to build/rebuild earthquake resistant houses/structures and keeping safe neighbourhood.
- Capacity building of Architects/Engineers/Builders and even masons for construction of earthquake resistant houses/structures.
- Formulation of suitable building bye laws in urban areas and enforcement thereof.

5.2.2 Flood

Floods are temporary inundations of land with water caused by rains, overflowing of rivers, discharges released from large reservoirs, cyclones, tsunami, melting of glaciers and sea tides. It may come gradually and take hours and days together to recede or may even happen suddenly due to heavy rains, breach in embankments, failure of dams, cloud bursts, storm surge etc. Except for flash floods, there is usually a reasonable warning period.

In a land-locked district like- Pune, floods are caused by either overflowing of rivers due to excessive rains in its catchment or excessive discharge released from reservoirs. The floods cause either breach in embankments or excessive erosions. As chance would have it, out of the four causes & consequences of floods—excessive rains, excessive discharge, excessive erosion, siltation and breach in embankments—only two of them can control and manage. The rest of the two are beyond the control of the administration. The district can however control excessive erosion, siltation and breach in embankments.

Normally, floods are quantified and analysed on the basis of depth of water and duration for which floodwater stays. Velocity of water causes erosion of riverbanks and– or destroy and damage habitations and other structures. Rate of rising of water level and timing of floods viz-a-viz agricultural activities determine damages resulting from floods.

The damages caused by floods consist of the flooding of land leading to-

- Crop damage, collapsing of mud houses, old & dilapidated buildings, endangering human lives,
- Livestock and other public and private property.
- People, standing crop and livestock are liable to perish by drowning.
- Utilities such as sewerage, water supply, communication lines, road network and power supply get damaged, disrupted or destroyed; clean drinking water becomes

scarce.

- Food shortage is caused due to loss of harvest & spoiling of stored grains.
- The agriculture gets affected due to deposition of coarse sand layers over the ground or onset of salinity or water logging for considerably long period.

Overall, floods damage houses/ human settlements/crops/infrastructure, endanger human and cattle lives, fragment families, destroy wealth, jeopardize livelihood base and causes migration. It literally wipes out the socio-economic development achieved so far in the state and drives it to rewrite everything and begin from the beginning: response, relief, restoration, rehabilitation, reconstruction, and redevelopment are needed on a very large scale. All precious investment is reduced to almost zero. All precious efforts made before go largely waste.

5.2.2.1 Flood Mitigation Measures

The flood mitigation measures may again be structural or non-structural. Mapping of flood prone areas is a primary step involved in reducing the risk of the region. Historical records give the indication of flood inundation areas and the period of occurrence and the extent of the coverage. The basic map is combined with other maps and data to form a complete image of the flood plain. Warning can be issued looking into the earlier marked heights of the water levels in case of potential threat. In the coastal areas, the tide levels and land characteristics will determine areas liable to inundation. Flood hazard mapping will give the proper indication of water flow during floods.

The structural mitigation measures

- The revival and maintenance of traditional practices of dam, reservoir and ponds system for diverting and storing flood water and making use of the same for multipurpose activities including irrigation, restoration of water tables etc. For this, larger involvement of senior citizens from the local areas will be required who have better understanding and knowledge about the system.
- The conversion of rivulets and tributaries into reservoirs for storing flood water for a desired period and for later use. For this, major river-based GIS mapping would be required. Besides the bed of the rivulets and tributaries would have to be properly structured and meticulously maintained.
- Using base flow and flood flows of the perennial rivers to generate hydroelectricity by putting generating units of 5 MW, 10 MW or even 20 MW may be planned. This will help both better river management as well as water conservation for productive utilization. As it is, we take care of and maintain anything which is productively utilized. Thus, if we start generating power, the rivers will in the process get maintained and managed.
- Attempt to modify Dams and Reservoirs, Embankment, Drainage Improvements, Channel Improvements, Diversion of Flood Waters and Using Natural Detention Basin.
- Storing Flood Water in reservoirs may help in reducing flood intensity, but the sedimentation caused by the stored flood water may subsequently reduce the capacity of the reservoir. As such, smaller reservoirs are often better choice than larger ones.

For, then de-silting of small reservoir becomes possible and can be undertaken periodically by the beneficiaries themselves.

- Channel Alterations help in reducing the gushing of flood water and these should again be done with provisions for regular maintenance of the slopes in the channel, removing of debris and other obstructions, using natural vegetation for strengthening the sides of the channels and for using it as a source of promoting fisheries etc.
- Watershed Management measures reduce overland runoffs from agricultural lands to streams or other water bodies by improving infiltration of rainfall into the soil, minimizing run-off and reducing the sedimentation that can clog stream channel or storage reservoirs. The measures to avoid it include maintaining trees, shrubbery and vegetative cover, slope stabilization etc.

5.2.2.2 Non- Structural Measures:

- Attempts to modify susceptibility of Flood. Flood plain zoning: It aims to regulate the developments in the flood plains, so that it is compatible with 'Flood Risk'. It recognises the basic fact that the flood plains are essentially the domain of the river, and as such all developmental activities must be compatible with the flood risk involved.
- Flood forecasting: Involves observing and collecting hydrological and meteorological data, transmission and then processing the data with a view to work out the likely level to be achieved at a particular site, i.e. to give advance warning. Stay in touch with IMD and CWC. Establish infrastructure for flood warning and dissemination.

5.2.2.3 Measures to be adopted at District Level

Following measures should be taken at District level by the collector on whom the implementation of DDMP rests. Action plan of relevant line departments should be put into order.

- Convening a meeting of District Level Disaster Management Committee before the onset of monsoon in the month of April/early May.
- Arrangement for functioning of control room. Specific charge should be given at Taluka level to listen to weather bulletins from radio and television to monitor the warning relevant to the Taluka.
- A joint inspection team at Taluka level will inspect river embankments in the month of March and April. A summary report will be sent to the Sub-Division and District accordingly.
- When monsoon breaks, District will send the daily/ weekly report regularly from the report received from village and gram panchayat levels and to the Sub-Divisional Officer. Dissemination of weather report and flood bulletins to lower level.
- Installation of temporary police wireless stations and temporary telephones in flood prone areas. Identification of the owners of country mechanised boats with address and contact numbers.

5.2.3 Drought

Drought is a creeping disaster. Its onset is difficult to demarcate and so also its end. Delay in the arrival of monsoon, failure of monsoon, irregular and scanty rainfall during kharif, falling

of groundwater level, drying of wells and reservoirs and deficit in paddy plantation indicate the onset of drought. Its spatial extent like that of floods denotes its severity.

The fall in groundwater level, less food production, availability of less fodder for animals, migration of labourers, water crisis determines its long-term impact. Its impacts like those of floods are cumulative and its continuance over a period or season magnifies the impact manifold.

Drought unlike other hazards does not cause any structural damages. The typical effects include loss of crop, livestock, timber, fishery production, food shortage, dehydration, loss of life, increased poverty etc. In fact, the impacts of drought are generally categorized as economic, environmental and social.

- Economic impacts denote loss of production in farm sector and also in nonfarm sectors like- forestry, fisheries, poultry, livestock because they depend upon surface and sub-surface water supplies. These losses result in loss of income and purchasing power among those rural people who depend on these for their livelihood. The processing industries based on agro- products suffer losses due to reduced supply of agro-products or supply at enormously increased prices. And losses both in primary and secondary sector result in unemployment, loss in revenue etc.
- Environmental impacts are seen in the depletion of flora and fauna due to reduced availability of water both for feeding and drinking the wildlife habitats with the loss of forest cover, migration of wildlife and their increased mortality due to preying by starving population. Continuance of drought for a longer period may result in the loss of biodiversity as well.
- Social impact is seen in the large-scale migration of the population from the drought affected areas to areas less affected, thereby causing dissensions. Children prefer doing some wage earning rather than going to school. People start selling their possessions to manage two times meal for the family. The social status and dignity get compromised. Inadequacy of food supply causes starvation. Inadequacy of water supply generates social conflict. Thus, the social capital and moral economy, the woof and warp of social fabric, is tattered and reduced to pieces.

5.2.3.1 Drought Mitigation Measures

Water Management: In the land of flooding rivers, if drought is a recurring feature, then surely, it is a clear-cut case of poor water management.

- Keeping in view the drainage and irrigation as interdependent to maintain the quality of soil, following water conservation related measures are required to be taken in drought prone areas.
- Maximising efficient use of available surface and groundwater in drought prone areas i.e. to resort to drip and sprinkler practices wherever possible, particularly for commercial crops including fruit orchards,
- Construction of underground reservoirs to escape the impact of evaporation.
- Conservation of floodwater in the branches of mainstreams and the network of rivulets.
- Creation of Anicuts or check dams to hold water in the riverbeds and make it flow through the canals for irrigation purposes.

- Revival of dam, reservoir and pond systems of the past and maintain the same.
- Digging of recharge wells and water harvesting structures to conserve water through rainwater harvesting and by developing the culture of roof water harvesting in each household.
- Spring water harvesting by diverting hill streams through small, excavated channels, called KULS for irrigation and domestic use.

Soil Management: The other factor responsible for drought conditions in Bihar is the nature of soil for which the first and foremost measures to be taken are:

- The use of organic fertilizers which not only enriches the soil with minerals but also slowly but surely enhances its water holding capacity. Besides, the use of organic fertilizer gets better values of the products in the market, specifically in the developed countries.
- Afforestation which helps in both water and soil conservation. Such plants that have shorter growing period should be preferred. It helps the soils in enhancing its capacity to hold water and prevents erosion. It is also said to be the best method to contain the spread of drought.
- Crop Management: The third factor responsible for agricultural drought is kind of cropping being done. There are cropping patterns that help in soil conservation as well as in getting better farm yield. They are:
- Strip cultivation: Consist of cultivation of different crops in different strips simultaneously.
- Cover Cropping: In plantation fields where gestation period of trees is long., creeper crops are planted which spread fast and provide cover to the topsoil and thereby conserve it.
- Crop rotation: Instead of grooming the same crop in the same field every year which tends to exhaust the same kind of mineral in the soil, as well as the moisture content in the soil. By rotating different types of crops soil fertility and moisture contents both are preserved.
- Alternate cropping: In deficit and/or irregular rainfall situations, alternate crops requiring less irrigation like bajra, need to be sown.

Introduction of modified Crop insurance: Disaster management is an integral part of agriculture, and a well-functioning insurance scheme is the only answer. Response to disasters through NCCF and CRF has failed to adequately address to the problem of agrarian distress due to vagaries of nature. National Agriculture Insurance Scheme (NAIS) even in the modified version fails to address this issue - indemnity levels are low, threshold levels are unrealistic, premium rates are high even after subsidy, crop compensation is unsatisfactory.

- To mitigate the drought and market risks, a farmer friendly crop insurance scheme through private insurance companies would be introduced for all major crops where the development cost of insurance product would be shared by the State Government. Scheme being an area insurance scheme amounts to a car insurance scheme when the owner would get compensation only when certain number of cars also meet accident before the owner gets the compensation.

5.2.3.2 Non- Structural Measure

Along with the structural measures, non-structural measures are necessary to implement. Sometimes implementation of structural measures are not possible due to funding issues on that scenario, a strong ground for non- structural measures can prevent the drought scenario on greater extent. The different kinds of measures that can be adopted by the states are:

- Working towards convergence of lessons learnt from studies carried out by multiple institutions working in related fields such as Central Research Institute for Dry land Agriculture (CRIDA), Agriculture Institute, India Meteorological Department (IMD), National Remote Sensing Centre (NRSC) and Indian Council for Agricultural Research (ICAR), etc.
- Impact of drought on agricultural economy should be assessed in terms of indicators like area sown, input use, livestock, crop yield, farm and overall income, employment and migration of families.
- Impact of drought on the poor in urban areas should also be assessed.
- Great stress should be laid on preventing deterioration in quality of life during drought.
- Drought mitigation measures should be strengthened with the help of the on- going communication revolution. Remote sensing techniques should be used extensively for drought assessment and mitigation. Satellite data may be used to target potential ground water sites for taking up well digging programmes.
- There should be adequate accountability of drought management authorities at all concerned levels of administration. There should be proper monitoring, assessment and evaluation of actors taken by the authorities.
- Agricultural extension agencies should be effectively involved in drought mitigation efforts; these agencies should remain very alert during the period of drought and should be strengthened in drought prone areas.
- Timely and adequate supply of inputs like drought resistant seeds by the concerned authorities should receive emphasis.
- There should be Water Availability and Outlook Committee and Impact Assessment Committee at local levels.
- Capacity Building program for different group of people at different level, like- arrange demos on drip and sprinkle irrigation and water harvesting for farmers at drought prone areas.
- Encourage farmers to adopt crop pattern development programs.
- Arrange awareness program regarding drought at different level.

5.2.4 Landslide

Landslides impact the Earth's natural environment, including effects on (1) the morphology of the Earth's sub-aerial and submarine surfaces; (2) forests and grasslands, and (3) habitats of native flora and fauna. Morphologic effects are part of a general tendency of surface degradation by mass wasting and erosion. The effects of landslides on vegetation and wildlife are mostly negative; in some cases, they are catastrophic. However, landslide-caused disasters

to flora and fauna are generally local in nature, which allows for species recovery with time. In the long term, landslides may even have positive effects on the habitats of flora and fauna.

Major earthquakes also have triggered multiple historic landslides over large areas. These often consist of thousands of individual landslides that in total have significant effects on the Earth's surface.

5.2.4.1 Prevention and Mitigation Measures of Landslide

Protection of life and properties from landslide disaster is indispensable in creating a safe environment for the society. The national imperative towards safety due to landslide initiation is increasing in view of the higher rate of human settlement in the mountain slope on many parts of the district. Landslides are significant amongst those hazards that can easily be disastrous to human life and property. It is estimated that economic loss due to landslides may reach between 1-2% of the gross national product in many developing countries. Evaluating and mitigating the landslide hazard and risk is a major challenge for the technocrats and decision makers in the developing world as 80% of the reported fatalities due to landslide is within the developing countries.

5.2.4.2 Structural Measures

Risk treatment of already distressed slopes includes the four broad types of landslide remediation practices for slope stabilization, namely: control works, restraint works, slope protection works and mass improvement techniques. Mitigation measures for landslide dams have been given special attention as a large portion of the hazard prone area in the district is susceptible to the formation of such dams with disastrous possibilities.

- Treating vulnerable slopes and existing hazardous landslides.
- Restricting development in landslide-prone areas.
- Preparing codes for excavation, construction and grading.
- Protecting existing developments.
- Monitoring and warning systems.
- Putting in place arrangements for landslide insurance and compensation for losses.
- Creation of landslide inventory.
- Selecting scales for mapping depending upon end-user requirements.
- Selecting landslide hazard zonation methodologies for different scales.
- Multi-hazard integration especially integrating seismic hazard.
- Prioritization of areas for landslide hazard zonation mapping.
- Landslide risk zonation.

Geological and geotechnical investigations of landslide risk assessment involve a multidisciplinary approach where engineering geologists and geotechnical engineers are an integral part of the investigating team. The investigations include preliminary stage geological investigations, detailed geological investigations and geotechnical investigations. As an aid to the development of a systematic method and development of standard codes, and

planning and capacity building for geological and geotechnical investigations, a few major disastrous landslides will be identified for creating pace setter examples of detailed investigations. These pace setting investigations will be carried out by assigning tasks to the identified organizations having the necessary expertise and experience.

Depending on the risk assessment, different kind of structural measures can be taken, like:

- Drainage Measures- Design Surface and sub-surface drainage measures.
- Designing of check dam, canal, spill dam, culvert, diversion etc.
- Retaining structures- Type of retaining wall such as RE wall, Gabions wall, Concrete clad wall etc. with relevant and effective design.
- Slope Reinforcement- Soil nailing, geo grid reinforcement, rock anchoring, rock bolting, cable anchoring etc.
- Use of Geo Synthetic materials like- Geo bags, Geo tubes, Geo net, geo grid, Geo Synthetic clay liner etc.

Biotechnical slope protection consists of two elements: biotechnical stabilization and soil bioengineering stabilization, both of which entail the use of live materials – specifically vegetation. Biotechnical stabilization utilizes mechanical elements (structures) in combination with biological elements (plants) to prevent and arrest slope failures and erosion. Both mechanical and biological elements must function together in a complementary manner. Soil bioengineering stabilization, on the other hand, can be regarded as a specialized subset of biotechnical stabilization in which live plant parts, i.e., roots, stems and branches, serve as the main structural/mechanical elements in the slope protection system.

5.2.4.3 Non-Structural Measures

Taking care towards non-structural measures are also important aspect for preventing the landslide risk.

- Landslide hazard, vulnerability, and risk assessment.
- Multi-hazard conceptualization.
- Landslide remediation practice.
- Research and development; monitoring and early warning.
- Knowledge network and management.
- Capacity building and training.
- Public awareness and education.
- Emergency preparedness and response.
- Regulation and enforcement.

The issues related to awareness and preparedness is considered as crucial in both the pre and post-disaster management processes. Mechanisms will be initiated for creating awareness among various stakeholders including government officials, local communities and non-governmental organizations on a sustained basis in landslide affected regions so that all the

stakeholders are empowered by information and knowledge and mentally prepared to face the hazard.

Capacity building is an important component of the disaster management process and is a field which needs attention. The requirement and importance of introducing appropriate capacity development interventions including capacity upgradation of institutions and organizations, education and training of stakeholders and responders, and proper documentation is included in the Guidelines.

5.2.5 Fire

Fires are the accidents which occur most frequently. It has whose diverse causes that require a range of intervention methods and techniques adapted to the conditions and needs of each incident. The fire risk can arise either from industrial processes, accidents in storage godowns or closely built timber framed buildings

Depending on the type of fire (nature of the material ablaze), meteorological conditions (wind) and the effectiveness of the intervention, material damage can be limited to a small area, or affect wide areas like forests or agricultural fires, hydrocarbons, gas or other highly flammable products, storage or piping installations, and rail or marine transport equipment. Fires are an important disaster to focus on as they can arise in response to other disasters like earthquakes or landslides. As fire disasters can be primary or secondary focus has to be on ensuring that fire services are able to respond despite disturbances caused by another disaster that has just occurred.

As a part of mitigation strategy, efforts should be made to

- Make firefighting services available to rural areas outside the local municipal limits.
- Assist municipal authorities that don't have fire brigades to establish such a service.
- Encourage agricultural marketing committees and cooperatives in rural areas to establish their fire services.
- Evolve methods of coordination between municipal fire services and industrial safety departments.
- Undertake community education and preparedness for fire fighting in areas where fire services will not easily available.
- In industrial towns, fire services should be equipped with protective clothing and firefighting devices including masks, gloves etc. for dealing with chemicals and toxic materials.
- Special burns wards should be established in every civil hospital and in the hospitals near the industrial estates.
- Equipping fire services with communication facilities like wireless etc. and wherever such facilities exist, these should be upgraded.
- Computerized data management system should be introduced to keep the record of all fires including frequency, extent, fatality, economic losses etc.
- The roles and responsibilities of district administration, police, fire services and medical services should be clearly laid down.

5.2.6 Epidemics

An epidemic is the rapid spread of infectious disease to a large number of people in a given population within a short period of time, usually two weeks or less. An epidemic can be the consequence of other disasters like storms, floods, droughts etc. Strengthening surveillance programmes and warning systems go a long way in controlling epidemics.

Steps towards mitigating the risks from epidemic include the following –

- Identification of areas endemic to certain epidemics must be routinely updated to access field requirements
- Identification of appropriate locations for testing laboratories
- Ensuring continuous flow of field data from both government establishments and private medical personnel.
- Collating and analysing the data at regular intervals to assess epidemiological monitoring requirements.
- Creating awareness among the general population to encourage preventive measures that can help in controlling epidemics.
- Quality monitoring of piped drinking water supply and water.
- Vector Control programmes as a part of overall community sanitation activities which include surveillance of water bodies and canal distribution network for control of diseases like malaria.
- Promotion of personal and community latrines
- Introduction of sewage, drainage and solid waste management systems
- Promoting and strengthening community hospitals with adequate network of paraprofessionals to improve the capacity of the Public Health Department (PHD) for surveillance and control of epidemics.
- Establishing testing laboratories at appropriate locations in different divisions within the districts to reduce the time taken for diagnosis and subsequent warning.

5.2.7 Special reference to Pandemic (Covid-19)

A new virus called the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as the cause of a disease outbreak that began in China in 2019. The disease is called coronavirus disease 2019 (COVID-19).

In March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. Public health groups, including the U.S. Centres for Disease Control and Prevention (CDC) and WHO, are monitoring the pandemic and posting updates on their websites. These groups have also issued recommendations for preventing the spread of the virus.

Health Department, Zilha Parishad, Pune

IDSP Cell- Corona Outbreak Summary Report Pune District Total

Date :- 17 June, 2021 8:00 PM

Pune District COVID-19 Dashboard

Area as per residence	COVID-19 Positive Cases **		Total Positive Recovered & Discharged		Active Cases		Deaths**		Sample Tested	
	Daily	Progressive	Daily	Progressive	Hospital Isolation	Home Isolation	Today	Progressive	Today	Progressive
PMC	257	475097	284	463885	1247	1456	8	8509	5817	2598737
PCMC	212	254738	202	249217	1061	221	4	4239	4005	1397846
Councils (NP)	90	56588	257	54748	404	458	2	978	1078	229743
Cantonment	13	15466	27	14987	73	47	1	359	236	43101
Rural	517	234446	505	225531	3795	1686	5	3434	7712	1075110
Pune District	**1089**	**1036335**	**1275**	**1008368**	**6580**	**3868**	**20**	**17519**	**18848**	**5344537**
Rural+NP	607	291034	762	280279	4199	2144	7	4412	8790	1304853
Rural+NP+ Cant	620	306500	789	295266	4272	2191	8	4771	9026	1347954

Note- * Total Positive recovered includes Hospital and Home isolation recoveries.

