DISTRICT DISASTER MANAGEMENT PLAN FOR

SOLAPUR – VOLUME 1




DISTRICT DISASTER MANAGEMENT DEPARTMENT,

SOLAPUR - 2022

Foreword

An event which is caused naturally, leads to destruction of property and loss of human life is called as a Natural Disaster. Natural Disasters can take place at any given time of the year and has the potential to destroy the large regions. Even though technologies are developing to forecast such events there are limitations to these efforts. Therefore, a lot of resources are spent on mobilization activities after an event of a natural disaster. For such large-scale mobilization drive one has to pre-plan operations and carve out an exit strategy which helps the very last person in need. This requires pre-disaster planning, monitoring of disaster events, awareness campaigns, etc.

Solapur district is regarded one of the largest districts in the state of Maharashtra. It has witnessed events of naturals disasters like the flooding of 2005-06, frequent draughts and latest being the Covid-19 outbreak. These events have resulted into heavy losses in terms of infrastructure, human life and resources. Many villages get affected and few displaced in due to such disasters. Manmade disasters caused by human negligence are equally important.

To curb the effects of disasters, and to deal with the challenges that arise in a post disaster scenario the Maharashtra Disaster Risk Management Program has been implemented in the district of Solapur. The disaster awareness has been sought from district level to village level. There have been guidelines prepared for an action plan which will be implemented according to the specific requirements of various natural disasters, mobilization of resources and its execution so the disaster management teams can work efficiently in the worst of the scenarios.

I hope that the disaster management teams, which comprise of the bravest of the citizens, will make use of the SOP as well as the guidelines and contents provided and enable themselves to work in the most challenging environments.

Mr. Milind Shambarkar

Collector, Solpaur

Foreword

Natural Disasters have been evident to us since the known mankind. They have been the sole reasons sometimes that have civilizations destroyed. Natural disasters, hence should be treated on the utmost priority. Now with climate change being an eminent threat to the mankind the events of natural disasters have become evident like never before.

The government of Maharashtra has implemented the Maharashtra Disaster Risk Management Program in the Solapur district in order to cater to the growing threat of climate which has resulted in severe draughts as well as untimely rains and flash flooding.

The district of Solapur is one of the most important districts in the state. Any disruptions in the district affect the state's performances. Therefore, there are provisions made in program where in the administrative hierarchy of the district has been provided with adequate exposure to the pre-disaster and post-disaster scenarios and resource mobilization in emergency scenario.

This disaster management plan aggregates the disasters the district is exposed to and provides guidelines with action plans for frequent disasters. This will help the disaster management teams to work with a coordinated effort in disaster scenarios. The administration can take informed decisions, while being proactive in managing disasters.

I wish the administrative set ups and disaster management teams make use of the information provided in this document and apply it for the safety of the populations during all phases of disasters.

Mrs. Shama Pawar

Resident Deputy Collector, Solapur

Executive Summary

Disaster Management is an important aspect in the developmental planning, which guides the direction and the investments in development sector. The aim of disaster management is safety of populations with quality and dignity of life. Disasters can rupture the developmental process by its scale and repercussions.

Disaster Management Act 2005 states the importance of preparing the Disaster Management plan for all the administrative authorities for their jurisdiction. Section 25, sub section (1) defines District Disaster Management authority which initiates the preparation of District Disaster Management Plan under section 31.

This document is prepared for Solapur District, its municipal councils by studying the area through various perspectives of social, economic, and environmental aspects. The document encompasses various aspects of disaster management and various methods used to collect and synthesize data. The process of formulating hazard identification is through studying various primary and secondary sources of data available. The process of carrying out vulnerability and capacity analysis is in conjunction with various stakeholders from the government and private sector. The risk analysis is formulated as per the concept of H X V – C = R. Different methodologies are adopted to formulate the risk analysis, hazard, vulnerability and available capacities are studied exhaustively. Solapur district is in a medium risk zone, with moderate exposure to threats of disasters. The identified major disasters of the district were further studied for formulating the prevention, mitigation, and preparedness strategies as per the analysis deduced from the HVCA and the guidelines given by NDMA.