*** Out of District Deaths 742*

BED MANAGEMENT HELP LINE NO-
PMC- 02025502106/07/08/09/010
PCMC- 02067331151/52
RURAL- 02026138082/18002334130

Dr. Bhagawan Pawar
District Health Officer
Zilha Parishad, Pune

The best way to prevent illness is to avoid being exposed to the virus. The CDC and WHO recommend following these precautions:

- Keep 6 feet (2 meters) of distance between yourself and people outside your household.
- Wash your hands often with soap and water for at least 20 seconds or use an alcohol-based hand sanitizer that contains at least 60% alcohol.
- Cover your mouth and nose with your elbow or a tissue when you cough or sneeze. Throw away the used tissue.
- Avoid touching your eyes, nose and mouth.
- Clean and disinfect surfaces you often touch daily.

If you have a chronic medical condition and may have a higher risk of serious illness, check with your doctor about other ways to protect yourself.

Role of district administration in Pandemic –

- As health of the people is one of the prime responsibilities of district administration, district disaster management authority (DDMA) should take immediate action to control the pandemic under the guidelines of the health department.
- The incident response system to be activated with Head of Health department as deputy to Incident commander.
- DDMA to initiate control rooms at Health dept and other line department collector office.
- After initial information regarding the spread of epidemic, the areas where spread is maximum should be taken into consideration and then the action plan (Response) for controlling of epidemic should be worked out with on consultation Health dept., the assistance of other line departments, NGOs and other agencies (such as private Hospitals, suppliers) should also be included in response plan.
- The detailed inventory of resources is to be prepared according to type and spread of

pandemic.

- Adequate preventive equipment (foggers, spreading pumps, pesticides, dusting powder, testing kits, masks, PPE kits, Human recourses are to be made available.

5.2.8 Industrial and Chemical Accidents

- Industrial and chemical accidents refer to incidents originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.
- Major accidents involving chemical substances have local effects, but in some circumstances, they can affect whole regions because of factors like the weather conditions during the time of the accident. Prevention of such incidents must be the priority, but a positive result can only be assured if there are strict guidelines for using and handling of dangerous chemicals.
- When an accident involving chemical substances that could endanger life or the environment occurs in a chemical works or installation, those in charge of it should implement the safety measures which will minimise its consequences.
- They should immediately inform the relevant local authorities of the accident who will be responsible for informing the public and deciding upon the instructions to be followed by them.
- The co-ordinated use of the civil and military means required to deal with the disaster should be ensured.
- All industrial concentrations should be encouraged to establish MARG for management of industrial accidents.
- Industries involved in the production or transportation of inflammable, hazardous and toxic materials should have a mandatory responsibility for preparing an off-site plan and communicating the same to the District Collector. Simulation exercises should be undertaken in the adjoining communities.
- Poison centres should be established in every civil hospital and in the hospitals near the industrial estates with facilities for detoxification.
- All transport of hazardous and toxic materials should be communicated to the RTO.
- All pipelines carrying hazardous and toxic materials should be equipped with devices to check any leakage or metal fatigue.
- Small-scale industries releasing toxic wastewater should be encouraged to set up common effluent treatment facility.
- A common format for chemical data sheets should be devised which should be used to collect information from all industries in the district and the same should be available with fire brigade and police.

Mitigation Measures/ Activities and Responsibility of line departments at various stages of Disaster Cycle of Various Hazards

5.2.9 Flood

Task	Activities	Responsibility
Development of techno- legal regime/ regulations	• Prohibition of development in wetlands, flood zone and low-lying areas • Encourage for flood proofing structures in flood prone areas • Build new water and sewage systems and utility lines • Prescribing standards for different flood prone zones on flood plains • Enactment and enforcement of laws regulating development activities in flood plain • Specific building by-laws for flood plains	• Revenue Dept. • Irrigation Dept. • UD Dept. Panchayat and Rural Housing • Local Governments • PWD

5.2.9.1 Safe dwelling in flood hazard areas

Task	Activities	Responsibility
Arrangement of safe dwelling in flood hazard areas	• Development of flood hazard map • Study of history on floods occurred and estimated loss and damage • Asses the vulnerability of risk elements • Build houses in safer zones	• Revenue Dept. • Irrigation Dept. • UD Dept. Panchayat and Rural housing • Local Governments • PWD

5.2.9.2 Development and Redevelopment Policies

Task	Activities	Responsibility
Development and redevelopment of flood preventive policies	• Develop long term flood policies to protect natural resources, property and lives. • Legislative and regulatory requirements	• Revenue Dept. • Irrigation Dept. • UD Dept. • Panchayat & Rural Housing • Local Governments • PWD

5.2.9.3 Modifying floods

Task	Activities	Responsibility
Modifying flood by construction works	• Construction of dams and reservoirs, dikes, levees, and	• Revenue Dept.

	floodwalls, channel alterations, high flow diversions, storm water management, coastline protection works and watershed management. • Development of catchment area of the flood plain • Forestation and vegetation • Land sloping and small check dam construction	• Irrigation Dept. • UD Dept. Panchayat & Rural Housing • Local Governments • PWD

5.2.9.4 Flood Forecasting and Warning System

Task	Activities	Responsibility
Updating of flood forecasting and warning system	• Strengthening and up gradation of existing flood forecasting system • Stay in touch with IMD and CWC • Establish infrastructure for flood warning and dissemination • Ensure proper communication between district authority and SEOC.	• DDMA Authority • Irrigation Dept. • CWC • IMD

5.2.9.5 Non-structural Measures

Task	Activities	Responsibility
Capacity Building	• Prepare departmental flood contingency plan • Establish rain gauge recording station with trained manpower in the state • Train the flood rescue teams and ensure they have functional rescue materials.	• Revenue Dept. • DDMA Authority • Irrigation Dept. • Line Dept.
	• Conduct demos/ mock drills in flood prone areas time to time and ensure that rescue teams are properly trained and equipped • Organize trainings for various stakeholders involved in flood mitigation and management	

	• Organize mock drills on flood rescue	
Awareness Generation	• Undertake public awareness activities in flood affected areas and let people know what to do and what not to do after, before and during flood. • Design and develop the IEC materials in local language and ensure their storage and distribution among people. • Motivate all families in flood prone areas to prepare the family kit of emergency materials	• Revenue Dept. • DDMA Authority • Irrigation Dept. • Information Dept. • Line Dept.

5.2.10 Earthquake

5.2.10.1 Structural measures Zoning and Building codes

Task	Activities	Responsibility
Zoning and Building codes	• Conduct micro- zonation study and prepare seismic map in earthquake prone locations • Identify the Vulnerable structures • Adapt building code and suggestions given by micro zonation study and do construction works accordingly	• Revenue Dept. • DDMA • UD Dept. • PWD Dept. • Gram Panchayat • Local Urban Bodies • Housing Dept.

5.2.10.2 Development of safe siting and Earthquake Resistant Structure

Task	Activities	Responsibility
Safe sitting in earthquake areas.	• Select rock or stiff soil for building construction • Avoid constructing the capital-intensive infrastructure, hazardous facilities and important buildings in Seismic fault areas	• Revenue Dept. • UD Dept. • PWD Dept.
Develop earthquake resistant structures	• Adopt earthquake resistant structure in all construction works • Incorporate the earthquake	• Gram Panchayats • Local Urban Bodies • Housing Dept.

	resistant design in all houses build by government departments and private agencies	

5.2.10.3 Retrofitting of weak structures

Task	Activities	Responsibility
Retrofitting the weak structures	• Develop a database of existing private and govt. building in the state • Identify the buildings need retrofitting • Prepare a project/scheme for retrofitting	• Revenue Dept. • UD Dept. • PWD Dept. • Gram Panchayats • Local Urban bodies • Housing Dept.
Avoid use of very weak/ risk structures	• Identify the very weak/ old structures • Put notice not to use and vacate	

5.2.10.4 Instrumentation for monitoring of seismic activity

Task	Activities	Responsibility
Regular monitoring of seismic activities	• Set up seismic recording stations in seismic prone areas with modern equipment's • Ensure regular study and research work in this field by technical groups • Ensure dissemination of data and information to all concerned	• Science and technology Dept. • Local urban bodies

5.2.10.5 Non-structural measures

Task	Activities	Responsibility
Capacity Building	• Strengthening of Techno- legal regime • Organize trainings on earthquake resistant structures for engineers, architects, masons and other working in construction industry. • Prepare departmental earthquake contingency plan, action plan and SOP • Carry out structural safety audit of all critical Infrastructures and key resources • Motivate disaster insurance of buildings • Improvement of emergency response	• Education & technical Education Dept. • Revenue Dept. • DDMA • Line Dept.
Awareness Activities	• Organize school programs, public awareness campaigns on earthquake safety.	• Information Dept.

	• Organize Drop. Cover Hold demo in Schools • Develop IEC Materials and distribute	• DDMA

5.2.11 Drought

5.2.11.1 Structural Measures

Task	Activities	Responsibility
Water management construction works	• Construction/ repair/ strengthening of dams, reservoirs, lift irrigation, water sheds, tube wells and canals for surface irrigation • Construction/ repair/strengthening of percolation tanks, farm ponds, check dams etc. • Construction/ repair/ strengthening of warehouses and cold storages for preservation/ storage of food grains	• Revenue Dept. • Irrigation Dept. • Agriculture Dept.
Soil management	• Use of organic fertilizer to enhance water holding capacity of soil • Prefer shorter growing period plants	• Agriculture Dept.
Crop management	• Adaptation of strip cultivation of different crops • Adaptation of Cover cropping to moisture the soil for long period • Do crop rotation for soil fertility and moisture contents	• Agriculture Dept.
Adaptation of new technology	• Application of advanced agro- science technology and agro engineering inputs to improve agriculture production • Adaptation of new technology for water harvesting and watering crops • Undertake programs to motivate farmers to change crop patterns, and follow alternative livelihood sources	• Revenue Dept. • Agriculture Dept.
Techno-legal regime	• Enactment and enforcement of laws regulating ground water level and exploitation of natural resources • Do insurance for all crops	• Revenue Dept. • Agriculture Dept.
Forecasting and warning	• Strengthening the existing drought forecasting system	• Revenue Dept.

	• Establish infrastructure for drought warning and dissemination	• DDMA • Irrigation Dept. • IMD

5.2.11.2 Non-Structural measures

Task	Activities	Responsibility
Capacity building	• Develop departmental drought contingency plan, action plan and SOP • Provide training on drought mitigation and management to all stakeholders • Arrange demos on drip and sprinkle irrigation and water harvesting for farmers • Encourage farmers to adapt crop pattern developed for drought prone areas • Rational use of fertilizers and pesticides • Motivate farmers to adapt the technique for preservation of green folder	• Revenue Dept. • Irrigation Dept. • Agriculture Dept. • Forest and Environmental Dept. • Rural Development • All Line Dept.
Awareness	• Aware general public on drought consequence and provide tips on water conservation, drought resistant crops, new technology, off-farming activities and alternative livelihood sources • Aware farmers about government schemes and insurance Policies for crops, animal husbandry, fishery, horticulture etc.	• DDMA • Revenue Dept. • Irrigation Dept. • Agriculture Dept. • Information Dept. • All line Dept.

5.2.12 Fire

5.2.12.1 Structural Measures

Task	Activities	Responsibility
Develop fire infrastructure and other fire	• Extend coverage of fire and emergency services to rural areas • Involve the new stakeholders	• Fire and emergency services dept.

facilities	• Strengthen coordination between municipalities and industrial safety department • Equip fire stations with modern fire engines and other equipment's • Provide fireproof devices to fire fighters • Insurance coverage for fire staff • Make provision for special fire burn ward in the hospital • Ensure that all fire stations are connected to effective communication system	• Industrial safety department • Urban local bodies • Health Dept.

5.2.12.2 Non-structural measures

Task	Activities	Responsibility
Capacity Building	• Impart fire management training to fire staff and strengthen their working skill. • Organize regular demo for fire brigade to familiar them with fire equipment's • Conduct mock drills to check up the departmental preparedness	• Urban Development Disaster Management Unit
Awareness Generation	• Organize awareness programs on fire safety in Schools, Colleges and offices. • Disseminate fire safety tips among public through print and electronic media • Develop IEC materials on dos and don'ts for public distribution	• DDMA

5.2.13 Industrial and Chemical Accidents

5.2.13.1 Structural measures

Task	Activities	Responsibility
Industrial safety measures	• Set up Emergency response Centre (ERC) • Strengthen Mutual Aid Response Group (MARG) • Form and strengthen the crisis Groups at District and local levels. • Industries not to be allowed in Hazard prone areas	• Industrial Dept. • MIDC • District Authorities • Local Authorities

	• Develop on-site and off-site plans • Set up toxic water treatment facility • Set up leakage checkup devices • Purchase, store and keep functional all necessary industrial safety equipment's. • Make Provision for poison ward in Civil hospital	
Techno – legal regime	• Implement the Acts and Rules related to industrial safety firmly. • Ensure structural safety inspection/ audit inspection/audit by competent authority.	• Industry Dept. • MIDC • Local Authority
Strengthening EOC and warning systems	• Establish/ strengthen EOCs at all levels • Set up on site and off – site warning dissemination system	• Nodal Authority • MIDC • Dist. Collector • Municipal Commissioner

5.2.13.2 Non-Structural Measures

Task	Activities	Responsibility
Emergency Planning	• Prepare/ update emergency onsite and offsite plan • Regular monitoring of safety activities in all the factories/ industries	• Nodal Authority: • MIDC • Dist. Collector • Municipal Commissioner
Organize Capacity Building	• Organize industrial safety trainings for officers and staff working in the factories • Set up an on –site and off –site monitoring team to check up all safety measures • Conduct mock drills in regular interval • Encourage disaster insurance	• Nodal Authority: • MIDC • Dist. Collector • Municipal Commissioner
Awareness Activities	• Organize community awareness programs for the communities residing near the factories and let people know what to do what not to do in case of industrial disaster • Develop IEC materials on local language and distribute them in schools	• Nodal Authority: • MIDC • Dist. Collector • Municipal Commissioner • DDMA

	and local communities • Organize School level awareness activities and ensure students participation in large number	

5.2.14 Epidemics

5.2.14.1 Structural Measures

Task	Activities	Responsibility
Surveillance and warning	• Identify the epidemic prone areas • Establish mechanism for regular monitoring of such locations • Set up testing laboratories with trained manpower if required • Collect data and disseminate to concerned authorities	• Public health Dept. • Local Govt. Bodies • Municipal Authorities
Preventive and promotive Measures	• Ensure clean drinking water, personal toilets, and proper sanitation facilities in epidemic prone areas • Ensure safe drainage and proper waste management system	• Public health Dept. • Local Govt. Bodies • Municipal Authorities
Strengthening Institutional infrastructure	• Organize Capacity building trainings for health staff • Establish testing labs with modern equipment and trained manpower	• Public Health Dept. • Local Govt. Bodies • Municipal Authorities

5.2.14.2 Non-structural Measures

Task	Activities	Responsibility
Capacity Building activities	• Identify the primary stakeholders of current epidemic • Organize epidemic management trainings for all stake holders • Provide necessary safety devices to health staff who manage and work in epidemic areas	• Health Dept.
Awareness Programme	• Organize public campaigns to aware them on what to do and what not to do to control the epidemic • Use both electronic and print media to disseminate the safety measures and the actions government taken to check the epidemic	• Health Dept.

5.2.15 Road Accidents

5.2.15.1 Structural Measures

Task	Activities	Responsibility
Strengthening Intuitional capability	• Make provisions for special enforcement wing • Set up traffic posts and trauma care centers on Highways • Set up hotline and speed monitoring technology • Keep equipment for removal of accident Vehicles • Fix a lead agency for monitoring • Make provision of special route for hazardous Vehicles	• Transport Dept.
Strengthening Road Infrastructure	• Avoid parking at any point on National and state highways • Make special provision for parking with food, water, fuel and other facilities • Show excavation locations with barricades • Put road dividers, speed breakers, information sign boards and men at railway crossings • Keep machines for removal of debris in emergency	• Transport Dept.
Improving Regulations	• Insurance regulation • Strictly use protective materials by two-wheeler drivers • Special rules for school buses • Training for drivers carrying hazardous materials • Use blinking lights for Stationary Vehicles	• Transport Dept.

5.2.15.2 Non – Structural Measures

Task	Activities	Responsibility
Capacity Building	• Organize capacity building training to all stakeholders involved in road transport,	•

	and traffic management. • Strengthen the management skill of traffic police and RTO staff organizing mock drills in regular interval	
Awareness Generation	• Create Public awareness on road safety, traffic rule, and noise pollution control. • Disseminate the transport rules and regulation among public and the consequences of its violation	• Transport Dept. • Local Governments

5.2.16 Land slides

5.2.16.1 Structural measures

Task	Activities	Responsibility
Preventive and protective measures	• Treating Vulnerable slopes and existing hazardous landslides • Restricting development in landslide – prone areas • Preparing codes for excavation, construction and grading • Protecting existing developments • Monitoring and warning systems • Putting in place arrangements for landslides insurance and compensation for losses. • Creation of landslide Inventory • Selecting landslide hazard zonation methodologies for different scales • Multi- hazard integration especially integrating seismic hazard • Prioritization of areas for land slide hazard zonation mapping • Landslide risk Zonation	• PWD • Revenue • IMD • Police • GSI

5.2.16.2 Non- structural measures

Task	Activities	Responsibility
Capacity building	• Land slide remediation practice • Research and development; monitoring and	• Revenue Dept. • DDMA

	early warning. • Knowledge network and management • Public awareness and education • Emergency preparedness and response • Regulation and enforcement	• Police

5.2.16.3 Mitigation Activities

1. Taking into consideration the danger of leopard attacks during preceding five years in the region under Junnar forest area of the district, the area in question has been declared as 'leopard prone area'.
2. Issued Guidelines for restricting Tourist Activities in Proximity to Hazard-Prone Dams and Waterfalls.

5.3 Summary of Mitigation measures:

Task	Activity	Authority for implementation	Cost (in lakhs)	Funding source
1	2	3	4	5
Flood Mitigation Projects (24 Projects)	Construction of retaining wall, gutter and sewerage etc	Public works Department, Pune	63,14,77,104	NDMF/SDMF
Landslide Mitigation Projects (47 Projects)	Construction of retaining wall, land work etc	Public works Department, Pune	1,66,69,23,936	NDMF/SDMF

Table 14 Flood Mitigation Projects in Pune District

Description	Taluka	Budget (INR)
Construction of RCC drainage system under disaster mitigation from Dongar Paytha to Rama 133	Khanapur	50,00,000
Construction of flood protection wall along the Karha River	Baramati	50,000,000
Construction of flood protection wall along the Karha River	Baramati	50,000,000
Construction of flood protection wall along the Karha River	Baramati	50,000,000
Construction of flood protection wall along the Lendi Nala	Baramati	20,000,000
Construction of flood protection wall along the Deshmukh Stream	Baramati	30,000,000
Construction of flood protection wall near the crematorium road along the Shivganga River	Bhor	3,000,000
Construction of flood protection wall from Ganpati Temple	Bhor	3,000,000

to crematorium resting place		
Construction of flood protection wall near ZP School	Bhor	1,500,000
Construction of CD work and RCC pipe near ZP School	Bhor	1,500,000
Construction of flood protection wall near the crematorium	Bhor	1,500,000
Construction of flood protection wall along the Ghod River	Ambegaon	88,407,789
Construction of flood protection wall along the Ghod River	Ambegaon	69,930,259
Construction of drainage system from km 6/400 to 7/350 (Avasari Bu. village section)	Avasari Bu	2,35,13,885
Construction of drainage system from km 17/600 to 17/900 (Pargaon section)	Pargaon Tarf Avasari Bu	1,19,15,151
Construction of flood protection wall along the Nira River	Indapur	49,922,156
Safety measures for rockfall hazard from Bhamchandra Hill	Chakan	3,08,64,205
Construction of closed drainage line	Chakan	98,91,774
Construction of closed drainage line	Ambethan	1,49,01,885
Construction of flood protection wall and embankment	Hatviz	1,51,24,000
Construction of flood protection wall and embankment	Bhivade Kh.	2,69,55,000
Construction of flood protection wall and embankment	Ghangaldare	3,75,45,000
Construction of flood protection wall and embankment	Bhivade Bu.	3,20,06,000
Construction of flood protection wall along the major stream to Bhimnagar	Khanapur	50,00,000

Table 15 Landslide Mitigation Project in Pune District

Description	Taluka	Budget (INR)
Preventive measures in landslide-prone areas	Ambegaon	4,867,565
Preventive measures in landslide-prone areas	Ambegaon	49,122,425
Preventive measures in landslide-prone areas	Ambegaon	44,444,000
Preventive measures in landslide-prone areas	Ambegaon	39,450,000
Preventive measures in landslide-prone areas	Ambegaon	3,521,000
Preventive measures in landslide-prone areas	Ambegaon	8,648,000
Preventive measures in landslide-prone areas	Ambegaon	6,856,000
Preventive measures in landslide-prone areas	Ambegaon	12,800,500
Preventive measures in landslide-prone areas	Ambegaon	10,852,000
Preventive measures in landslide-prone areas	Ambegaon	1,195,965
Retaining wall	Ambegaon	118,408,000

Retaining wall, catch water drain	Ambegaon	8,647,747
Retaining wall, catch water drain	Ambegaon	14,982,000
RCC Retaining Wall	Ambegaon	19,999,998
Building wall in landslide-prone areas	Khed	27,625,962
Building wall in landslide-prone areas	Khed	28,152,958
Building protective wall at potential landslide sites in Padarwadi	Khed	4,998,914
Protective wall and land work	Junnar	44,484,405
Protective wall and land work	Junnar	42,921,723
Protective wall and land work	Junnar	40,425,895
Protective wall and land work	Junnar	32,006,473
Protective wall and land work	Junnar	63,975,340
Protective wall and land work	Junnar	63,402,407
Protective wall and land work	Junnar	40,442,780
Protective wall and land work	Junnar	38,758,896
Protective wall and land work	Junnar	58,965,509
Retaining wall, excavation drain, chiseling hard rock	Bhor	9,000,000
Building landslide prevention protective wall	Maval	15,907,910
Building landslide prevention protective wall	Maval	12,388,871
Building landslide prevention protective wall	Maval	10,238,987
Building protective wall for landslide-prone areas	Maval	15,145,799
Building protective wall for potential landslide safety in Devghar	Maval	26,945,999.9
Building protective wall for landslide-prone areas	Maval	9,657,000
Building landslide prevention protective wall	Maval	9,105,945
Retaining wall	Maval	26,945,695
Retaining wall	Maval	11,667,933
Retaining wall	Maval	4,549,889
Retaining wall	Maval	15,370,915
Retaining wall	Maval	76,468,228
Retaining wall	Maval	76,468,228
Retaining wall	Maval	6,011,451
Retaining wall	Maval	26,353,023

Retaining wall	Maval	46,102,544
RCC Wall	Maval	40,000,000
RCC Wall	Maval	130,000,000
Retaining wall	Velhe	10,000,000
Retaining wall	Velhe	6,000,000

6 Preparedness Measures

6.1 Identification of stakeholders involved in disaster response

Community is the first responder in case of most of the disasters. This shows the importance of VDMP as well as Village Task Force along with their training. Local people who can undertake search and rescue operations should be identified and given training. But not all levels of disaster can be managed by village task force. Highly trained professionals are needed for response. It includes swimmers, divers and rescue workers. They can be identified at Taluka level and given training at that level.

Response and evacuation of disabled population is also important as they are highly vulnerable. Training can be given for the rescue workers for rescuing them or evacuating them during emergency. Fire brigades are adequately trained in this and carry people using different cradle carry method, firemen carry method, blanket carry method etc. The Taluka level rescue workers should be trained in it.

Formation of Disaster Response Teams

In the context of disaster management, it is essential to establish specialized teams for various activities. These teams play a crucial role in rescue and relief efforts. Additionally, specific attention must be given to the evacuation and assistance of disabled individuals, ensuring their safety during disasters.

The formation of these teams occurs across three phases:

1. **Pre-Disaster Phase:**
    - Capacity Building
    - Public Awareness Initiatives
    - Preparation, Updation, and Verification of Disaster Plans
    - Training
2. During
    - Search and Rescue
    - First aid
    - Relief Camp
    - All other components required by IRS.
3. Post Disaster-
    - Understanding needs of affected community
    - Rehabilitation
    - Distribution of relief aid
    - Policy advocacy to bring normalcy in affected area.
    - Documentation
    - Additional measures as described in IRS.

a) Early Warning

Early warning helps to plan the course of recue and relief operations, helps to move the population to safe shelters and helps to disseminate the knowledge to the public so that mortality rates can be reduced. Early warning system is not available for every hazard. But for most of the hazards early warning can be issued. It includes heavy rain, flood, landslides, tsunami etc. At district level DDMA can receive the early warning from nodal agencies or from other sources and can plan the rescue and relief operations. There are nodal agencies that can give warning for different disasters.

After receiving early warning, the information should be disseminated to various departments for preparedness as well as to the public for safety. It is the responsibility of DDMA and TDMA. The information from nodal agencies or from SDMA should be disseminated to TDMA, VDMA, Panchayat office, line department officials and to public based on the ground situation. The early warnings can be disseminated through various means such as:

- Telephone,
- Fax,
- VHF,
- Police Wireless,
- Internet (e-mail),
- Websites,
- Radio/TV network,
- Mobile Phones (SMS).

b) Search & rescue

Search and Rescue operations are an important part of relief activities to save the life of victims. Experts are needed for ding search and rescue operations. Search and Rescue operations are usually carried out by Fire and Safety brigade, Coast Guard, Police, NDRF etc. Also, volunteers can also be used for rescue operations if sufficient experts are not available. Training should be given to SAR team and mock drills and exercises should be done regularly. Preparedness for Search and Rescue will be done based on the type of disaster in the region. In flood, swimmers and divers are more needed. While in building collapse debris removal and tracking the people trapped in the debris is more important.

As part of preparedness, the Search and Rescue teams should be formed in district and Taluka level and training should be given. The team comprises of:

- Fire fighters
- Police men
- Coast Guard officers
- Swimmers
- Medical professionals.

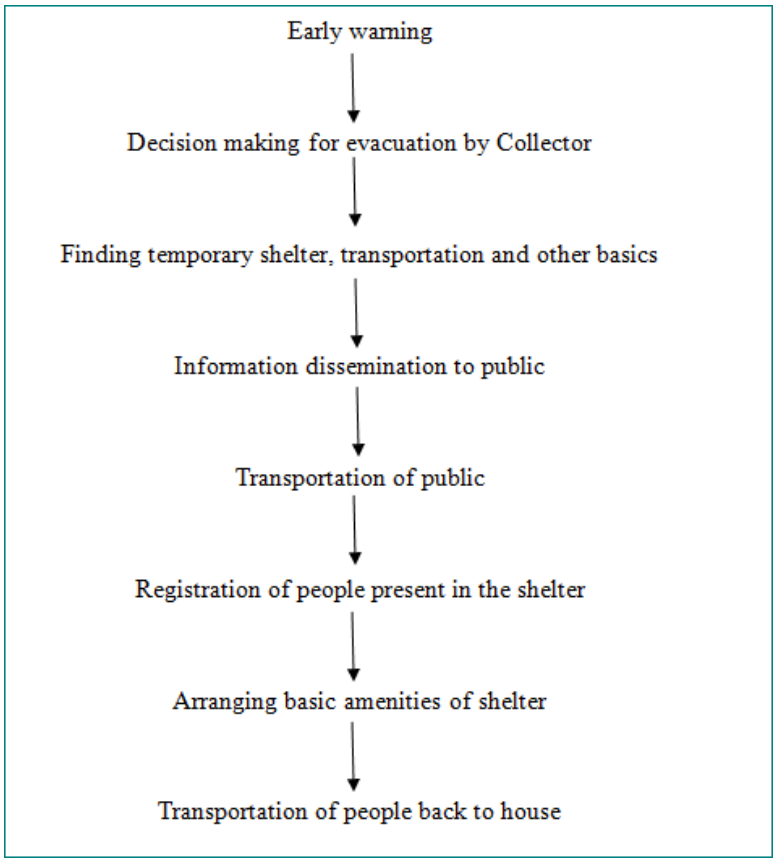
It is mainly carried out by NGOs and VOs along with NDRF, SDRF and DDRF.VOs like NSS, NCC, NYK, Civil Defence, Home guards and other task forces available at various departments.

c) Evacuation

Evacuation can be done for those disasters where early warning is available and the level and efficiency of the evacuation will be based on the time availability after forecasting the disaster. Evacuation needs proper planning and preparation or that it can become hazardous. Evacuation can be of two types. It can be after a hazard where the survivors in a hazardous situation can be evacuated, or it can be after an early warning where time period for evacuation will be there.

For the process of evacuation, temporary shelters should be identified outside the vulnerable location, mostly in schools or barren land (in case of earthquakes). The safety and security of the temporary shelters should be monitored. In case of vulnerable people like physically disabled, special attention should be given to their needs.

Basic amenities such as water, food, and sanitation, medical attention etc should be addressed. In case of winters special care should be given. Evacuation procedure will not be completed until relocating the people to safe permanent location or their own place. Depending upon the impact and the vulnerable group, chances of damage spreading in surrounding area is considered before planning the evacuation process. This process can be implemented by using various transport facilities such as bus, train, boats and airlift.



d) Damage and Loss Assessment

In order to start any post disaster activity, it is essential to know the extent of the damage to life, property and environment. To understand this, inputs from government officials from various departments deputed at village level are taken into consideration. For different disasters, the geographical area that needs to be assessed will vary depending upon the extent of the hazard.

Type	Number	Remarks
Number of affected populations		
Number of affected families		
Loss of life		
Injured		
Missing		
No of house fully damaged		
No. of house partially damaged		
Crops fully damaged (acre)		
Crops partially damaged (acre)		
Fully damaged educational institutions		
Partially damaged educational institutions		
No of water sources damaged/not functioning		
No of latrine damaged		
Loss of livestock's (no.)		
Embankment Fully damaged(km)		
Embankment partially damaged (km		

5.2 Activation of IRS in the district

The District Collector automatically becomes the head or the Chairperson of the DDMA, and hence he is appointed as the Responsible Officer of the district. Some of the responsibilities may be passed on to the Additional District Collector for management and supervision of any incident that occurs in the district, as he is the Chief Executive Officer of the District. The District Emergency Operation Centre and the Incident Commander will make him aware of all the developments and progresses of responses activities in the district.

5.3 Protocol is observed for seeking help from other agencies such as Govt. of India, State Government, Public Sector Undertaking (PSUs), Other State Governments, National Disaster Response Force (NDRF), State Disaster Response Force (SDRF), Army, Navy and Air Force, Central Paramilitary Forces

The line departments and their head will perform different roles and responsibilities based on the nature and kind of disaster. These responsibilities of the line departments shall be clearly defined based on different types of disasters in the DDMP, which shall be approved by the State Government.

6.1.1 Army, Air Force & Central Paramilitary Forces

The Chairman of the DDMA shall report to the State Home Department which will further request military help to the Central Home Ministry. The subject should be forwarded to concerned departments for the help sought.

6.1.2 National Disaster Response Force

The DDMA can immediately make arrangements for NDRF team or battalion directly during sudden onset of disasters in areas, where early warning systems may not be possible. The DDMA will maintain a close association with the nearest NDRF Commander-in-Chief of the NDRF for rapid deployment of the team in case of sudden disastrous situations.

6.1.3 State Disaster Response Force

The DDMA shall write to the State Disaster Management Authority which will consult with concerned ministries for requisition of SDRF.

6.2 Mechanisms for checking and certification of logistics, equipment and stores

The DDMA shall write to the concerned Logistic Section Chief (LSC) in Revenue Department to further carry out the responsibility of checking and making certifications of logistics, equipment and stores.

6.3 Operational check-up of Warning Systems and EOC

The DDMA shall periodically conduct operational check-ups of warning systems, EOC and also the equipment available there. Pre-monsoon preparedness meeting also extends opportunity to checking warning equipment.

A checklist is to be prepared for routine maintenance and testing of the equipment.

6.4 Periodical inspection of facilities and critical infrastructure

The DDMA shall coordinate along with the Public Work Department to conduct a periodical inspection of facilities and critical infrastructures like bridges and Highways, government buildings especially before the onset of monsoons.

Command and coordination – identification of quick response teams

The head or the Chairperson (?) will convene meetings regularly with all the departments and stakeholders and even include various NGO's and groups for effective management and preparedness of summer seasons and monsoons.

6.4.1 NGOs and other stakeholders' coordination

The NGO which are working in development sector as well as disaster management sector can be used for different purposes such as Post Disaster Need Assessment. The NGO workers or volunteers should be trained regarding their work during L0 phase of disasters and during the issue of warning, NGO officials can be communicated and can be used. Also in case f temporary shelter preparation, water and sanitation etc. can be managed by NGO with the support and monitoring of government officials.

6.5 Seasonal preparedness for seasonal disasters like flood and cyclone

The DDMA can make seasonal preparedness by:

Identifying Risks: Listing out various risks from hazards like floods, fire to the infrastructures and facilities. This will decrease the geographical susceptibility of the structure. Identifying vulnerability of the objects and structures are also an important process of the preparedness. Hence this identification process will focus on the prevention and mitigation of any damages that can take place in the future.

Identifying Resources: The DDMA shall identify resources available in the district, for assistance in a disastrous situation and sources which can lower the damage and the risks.

Decreasing Risks: Once the list of risks and vulnerabilities are prepared and specified, then the DDMA shall conduct and formulate a program making arrangement of activities that can decrease the risks. This can be done with the help and association of various line departments.

Preparedness

6.5.1 Community Preparedness

Community preparedness plays a crucial part in disaster management. Community seems to be one of the exposed entities in any disaster risk. The two main elements to be explored in the community preparedness are community base and people centric. Community based disaster management is believed to have direct involvement of community in every phase of disaster. It is vital that community members themselves are aware and self-reliant in acquiring knowledge and information of risks and vulnerabilities of the area. The core activities where community people could get involved are

Table 16 Community Preparedness Activities

Risk Knowledge	• Knowledge about past hazards. • Identification of hazards and disaster-prone areas. • Pattern and frequency of disaster
Dissemination and communication	• Develop community based early warning system. • Dissemination of information to vulnerable communities • Dissemination of information about person with disability.
Monitoring	• Parameters for the development of early warning. • Parameters for structural development and implementation.

Response Capabilities	• Take all the prevention, mitigation and preparedness measures. • Capacity building and awareness programs. • Provide support to conduct post disaster assessment studies.

6.5.2 Community Sensitization regarding special needs with reference to persons with disabilities

People with disability are most obvious vulnerable group during any disaster. Often there is high risk of additional impairment, injury or even death. Various initiatives have been taken to deal with the group and make things easily accessible to them. Most important among the initiatives is sensitization of community about needs of disabled people. Therefore, disability-inclusion is crucial in disaster risk reduction measures. Some of the following measures are taken for persons with disability in community preparedness: -

Table 17 Community Sensitization Activities

Task	Activity
Identification	• Identification of person with disability in community with the kind of disability. • Making the area of stay and work in the village.
Awareness and dissemination of Information	• Awareness programs related to disasters and vulnerabilities in their area. • Capacity building training with on rescue and emergency exits • Conducting mock drills including people with disability.
Monitoring	• Basic provisions for person with disability in Safe shelter with light, toilet, sanitation. • Accessibility of the safe shelter through ramps for them. • Ensuring safety evacuation doors for them.

6.6 Standard Operating Procedures (SOPs)

6.6.1 Protocol and arrangements for VIP visits

In case of post disaster scenario, the physical presence of high authority Government officers and/or local elected representatives/ministers is unavoidable as it helps to control the public sentiments as well as provides interactive participation from the community. The visit to the position of incidence by government functionaries is based on the system protocols.

These visits attract a lot of public and media attention and can aggravate public sentiments. Hence, it is suggested to minimize the movements by VIPs and VVIPs until situation is under

control and proper information regarding the gravity of the situation is made available to VIPs and VVIPs. Normally incident commander may accompany them during this visit.

6.6.2 Procurement (essentials, tents, blankets, tarpaulins etc., SOP for Rate contract)

Based on the type of disaster, the relief material is needed to be provided from out of the affected area. This material can be in different forms such as food grain, utensils and other household items. In the last 2-3 disasters it was noticed that all the material made available by the public, NGOs and private companies is routed through the centralized distribution system which is under the guidance of either Divisional Commissioner or District Magistrate for L2/ L3 level disasters.

In case of L1 level disasters such as building collapse, small fires this procurement of material and distribution system is carried out at the tehsil level.

Procurement at the Government level is done by the rate contract decided by State Government and in case of any item not included in the list, DM can procure such items after approval from DDMA with the available funds for management of emergencies.

6.6.3 Logistics

Logistics in case of emergencies is governed by the incident commander through the officer made in charge of logistics. Logistics involves three branches- Service, Support and Finance.

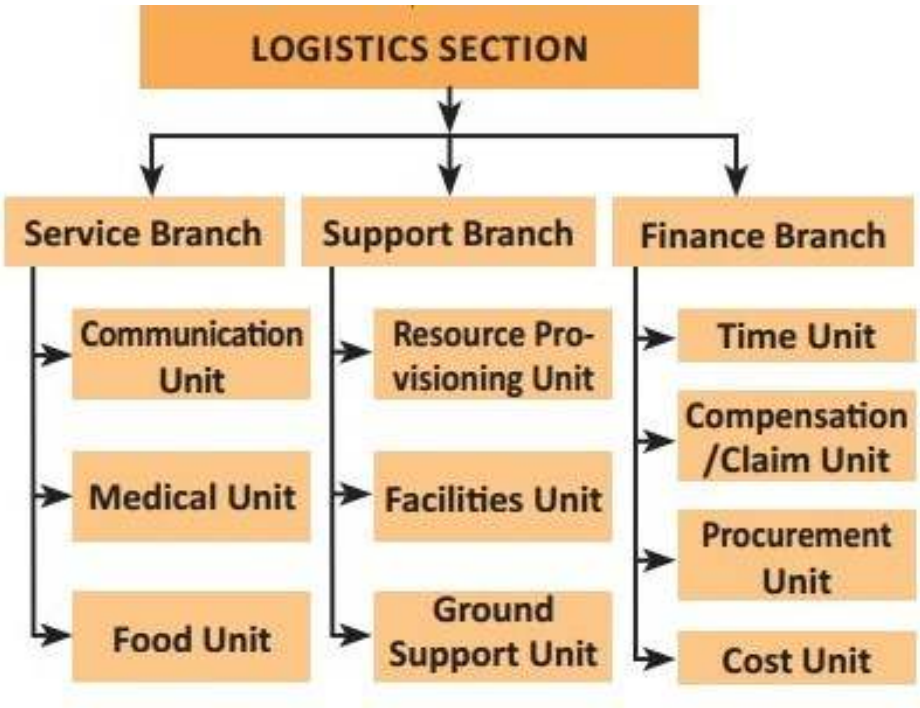


Figure 24 Flow Chart for Logistics Section

6.7 Knowledge Management, networking and sharing

Knowledge management is all about getting right knowledge, in right place and at the right time. Preparedness is to develop, support and enhance the organizational knowledge process of knowledge creation, storage, retrieval, transfer and application. The management focuses

on capturing, organizing and converting organizational knowledge into common database, for further effective retrieval of relevant contents through advanced searches from the data base. At the lower end organizations focuses on learning, sharing and collaborating through physical interactions, workshops, documentation of experiences or sharing through web portals. The networking comprises of all the SDMD, DDMD, and administrative training institutes.

Table 18 Knowledge Management Activities

Task	Activity	Responsibility
Knowledge Management	• Disaster management activities carried out at various levels. • Documentation and dissemination of information to line departments. • Training and awareness programs • Government, community and private organization resource mapping. • Recording of best practices, lessons learnt, work experience and sharing with stakeholders in meetings, workshops and seminars.	• Revenue Department • DDMA • Technical Department.

6.7.1 Uploading of information on resources on India Disaster Resource Network (IDRN) / State Disaster Resource Network (SDRN)

IDRN is a web based common information system for managing the inventory of equipment, skilled human resources and critical supplies for emergency response. It manages the district level resource database throughout the nation. The primary focus is to enable the decision makers to find answers on availability of equipment and human resources required to combat any emergency situation. This database also enables the organization to assess the level of preparedness for specific vulnerabilities. Total 266 technical items are listed in the resource inventory. The districts have been given the username and password through which they can perform data entry and data updation on IDRN for resources available in the district. The IDRN network has functionality of generating multiple query options based on specific equipment, skilled human resources and supplies with their location and contact details. Every year the resource inventory has been updated at the district level by DDMOs whereas NIC provides technical assistance by updating it in website.

6.7.2 Documentation of lessons learnt and best practices after each event

Documentation of any disaster is essential to identify the gaps in all three phases of disaster management. This helps the authorities in order to prevent occurrence of such disasters by taking additional measures in terms of capacity building, resource management, financial management and logistics. This can act as a resource material for research also.

6.7.3 Community registries to collate basic contact information for persons with disabilities

Community registries should be maintained by collating basic contact information of the persons with disabilities (physical and mental). This data can be collected through VDMP and should be updated at least once in a year.

6.8 Media management / information dissemination

Mass media and communication system plays vital role in predicting and dissemination of information in advance. The communication system has significantly developed to a great extent in predicting and disseminating information about the disaster, there has been an impact on how public learns of and perceives the impact of disasters. Both the electronic and printing media has been linked to the disaster preparedness in awareness programs, warning dissemination, and evacuation, alerts government officials and in coordination with various stakeholders. Communication virtually links all the hazards mitigation process. The capabilities of communication, data gathering and data management technology have leaped forward in parallel with the increase knowledge about the origin and behaviour of natural hazards. The advancement in mass and telecommunication with technology had major contribution in forecasting and dissemination of information.

6.8.1 Training and interaction strategies with Media/pre-event awareness for Media.

A. To control the rumours spreading via various sources such as social media and issue strict warnings and instructions to public and government stakeholders.

B. To establish a system to monitor social media such as WhatsApp, Twitter, Facebook, etc.

C. Depute a responsible officer under IRS system to give correct information to print and electronic media and ensure that incorrect information is not spread through print and electronic media.