This document should serve the purpose of furthering the action planning for any disaster threat. The document is compiled in three volumes, with the first volume as disaster managements plan, second volume as maps and the third being the compiled list of phone numbers. The effectiveness of the document is to read it conjunction with other volumes for action planning purpose. We sincerely thank for the opportunity of serve the people of Solapur district and hope this exercise will help them in maintain their safety.

Road Map of the Document

The document covers the Disaster Management plan of Solapur district which is presented as Volume 1. The study is conducted and documented as per the NDMA guidelines.

The initial chapters of the Disaster Management plan are common which represent the aim, scope and methodology adopted for the study. The focus is then on different chapters for the 11 Municipal Councils of the district.

Solapur district is studied for its demographic and socioeconomic and cultural profile and on the basis of this the Hazard, Vulnerability, Capacity and Risk Analysis is formulated. The plan incorporates the Prevention, Mitigation, and Preparedness measures, Reconstruction, Rehabilitation, and Response Measures for Solapur district.

The chapters for Financial Resources for implementation of DDMP, procedure and methodology for monitoring, evaluation, updating, and maintenance of DDMP, Coordination Mechanism for implementation of DDMP, Standard Operating Procedures (SOPs) and checklist are common to all the municipal councils of Solapur. Recommendations are formulated in the last chapter, after studying the entire process of disaster management of the district.

Maps of all the tehsils are presented in Volume 2 and the list of phone numbers is compiled in Volume 3.

Index

Chapter 1 Introduction

1.1 Background

Solapur has a glorious historical and political past. It has rich social traditions. The city has developed at a great pace in the past three decades. The political, social, industrial, and educational changes have brought about many developments in the city. To render the process of development seamlessly, it's necessary to prepare a strategy for managing the disasters and preparing for the worst case scenarios.

A **disaster** is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. In contemporary academia, disasters are seen as the consequence of inappropriately managed risk. These risks are the product of a combination of both hazard/s and vulnerability. Hazards that strike in areas with low vulnerability will never become disasters, as is the case in uninhabited regions.

Developing countries suffer the greatest costs when a disaster hits – more than 95 percent of all deaths caused by hazards occur in developing countries, and losses due to natural hazards are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries.

Disaster management is the effort of communities or businesses to plan for and coordinate all personal and materials required to either mitigate the effects of, or recover from, natural or man-made disasters, or acts of terrorism. Disaster management does not avert or eliminate the threats, although their study is an important part of the field. Events covered by disaster management include acts of terrorism, industrial sabotage, fire, natural disasters (such earthquakes, hurricanes, etc.), public disorder, industrial accidents, and communication failures.

The Document briefly studies every aspect of Disaster Management for the Solapur district including all its 11 tehsils and Solapur City

1.2. Aim of the Document

The aim of the document is to prepare a guideline mechanism to augment the impacts of susceptible disasters. This document aims at making a Disaster Management (DM) plan for Solapur and its municipal councils integrating the plans of all the villages, dovetailing with the overall analysis of the hazard, vulnerability and capacity of the tehsils, and plans to achieve disaster reduction in terms of prevention and to prepare strategy of Preparedness and Mitigation, to minimise losses to human life and property.

1.3. Scope of the document

1. Scope with which this DM Plan has been created is as under:-

    (a) Identifying Hazards, Vulnerabilities, Capacities and Reduce Risks as they exist currently, for each tehsil and giving overall risk status for each tehsil.
    (b) Identify preventive mechanism at all levels for different hazards.
    (c) Identify mitigation measures so that the risk due to each hazard is reduced.
    (d) Identify preparedness levels for speedy incorporation into actionable tasks to attain the level of preparedness so that response mechanism is strengthened. This would include organizational structures and resource management and pre-deployment of resources.
    (e) Identifying specific actions for all departments and individuals and to co-opting agencies for easy operationalization of contingency plans, to make it convenient for all functionaries to know what to do, when, where and how.
    (f) Setting up such procedures that would help speedy recovery.