6.8.2 Identification and training of the Official Spokesperson

Normally PRO deputed at DM office is well aware about his responsibility as a spokesperson and passes on the information only after approval by DM. However, at the disasters scaling L1 and L2 i.e. on tehsil and village level, such spokesperson is not available and local available officer may not be aware of media management.

A special training module is required to be developed for such officers/ spokespersons including Tahsildar.

6.9 Medical Preparedness and mass casualty management

For medical preparedness, the details of all the hospitals available in the district should be made available in the DDMA or Control room. In preparedness phase, the hospital authorities, management, doctors and other staffs should be trained in emergency management. Details of medical equipment and manpower available in each region should be made available and in case of emergency, the transportation of injured people should be made

accordingly. During emergency, first aid for injured and triage in case of heavy causality is the duty of medical professional in the Taluka or district level. Based on the need for critical care facilities, Surgical Services, Transfusion Services etc. victims should be allotted to different hospitals as per the available resources.

7 Capacity Building and Training Measures

7.1 Approach

Capacity building of various stakeholders by periodical training is important factor in preparedness. As government officials are mainly engaged in routine office work periodical training become important to build their capacities.

The modules will be specific to the participants by conducting TNA and references will be taken from NDMA, NIDM and state level ATI directives.

Developing the capacities of the public is essentially important as disaster management should be 'To the people, by the people, for the people'.

As the neighbour is first responder for any disaster scenario, it is very essential to develop capacity of the public which not only will be available in golden hour but also will be helpful to government functionaries in order to prevent or mitigate the disasters.

Hence, training at all levels to all stakeholders becomes extremely essential, irrespective of hazard.

7.2 Capacity Building Plan

A year-long training, capacity building plan should be made available and discussed with DDMA, including financials involved therein.

This plan should include all stakeholders from public, NGOs, VOs, elected members and government officials.

7.2.1 Institutional capacity building

District level institutional mechanism runs from District collector to village level functionaries such as Talathi and Gram-sevak; who are part of revenue department and PRI. In addition to this, the capacity should be developed for all line department stakeholders e.g. Irrigation, Public works department, Health, animal husbandry, police, state transport etc.

7.2.1.1 Engineers, Architects, Masons, Doctors, Nurses, Teachers and other professionals

Professionals from various fields in the private sectors should be trained in including disaster management perspective into their profession. Their skills in the respective fields can also be used during and post disaster period when required.

7.2.1.2 Police, Fire Services, SDRF

Police, Fire Services, SDRF and TDRF are mainly responsible for responding in the first phase of disaster scenario and are normally first to reach to the position of the incidence. Hence, the modules designed to train these forces should be focussed on first aid, search and rescue and fire safety by using the available equipment and manpower.

Special focus should be given to the periodic maintenance of equipment and repairing their-off. A special focus on maintaining of the spares should be also considered in these modules.

7.2.2 Community capacity building and Community Based Disaster Management

Community as a whole is main component in the DRR. As they are the sufferers from any natural or manmade disasters, it is essential to convey the importance of understanding hazard and prevention and mitigation therein.

If proper capacity is developed at community level, it is possible that many of the hazards will be eliminated before they get converted into disaster.

The capacity of the community is inversely proportional to the intensity of the disaster. More the capacity of the community, lesser will be the losses due to disaster.

Separate modules are required to be designed for teachers, students, NSS, NCC, housing societies and VOs like home guard, civil defence and NYK.

7.2.3 Training of Trainers (ToT)

(Availability of disability-inclusive training for all relevant service personnel)

As reaching to all stakeholders at grassroots level is near impossible to any institution, it is required to train the master trainers specific to their expertise. The knowledge and experience of these shortlisted master trainers helps in taking the subject further down the ladder.

7.3 Skill up gradation and follow up training programmes

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.

7.3.1 Training Calander

No.	Name of Training Programs	Target Audiences	Duration of Program	No of Participants	No Training programs 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,	Nodal officers of district line departments			

	developing disaster mitigation proposals and their implementation.				
2	Orientation of Tehsildar and BDOs on disaster/climate risk management and nature-based solutions	RDCs, Tehsildars, BDOs			
3	Training Program on Urban Disaster Resilience and Climate Risk Mitigation in urban areas	SDO, BDO, CEO-Municipality			
4	Training program on Urban Risk Reduction and Resilience: Focus on flood risk management, Solid Waste Management and Drainage System	Line department			
5	Training program on Lightning Risk Management and Safety Measures at the Taluka level	Farmers, NGO, Agriculture department			
6	Training Program on Crowd Management and Stampede Risk Reduction at Taluka level	Taluka level Police, Home guard, Aapada Mitra			
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			
8	Training on Child-Centric DRR	School			
9	Training on River Basin Management	Irrigation Dept, DDMO, PWD, CWC, WRD, Tehsildar			
10	Training on mental health and psycho-social wellbeing in DM at Taluka level	Health dept, NGO			
11	Training on gender inclusive DRR	SDRF, Fire, Civil society, WCD, SJD			
12	Training on Industrial and Chemical Disaster Management, CBRN	Local industries			
13	Training of trainers for Life-saving techniques in disasters, Triage, Rainwater Harvesting and Energy Conservation.	Aapda Mitra, Local Youth, Schools			
14	Training on handling tourists during emergency	Tourism, Travel agency, Coast Guards, Aapada Mitra, NGO			
15	Training on school safety and security at the Taluka level	Schools			

7.3.2 Aapda Mitra training

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.

8 Response planning (multi-hazard), preparedness and assessment

8.1 Quick assessment of damages and need

Damage and loss assessment should be done immediately after rescue operations. It helps to understand the extent of damage in the region. Data regarding the following details should be collected, including the extent of damage such as partial or complete.

Table 19 Showing the Data Collection Format for Damage

Type	Number	Remarks
Number of affected populations		
Number of affected families		
Loss of life		
Injured		
Missing		
No of house fully damaged		
No. of house partially damaged		
Crops fully damaged (acre)		
Crops partially damaged (acre)		
Fully damaged educational institutions		
Partially damaged educational institutions		
No of water sources damaged/not functioning		
No of latrine damaged		
Loss of livestock's (no.)		
Embankment Fully damaged(km)		
Embankment partially damaged (km		

8.1.1 Response flowchart

In case of any disaster, quick response is a key to reduce losses. For this, platinum time (i.e. first 15 minutes after disaster) and golden time i.e. first 60 minutes after disaster are to be considered while planning response activity.

In general, the response, activities is under the guidance of incident commander (DM, Tahsildar or HOD of concerned department).

At district level, the stakeholders for response are- NDRF, SDRF, DDRF, TDRF, village response force and Civil defence, Home Guards etc. However, involvement of NGOSs who have specific expertise depending upon the nature of the disaster and the lifesaving/ rescue

equipment available with them. As a normal practice, such NGOs are part of DDMA and are directly involved in addition to the government agencies and voluntary organizations.

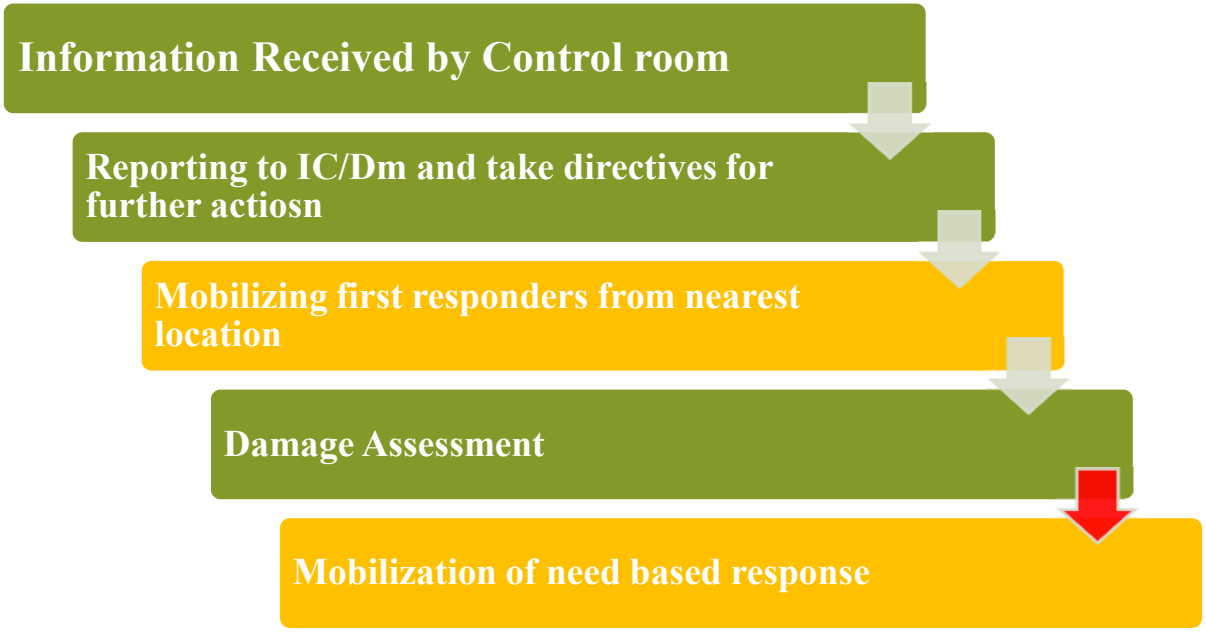


Figure 25 Flow chart for Response

8.1.2 Warning and alert

Early Warning Systems: Two-way communication system between village, tahasil and district is established via land line phone, mobile phone, wireless system used by Police and Irrigation depts.

In addition to this HAM operators and infrastructure available with them within the district is also used. The repeaters installed can be useful in case of disaster. District administration will take measures to strengthen this network.

Warning dissemination: Arrangements for dissemination to the last person DDMA to translate the alert warning in local language(s) and disseminate the same through various medium. Withdrawal of warning should also be done by DDMA

8.1.3 District CMG meeting

The crises management group is essentially required to mobilize early warning system.

Under the guidance of DDMA, depending upon type and intensity of disaster, this crises group will conduct meeting and plan coordination with other agencies (RDMC, TDMC, NDRF etc.)

In general, this meeting is conducted as and when required or when DDMA feels necessary activation of CMG.

8.1.4 Activation of EOC

Sr. No.	Emergency Management Functions / Tasks	Function / Tasks Lead	Support Function Officer Agencies
1	Direction, Control & Coordination	DM	DDO, SP, Resident, DY.Collector and Tahasildar.
2	Information Collection Analysis and Damage Survey	DM	DDO, SP, Resident, DY.Collector (RDC), Tahasildar, DIC, Dy.DDO, Ex.Engr, R&B, DAO.
3	Communication	RDC	Dy. Tahasildar, Mobile Operators, TV, Radio, Police, Forests, Fire.
4	Alert and Warning	RDC / SP	EOC / Disaster Tahasildar, 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/ SDFR /NDRF	Fire, Civil Defense, Home Guards & SDRF (When magnitude of any disaster would beyond coping capabilities of these response agencies, NDRF may be requisitioned for search & rescue operations)
7	Emergency Public Protection	DIO	EOC / Police / Transport / Forest
8	Law and Order / Public Information	SP	Dy. SP, Home Guards Commandant, NGOs, Para-Military, and Armed Forces
9	Public Works	Ex. Engr. R & B	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, Tahasildar, TDO
11	Health and Medical Services, Psychosocial Care.	Chief District Health Officer (CDHO)	Supt. Govt. Hospital, Municipalities, PHCs, CHCS, Red Cross, Fire Brigade, Civil Defense, R & B, NGOs, Doctors, TDO, Tahasildar.
12	Animal Health & Welfare	Dy. Director Animal Husbandry	Veterinary Inspector, NGOs.
13	Water Supply and Sanitation	Ex. Engr. Water Works	Dy. Ex. Engr. Talathi, Tahsildar, TDO Health, Dy. Engineer
14	Power	Supt. Engr. Electricity Board	Ex. Engr, Ex. Engr. Technical, EB, Transport.
15	Resource Management (Including food and relief supplies and other logistic support)	Civil Supplies Officer	RTO, DSO, Private & Public sector, Municipal Water Supply Board, Tahasildar, Dis.Supply Tahasildar

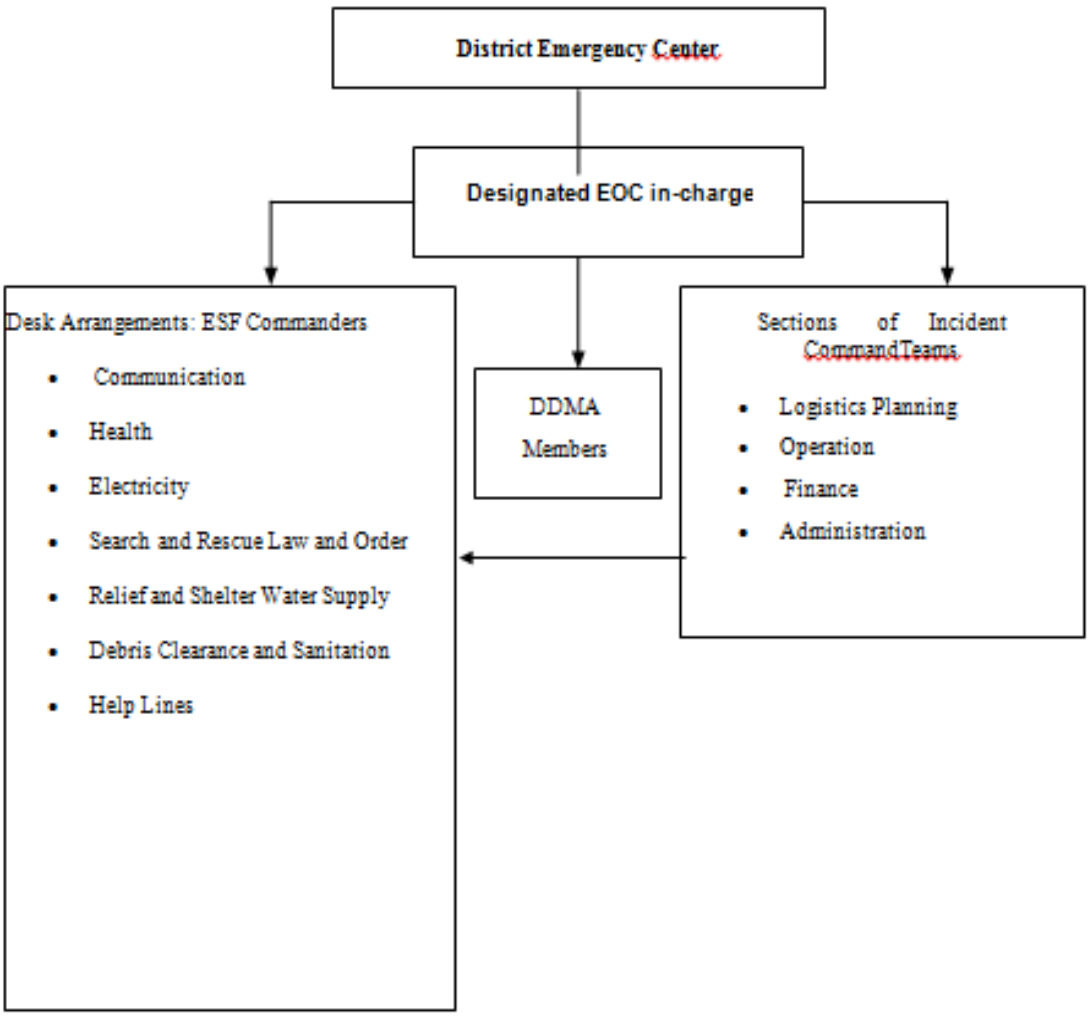


Figure 26 Flowchart of District Emergency Operation Center

8.2 EOC Operations

The operation of the EOC will be at L0 level of maintenance pursuing the following activities:

Regular Functions of EOC during Normal Times

1. Updating and Maintenance duties of the EOC
2. Managing Inventories and reviewing existing logistic facilities
3. Keeping updated with other hazard, weather and terror events across the world.
4. Tracking and documenting new forms of disaster response measures and technology used around the world.
5. Capacity Building including mock exercises and other preparedness and training exercises.
6. To always ensure the continuous operation of the regular Public Safety facilities.
7. The EOC is normally staffed twenty-four hours a day during seasons of extreme weather events and therefore it can quickly be activated for any emergency. When a

major emergency occurs, or is imminent, it will be the responsibility of the Emergency Coordinator to set up and staff an appropriate Emergency Operations Center (EOC). The EOC is usually activated at the orders by Chief Secretary at the State level or the collector in the district level respectively. The activation of EOC should normally occur when the Government proclaims a State of Emergency affecting the area due to weather, hazardous materials, terrorism, etc. It also depends upon the severity and nature of the hazard event. It should be noted that the activation of EOC should be followed by the issuance of warning by nodal technical agencies. When the situation returns to normal, automatically the response operations cease and the EOC staff strength also reduced automatically. The deactivation of EOC takes place upon the receipt of Chief Secretary's order.

8. In case of extreme disasters such as chemical disasters, bomb blasts and terrorist attacks, national security and control take precedence. The Ministry of Home has to establish special measures to ensure the security of the nation by sealing and evacuating strategic government and national institutions well within 3-4 hours of the occurrence. National borders, air and sea space also have to be protected and if need be, sealed off. The designated officers of the Home Guards at the EOC will provide security to the EOC entrance points. In addition to EOC staff, the authorized individuals are allowed by the Home Guards to enter the EOC.

EOC Levels of Operation

The EOC activation at various levels depends on the level of disaster. The National/state/district EOCs are activated in the L3, L2 and L1 levels of disasters respectively.

EOC Levels of Operation

Level	Nature of EOC Operation
Level 0 (L0)	**Normal**: Situation is monitored by EOC in charge
Level 1 (L1)	**Watch**: When an event / disaster may occur, notification is made to agencies and support staff who would need to take action as part of their responsibilities.
Level 2 (L2)	Partial Activation: Limited activation of EOC when an event / disaster is very probable or following an event which doesn't require full activation. All primary or lead staff will be notified and will staff the EOC.
Level 3 (L3)	Full Scale Activation: All primary and support agencies are notified. All EOC Support personnel will staff the EOC.

Immediate Tasks on EOC Activation

Chief Secretary, Govt. of Maharashtra will initiate the activation of the emergency services of the EOC as established.

8.2.1 Immediate Tasks upon EOC activation

1. The Chief Secretary will determine what staff he/she deems necessary to effectively operate the EOC apart from the prescribed staff. The Personnel from various departments and agencies are called to work in the EOC.
2. Orders are faxed from the crisis management committee to related ministries and departments for additional resources.
3. The emergency operation taskforces are asked to send report on the situation and the immediate resource requirements to the EOC within 4-8 hours of activation.
4. The EOC produces a situation report summarizing the reports.
5. Records will be maintained in the emergency control room.

8.2.2 EOC Tasks during emergency phase as suggested by HPC

Time	Task
First 24 hours of the emergency	1. Establishing Control rooms at the airport with information desks at the arrival, departure and assembly points. 2. Set up General Information Desk at airport EOC. 3. Establish and activate emergency phone lines and helplines immediately within few hours of the disaster. 4. Set up separate desks for each ESF and international aid/NGO. 5. Set up desks for donations (cash and material). 6. Establish contact with the affected State EOC. 7. Set up EOC at neighbouring States. 8. Establish contact with NRSA/ISRO/Defence for aerial and satellite imageries of the affected area. 9. Provide information and standard operating procedures for civilian population such as media, researchers, volunteers, field workers, etc. through: o Organize/coordinate aerial surveys for rescue operations o Establish contact with the disaster site which will have Incident Command Systems placed at the disaster site based on the scale of the disaster o Deploy Incident Commanders in consultation with the Center at strategic incident commands.
	EOCs at the State and the central levels will be jointly involved in the following: 1. Set up information desks at critical locations 2. Identify and channelize different categories of workers under the following at the information desks and provide identification tags for the following: - Media - Researchers - NGO/International Agency - Fieldworkers/Volunteers - Government officials 3. Place situation reports at bulletin boards outside information

Time	Task
Next 48 Hours	desks and E OC. 4. Direct Central and international agencies to priority areas (worst affected areas). 5. Identify locations for international and other NGO agencies to set up their site offices for the uniform distribution of aid in all parts of the affected area. 6. Communicate with the District Magistrate and the SRC for local information through: - Information flow chart of Information and Arrival Centre at airport. - Material/Manpower flow chart of Information and Arrival Centre at airport. - Information flow chart of EOC at Centre. - Information flow chart of desk for ESF. - Information flow chart of NGOs. - Information flow chart of media. - Information flow chart of researchers.

8.2.3 EOC Communication

The Telecommunication Task Force Leader of the EOC shall ensure immediate restoration of disrupted communication facility or infrastructure to ensure uninterrupted communication for effective disaster management operations. The task force will also ensure that the communication shall be brief and simple, and no chaotic situations arise. Telephones or Hot Lines shall be used wherever possible to avoid congestion of radio communication. All task force members shall communicate only through their allotted frequency channel to avoid congestion in the particular channel. The personnel who use radios should be acquainted with the operation of the equipment, various channels, code words, length of speech, etc. The EOC has an important role in issuing early warning.