2. This document should be augmented, separately, by creating a detailed resource inventory and contact details. During warning periods and active disaster phase, this inventory and contact details should be effectively used for issuing warning/ orders and deploying resources at the disposal of the Solapur District Disaster Management Authority.

1.4. Methodology used for Preparing the Document

1.4.1. Methodology: The process of plan-evolution has been done as per the following methodology

(a) The process started with studying the district from different perspectives and identifying the risks to the city.

(b) To achieve this stress was on the primary and secondary data collection, many formats and questionnaires were prepared to collect the data and techniques were selected to analyse it.

(c) The geological and climatic data of Solapur District was collected for study. The development of Solapur district in terms of population, demography, economic and socio-cultural (including religious and political) aspects, growth of industries, road communications and natural layout was studied.

(d) The basic data from all tehsils under Solapur District Disaster Management Authority jurisdiction was collected for analysis.

(e) The primary was collected through questionnaire surveys, interviews, and workshops. The administrative perspective was gathered through interviews and workshops, and the people centric approach adopted the methods of questionnaire survey and key stakeholders interviews..

(f) The listing of Vulnerable Areas and Vulnerable Points from their administrative, economic, political, and socio-cultural aspects was identified.

(g) Further, hazard and vulnerability of each division was analysed and existing capacities in terms of infrastructure, facilities, resources, spaces and the capacity of the population in terms of individuals, groups, and informal associations was studied and analysed.

(h) The prevention, preparedness and mitigation measures are devised as per the guidelines given by NDMA

(i) The capacity building measures are formulated as per the findings of the study in consultation with the stakeholders

(j) This document summarizes the recommendations based on the need generated by the study in consultation with the stakeholders.

1.5. Disaster Management Act 2005

The Disaster Management Act, 2005, (23 December 2005) No. 53 of 2005, was passed by the Rajya Sabha, the upper house of the Parliament of India on 28 November, and by the Lok Sabha, the lower house of the Parliament, on 12 December 2005. It received the assent of The President of India on 9 January 2006. The Disaster Management Act, 2005 has 11 chapters and 79 sections. The Act extends to the whole of India. The Act provides for "the effective management of disasters and for matters connected therewith or incidental thereto."

The Act calls for the establishment of National Disaster Management Authority (NDMA), with the Prime Minister of India as chairperson. The NDMA may have no more than nine members including a Vice-Chairperson. The tenure of the members of the NDMA shall be five years. The NDMA which was initially established on 30 May 2005 by an executive order was constituted under Section-3(1) of the Disaster Management Act, on 27 September 2006. The NDMA is responsible for "laying down the policies, plans and guidelines for disaster management" and to ensure "timely and effective response to disaster". Under section 6 of the Act it is responsible for laying "down guidelines to be followed by the State Authorities in drawing up the State Plans".

State Disaster Management Authority

All State Governments are mandated under Section 14 of the act to establish a State Disaster Management Authority (SDMA). The SDMA consists of the Chief Minister of the State, who is the Chairperson, and no more than eight members appointed by the Chief Minister.

District Disaster Management Authority

The Chairperson of District Disaster Management Authority (DDMA) will be the Collector or District Magistrate or Deputy Commissioner of the district. The elected representative of the area is member of the DDMA as an ex officio co-Chairperson (Section 25).

1.6. Disaster Management Terminologies, Concepts and Policies

Definitions: It is important to understand certain definitions so that the users of this plan have a common platform of understanding. Definitions have undergone changes. The latest understanding at global level is being given here along with explanations where required.