8.2.4 EOC Information Center Management

The principal role of information centre in the EOC constitutes collection of data, analysis and dissemination of information to relevant organization. Upon the activation of EOC, this center coordinates the flow of information with respect to activities associated with relief operations. During normal times, it maintains a systematic database of the resources available, important phone numbers, name and addresses of important government officials, EOC emergency staff members, trained officials and first responders, international aid agencies and NGOs. The EOC- information centre does damage assessment of the affected areas, collect all related information of government schemes for smooth management, monitors different disaster mitigation programmes, coordinate with different organizations, also conducts evaluation of the programmes and immediately takes up.

8.2.5 Preliminary Steps to Set up an Emergency Operations Centre

While setting up of an EOC, the following aspects should be given due consideration:

- **Number of people involved:** The number of people at an EOC should be limited to

the people directly involved in the EOC operations.

- **Presence of decision makers and operations staff:** All key individuals involved in decision making and executing them needs to be present at the EOC, as and when policy decisions are being taken.
- **Communications and other equipment:** The EOC should have sufficient physical space and support equipment to enable staff to operate effectively. An EOC requires the best available communications and other equipment to operate efficiently. However, the lack of equipment should not be used as an excuse for not setting up an EOC. Runners can work in the place of radios, paper and pens in the place of computers and printers, and chalk boards in the place of whiteboards.
- **Information Resources:** The EOC should contain maps and documentation on other relevant resources needed to respond to a disaster.
- **Alternate sites:** There should always be an alternate site for the EOC in case it has to be abandoned.
- **Knowledge of the EOC location**: Only those who need to know where the EOC is located should be told its exact location.

8.2.6 EOC Basic Requirements

- **Site or Location of the EOC:** The Emergency operation centre (EOC) should be established near the office of key government functionaries and is ideal to be positioned away from the disaster scene. As per the recommendations of the HPC, a network of EOCs is to be set up in national, state capitals and headquarters of disaster prone or vulnerable districts.
- **EOC Space Requirements:** Table 15 suggests the space required for specific functions of the EOC.

Table 20 EOC Space Requirements

Functions	Space Requirement
Policy Makers	A separate room from the main EOC area often designed also as a conference room.
Media Information Provision	Separated from the main EOC area.
Communication and Data Processing	Designed separately from the main EOC as a Radio Room. It should include computer servers and similar equipment's.

Incident Commander	Separate cabin for the Incident Commander
Task Forces	Space for up to 15 Task Forces. Each task force should be provided separate desks, which is able to host atleast 3-4 persons at a desk at a time.
Logistics Coordination	Desks and space to host five persons
Administrative Personnel	Desks and space to host five persons
Finance Personnel	Desks and space to host five persons
Restrooms and Toilets	Restrooms and toilets for personnel at EOC

While designing EOCs, specific attention should also be given to aspects related to the electrical/data circuit layout, security considerations, lighting considerations, projection displays, visual aids, equipment, communication considerations, UPS/backup power considerations, and functional considerations with a view toward avoiding potential pitfalls in design, construction, and equipment functionality.

8.2.7 EOC Equipment

List of Essential items in control room

8.2.7.1 Furniture

1. Suitable table and chairs (for minimum 4 staff members + cabin for DDMO)
2. Storage cupboards (capacity to hold atleast 50 files + one loft to store old record)
3. storage drawers for Maps Large size 5 ft x 4 ft minimum)
4. Computer tables 4 nos.
5. Air conditioner
6. Fan – (1 fan to cover 50 sq ft)
7. Drinking water facility (dispenser + cooler)
8. Rest room for staff with bunks for at-least 2 persons
9. Toilet with wash basin
10. Two exit doors (main entrance plus one emergency)
11. Conference table with chairs (to accommodate 6 chairs around the table with projection facility)
12. T.V, set with cable connection.
13. Projector
14. Screen
15. Copy Machine
16. Fax
17. Printer (colour / black & white 2 no's)
18. Scanner plus copier
19. Adequate ventilation (exhaust fan with flaps)
20. Adequate lighting arrangement
21. UPS with at-least 6 hours back up (Full Load condition – computer, fans, lighting +)
22. Filing cabinet
23. Firefighting equipment (smoke detectors, sprinklers, extinguishers, buckets, blankets etc)

24. separate space to store search and rescue equipment.
25. Separate electrical connection from main meter with overload circuit breakers.
26. Note: - All furniture must be made up of fireproof material. (No carpets or leather or wool / wood furniture or carpets, mattress etc.

8.2.7.2 Reading and reference material

1. Copy of D.M. Act
2. Copies of all G.Rs
3. Record of previous occurrences and case studies
4. D.M. Plan of city or district / village plans
5. Copies of all Word / Tahasil plans
6. Resource inventory of equipment available with District, Nagar palika, nagar panchayat, Tahasils, village and with private and NGOs (Ref IDRN)
7. Guidelines given by NDMA, NIDM, State Govt.
8. Reading and reference material along with case studies from outside Maharashtra
9. Directory of all essential tel. numbers
10. D.M. Plans of line departments such as MSEB, Irrigation, railway, Police and neighbouring districts with road map and essential s & R equipment in border area.
11. Details of shelters and facilities available in identified shelters.

Maps (all maps that of size 4 ft x 3 ft, coloured)

1. District map showing road, rail network
2. Tahasil maps showing road, rail network
3. Tahasil maps showing dams and rivers
   With villages on the bank of river.
4. Tahasil map showing Hazardous industries
5. Hazard Map of district and all Tahasils.
6. Tahasil map showing Resources such as- fire stations, rescue boats, S & R equipment, civil defence and home guards, S.T Depot, MSEB, food supply godowns, HT lines grids, etc

8.2.7.3 Logbooks/ Record books

1. Entry and exit in control room
2. Communication record of important call record
3. Wireless communication
4. Testing and maintenance record of various equipment (S & R, Battery, Gen Set, Electrical Equipment etc

5. Handing and taking over of shift
6. Record of faults
7. Record of equipment maintenance
8. attendance register
9. Inventory of equipment and furniture
10. Video conf. Facility usage record (Dept. Date, time, and duration of use)
11. Record of first information from various sources about occurrence of disaster situation.
12. Record of various trainings.
13. Record of cash received and utilization of same
14. Check in record (daily or routine check of communication equipment as per schedule)

A list of equipment that is essential for the Emergency Communication Centre of the EOC is given in below.

- Radio communications supported with capabilities on all public safety frequencies
- Amateur radios (multiple bands in UHF, VHF)
- Secure satellite telephone
- Doppler weather radar and infrared satellite imagery
- Quick-call and community siren warning system
- Emergency Alert System encoder/decoder
- Primary telephones, backup phone system and dedicated circuits
- Group paging terminals
- Fax machines
- Internet – leased line and Wi-Fi (using dongal)

Emergency Communication Centre – Essential Equipment

8.2.7.4 Back up Control Room

In case of rare incidents or disasters, the EOC building may be severely damaged and cease to function. In that case a backup EOC or a temporary set up can be used for coordination and control of emergency operation. In district, this alternative control room can be either from divisional commissioner office or nearby municipal corporation or in case of extreme situation, the control room can be shifted to nearby district HQ.

However, if IRS is formed and is established in the staging area, then this alternative control room can be operational from staging area itself.

8.2.8 Resource mobilization

The resources are normally identified at village and tahasil level as well as RDMC, municipal councils and corporations. The detailed information of available material and manpower is available on IDRN network. Also, it is attached in the annexure.

8.2.9 Seeking external help for assistance

In case of L2 or L3 level disasters, where the capacity developed at the local level or in the affected area is not adequate. Outside help is required and is called from surrounding tahasils or districts. These can be NDRF or SDRF or from nearby states. The army can also be called where the resources, equipment and manpower available with NDRF, SDRF is not sufficient and extent of affected area is large.

This can be asked after approval from DDMA and consent taken from SDMA or DMU, Mantralaya Mumbai.

Psyche Social care of affected population (Availability of psychosocial support service personnel that have the capacity to assist persons with disabilities affected by disasters)

District administration should identify the expert manpower of counsellors, psychiatrist etc. available in the district to provide psychosocial care in case of disaster. Trainings of task forces should be organized on psychosocial care with the help of experts from NIMHANS, AIIMS etc. so that they are capable of handling people in trauma.

8.2.10 First assessment report

Normally first assessment report is generated immediately after occurrence of the disaster. This is generated by local revenue department officer available at site (tahasildar, mandal adhikari or talathi) they are supported by gram sevek, police patil, teacher etc).

The first assessment normally gives first extent of damage (life, livestock or structure)

8.2.11 Media management / coordination / information dissemination

Mass media and communication system plays vital role in predicting and dissemination of information in advance. The communication system has significantly developed to a great extent in predicting and disseminating information about the disaster, there has been an impact on how public learns of and perceives the impact of disasters. Both the electronic and printing media has been linked to the disaster preparedness in awareness programs, warning dissemination, and evacuation, alerts government officials and in coordination with various stakeholders. Communication virtually links all the hazards mitigation process. The capabilities of communication, data gathering and data management technology have leaped forward in parallel with the increase knowledge about the origin and behaviour of natural hazards. The advancement in mass and telecommunication with technology had major contribution in forecasting and dissemination of information.

9 Reconstruction, Rehabilitation and Recovery Measures

In the post disaster situation, the normal life is disrupted and day to day activities including livelihood are affected, it becomes DDMA's responsibility to provide assistance to the affected community.

Even though Reconstruction, Rehabilitation and Recovery are primary responsibilities of the district administration, due to limited resources the DDMA needs to rely on state and central government directives and resources. For this, the guidelines issued by NDMA and NIDM are to be referred and suitably amended if required.

This reconstruction will be done after assessment of situation, type of disaster, number of people, family affected, and type of livelihood they have lost. In case of disasters such as earthquake, floods, building collapse, Landslides, the damage to human, animal and structure is imminent. In such cases the livelihood is also lost along with the home. In such cases it becomes priority of the government to undertake reconstruction of the affected community. This reconstruction can be in terms of relocating the community to different location or provide assistance to reconstruct their homes.

Reconstruction should also take into consideration to various businesses so that they can restart their business and go back to their normal life cycle. In this case government may give tax waivers, infrastructural facilities such as construction of road, communication, restore availability water, drainage system electricity etc. These measures will help to reconstruct businesses and bring back the normal life for business as well as for the people working.

The best-case study for reconstruction activity can be rehabilitation of landslide in village Malin in Pune district.

After reconstruction of the infrastructure, rehabilitation process comes into picture. In the structural part of rehabilitation- housing, school, health facilities and other basic civic amenities are developed so that, community can go back to their houses, area and start living. Whereas, in the non-structural rehabilitation, focus should be given on regenerating livelihood of the affecting communities. Livelihood needs to consider the needs of landless, farmers, local businesses, industries affected. While supporting communities for income generation activities, preference should be given to widow women, single parent mothers and women in general. For livelihood support, various government schemes can be used. For sustainability of these inputs and efforts, preferably support should be provided to beneficiaries through the self-help groups, farmer groups. In case of disaster where agriculture is severely affected, daily wage earners who are dependent on the agriculture works for livelihood are severely affected. As farmer has no resources to invest in the farming, daily wage earners are left without work. Also, as they do not have any land or business activities, they are not often covered under the compensations provided by the government. Therefore, the district administration should also take this part into consideration and use this workforce into reconstruction and other works as and when required. MGNREGA can be very effectively used to engage the productive workforce of the

community in the work. Otherwise, lack of work might divert them towards engagement into addiction, thefts etc.

DDMP will describe the strategy required to restore normalcy to the lives and livelihoods of the affected population as per the guidelines set by the NDMA and NIDM. These guidelines will be specific to the needs of the district and can be included in the DDMP after approval from DDMA.

Short-term reconstruction requires return of vital life support systems to minimum operating standards while long term rehabilitation will continue till complete redevelopment of the area takes place.

9.1 General Policy Guidelines

Recovery is usually decision making and taking actions after a disaster with a view to "restoring or improving life and assets of the disaster-stricken community, while encouraging and facilitating necessary adjustments towards disaster risk reduction. Recovery and reconstruction (R&R) or comprehensive rehabilitation is the final step in cycle of disaster management. In addition, this is the phase of new cycle, where the opportunity to reconstruction and rehabilitation should be utilized for building a better and more safe and resilient society. 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 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.

Post disaster reconstruction and rehabilitation should pay attention to the following activities for speedy recovery in disaster hit areas. The contribution of both government as well as affected people is significant to deal with all the issues properly.

9.2 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

9.3 Detailed damage and loss 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. Thus, damage assessment needs to be conducted into two phases:

a. Preliminary Damage Assessment, which is carried out instantly after a disaster,

b. Detailed Damage Assessment which is conducted before reconstruction and rehabilitation processes by the respective departments.

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.

9.4 PDNA District committee

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:

9.4.1 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.

9.4.2 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.

9.4.3 Sector Team

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.

9.5 PDNA Format

After a disaster, every intending department shall communicate the damage-loss assessment to the district authorities through proper channels. The following table can be filled or used after an event of disaster for damage and loss assessment:

Table 21 Department wise Template for PDNA

Power							
Service	Units Damaged	Villages Affected	Population Affected	Recovery Measure	Implementing Agency	Tentative Duration	Budget
Feeder							
Transformer							
HT Lines							
LT Lines							

Electric Poles							

Health

	PHC (Village Name)	Sub-PHC	Drug Store	Recovery Measures	Implementing Agencies	Tentative Duration (days to months)	Budget
No. of Health Centres Inaccessible							
Drugs and Medicine Destroyed							
Medical Equipment Damaged							

Socio-Economic

Village	Men	Women	Children	Houses	Shops	Recovery Measures	Implementing Agencies	Tentative Duration (Days to Months	Budget

Water Supply

Type	Village	Number of Units Affected	Recovery Measures	Implementing Agencies	Tentative Duration (months)	Budget
Well						
Borewells						
Ponds						
Water-supply Disrupted						
Contamination						
Pipeline Damaged						
Hand Pump						
Cattle Trough Damaged						
Reservoir Damaged						

Road and Transport

Road Damage	Location	Severity	Length of the Road	Implementing Agency	Tentative Duration (months)	Budget
Panchayat						
State Roads						
National Highway						
Nagar Palika						

Communication

Landline Connectivity						
Mobile Connectivity						
Wireless Tower						
Radio						

Food Supply

Type	No of Godowns damaged	Types of Grains Perished (tons)	Quantity of grain at risk (in tons)	Implementing Agencies	Tentative Duration (months)	Budget
Civil Supply						
AMPC						
Others						

Housing

Partial Damage		Fully Damaged		Recovery Measure	Scheme / Program	Implementing Agency	Tentative Duration (months)	Budget
Kutccha	Pucca	Kutcha	Pucca					

Public Utilities

Public Buildings	Partial Damaged	Fully Damaged	Recovery Measures	Program / Scheme	Implementing Agency	Tentative Duration (months)	Budget
Panchayat							
Education Buildings							
Anganwadi							
Hospitals							

Office Buildings							
Market							
Police Station							
Community Halls							

Agriculture					
Crop Failure (hectare)	Households effected	Recovery Measures	Implementation Agency	Tentative Duration (months)	Budget

The above table shall be used after the initial damage assessment by departments.

9.6 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.

Foster collaboration and knowledge-sharing among stakeholders to promote a culture of continuous learning and improvement in disaster management practices.

9.7 Administrative Relief

The district has essential but basic resources to respond to any natural calamity or hazard. The district level relief committee consisting of official and non-official members includes the local legislators and the members of parliament review the relief measures and make arrangements towards issue of essential commodities, group assistance to the affected people, damage assessment and administrating appropriate rehabilitation and restoration measures.

9.8 Reconstruction of Housing Units and Basic Infrastructure Rehabilitation

Housing reconstruction and rehabilitation is usually constructed at a new location or site. For this land acquisition may be done and a proper survey to check its vulnerabilities is also conducted. Houses should be reconstructed in the disaster hit areas according to the following directions:

- Public Private Partnership Program (PPPP). Under this programme, the houses are reconstructed by the NGO's for the beneficiaries to be registered in the joint names.
- All the houses should be insured.
- Reconstruction driven by the owners itself.
- Assistance (technical, financial and material) to be provided by the government.
- The designs for seismic reconstruction of houses provided by the government.
- The material assistance provided through material banks at subsidized rates.

Upgrading the existing damaged houses with the help of repairing and retrofitting is also part of reconstruction. Restoration of basic infrastructures like schools, offices, bridges may also be processed either on the damaged or the existing areas or on new relocated areas.

9.9 Economic Rehabilitation

Economic rehabilitation mainly focuses on restoring economic attributes and bringing about stability in the economic system. This can be done by creating livelihood options, reconstruction of the infrastructure, provisions of schemes to disaster affected communities, provision of essential capital like seeds, manure, livestock to communities to restart their livelihood activities like farming and agriculture. Employment opportunities for rehabilitation processes may also add to economic rehabilitation.

9.10 Social Rehabilitation

Social Rehabilitation mainly focuses of restoring educational facilities and institutions in the district, cultural places and socially deprived communities or population. For example, special medical support will be given to pregnant women's and lactating mothers. Special camps and orphaned children will be settled in foster care, and child-help lines will also be established. Aged people and women will also be provided with pensions and some reimbursements. Women maybe engaged in livelihood restoration projects and differently abled people will be given special treatments and will be kept under continuous supervision of the doctors.

9.11 Recovery Program:

9.11.1 Short-term recovery program:

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.

9.11.2 Long-term recovery program: Sustainable livelihood

Disaster recovery usually occurs in stages, with preliminary efforts committed to helping those affected and hence meeting up immediate needs for housing, food and water. As homes, business and economy are recovered, people return to work and societies persists with the rebuilding efforts. Many government agencies, voluntary organizations, and the private sector cooperate to provide assistance and support to the affected communities.

Some individuals, families and communities that are especially affected hard by a disaster, need more time and specialized assistance to recover and more dignified structure to support them to reach a standardized space. This phase of long-term recovery can also be termed as reconstruction and rehabilitation as now the focus of the authorities has shifted from short term needs to getting the normal lives of effected people on track. During this time the contribution of both government as well as affected people is significant to deal with all the issues properly. 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.

9.11.3 Matrix of Short Term and Long-term Recovery Programs

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

9.12 Insurance

Losses in terms of the revenues are very large after any disaster. Government needs to raise huge amount of funds for reconstruction, rehabilitation and recovery process. For this, insurance sector can support by and large to the affected community which in turn can reduce financial burden on the government. It is recommended that the government authorities ensure that all the likely losses should be covered under insurance. This includes insurance of animals, crops, construction, etc. This will help in reducing post disaster financial burden on the government.

10 Social Inclusion in Disaster Risk Reduction (DRR)

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, it's crucial for DRR initiatives to 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. Social inclusion, as defined by the World Summit for Social Development, 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 often 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 favour 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 in 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. 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.

10.1.1 Inclusion of LGBTQIA+ Communities

Including the LGBTQIA+ community in the social inclusion aspect of disaster risk reduction (DRR) in India is essential for creating a resilient and equitable society. This community often faces unique vulnerabilities during disasters, largely due to existing societal stigma, discrimination, and legal challenges. These issues can lead to inadequate access to emergency services, safe shelters, and healthcare, making them disproportionately affected during crises.

To address these challenges, DRR plans must incorporate specific strategies that cater to the needs of the LGBTQIA+ community. Firstly, emergency responders and disaster management personnel should receive training to understand and respect diverse gender identities and sexual orientations. This can help prevent discrimination and ensure that LGBTQIA+ individuals receive equitable treatment during emergencies.

Creating inclusive communication channels is another vital step. Disaster warnings, safety instructions, and relief information should be disseminated in ways that reach all community members, including those who may face barriers due to their sexual orientation or gender identity. Utilizing diverse platforms and inclusive language can help ensure that no one is left out.

Furthermore, safe shelter provisions need to be re-evaluated to ensure they are welcoming and secure for LGBTQIA+ individuals. Traditional shelter settings can often be unwelcoming or even hostile, so creating dedicated spaces or ensuring inclusivity within general shelters can make a significant difference.

Engaging LGBTQIA+ organizations in the planning and decision-making processes is also crucial. These organizations can provide valuable insights into the specific needs and challenges faced by the community, ensuring that DRR strategies are well-informed and comprehensive. Their involvement can enhance community trust and cooperation, which is vital for effective disaster response and recovery.

Incorporating LGBTQIA+ perspectives into DRR plans is not only a matter of social justice but also enhances the overall disaster resilience of the district. By recognizing and addressing the specific vulnerabilities of the LGBTQIA+ community, we can ensure a more effective and inclusive response to disasters. This holistic approach contributes to the development of a safer, more inclusive society, where every individual’s well-being is prioritized, and no one is left behind during times of crisis.

10.2 Schedule Caste 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), it's crucial to acknowledge the specific challenges faced by SC and ST communities. 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, further 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. Special 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 provides protection for 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 specific needs and priorities.

10.3 Children

The United Nations Convention on the Rights of the Child (1989) established legally binding international standards to safeguard the rights of children. 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 labour. Disruptions in education, access to food, and nutrition exacerbate their vulnerability. Post-disaster recovery efforts must prioritize the reopening of Anganwadi centres 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, along with 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 aging rapidly, with projections indicating that by 2030, there will be more people 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 age structure of the population are occurring due to factors such as increased life expectancy and better healthcare, leading to population aging. Although the proportion and size of the elderly population increasing over time however, the elderly face unique challenges during disasters, often being 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 key principles: recognizing the specific 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 the elderly 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 Person with Disability (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 are disproportionately affected by disasters due to 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 the property and assets of PwD.