(a) **Hazard**: Any living or non-living being, a process or a natural phenomenon that has the capacity to cause damage, destruction, and loss to life and property or to economy or land forms due to its existence or occurrence or continuation is considered to be a hazard. Hazard is analysed as a function of 'Probability of Occurrence', 'Frequency of Occurrence' and 'Intensity' (or strength) with which the hazard can cause ill-effects.

(b) **Vulnerability**: It is that section of living beings, infrastructure or material or land forms that would have to bear the consequences of any hazard, is known as the vulnerable elements. The degree to which these vulnerable elements are present in a given area that suffers from the consequences of a hazard is termed as the vulnerability.

Vulnerability is a function of population density, infrastructure, and material density within an area over which a hazard is effective. (The ability of these elements to withstand ill-effects of the hazard is not considered as a function of vulnerability any more. It is being considered as a function of capacity).

(c) **Capacity**: Capacity is a measure that indicates the capacity of a community, Govt. or a Nation to withstand the possible consequences of any hazard. The capacities could be in the form of preventive capacity, capacity to mitigate and reduce the risks, capacity to respond speedily, and the capacity to recover from the ill-effects of any hazard.

(d) **Risk**: The living/ non-living beings, infrastructure, and material that would actually be subject to loss/ damage/ destruction, out of the total vulnerable elements are counted as 'Risk'. The risks could be of many kinds – Risk to lives, Risk to infrastructure in terms of destruction, damage to crops and processes are all categorised under "Physical Risks". The economic losses and cost of reconstruction/ rehabilitation and compensation are termed under "Economic Risks" while the socio-cultural impacts are considered under

"Socio-Cultural" Risk. Risk has to be deduced in terms of actual loss or damage suffered/ likely to be suffered.

(e) **Disaster**: Disasters have been defined differently by different experts. But, the most comprehensive and widely acceptable definition that has also been accepted in India is – An event that causes such extensive loss/ damage/ destruction that it upsets the normalcy of a society and it takes extra ordinary efforts by the stake-holders to make the society get back to the state of normalcy.

(f) **Prevention**: It is the canvas of actions that help in reducing the probability of occurrence of a hazard.

(g) **Mitigation**: All actions, structural or non-structural, to ensure that even if a hazard occurs, its consequences in terms of damage/ losses/ destruction are minimum (such that the normalcy is not disturbed appreciably, thereby the disaster is at a low end of its spectrum). The aim of any mitigation is to firstly prevent a hazard from becoming a disaster and secondly to ensure reduction of risk to keep the losses/ damages/ destruction to a minimum level).

(h) **Response**: Actions that entail a reaction by the stake-holders to overcome the adversity of a disaster (and hazard) through speedy and adequate evacuation/ rescue and immediate relief activities such that the loss of lives and infrastructure is minimised.

(i) **Recovery**: This is a process of bringing a society back to a basic state of normalcy (before commencing rehabilitation or reconstruction and further development).

(j) **Compensation**: It is the monetary allotment against the cost of the services/ material received from any source or to help a victim of a disaster to recover faster and adequately and rehabilitate.

(k) **Rehabilitation**: It is the activity of bringing back to physical normalcy a victim who has suffered due to the onset of a disaster, in terms of offering a place of residence, allowing regeneration of livelihood through a job/ economic activity for sustaining of life.

(l) **Resource**: Any individual human or a group/ organisation or material or land that is used for preparedness, evacuation, rescue, relief, rehabilitation or reconstruction or even to facilitate the processes mentioned above.

(m) **Emergency Support Functions**: All functions by a govt. stakeholder to support prevention/ mitigation/ Response/ Recovery and Rehabilitation before or during or after onset of a disaster.

(n) **Command**: It is a function to direct a resource and cater to its optimum use. It is a responsibility given to the stake-holder who is in command and the stake-holder exercises functional authority over the resource and also is responsible for maintaining the effectiveness of the resource and orders its utilisation. The resource(s) placed under the command of a stake-holder is bound by legal duty to function as per the directions given by the stake-holder in command of that resource.