11 Financial Resources for implementation of DDMP

This chapter would focus on the budget and other financial allocations made at district level in preparing and executing the disaster management plan, all relevant Government Orders (GOs) issued from time to time would find a reference here with important ones attached in Annexure.

(According to the Disaster Management Act, 2005, Chapter IX-No. 53, Finance, Account and Audit.)

11.1 Provision of funds by State Government

The State Government shall immediately after notifications issued for constituting the State Authority and the District Authorities, establish for the purposes of this Act the following funds, namely: -

- the fund to be called the District Disaster Response Fund.
- the fund to be called the District Disaster Mitigation Fund.

11.2 Emergency procurement and accounting

Whereby reason of any threatening disaster situation or disaster, the National Authority or the District Authority is satisfied that immediate procurement of provisions or materials, or the immediate application of resources are necessary for rescue or relief, -

- it may authorize the concerned department or authority to make the emergency procurement and, in such case, the standard procedure requiring inviting of tenders shall be deemed to be waived.
- a certificate about utilization of provisions or materials by the controlling officer authorized by the National Authority, State Authority or District Authority, as the case may be, shall be deemed to be a valid document or voucher for the purpose of accounting of emergency, procurement of such provisions or materials.

11.3 Linking with the development plans.

Disaster management is no more confined to revenue department. It is a subject of all the departments. The following activities have been considered in mainstreaming it into development activities.

1. The Disaster Management has been included in school curriculum at CBSE level.
2. The Disaster Management is also made compulsory to NSS / NCC students at college level. So that during disasters they can be called upon for certain help.
3. Various Disaster Management courses have been offered in different institutions, colleges, universities taking its significance into account.
4. In construction work the civil engineers have to follow Bureau of Indian Standards (BIS) to construct resistant structures.

5. Special budget at district, taluka and village level should be allocated for training of various teams against disaster, purchasing of equipment to save the life and property of the people, organizing mock drills to create awareness among the people, updating the disaster management plans, etc.
6. Government officers, staff are also trained under disaster management, so that their skill will be helpful at the time of disaster.
7. Earthquake resistant principle may be followed in Indira Awas Yojana, lifeline structures, all buildings may be insured by bank, private companies.
8. At district, taluka and Panchayat level the plan should be adopted to reduce the risk and vulnerability in various activities.
9. Fund allocation should be made by Zilla Parishad, Panchayat Samiti and Gram Panchayat to carry out the following DRM activities: -
    a. To train Search and Rescue, First Aid groups
    b. To create awareness among the people
    c. To procure search and rescue materials
    d. To evacuate and set up temporary shelter for disaster victims

11.4 Disaster Risk Insurance

Most of the insurance companies provide insurance for life and property. Many of them have covered animal and crops insurance also.

Insurance should be made mandatory for all (life and property as well as vehicles) as it can provide essential financial support to individual or family in case of loss of life or property or accident.

Proper insurance can reduce the burden on the government as govt. need to spend lots of amount in distributing humanitarian help in post disaster.

11.5 Other financing options

Other financing options for restoration of infrastructure / livelihoods, like utilization of flexi fund within Centrally Sponsored Scheme for mitigation/restoration activities in the event of natural calamities in accordance with the broad objective of the Central Sector Scheme.

12 Procedure and Methodology for Monitoring, Evaluation, Updation, and Maintenance of DDMP

The strategy of monitoring and evaluating the DDMP are given below:

- Standard reviews to be given on the execution of the plan.
- Examining the efficiency of the plan by applying it after any major emergency that occurs in the district.
- Maintaining the India Disaster Resource Inventory (IDRN) by staying updated and connected with the plan.
- Revising all the list of important personnel's and their roles and responsibilities in the field of DM, every six months.
- Plan should be easily available in the web and in hard copies.
- Plan needs to be disseminated among the entire stakeholders and the line departments, agencies and concerned organizations, so that they are made aware of their roles and responsibilities.
- Conduction regular drills and activities needs to be done in order to test the usefulness of the plan.

Regular training of officials responsible in implementation of the plan, and regular interactions with the army or any central government agencies for strengthening the plan.

12.1 Authority for maintaining and reviewing the DDMP

As a normal practice, in order to maintain correct information and adopt developments and new strategies, it is necessary to review the DDMP periodically. This timeframe can be set by DDMA during scheduled meeting or as and when required.

12.2 Monitoring and evaluation of the DDMP

The purpose of evaluation of DDMP is to determine

1. the adequacy of resources
2. co-ordination between various agencies
3. community participation
4. partnership with NGOs
5. The plan will be updated when shortcomings are observed in
6. Organizational structures
7. Technological changes render information obsolete
8. Response mechanism following reports on drills or exercises
9. Assignments of state agencies

Individuals and agencies assigned specific responsibilities within this Plan will prepare appropriate supporting plans and related standard operating procedures, periodically review and update alerting procedures and resource listings, and maintain an acceptable level of preparedness.

12.3 Post-disaster evaluation mechanism for DDMP

After documenting the event of disaster, the gaps identified and the shortfalls in the system will surface and are needed to be repaired. This should reflect in the next update of DDMP, so that the gaps are bridged in time which will help to reduce the losses which may incur in future disasters.

12.4 Schedule for updation of DDMP

The existence of a Disaster-preparedness plan plays a vital role during Disasters. The officials then have at their hand, a complete set of instructions which they can follow and also issue directions to their subordinates and the affected people. This has the effect of not only speeding up the rescue and relief operations but also boosting the morale of affected people.

Disaster plan is also useful at pre-disaster stage, when warnings could be issued. It also proves as a guide to officials at the critical time and precious time is saved which might otherwise be lost in consultations with senior officers and getting formal approval from the authorities.

Keeping all these points in mind the DDMP must be evaluated and updated by the district administration in normal time.

The DDMP is a “living document” and the Collector along with all line departments will update it every year taking into consideration. The following guidelines would be adhered to while updating the DDMP:

- A procedure would be in place to update the plan on a regular basis to ensure that the items requiring updating are considered.
- When an amendment is made to a plan, the amendment date would be noted on the updated page of the plan.

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.

A senior official in every agency is to be designated to ensure that all plan-holders are notified of changes as soon as possible. Plan-holders would be requested to verify that they have received the changes.

An annual conference for DDMP update will be organized by the Collector. All concerned departments and agencies would participate and give recommendations on specific issues

12.5 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.

12.6 Consultation with Key officials

For effective disaster management in the district, the District Disaster Management Authority (DDMA) Washim 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,

organizing, coordinating, and implementing disaster mitigation, preparedness, response, and recovery measures.

B. Emergency Operation Centers at sub-division and district levels to support disaster management efforts by coordinating information, resources, and services.

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.

12.7 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 familiarize 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 – Alignment with NDMA 2014 AND NDMP 2019

- 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 input 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.

12.9 Uploading of updated plans at DDMA/ SDMA websites

DDMA will be responsible for approval of DDMP and make it available on the website of the district administration, which will be open to public, as well as the references can be drawn which will help other stakeholders in case of emergency.

Conducting mock drills at district and sub district levels, at least annually, is important for the district as per approved Mock drill calendar. It would ensure that all parties understand their roles and responsibilities clearly and understand the population size and needs of vulnerable groups involving them in the actual exercise. It would also help to test the efficacy of the plans prepared. Based on feedback from such simulation exercises, the plans will have to be revised, and capacity would be enhanced to fill the gaps. While indicating the mock drill plan of action, it is essential to list down

12.10 Mock drills

All the departments should conduct mock drills at least twice a year- one for manmade and one for natural disaster.

Monitoring and gap evaluation

The outcome of the mock drill should be documented highlighting the gaps observed and lacunas in human resource and equipment.

Checking whether all the personnel involved in execution of DDMP are trained and updated on the latest skills necessary in line with the updated plans.

Check that the on –site /off-site emergency plan of major chemical, industrial and nuclear installations are received at DC Office.

13 Coordination Mechanism for implementation of DDMP

District Disaster Management Plan for the Pune is a public document. It is neither a confidential document nor restricted to any particular section or department of administration. The underlying principle of disaster management is that it has to be part of all departments, and none can fold fingers against it. The District Disaster Management Plan is the sum and substance of the *Horizontal and the Vertical* disaster management plans in the district. Horizontal plans included plans prepared by line departments such as Police, Fire Service, Municipal Corporation Department, Irrigation and Flood Control, Civil Defence, Department of Food and Civil Supplies, Public Works Departments etc whereas the Vertical plan includes Sub Divisional Plans, Community Plans, School/Hospital plans and all other logical units' plan at the lower level and State disaster management plans and National disaster management plans at the higher level. Preparation of plan is the ultimate responsibility of the District Disaster Management Committee (DDMA or the person / sub committee appointed by the DDMA in the district. The first draft plan is to be discussed in the DDMA and later the Chairman of the DDMA shall ratify it. The same procedure is to be followed in updating of the plan document. The district plan is to be updated biannually by the District Disaster Management Committee, or the s committee appointed by the DDMA. In order to update the document, all Vertical and Horizontal plans shall be collected and incorporated to the District Plan. After each biannual updation of the DDMP, version number shall be given serially. A copy of the updated document shall be circulated to each stakeholder of disaster management in district.

13.1 Intra and inter-Department coordination with horizontal linkages

Involvement of relevant departments in all three phases of handling of any emergency is extremely essential as management of disaster becomes effective if efforts are made jointly. Hence, all line departments need to work hand-in-hand and by following the guidelines of IRS.

This horizontal coordination should be as detailed into the tahsil & district plans and the SOPs set therein.

Depending upon the type of hazard, Incident Commander should depute his deputy. The officer so deputed shall be responsible for handling the disaster, advice the IC regarding the horizontal system established in his department, plan coordination, liaison with other line departments by communicating needs and gaps with horizontal equivalent officers.

This will be helpful in expediting the response process.

13.2 Coordination mechanism with other Stakeholders

The help from NGOs and VOs is extremely essential in pre, during and post disaster scenario. All the above-mentioned institutions can share the responsibility of district administration to generate awareness, spread early warning and act as first responders.

In the DDMC, it is essential that all these NGOS and VOs should be identified and their scope of work in terms of human Resource and material is listed so that, there should be no gap during actual implementation.

Table 22 List of NGOs in Pune

Sr. No.	Name of Organization	Taluka-District	Contact Person	Contact Number
1	Aapatti Vyavasthapak Sangh, Junnar	Junnar, Pune	Tejas Arun Shinde	9860709330
2	Sahyadri Search & Rescue Force	Bhor, Pune	Sachin Sadashiv Deshmukh	9272718008
3	Aapatti Vyavasthapak Sangh	Pimpri-Chinchwad, Pune	Santosh Nivratii Shelar	8087999980
4	Mulshi Aapatti Vyavasthapan Samiti	Mulshi, Pune	Pramod Pandit Balakwade	8390336688
5	Shivdurga Mitra Lonavala	Mawal, Pune	Sunil Vishnu Gayakvad	9822500884
6	Durgpremi Giribhraman Sanstha	Pune City, Pune	Yuvraj Annaso Kinije	8999962884
7	Shivtare Group	Purandhar, Pune	Vijay Shivtare	9822336106
8	Grace To India	Bhawani Peth, Pune, Maharashtra		020-26350107
9	Janhvi Foundation	Haveli, Pune	Vikram Babasaheb Gaikwad	9822940848

13.3 Coordination with block/ village level Task Force(s) with vertical linkages as also inter-block and inter-village coordination with horizontal linkages

During preparation of VDMP, the resources and manpower available at village level is also identified. The efforts are being made to train them and develop their capacity as village level task force, which will assist in block level emergencies. This task force in general will be composition of volunteers capable in various skills such as meson work, repairing of electrical equipment, first aid, firefighting, swimming (well, river, dam) etc.

In case of occurrence of any emergency, this task force should be capable to control the situation till the external resources reach to the location of incidence.

13.4 Coordination system with state departments and training institutes at state and district level

Disaster Management Unit at Mantralaya has well equipped control room and is connected to all district HQs, RDMCs and other emergency services.

In case of occurrence of any disaster even at village level, information is immediately sent to State Control Room.

If the situation is controllable by district administration, no assistance is requested from State Control Room.

In Case the situation is worse and beyond the control of district administration as well as outside agencies such as military, NDRF, SDRF; then only a request is made by DDMA to State Control Room for assistance.

State training institute is located at YASHADA Pune. This institute is responsible for policy advocacy to state and district governments. It prepares training module and conduct trainings to make all stakeholders aware about guidelines of NDMA & NIDM.

13.5 Intra-block and intra-village coordination

Coordination with local self-government (Panchayat Raj - Zila Parishad, intermediate level, if any, and Gram Panchayat and Urban Local Bodies).

The responsibilities of local authorities are already listed in the Act. However, these local authorities are required to function 'subject to the direction of district authority' (section 41 of the DM Act 2005); and ensure that all the employees are trained in disaster management. In case of any emergency, all LSGs should make available adequate manpower and resources to DDMA.

13.6 Linkage with DDMPs of neighbouring districts

In case, a disaster takes place in border area of districts, it is advisable to get assistance from neighbouring district which may have adequate infrastructure. This will be of double benefit of expediting response process and thus, reduce gravity of Disaster.

Such help from neighbouring district can be made from one district to the other district after approval from DDMA.

13.7 Linkage with SDMP

The SDMP focuses on larger scope and particularly on L2 L3 level disasters, where district administration might have their own limitations in terms of manpower and resource availability.

References are therefore, needed to be drawn from SDMP while preparing DDMP.

14 Standard Operating Procedures (SOPs) & Checklist

SOPs and checklists could be prepared for various stakeholders' effective response. These can be made based on the functioning of Emergency Support Function (ESF) groups or IRS. Depending on the hazard profile and level of exposure the district should decide in a participatory way the number of ESF covering all the above. The SOPs would briefly describe the following:

14.1 Revenue Department

14.1.1 Normal Time Activities

- A map of disaster-prone areas in the district, history of the district, geographical conditions occupational details, settlements, rain, irrigation and industries etc.
- Safe alternative routes to utilize during disaster in the disaster-prone areas.
- Key officers of all the departments, staff, vehicles and buildings.
- Details of control room arrangement.
- Details of geographical groups and assignment of Zonal Officer.
- Details of food grain storage places in the district and the Fair Price Shops.
- Details of vehicles, boats and equipment available in the district for rescue operation.
- Setting up of communication mechanism to communicate the messages from village to village.
- Details of operating systems for District Disaster Management Committee.
- List of NGOs and self-help groups and their addresses and phone numbers in the district in the prescribed annexure
- Orientation Training to various District level officers and departments for effective functioning of control room, coordination and operations.
- Details of salt pan workers and fishermen who can become the victims of Disaster and sufficient arrangement to contact the owners of saltpan.
- Special appointment of persons in charge of Control Room.
- Hazard analysis, seasons, possibilities of disasters and review of disaster history.
- Review of disaster-prone areas, risks, response plan, resource and utility of resources and equipment.
- Strategy for disaster management
- To update the DDMP
- To check condition of safe shelters in district and if necessary, repair the same in coordination with local authorities
- Repairing of roads and ways leading to safe shelters in co-ordination with concerned departments
- Evacuation plan as a part of DDMP.
- To undertake development projects like rural housing, scarcity of relief works,

disposal of rainwater, water conservation and rainwater harvesting.

- To co-ordinate scheme for poverty eradication, self-employment and the schemes of other departments.

14.1.2 On receiving the warning

- Will review the alarming situation in the meeting of DDMC.
- Work Distribution among available officers.
- Will review and coordinate to get every task done
- Will alert and make aware the functionaries related to early warning and communication
- Will ensure that messages are communicated to the members.
- Ensure operation of control room round the clock.
- Will send vehicles with public address system for top priority areas.
- Will instruct all the staff to hold positions at their respective places.
- Shifting the people living in low lying areas, seashores, and economically weaker people, socially & economically backward families and houseless families to safe places.
- Will work out the arrangements for search and rescue operation, shifting of people and utilization of human resources as per necessity with the help of DMTs and local community through zonal officers.
- Will arrange for temporary shelter for the people evacuated
- Will air such warning in advance.
- Will provide vehicles to shift people to safer places.
- Undertake the operation of forceful evacuation of people unwilling even after warning.
- Will arrange for food, drinking water, medicines at temporary shelters and relief camps with the help of local NGOs, doctors, industrial houses, etc.
- Will make advance preparation for relief activities through local NGOs, industrial houses and donors in addition to normal norms of relief.
- Will work out the financial estimates for search, rescue and immediate relief.

14.1.3 Post Disaster Activities

- Will segregate the villagers and isolate area of disaster
- Activate the DMTs.
- Will start relief activities including emergency relief material distribution, work out strategy of damage assessment and provide formats for the same.
- Will guide the team members about accident relief payments as per government rules and regulations.
- Will make arrangements for transportation and distribution of Govt. relief amount and materials.

- Will ensure that there is no haphazard distribution of relief material so that needy people are not deprived of it.
- Will arrange for drinking water and essentials at community kitchen / relief camps as per the necessity.
- Will work out primary estimates of the damage.
- Will undertake the rescue operations to save trapped people if any through DMTs, trained police personnel and swimmers.
- Will requisition more vehicles for rescue work, shifting people to temporary/permanent dispensary for treatment through DMTs, NCC, Home Guards, Local Police, and Paramilitary Forces etc.
- Will arrange for identification of casualties and preserve dead bodies till legal procedure is over.

14.1.4 Police Department

A. Normal Time Activities

Superintendent of Police will work as nodal officer for coordination of disaster management. He will prepare a separate and comprehensive plan of district as far as department of police is concerned. He will also prepare a list of resources as a part of DDMP on consideration of the following.

- Details of contacts of all the staff members in district.
- Maps and statistical data of district area.
- Human and other resources.
- Details of police staff, retired officers/staff of police department and the control room staff.
- Details of functions and responsibilities of district control room staff.
- Appointment of nodal officer in the control room.
- Ensure smooth traffic arrangement to and fro disaster affected area.
- Details of anti-social elements.
- Security arrangements at relief camps and food storages.
- Security for the transportation of the relief material.
- Immediate police procedures for human death.
- To assist the authorities for the evacuation of people from disaster affected areas.
- Adequate equipment for communication.
- List of swimmers.
- Wireless stations in the district and communication network.
- To update the related details of Disaster Management Plan.

B. On receiving the warning

- Shall remain in contact with the District Collector.

- Make advance preparation to implement the action plan for search and rescue.
- Will prepare a plan for police personnel for search and rescue.
- Will arrange to communicate the messages through all the equipment of communication and vehicles as per then necessity.
- Will requisite vehicles after obtaining the orders for the same from the district authorities.

C. Post Disaster Activities

- Will arrange law and order against theft in the disaster affected area.
- Will co-ordinate the search and rescue operation through NCC/VTF/NGO.
- Will arrange for security at the relief camps/relief materials storages.
- Will see the law and order is maintained at the time of distribution of relief material.
- Will assist the authorities for evacuation of people to the safer places.
- Will make do arrangements for postmortem of dead persons, and legal procedure for speedy disposal.

14.1.5 Health Department

A. Normal Time Activities

While preparing the DDMP / updating the same, the Health Department shall take care to include the following particulars carefully.

- A separate plan for disaster management as far as public health is concerned.
- Arrangements for exchange of information in the control room.
- Appointment of nodal officer.
- Advance arrangements for life saving medicines, insecticides and vaccines.
- Maintenance of vehicles such as ambulance, jeep and other equipment such as generators etc.
- Distribution of work by forming groups of staff during emergency.
- List of private practicing doctors / medical facilities.
- Arrangement for survey of disaster.
- Mobile dispensary units.
- Information regarding proper places for on-the-spot medical services in various villages during disaster.
- Dissemination of information among the people regarding the death, injury.
- Primary information of disaster related relief activities to all the staff members.
- Training to PHC / Community Health Centre staff to prevent spreading of diseases among the people, animals, and advance planning for the same.
- Blood group wise list of blood donors with contact telephone numbers and addresses.
- Training of DMTs regarding first aid.
- To prepare an action plan for the availability of equipment to be useful at the time of

disaster management for medical treatment.

- Co-ordination with various government agencies – schemes to meet the necessity of equipment in emergency.
- To see that all vehicles like ambulance, jeep and equipment like generators and equipment essential for health care are in working condition.

B. On receiving the warning

- Will ensure the availability of important medicines, lifesaving medicines, insecticides and if necessary, contact for additional supply.
- Round the clock control room at the district level.
- Will appoint health staff for duty in their areas as per the plan of disaster management.
- Activate the mobile health units for the post disaster situation.
- Will issue orders for immediate appointment of local doctors and local voluntary agency for emergency work.
- Will contact blood donors.

C. Post Disaster Activities

- Will provide first aid to injured
- Arrange for shifting of seriously injured people to the nearby hospital.
- Make available sufficient stock of medicines to the affected areas immediately.
- Will make arrangements for the available additional health staff in the affected areas deputed by the state authority.
- Will organize to get the insecticides & preventive medicines to curb spread of diseases.
- Will arrange for regular drinking water testing.
- Will depute the mobile units for first aid.
- House to house Distribution of chlorine tablets and other necessary medicines.
- Will shift the seriously injured people to the hospital.
- Will immediately start the procedure for postmortem of the dead bodies.