(o) **Control**: It is the authority and responsibility through which a stake-holder directs operational (tactical) activities, distribution, efficiency, and methods of utilisation over any resource.

(p) **Warning**: A communication given to the vulnerable or response elements regarding probable occurrence of a hazard/ disaster so that protective/ response measures could be taken in time to reduce vulnerability through evacuation or by moving to safety. It also could be about an occurred hazard/ disaster such that the response mechanism could be activated effectively with speed. (The contents of a warning could be different for the vulnerable elements and for the response forces).

1.7 Profile of Solapur

a) History

It is believed that Solapur was formed out of a confluence of 16 villages that is why, “Sola” which means sixteen and “Pur” which means a village. The present city of Solapur was considered to be spread over sixteen villages viz. Aadilpur, Ahmedpur, Chapaldev, Fatehpur, Jamdarwadi, Kalajapur, Khadarpur, Khandervkiwadi, Muhammadpur, Ranapur, Sandalpur, Shaikpur, Solapur, Sonalagi, Sonapur and Vaidakwadi. The district has witnessed several

ruling dynasties such as Andhrabhratyas, Bahamanis, Chalukyas, Rashtrakutas and the Yadavas.

However, recent studies from the inscriptions of the Shivayogi Shri Siddheshwar temple, the town was called “Sonnalage” which later also came to be known by the name of “Sonnalagi” till the time of the Yadavas. The inscriptions found on the Solapur Fort show that the town was known as Sandalpur.

Later, during the Muslim rule, the town came to be known by the name Sonalpur. The importance of Solapur is unique in the history of India in the sense that this district enjoyed the freedom even before independence. The citizens of Solapur enjoyed the Independence for three days from 9th to 11th May 1930. Many citizens lost their lives in the Police firings. Due to this the rate mob attack the Police Stations, out of fear the Police and other officers ran out of Solapur. During this period the responsibility of law, order and security of citizens was on the shoulders of congress party leaders. The then congress president, Shri. Ramkrishna Jaju, with his other congressmen maintained the law and order for a period of three days from 9th to 11th May 1930.

b) Geography

Following are the geographical features of the Solapur district.

Area: 14844.6 sq.kms. (4.82% of the total area of Maharashtra State). 338.8 sq.mts (2.28%) comprises of the urban area whereas 14505.8 (97.72%) is identified as the rural area.

Biggest Taluka: Karmala consuming 1609.7 sq.km.

Smallest Taluka: North Solapur consuming 736.3 sq.km.

Location: Latitude: 17.10 degrees to 18.32 degrees north

Longitude: 74.42 degrees to 76.15 degrees

Neighbouring districts:

North: Ahmednagar and Osmanabad district

South: Sangli district and Bijapur district (Karnataka State)

West: Satara and Pune district

East: Osmanabad district and Gulbarga district (Karnataka State)

Terrain: Scattered hills in Karmala, Madha and Malshiras Talukas. Flat and undulating terrain characterises the geography of the region.

Sr. No.	Name of Taluka	No. of villages	Area in sq.kms.
01.	North Solapur	54	736.30
02.	South Solapur	90	1195.30
03.	Akkalkot	135	1390.30
04.	Barshi	138	1483.10
05.	Mangalwedha	81	1140.90
06.	Pandharpur	95	1303.60
07.	Sangola	103	1549.90
08.	Malshiras	112	1522.20
09.	Mohol	104	1408.40
10.	Madha	117	1544.90
11.	Karmala	118	16 09.70

c) Climate and Rainfall

Category of climate classification: Arid and Semi-arid climate

Highest Temperature: 46 degree Celsius

Coldest Temperature: 12 degree Celsius

Month	Min	Max	Mean
January	16.3	31.5	23.9
February	18.5	34.3	26.4
March	21.9	37.7	29.8
April	24.8	40	32.4
May	25.4	40.2	32.8
June	23.6	34.6	29.1
July	22.7	31.8	27.2
August	22.2	31.4	26.8

September	22	32	27
October	20.8	32.7	26.8
November	18.4	32.1	25.2
December	15.8	31	23.4
Year	21	34.1	27.5

Average annual rainfall: 561.41 mm, Highest rainfall taluka: Barshi- 642.65 mm

Month	**Millimeters**	**Inches**	**Days**
January	6	0.2	0
February	2	0.1	0
March	8	0.3	1
April	15	0.6	1
May	35	1.4	3
June	120	4.7	7
July	120	4.7	8
August	135	5.3	9
September	175	6.9	9
October	95	3.7	5
November	20	0.8	1
December	7	0.3	0
Year	745	29.3	45

d) Geology and Soil study

Sr. No.	Relief Division	Area in Sq.km.	Percentage of Total Geographical Area of the Region
01.	The Hilly Region	497	3.34
02.	The Plateau Region	11916	80.00
03.	The Lowland Region	2482	16.66
	Total District	14895	100.00

Relief features: The district lies in the basins of the Nira, Bhima, Sina and Mann rivers. Most of the Malshiras taluka in the west drains northwards into the Nira river which falls into the Bhima River in the west of the district. The drainage area of the Bhima which winds south-east through the district includes on the left bank Karmala, Madha, Pandharpur, Mohol and South Solapur and on the right bank Malshiras, Sangola, Pandharpur and Mangalvedha. The Sina which flows roughly south-east, parallel to the Bhima, drains eastern Karmala, central Madha, Barshi, eastern Mohol and Solapur North and South.

Classification of soils is done in 3 types: Black, Coarse Grey and Reddish soil**.**

The topography of the district is divided into 3 natural zones.

Zone	District	Classification
Eastern Zone	Barshi, North Solapur, South Solapur, Akkalkot Taluka	Medium to deep Black soil. Main crops grown are Jowar, Bajra and Pulses
Central Zone	Mohol, Mangalvedha, East Pandharpur, Madha Taluka	Moderate soil and uncertain rainfall. Both Kharif and Rabbi crops are grown
Western Zone	Karmala, Sangola, Malshiras, Western Pandharpur	Shallow and Poor soil. Rabbi crops are grown in the zone. Kharif crops such as Bajra and Groundnut are grown.

e) Socio-Cultural Scenario

Solapur, lies on the border of the states of Maharashtra, Karnataka and Andhra Pradesh and is also known as the “Gateway to South India.” That is why the district is home to not only the Marathi people, but also to Kannada, Guajarati’s and the Telugu people. That is why this blended mix of different cultures has resulted in a cultural diversity throughout the district. It has also resulted in being an important economic centre. The food culture in Solapur is a mix of different states. Apart from the very obvious Marathi cuisine one can find ample of Guajarati and South Indian food.

f) Economic Scenario

Agriculture is the main occupation of the people. Cotton textile has been an important occupation since the 20th Century but the sector has seen its entire cotton textile mills shut although new factories have come up. Solapur district has around 6000 powerloom industries out of which 300 establishments are registered under Mumbai Shops and Societies Act 1948 and other 3000 are registered under Factories Act 1948.Solapur chaddars (the bedding accessories) and towels are famous worldwide due to its unique designs and quality. The localities like Pandharpur, Tuljapur, Gangapur and Akkalkot home many small and medium scale industrial houses that have been seen here for years. Solapur District has 28 sugar factories which makes it the highest number of sugar factories in the state. The largest beedi-producing industry in Maharashtra State is in the district of Solapur. The district homes around 115 units of 29 different beedi factories. There are other well know cottage and small scale industries in Solapur like tanning industry, wool weaving, oil mills, rope making, bamboo industry, kumkum making etc.

g) Educational and Health Scenario

The district has its own university, known as 'Solapur University', with more than 1000 schools and 134 colleges. The quality of education is at par with the cities of Pune and Mumbai and there many more schools springing up. There are a total of 132 hospitals in the district which consist of PHC's, urban hospitals and rural hospitals.

h) Administrative Setup

District Administration Setup: The Solapur district comprises of 6 Revenue Sub-Divisions, 11 Revenue Tehsils, 91 Revenue circle and 1144 Revenue villages.