14.1.6 Water Supply Department

A. Normal time activities

The water supply dept. shall ensure the following to be included in the DDMP: -

- Setting up of control room and arrangement for the control room operator.
- Assign the responsibility as nodal officer to the Executive Engineer or any other officer.
- Prepare an alternative contingency plan to provide drinking water in case of failure of regular water distribution system during disaster.
- Detailed information of available water resources throughout the district.
- Make provision of water through Govt or private tankers.

- Preventive measures for water borne diseases and chlorination of water.
- Availability of safe drinking water in the affected areas.
- Inform the staff about the disaster.

B. On receiving the warning.

- Organize the teams to check the sources of water / drinking water.
- Standby arrangements of tankers for drinking water through tankers or any other available source.
- Will make available chlorine tablets insufficient quantity and arrange to distribute through DMTs.

C. Post disaster work.

- Implement the alternative contingency plan to provide drinking water in case of failure of regular water distribution systems during disaster.
- Will start work for immediate repairing of water pipes in case of damage.
- Will arrange to check the water tanks, overhead tanks, and pumps, reservoirs and other water resources.
- Will contact the electricity authorities to re-establish the electric supply in case of failure.
- Will provide chlorinated water either by activating group water supply schemes individual schemes or through tankers.
- Will provide drinking water to the relief camps / relief kitchens, shelters etc. through available resources.

14.1.7 Irrigation Department

A. Normal time activities

The irrigation department shall carefully include the following particulars while preparing/ updating the DDMP: -

- Contact address and phone numbers of all the staff / officers, vehicles and swimmers of the district.
- Details of irrigation related factors in the district such as rivers, pools, canals, large and medium dams, etc.
- Control room arrangements and appointment of Nodal Officer.
- Details of damage prone areas.
- Location of water level gauge station for flood situation.
- To disseminate information/warning to the damage prone areas in case offload situation.
- Details of immediate action to be taken in case of leakage from large water reservoirs.
- Supervision over major storage /reservoirs.
- Very clear explanation of disaster and priorities during disasters to all the staff.
- Effective working of control room at every major dam.

- Adequate and modern equipment for communication.
- Periodical checking of Dam /Wastewater canal –tunnel, roads leading to Dams etc. for maintenance during normal time.

B. On receiving warning

- Ensure that communication equipment like telephone, mobile phone, wireless set and siren etc. are in working condition.
- Keep the technical and non-technical staff ready and alert.
- Get status report of ponds, dam, canal and small dams through technical persons.
- Will take decision to release the water in consultation with the competent authority and immediately warn the people living in low lying areas in case of increasing flow of water or overflow.
- Keep the alternative arrangements ready in case of damage to the structure of dam / check dam to leakage or overflow in the reservoirs.
- Make do arrangements to disseminate the information about the increasing and decreasing water level whatever it may be to the community, media etc.
- A senior office will remain and work accordingly at large storage reservoirs.
- Will arrange to provide the dewatering pumps, generators, trucks and bulldozers, excavator, boats for search and rescue operations wherever required.

14.1.8 Water Supply Department

A. Post disaster work.

- Will obtain the clear picture of the condition of all the reservoirs through teams of technical officers.
- Ensure about no overflow or no leakage.
- If overflow or leakage is found, start immediate action to avoid adverse effect to the reservoir as per the action plan.
- If there is no possibility and risk, keep the people and media informed about “everything is safe”.
- If overflow or any leakage is found, he will immediately warn the people living in the low-lying areas.
- Will take due care for the transportation of drinking water if drinking water is provided through irrigation scheme.
- Will assist the local administration to use boats, dewatering pumps, etc. search and rescue operations.

14.1.9 Agriculture Department

A. Normal time activities

- All the details of his subordinate staff with addresses and phone numbers and resources of irrigation for agriculture in all the villages.
- Details of buildings, vehicles and equipment under his control and list of contractors with vehicles and equipment used by them.
- Maps showing details of agricultural resource laboratory, seed center, agriculture training school with statistical data.
- Details regarding agricultural production, extension, seed growth centres, agriculture university campus, training centres.
- Action plan regarding the repair/alternative arrangement in case of agricultural production related facilities are disrupted.
- Will prepare the action plans to avail the technical, semi technical and administrative employees along with vehicles from nearby district and taluka offices.
- Will inspect the sub-ordinate offices, other centres and sub-centres under his control, which are damage prone.
- Will prepare a sub-plan for timely and speedy availability of machines and equipment for restoration of the economic activities in case of loss of properties as well as crops.
- Will maintain the necessary equipment such as diesel generators, dumpers, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers, RCC cutters, cable wires, fire equipment, de-dusting equipment etc., which can be used during emergency and ensure every 3 months those are in working condition.
- Will prepare a list of public properties related to agriculture in the damage prone areas and will in advance make arrangements to lessen the damage.
- Will take due care to see that the emergency services at hospital, shelters, with special reference to agriculture are not disrupted.

B. On receiving warning

- Will immediately contact the District Control Room and will assist in the work assigned to him as a part of his duty.
- Will ensure that the staff is on duty, under this control and available at the headquarters.
- Will assign the work to his subordinate officers and staff the work to be done regarding agriculture under DDMP and will send them to their sites.
- Will receive instruction from the district liaison officer and will take necessary action.
- Will ensure the availability of resources included in the DDMP and will make due arrangement to get those during emergency.
- Will make groups having vehicles for emergency work and will assign the areas to them.
- Will set up a temporary Control Room for the dissemination of information for emergency work and will appoint a nodal officer.

14.1.9.1.1 C. **Post Disaster Activities**

- Will follow the instruction of the District Liaison Officer.
- Will carry out the duty assigned to him for search and rescue work.
- Will deploy the resources and manpower available to manage the disaster.
- Will review the matters regarding discontinuation of movement for safety measures and will see that it is restarted very soon.
- Will send DMTs with necessary equipment in case the crop is washed away, and if there is water logging in a very large amount.
- Will act in such a way that the human life is restored again speedily and timely in the priority areas.
- Will contact the circle office or central control room if machines equipment, vehicles, manpower, technical personnel are required to restore the agricultural activities.
- Will make arrangement to avail the external helps to manage to disaster.
- Will collect the details of loss of crops to send it to the district administration.
- Should have the details of village wise various crops in the district.
- Will prepare a primary survey report of crop damage in the area and will send the same to district control room and to the administrative head
- Will immediately put the action plan in real action during the emergency.

14.1.10 M.S.E.D.C

A. Normal time activities

While preparing a separate plan regarding M.S.E.D.C /Energy Department will prepare the list of available resource as a part of DDMP. It will include the following:

- Details of the staff members with their contact addresses and telephone numbers.
- Maps showing the power stations, sub-stations, Diversification of Power units (DPs), transformers and major electric lines with detail information.
- Other important details like water supply schemes pending on electricity, drainage systems, railway stations, bus-depots, ports, strategically important places, army, air force, navy camps, light houses, major hospitals and for that he will check and ensure of electric supply during emergency.
- Prepare an action plan for repairs *I* alternative arrangement in the case of electricity disruption as a part of DDMP.
- Inspect at every 3 months the power stations. Sub-stations etc; which are damage prone.
- The, plan should include for timely supply of electric poles, D.Ps, transformers etc; at the time of line disruption.
- To prepare an action plan for immediate procurement of the required tools and equipment for restoration of electric supply on temporary bases.
- To prepare a list of public properties related to M.S.E.D.C, which are in the damage prone areas and will make advance arrangements to minimize the damage.

B. On receiving the warning

- To contact the District Control Room and assist in their work.
- To ensure that all the employees remain present on duty at the taluka headquarter.
- To assign work to all officers/employees related to M.S.E.D.C.
- Will ensure to make available the resources available and will establish contacts for the same to deploy those at the time of emergency, which are included in the DDMP.
- To consult the District Liaison Officer to discontinue the supply in case of damage in the line or for the safety of the people and property.
- To make groups having vehicles for the emergency work and will assign the areas.
- To immediately set up a temporary control room in the office for dissemination of information during the disaster and will appoint a nodal officer from MSEDC for this work.

C. Post Disaster Activities

- To follow the instructions of the district liaison officer.
- To perform the duties assigned for the search and rescue work.
- To deploy the resources and manpower required for the disaster management.
- To dispatch the task forces with necessary equipment to the place where the electric supply is disrupted and ensures that the same is restarted at the earliest.
- Contact the circle office or the Central Control Room of MSEDC to procure the machines and equipment, vehicles, manpower, technical personnel for restoration of the electric supply.
- To utilize the external resources and manpower allotted to him in a planned manner for disaster management.
- To immediately undertake the emergency repairing work as mentioned in the action plan.
- To prepare a primary survey report regarding damage in the area and send the same to the district control room and to the own administrative head immediately.
- To make temporary arrangement for electric supply to the places like hospitals, shelter, jail, police stations, bus depots etc; with D.G. stein.

14.1.11 Public Works Department

A. Normal time activities

- Details of the staff members with their contact addresses and telephone numbers.
- Details of buildings, vehicles and equipment as well as the names of contractors and the vehicles & equipment used by them.
- Maps of the areas in the district with the statistical data related to available resources.
- The position of approach roads and other road of all the villages including bridges, railway crossing etc.

- To strictly observe the rules during the constructions regarding use of earthquake and cyclone proof materials.
- The PWD will inspect periodically the buildings, residences, high rise buildings under their control.
- Damage prone road bridges and arrangement for their inspection
- Action plan for emergency repairs.
- Will appoint an officer of the rank of Assistant Engineer to coordinate during emergency at the District Control Room.
- Will maintain the departmental equipment such as bulldozers, tractors, water tankers, dumpers, earthmovers excavator, de-watering pumps, generators, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers, RCC cutters etc; which can be used during emergency and will quarterly check-up these to ensure in working condition.

B. On receiving the warning

- Will immediately contact the District Control Room for assistance.
- Will ensure that all the staff members remain on duty at the headquarters.
- Will send the officers and the staff assigning them specific duties for the DDMP
- Undertake all the action for the disaster management required to be done by the PWD after receiving instructions from district liaison officer.

C. Post Disaster Activities

- Will follow the instructions of the District Liaison Officer
- Will remain active for search and rescue activities
- Will provide all the available resources and manpower for disaster management.
- Will mobilize the service of technical personnel for the damage survey work to help the district administration
- Will prepare a primary report of damage in the affected area within 12 hrs / 24 hrs looking to the emerging situation
- Will make arrangements for electricity, water, and latrines in the temporary shelters. Will also inspect the approach roads leading to the temporary shelter and repair the same if so required.

14.1.12 Department of Telecommunications

A. Normal time activities

- Details of the staff members with their contact addresses and telephone numbers.
- Details of buildings, vehicles and equipment including the contractors and the vehicles and equipment used by them.
- Maps showing the details of telephone exchanges, D.Ps, important telephone lines, hot lines, telex lines, microwave towers with statistical data.
- Details of telephone numbers of water supplies, Control Room, hospitals, drainage system, railway stations, bus depots, strategically important places, ports, Army, Air

force, Navy camps, Jail, Police Station and other sensitive places, light houses, major industrial units, and other communication channels which can be used during emergency.

- Action plan for repairs/alternative arrangement in case of disruption of telephone line and microwave towers.
- Inspect the telephone exchanges/sub-exchanges in the damage prone area at every 3 months.
- To appoint an officer not below the rank of telephone inspector to co-ordinate the district control room during emergency.
- To maintain the equipment such as diesel generators, dumpers, generator, cutters, tree cutters, ladder &, ropes, flood lights, shovels, axes, hammers, RCC cutters, cable wires, fire equipment, etc; which can be used during emergency and ensure every month that these are in working condition.
- To ensure that the telephone lines at the shelters, emergency hospitals, police stations, control room and other places of emergency services, which can be used during disaster, are not disrupted.
- To prepare a list of public properties related to the telephone department which are in damage prone areas and will make arrangements to lessen the damage.

B. On receiving the warning

- To contact the District Control Room and assist in the work.
- To ensure that the staff are on duty at the headquarters.
- To assign work to the subordinate officers asperse DDMP and send the mother sites.
- To receive the instructions from the District Liaison Officer and to do the needful.
- To ensure availability of resources included in the DDMP and establish contacts for the same during emergency.
- To setup a temporary control room for the exchange of information for emergency work and will appoint a nodal officer.

C. Post Disaster Activities

- To follow the instructions of District Liaison Officer.
- To perform the duties assigned for search and rescue work.
- To deploy the resources and manpower available to manage the disaster.
- To review the situation regarding disconnected telephone lines due to safety measures and re-establish the communication network as soon as possible.
- To send the Disaster Management Teams with the necessary equipment for restoration of the telephone lines speedily where the lines are disrupted and to such places, which are strategically important.
- To make arrangements to obtain external help to manage the disaster.
- To prepare a primary survey report of damage and to send the same to the District Control Room and to the administrative head within 6hours.
- To arrange for temporary hotline services or temporary telephone connections at the

District Control Room, hospitals, shelters, ports, jails, police station, bus depots, etc.

- To immediately undertake the emergency repairing work.
- To make an action plan to avail immediately and timely, telephone poles, D.Ps, transformer to the established the communication system.
- To prepare an action plan to avail temporarily, technical personnel from the nearby district, staff and vehicles from the district office which are not affected in consultation with the district authority.

14.1.13 Animal Husbandry

A. Normal time activities

- Addresses of members with telephone numbers.
- Details of veterinary centres, artificial insemination centres, veterinary dispensary, veterinary colleges' buildings, vehicles, mobile dispensaries and equipment and also the details of vehicles and equipment used often by outsource.
- Maps showing the details of animal breeding laboratories, animal vaccination centres, animal husbandry training school with statistical data.
- Details of essential facilities to be provided at sensitive place such as important animal husbandry centres, veterinary college campus, training center etc.
- Arrangement of repairs/alternative arrangements in case the facilities related to animal husbandry and veterinary services are disrupted.
- To make arrangements to necessary medicines, vaccines and other material, for treatment of animals.
- To collect the details of cattle in each village of the taluka, details of safe places for the treatment of animal, milk dairies, other private veterinary doctors and facilities related to it.
- To appoint an employee not below the rank of livestock inspector to coordinate the District Control Room during emergency.
- To maintain the equipment available such as stands to keep animals, sharp instruments, insecticides, diesel generators, dumpers, generator, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers, RCC cutters, cable wires, fire equipment , de- dusting equipment etc; which can be used during emergency and will also ensure that they are in working condition.
- To see that essential services related to animal husbandry and Veterinary services are not disrupted at the time of emergencies.
- To prepare a list of public properties related to animal husbandry, which are damage prone areas and will make advance planning to lessen the damage.

B. On receiving the Warning

- To immediately contact the District Control Room and will assist in the work.
- To ensure that the staff is on duty at the headquarters
- To assign the work to be done to the subordinate officers and staff and send them to

their sites.

- To receive instructions from the district liaison officer and do the needful.
- To ensure the availability of resources included in the DDMP and will make necessary arrangements to obtain those during emergency.
- To consult the Liaison Officer to prevent the probable epidemic among the cattle and for the safety measures.
- To make groups having vehicles for emergency work and will assign the areas totem.
- To set up a temporary control room for the exchange of information for emergency work and will appoint a nodal officer.

C. Post Disaster Activities

- To follow the instruction of the District Liaison Officer.
- To carry out the duty assigned to him for search and rescue work.
- To deploy the available resources and manpower to manage the disaster.
- To review the matters to restart the milk collection activity where it has been closed for security measures.
- To send DMTs with necessary equipment in case of cattle death are there in the affected areas for the disposal of carcass with a view to restoration of public life and result oriented work. To arrange to treat the injured cattle.
- To contact the State Director of A.H. if additional equipment vehicles, manpower, technical personnel etc; are required for restoration of the cattle related activities.

14.1.14 State Transport

A. Normal time activities

- Details of the staff with contact numbers, details of bus drivers, conductors, mechanical and supervisory staff.
- Details of location of buses in all the areas of the district available round the clock.
- Details of fuel arrangements for buses for emergency work.
- Do's and Don'ts to be observed strictly during emergencies and details of priorities should be given to the staff.
- Arrangement for additional buses for evacuation of people from the affected areas.
- Details of buildings, vehicles and equipment under his control and list of contractors with vehicles and equipment used by them.
- Map showing S.T. depots, pick up stand, control point, S.T. garages and important routes with equipment of communication, telephone line, telex lines, megaphone, amplifiers with statistical data.
- Details of important telephone numbers of water supply schemes, control room hospitals, drainage system, railway stations, bus depots, strategically important places, ports, Army Air force Navy camps and other sensitive places, light houses,

major industrial units, and other communication channels which can be used during emergency/calamity.

- Action plan regarding repairs/alternative arrangement in case of disruption of transport services.
- Alternative routes for the transportation and road network.
- To inspect the damage prone S. T. Depots, pick up stand, control points, garages etc; at the frequency of every three months.
- To plan out for restoration of goods transportation in case of damages observed to the buses & parcel van.
- To prepare an action plan to procure temporary buses, the technical personnel from the nearby district which are not affected.
- To maintain the equipment available such as cranes, diesel generator, earth over machines, de-dusting pumps, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers, RCC cutters, etc. which can be used during emergency and will ensure that those are in the working conditions.
- To take due care to see that the transportation at shelters and emergency hospital is not disrupted during calamities.
- To prepare a list of public properties related to transport department, which are in the damage prone area and will arrange in advance to minimize the damage.

B. On receiving the warning

- To set up a temporary special control room and information centre at the main bus station.
- To immediately contact the district control room and will assist in the work.
- To ensure that the staff at the headquarter is on duty.
- To assign the work to be done by the subordinate officers and staff regarding transportation under DDMP and to send them to their sites.
- To receive instructions from the district liaison officer and will do the needful. To ensure for not allowing passenger buses to move out of the S.T. Depots during final warnings of cyclone, flood etc; to take safety measures for passengers who cannot return to their home.
- To ensure the availability of resources included in the DDMP and will make do arrangements to get those during emergency.
- To consult the Liaison Officer to close the transportation in the damage prone areas for the safety of the people and the property.
- To make groups having vehicles for emergency work and will assign the areas to them.
- To set up a temporary control room for the dissemination of information for emergency work and will appoint a nodal officer.
- To make available the sufficient number of S.T. buses to the state administration for the evacuation of the people to safe places from the disaster-prone areas.

- To assist the administration to send the messages of warning to the remote areas through the drivers/conductors on transport routes.

C. Post Disaster Activities

- To follow the instructions of District Liaison Officer.
- To carry out the duty assigned for search and rescue work
- To engage the resources and manpower available to manage the disaster.
- To review the matter regarding closing of movement of buses for safety reason and see that those are restarted very soon.
- To send DMTs with necessary equipment if the transportation is disrupted.
- To contact the District Control Room if additional equipment, vehicles, manpower, technical personnel, which are required to restore the transportation related activities.
- To prepare a primary survey report on damage in the area and will send it to the district control room and to the administrative head within 6hours.
- To make temporary arrangement of transportation for control rooms, hospitals, shelters, bus depots etc.
- To immediately undertake repairs needed at the bus stations.
- To collect the details of roads, damaged and will get them repaired
- In co-ordination with competent authority and will restore the bus services.

14.1.15 Forest Department

A. Normal time activities

- Addresses of members with telephone numbers.
- Details of veterinary centres, artificial insemination centres, veterinary dispensary, veterinary colleges' buildings, vehicles, mobile dispensaries and equipment under his control and the details of vehicles and equipment used often by outsource.
- Maps showing the details of area with statistical data.
- Approach roads under forest department and their condition including bridges, causeways, railway crossing etc.
- Inspection of damage prone roads, bridges, check dams, causeways, under forest department
- To inspect periodically the buildings, residencies, high causeways under forest department
- To maintain the equipment available such as sharp instruments, insecticides, diesel generators, dumpers, generator, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers, RCC cutters, cable wires, fire equipment, de-dusting equipment etc; which can be used during emergency and will also ensure that they are in working condition.
- To take care of public shelters, other places to be used for evacuation with primary facilities like water

- To prepare a list of public properties in the damage prone forest areas and will make advance arrangements to lessen the damage.

B. On Receiving the Warning

- To immediately contact the district control room and will assist in the work.
- To ensure that the staff at the headquarter is on duty.
- To assign the work to be done by the subordinate officers and staff regarding transportation under DDMP and to send them to their sites.
- To arrange for wireless, telephones, manpower, forest guard in advance to disseminate information of the disaster in the damage prone areas and will play a key role with the district administration to warn the public.
- To make in advance arrangement for fuel wood and bamboos for priority areas.

C. Post Disaster Activities

- To follow the instructions of District Liaison Officer
- To carry out the duty assigned for search and rescue work.
- To engage the resources and manpower available to manage the disaster.
- To prepare a primary report of damage for the affected areas.
- To take actions to provide electricity, water and latrine to the temporary shelters in the forest areas.
- To send task forces with vehicles, tree cutters, ropes, flood light, generator in case of closure of roads due to felling of trees.

14.1.16 Airport Authority

A. Normal time activities

- Details of the staff with their address and phone numbers, details of port workers, securities, mechanics and supervisory staff. Details of location of ports & jetties in all the areas of the district working round the clock.
- Details of fuel arrangement for ships-mechanized launches at the time of emergency.
- Do's and Don'ts to be observed during emergencies and details of priorities should be given to the staff.
- Set up for evacuation of people from affected area of the port area.
- Details of buildings, vehicles and equipment and list of contractors with vehicles and equipment.
- Map showing ports, Jetties, light houses, signals, as well as important routes, communication equipment, telephone line, telex lines, megaphone, amplifiers with statistical data.
- Details of important telephone numbers of water supplies, control room, hospitals, drainage system, railway stations, bus depots, strategically important places, Army Air force Navy camps and other sensitive places, light houses, major industrial units, and other communication channels which can be used during emergency.