The administration of the Taluka is run by the Tehsildar. They in turn report to their respective Sub Divisional Officers and the District Collector. The overall administration of a Sub-Division is taken care by a Sub-Divisional Officer and they in turn report to the District Collector.

District Collector / District Magistrate is mainly responsible for the District Administration. The District Collector is assisted by Resident Deputy Collector and the Sub-Divisional Officers to maintain the law and order in the district. The Tehsildar of the Taluka is responsible for

the law and order situation in their respective Talukas. The flow of instructions/orders is mainly from the Collector to S.D.O.'s and then to Tehsildars

i) Land use Pattern

- Agricultural Area – 11480 sq.kms.
- Cultivable not in use – 380 sq.kms.
- Non-agricultural – 690 sq.kms.
- Grass Lands and Herbs – 720 sq.kms.
- Forest Cover – 350 sq.kms.
- Wastelands – 1260 sq.kms.
- Drought prone areas (All eleven talukas) – 14844.6 sq.kms.

j) Religious and Tourist Places

Velapur -Velapur, which is a small village in Solapur district, is around 32 km away from Pandharpur. The north east of this village possesses a very famous temple of historical importance. The temple that resonate ancient beauty is constructed in the Hemandpathi style of architecture. There are twenty stone memorials around the temple along with its shrine.

Revansiddheshwar Mandir - RevanSiddheshwar Mandir, which is a combination of three major attractions, is an important tourist hotspot in the Solapur district of Maharashtra. As this temple is located near the Moti Baug Talao (Lake) and the Great Indian Bustard Sanctuary in Nannaj. There is an idol of the great saint in the basement on the inside of the temple's chamber. The shrine is covered by many chambers made in stone.

Hazrat Shah Zahur Dargah - Hazrat Shah Zahur's dargah is a renowned Muslim religious spot that are visited by numerous pilgrims and tourists. This mosque is dedicated to the famous Islamic saint Hazrat Shah, who was famous for performing numerous miracles.

Sant Damaji of Mangalwedha -The Sant Damaji Temple is a famous pilgrim spot in Solapur district of Maharashtra. This temple is dedicated to the great saint- Shri Sant Damaji and is

located in Mangalwedha city, which is 55 km away westwards and around 25 km away from the holy desitnation of Pandharpur.

Hotagi - Hotagi is a beautiful little city, which is extremely close to Solapur, within the state of Maharashtra. The place is famous for Sai Baba Temple, which is a renowned pilgrim location for Hindu devotees.

The Ramalingeshwar Mandir - The Ramalingeshwar Mandir, which is located about 70 km away from Solapur is a beautiful shrine. You can see the peaceful and calm vibes that surrounding locale of this place of worship.

The Shri Dahigaun Tirth - The Shri dahigaun Tirth is a popular Jain pilgrim destination in Dahigaun village of Solapur and it lies in a village that goes by the same name. The temple homes a 244 cm high black coloured idol of Lord Bhagwan Mahavir, seated in a padmasana position.

Jain Temples - Solapur is famous for beautiful and historic Jain temples namely Parasnath Temple, Adinath Temple and Mallikarjuna Temple. All these temples are named after the Jain Thirthankaras.

Kamaladevi of Karmala - Karmala is famous for the temple of Shri. Kamaladevi. There is a significance of no. 96 for the temple. The Kamala Bhavani Temple is built by Rao Raje Nimbalkar in 1727. It is considered to be the second seat of Tulajapur Tulaja Bhavani.

Akkalkot - Akkalkot is a Holy place of Shri.Swami Samarth Maharaj. It is located at a distance of 38 kms. by road from Solapur District headquarters. This Saint is believed to be the reincarnation of Lord Dattatraya. The Samadhi of this Saint is worshipped by the devotees.