- Arrangement for transportation & evacuation of people from the affected areas.
- Action plan regarding repairs and alternative ways in case of disruption of transportation.
- Plan showing the alternative routes and arrangement for transportation of goods etc; during emergencies.
- To inspect the port, jetties, lighthouses, signals, pick up stand, garages, control point etc; which are damage prone.
- To make do arrangement for materials to restore the facilities in case the movement of the materials and goods on the ports are damaged.
- To prepare an action plan to avail on temporary bases, the technical personnel from the nearby district which is not affected. Will also collect the details of swimmers in the district.
- To make arrangement for sufficient fuel during emergency.
- To maintain the equipment available such as cranes, diesel generator, earth mover machines, de-dusting pumps, cutters, tree cutters, ladders, ropes, flood lights, shovels, axes, hammers, RCC cutters, etc. which can be used during emergency and will ensure that those are in the working conditions.
- To take due care to see that the transportation at shelters and emergency hospital is not disrupted during calamities.
- To prepare a list of public properties related to transport department, which are in the damage prone area and will arrange in advance to minimize the damage.

B. On receiving the warning

- To set up a temporary special control room and information centre at the main bus station.
- To immediately contact the district control room and will assist in the work
- To ensure that the staff is on duty at the headquarter.
- To assign the work to be done by the subordinate officers and staff regarding transportation under DDMP and to send them to their sites.
- To specifically take action to ensure that the port workers, tourists and fishermen do not move out for fishing as well as sailing during the final warnings of cyclone, flooded.
- To evacuate the fishermen and saltpan workers to a safe place and if they deny, to get it done forcefully.
- To ensure that the warning signals are received in time and shown immediately to the people.
- To undertake the work of search and rescue and the relief work in co-ordination with Navy Coastguard.
- To ensure the availability of resources included in the DDMP and will make do arrangements to get those during emergency.
- To consult the liaison officer to close the ports and sailing in the sea, which is damage prone or dangerous for the safety of the people as well as the property.

- To assist the administration to send the messages regarding warning to the remote area as well as the coastal areas through the port staff.

C. Post Disaster Activities

- To follow the instructions of District Liaison Officer.
- To carry out the duty assigned for search and rescue work.
- To engage the resources and manpower available to manage the disaster.
- To review the matters regarding closing of movement at the port for safety measures and will ensure that it is restarted very soon.
- To contact the district control room if additional equipment, vehicles, manpower, technical personnel are necessary to restore the port related activities.
- To prepare a primary survey report of damage and send it to the Control Room and to the administrative head.
- To collect the details of ports, jetties, light houses as well as approach roads connecting the damaged ports and will get them repaired in co-ordination with the competent authority and will help for restoration of the economic activities pertaining to ports.

A. Normal Time Activities

- Maintain updated records of staff, including addresses and phone numbers. This includes airport workers, security personnel, mechanics, and supervisory staff.
- Document the locations of all airport facilities, including terminals, runways, hangars, and maintenance areas.
- Ensure arrangements for fuel supply for aircraft and ground support equipment during emergencies.
- Provide staff with detailed do's and don'ts during emergencies and establish clear priorities.
- Develop and regularly update evacuation plans for passengers and staff from affected areas.
- Keep an inventory of buildings, vehicles, equipment, and a list of contractors with vehicles and equipment.
- Create maps showing airport facilities, important routes, communication equipment, and emergency exits.
- Maintain a list of important telephone numbers, including water supply, control room, hospitals, drainage system, railway stations, bus depots, military camps, major industrial units, and other communication channels.
- Plan for the transportation and evacuation of people from affected areas.
- Develop action plans for repairs and alternative routes in case of transportation disruptions.
- Regularly inspect airport facilities, including terminals, runways, control towers, and other critical areas.
- Ensure materials are available to restore facilities if damaged.

- Prepare an action plan to temporarily avail technical personnel from nearby unaffected districts.
- Ensure sufficient fuel supply during emergencies.
- Maintain equipment such as cranes, diesel generators, earth movers, pumps, cutters, ladders, ropes, floodlights, shovels, axes, hammers, and RCC cutters in working condition.
- Ensure transportation to shelters and emergency hospitals is not disrupted during calamities.
- Prepare a list of public properties related to the airport that are in damage-prone areas and arrange to minimize damage in advance.

B. On Receiving the Warning

- Establish a temporary special control room and information center at the main terminal.
- Immediately contact the district control room and assist in coordination.
- Ensure staff is on duty at the headquarters.
- Assign tasks to subordinate officers and staff regarding transportation under the Disaster Management Plan (DMP) and send them to their sites.
- Ensure that airport workers, tourists, and others do not move out during final warnings of cyclones or floods.
- Evacuate people to safe places and enforce evacuation if necessary.
- Ensure warning signals are received and communicated to the public promptly.
- Coordinate search and rescue operations with relevant authorities.
- Ensure the availability of resources included in the DMP and arrange for additional resources if needed.
- Consult with the liaison officer to close the airport if necessary for safety.
- Assist in sending warning messages to remote and coastal areas through airport staff.

C. Post-Disaster Activities

- Follow the instructions of the District Liaison Officer.
- Carry out assigned duties for search and rescue operations.
- Engage available resources and manpower to manage the disaster.
- Review safety measures and ensure the airport is reopened as soon as possible.
- Contact the district control room if additional equipment, vehicles, manpower, or technical personnel are needed.
- Prepare a primary survey report of damage and send it to the control room and administrative head.
- Coordinate with competent authorities to repair damaged facilities and restore economic activities.

14.2 Checklist of Various Department

14.2.1 Preparedness Checklist for the District Collector

- Preparation of the DDMP with the assistance of DDMO.
- Setting up District Control Room.
- Under the DDMP, district level agencies would be responsible for directing field interventions through various agencies right from the stage of warning to relief and rehabilitation.
- At the disaster site, specific tasks to manage the disaster will be performed.
- Collector will be an integral part of the DCR.
- Collector will be assisted by SOC.
- SOC will be headed by a Site Manager.
- Site Manager will co-ordinate the activities at various camp sites and affected areas.
- The site Operations Centre will report to the District Control Room.
- The Collector will coordinate all the field responses which include, setting up Transit Camps, Relief Camps and Cattle Camps.

14.2.2 Preparedness Checklist for the Police Department

- The department is familiar with the disaster response plan and disaster response procedures are clearly defined.
- Orientation and training for disaster response plan and procedures undertaken.
- Special skills required during emergency operations imparted to the officials and the staff.
- Reviewed and updated the precautionary measures and procedures, the precautions to be taken to protect equipment, the post-disaster procedures to be followed.
- Adequate warning mechanisms established for evacuation.
- An Officer has been designated as Nodal Officer for Disaster Management.
- Sources of materials required for response operations have been identified.

14.2.3 Preparedness Checklist for the Health Department

- The department is familiar with the disaster response plan and disaster response procedures are clearly defined.
- Orientation and training for disaster response plan and procedures undertaken.
- Special skills required during emergency operations imparted to the officials and the staff.
- Reviewed and updated the precautionary measures and procedures, the precautions to be taken to protect equipment, the post-disaster procedures to be followed.

- A hospital plan for the facilities, equipment and staff of that hospital based on "The Guide to Health Management in Disasters" has been developed.
- Hospital staff is aware of which hospital rooms /buildings are damage-proof.
- All the staff of the hospital has been informed about the possible disasters in the district, likely damages and effects, and information about ways to protect life, equipment and property.
- An area of hospital identified for receiving large number for casualties.
- Emergency admission procedures with adequate recordkeeping developed.
- Field staff oriented about DDMP, standards of services, and procedures for tagging.
- An Officer has been designated as Nodal Officer for Disaster Management.
- Sources of materials required for response operations have been identified.

14.2.4 Preparedness Checklist for M.S.E.D.C

- The department is familiar with the disaster response plan and disaster response procedures are clearly defined.
- Orientation and training for disaster response plan and procedures undertaken.
- Special skills required during emergency operations imparted to the officials and the staff.
- Reviewed and updated the precautionary measures and procedures, the precautions to be taken to protect equipment, tempo ST disaster procedures to be followed.
- An Officer has been designated as Nodal Officer for Disaster Management.
- Sources of materials required for response operations have been identified.

14.2.5 Preparedness Checklist for Water Supply Department

- The department is familiar with the disaster response plan and disaster response procedures are clearly defined.
- Orientation and training for disaster response plan and procedures undertaken.
- Special skills required during emergency operations imparted to the officials and the staff.
- Reviewed and updated the precautionary measures and procedures, the precautions to be taken to protect equipment, the post-disaster procedures to be followed.
- Adequate warning mechanisms for informing people to store an emergency supply of water have been developed.
- Procedures established for the emergency distribution of water if existing supply is disrupted.
- An Officer has been designated as Nodal Officer for Disaster Management.
- Sources of materials required for response operations have been identified.

14.2.6 Preparedness Checklist for Irrigation Department

- The department is familiar with the disaster response plan and disaster response procedures are clearly defined.

- Orientation and training for disaster response plan and procedures undertaken.
- Special skills required during emergency operations imparted to the officials and the staff.
- Reviewed and updated the precautionary measures and procedures,
- the precautions to be taken to protect equipment, the post-disaster procedures to be followed.
- Flood monitoring mechanisms can be activated in all flood's prone areas from 1stofJune.
- All staff is aware of the precautions to be taken to protect their lives and personal property.
- Each technical assistant has instructions and knows operating procedures for disaster conditions.
- Methods of monitoring and impounding the levels in the tanks evolved.
- Methods of alerting officers on other dam sites and the district control room, established.

15 Annexure:

1. Administrative Division of District

Headquarter	Pune District
District Control Room	Collector Office - 1077
Total Area	15,643 sq kms
District Geographical Coordination	Between 17° 54′ and 19° 24′ North latitudes and 73° 19′ to 75° 10′ East longitudes
District Boundaries	North: Ahmednagar district East: Solapur district South: Satara district West: Raigad district Northwest: Thane district

Taluka Name	**Area in Sq. Km**	**Headquarter**	**No. of Villages**	**No. of Cities**	**Gram Panchayat**	**Name of Municipal**
Ambegaon	1,344	Ghodegaon	235	1	128	Ghodegaon Municipal Council
Baramati	1,382	Baramati	118	1	97	Baramati Municipal Council
Bhor	1,338	Bhor	186	1	102	Bhor Municipal Council
Daund	1,290	Daund	155	1	105	Daund Municipal Council
Haveli	1,290	Pune	150	1	100	Pune Municipal Corporation
Indapur	1,440	Indapur	135	1	110	Indapur Municipal Council
Junnar	1,560	Junnar	200	1	120	Junnar Municipal Council
Khed	1,200	Rajgurunagar	180	1	115	Rajgurunagar Municipal Council
Maval	1,290	Vadgaon	170	1	110	Vadgaon Municipal Council
Mulshi	1,090	Paud	140	1	90	Paud Municipal Council
Pune City	450	Pune	0	1	0	Pune Municipal Corporation
Purandar	1,200	Saswad	160	1	100	Saswad Municipal Council
Shirur	1,290	Shirur	150	1	100	Shirur Municipal Council
Velhe	1,080	Velhe	120	1	80	Velhe Municipal Council

2. Demographics:

Particulars	Total	Male	Female
Total Population	9,429,408	4,924,105	4,505,303
Sex Ratio	915 females per 1000 males	-	-
Sex Ratio of 0-6 age	883 females per 1000 males	-	-
Population Density	603 per sq. km	-	-
Urban Population	5,751,182	2,975,361	2,775,821
Rural Population	3,678,226	1,948,744	1,729,482
SC/ST Population	1,529,579	781,887	747,692
Total Disabled Population	120,000	67,200	52,800

3. Hazard Wise Exposure village, population

Sr No	Hazard Type	Taluka	No of Villages	List of Villages	Population (approx)
1	Flood	Haveli	5	Mundhwa, Kharadi, Vadgaon Sheri, Yerwada, Dhanori	150,000
2		Baramati	4	Baramati, Malegaon, Morgaon, Nira	120,000
3	Drought	Indapur	6	Indapur, Bhigwan, Walchandnagar, Nimgaon Ketki, Kalas, Baramati	80,000
4		Junnar	3	Junnar, Otur, Alephata	50,000
5	Earthquake	Pune City	10	Shivajinagar, Kothrud, Karve Nagar, Deccan, Pashan, Aundh, Baner, Balewadi, Hinjewadi, Wakad	500,000
6		Khed	4	Rajgurunagar, Chakan, Alandi, Moshi	70,000
7	Landslide	Ambegaon	23	Malin, Ghodegaon, Kalewadi, Ambwane, etc.	50,000
8		Maval	15	Ghutke, Naiphad, etc.	30,000
9	Man-Animal Conflict	Junnar	5	Junnar, Otur, Alephata, etc.	20,000
10		Shirur	3	Shirur, Ranjangaon, etc.	15,000

4. Seasonality of Disaster

Disaster	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Earthquake	■	■	■	■	■	■	■	■	■	■	■	■
Floods						■	■	■	■			
Cyclones	■	■			■	■	■	■		■	■	■
Heatwave						■	■	■	■			
Cold wave	■										■	■
Epidemics	■	■	■	■	■	■	■	■	■	■	■	■
Industrial Accidents	■	■	■	■	■	■	■	■	■	■	■	■
Fires	■	■	■	■	■	■	■	■	■	■	■	■
Road Accidents	■	■	■	■	■	■	■	■	■	■	■	■
Lightning						■	■	■	■			
Drought			■	■	■	■						
Human Animal Conflict	■	■	■	■	■	■	■	■	■	■	■	■

5. Nodal Agency for early warnings

Sr. No.	Competent Agencies	Contact Details	Disaster Type	Nodal Agency for Early Warnings
1	Pune Municipal Corporation	020-25501000	Urban Flooding	Indian Meteorological Department (IMD)
2	District Disaster Management Authority (DDMA)	020-26123371	Earthquakes, Floods	National Disaster Management Authority (NDMA)
3	Pune Fire Department	101	Fire	Pune Municipal Corporation
4	Public Health Department	020-26127394	Health Emergencies	Health Department, Maharashtra
5	Public Works Department (PWD)	020-26122114	Infrastructure Damage	Public Works Department
6	Police Department	100	Law and Order	Police Department, Maharashtra
7	Irrigation Department	020-26122114	Flood Control	Irrigation Department, Maharashtra

6. Post Disaster Damage and Need Assessment

Sr. No.	Sector	Damage Types	Source of Fund
1	Agriculture	Crop loss due to floods	State Disaster Response Fund (SDRF)
2	Infrastructure	Road and bridge damage	National Disaster Response Fund (NDRF)
3	Housing	Damage to residential buildings	Pradhan Mantri Awas Yojana (PMAY)
4	Health	Damage to health facilities	State Health Department
5	Education	Damage to schools and educational institutions	Sarva Shiksha Abhiyan (SSA)
6	Water Supply and Sanitation	Damage to water supply systems	Jal Jeevan Mission
7	Power	Damage to electrical infrastructure	State Electricity Board
8	Livelihood	Loss of income due to disaster	Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
9	Environment	Soil erosion and deforestation	Ministry of Environment, Forest and Climate Change
10	Transport	Damage to public transport systems	Ministry of Road Transport and Highways

7. Emergency Contact No

Sr. No.	Name	Contact Details
1	Pune District Collectorate	020-26122114
2	Police Control Room	100 / 112 / 020-26126296 / 020-26122880
3	District Civil Hospital	020-26121446
4	Fire Brigade	101 / 020-26451707 / 020-26450601
5	Child Helpline	1098
6	Emergency (Revenue Services)	1077 / 020-25506800 / 020-25501269
7	National Emergency Medical Services (Ambulance)	108
8	District Health Authority	020-26058996 / 020-26058935
9	District Animal Husbandry Authority	020-25690484
10	State Electricity Distribution Company	1912 / 19120 / 1800-233-3435 / 1800-212-

Sr. No.	Name	Contact Details
		3435

District Collector Office Pune					
Sr. No.	**Officer's Name**	**Department**	**Designation**	**Mobile Number**	**Telephone Number**
1	Dr. Jitendra Dudi	District Collector Office Pune	District Collector and District Magistrate	9783802020	020-26114949
2	Mr. Suhas Mapari		Additional District Collector	9689931508	020-26124137
3	Mrs. Jyoti Kadam		Resident Deputy Collector	7796277777	020-26122114
4	Dr. Rajendra Bhosale	Pune Municipal Corporation Pune	Commissioner		020-25501103
5	Mr. Shekhar Singh	Pimpri Chinchwad Municipal Corporation	Commissioner		020-27425511/12/13
6	Mr. Amitesh Kumar	Pune Police Commissioner Office	Police Commissioner	9823133300	020-26125396
7	Mr. Vitthal Banote	Disaster Management Cell	District Disaster Management Officer	8975232955	020-26123371
Zila Parishad Officers					
Sr. No.	**Officer's Name**	**Office Name**	**Designation**	**Mobile Number**	**Telephone Number**
1	Mr. Gajanan Patil	Zilla Parishad Pune	Chief Executive Officer		
2	Mr. Chandrakant Waghmare	Zilla Parishad Pune	Additional Chief Executive Officer		020-26051478
3	Mrs. Shalini A. Kadu	District Rural Development Agency	Project Director		020-26131784
4	Mr. Shrikant Kharat	General Administration	Deputy Chief Executive Officer (General Administration)		020-26134806
5	Mr. Mahesh Avatade	Finance Department	Chief Accounts and Finance Officer		020-26135426
6	Mr. Vijaysingh Nalawade	Gram Panchayat Department	Deputy Chief Executive Officer (Village)		020-26131984
7	Mrs. Bhagyashree Bhosale	Zilla Parishad Pune	Assistant Group Development Officer		020-26131984
8	Mr. Ashok Barku Pawar	Agriculture Department	District Agriculture Development Officer		020-26133626
9	Mr. Appasaheb Gujar	District Water and Sanitation Mission	Deputy Chief Executive Officer (Water and Sanitation)		020-26052938

10	Mr. Jamsingh Bijesingh Girase	Women and Child Welfare Department	District Program Officer (Women and Child Development)		020-26054299
11	Mr. Baburao Pawar	Construction Department South	Executive Engineer (South)		020-26133425
12	Mr. Shankar Darade	Construction Department North	Executive Engineer (North)		020-26133485
13	Mr. Gaurav Borkar	Minor Irrigation Department	District Water Conservation Officer (Minor Irrigation)		020-26131605
14	Mr. Sanjay Naikade	Primary Education	Education Officer (Primary)		020-26137144
15	Mr. Bhausaheb Karekar	Secondary Education	Education Officer (Secondary)		020-26050733
16	Mr. Amit Patharwat	Rural Water Supply Department	Executive Engineer (Rural Water Supply)		020-26055129
17	Mr. Praveen Korgantiwar	Social Welfare Department	District Social Welfare Officer		020-26131774
18	Mr. Sachin Desai	Health Department	District Health Officer		020-26129965
19	Mr. Ganesh Dhere	Mechanical Department	Deputy Engineer (Mechanical)		020-26052771
Sub-Divisional Officers					
Sr. No.	**Officer's Name**	**Office Name**	**Designation**	**Mobile Number**	**Telephone Number**
1	Mr. Sanjay Asawale	Sub-Divisional Officer Haveli	Deputy Collector	8852800664	020-26330832
2	Mrs. Sneha Kisve-Devkate	Sub-Divisional Officer Pune City, Shirur	Deputy Collector	9604146186	020-26060472
3	Mr. Surendra Navale	Sub-Divisional Officer Maval, Mulshi	Deputy Collector	7020046461	020-26122239
4	Mr. Vikas Kharat	Sub-Divisional Officer Bhor, Velha	Deputy Collector	8830333748	02113-224456
5	Mrs. Varsha Landge	Sub-Divisional Officer Purandar	Deputy Collector	8408089376	02115-222079
6	Mr. Minaj Mulla	Sub-Divisional Officer Daund	Deputy Collector	7620448001	02115-222079
7	Mr. Govind Shinde	Sub-Divisional Officer Junnar, Ambegaon	Deputy Collector	9423116611	02133-223044
8	Mr. Jyogendra Katayare	Sub-Divisional Officer Khed	Deputy Collector	8007711711	02135-222039
9	Mr. Vaibhav Navadkar	Sub-Divisional Officer Baramati, Indapur	Deputy Collector	8308637322	02112-224385
Tehsil Offices					
Sr. No.	**Officer's Name**	**Office Name**	**Designation**	**Mobile Number**	**Telephone Number**
1	Mr. Suryakant Yewale	Tehsil Office Pune City	Tehsildar	9422948008	020-24472850
2	Mr. Kiran Survase	Tehsil Office, Haveli	Tehsildar	9004995999	2024472348
3	Mrs. Archana Nikam	Tehsil Office, Pimpri Chinchwad	Tehsildar		020-27642233
4	Mr. Vikram	Tehsil Office, Maval	Tehsildar	8888113931	02114-235440

	Deshmukh				
5	Mr. Ranjit Bhosale	Tehsil Office, Mulshi	Tehsildar	9850030074	020-22943121
6	Mr. Balasaheb Mhaske	Tehsil Office, Shirur	Tehsildar	9209134616	02138-222147
7	Mr. Sachin Patil	Tehsil Office, Bhor	Tehsildar		