Pandharpur - This is a holy place of Shri.Vitthal and Shri.Rukmini. It is also known as the Southern Kashi of India and Kuldaivat of Maharashtra State. It is located at a distance of 72 kms by road. from Solapur District headquarters. The Pandharpur Railway Station falls on the Miraj-Kurduwadi-Latur railway track.

k) Transportation : Solapur district is connected by roadway, railway and it hosts airport which is not fully functional for passenger service. Solapur railway station is the main railway hub within the city. The Solapur Railway Division is an important division connecting South India to Western & North west India. Solapur is well connected by road with major cities of Maharashtra as well as the adjoining State Capital of Hyderabad and important cities in Karnataka by four National Highways. Ratnagiri-Nagpur National highway NH-204 passes through city, connecting Solapur to other important cities in Maharashtra like Nagpur, Sangli, Kolhapur and Nanded. The Solapur-Aurangabad national highway project is completed recently and the new four laning has reduced the time and cost in travelling from Solapur to Aurangabad. Solapur Airport is located to the south of Solapur city. There aren't any scheduled flights operating out of Solapur Airport. Nearest airport is Gulbarga Airport (90 km).

Map of Solapur District showing all the talukas

Chapter 2: Hazard, Vulnerability, and Capacity Analysis (HVCA)

The hazard, vulnerability and capacity analysis was carried out for each tehsil of Solapur district. The methodology used was collecting the data and perceptions of people through a questionnaire survey with key stakeholders of each taluka. A workshop was conducted to validate the analysis with administrative officers of each tehsil. Each tehsil had its own disaster management plan prepared. The hazard, vulnerability analysis was also validated with the disaster management plan report of each tehsil. This chapter deals with the hazard, vulnerability, and capacity analysis of each tehsil.

2.1 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR NORTH SOLAPUR

North Solapur is located in the eastern side of district and is bordered by Osmanabad District to the northeast, South Solapur to the south and east, Barshi Taluka to the north and Mohol Taluka to the west. The tehsil headquarters is located at Solapur, which is also the district headquarters and its largest city with an area of 377.64 sq km.

- Population: Total population of the tehsil is 951558, 481064 males and 470494 females. There are16620 households in the tehsil out of which 5493 households are below poverty line.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. The soil is medium to deep black and of rich quality. Jowar, Bajra and Pulses are the main crops of this zone.
- Climate: The climate of North Solapur is dry. Humidity increases in monsoon months. The average temperature is 36degree which increases up to 43degrees in peak summers in the month of April and May and lowers down to 13 degrees in winters. The average rainfall is 519mm.
- Education: There are good number of schools and colleges in North Solapur with the rate of literacy as 82.07%, male literacy rate at 82% and female literacy rate at 74.99%.
- Health care: The health care facilities are good with hospitals, health care centres, and polyclinics.

- Transport: The tehsil is connected by road state highways and railways, 3km away with the neighbouring towns. The locals prefer private transport system, due to inefficient public transport facilities.
- Environmental status: The tehsil is flanked by Sina River. The level air, water, and soil pollution is evident. The tehsil has waste management system in village. There are 3 sugarcane factories in the tehsil, which releases untreated solid and liquid wastes.

Hazards and Vulnerability

Earthquakes

Hazards: North Solapur lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: There are pockets of dense population in the city and the organic development of the city makes it more vulnerable to earthquakes. Most of the structures do not comply with the earthquake resistant building codes. 28% houses are “kaccha” houses which are prone to damages in earthquake scenario. There is a susceptibility of disrupting critical services like water supply and drainage systems. The damage would be very high at the time of religious festivals like “Waari” when the floating population in North Solapur is more than 15 lakhs.

Floods

Hazards: The taluka is flanked by river Sina which is prone to flooding if water is released by Ujani Dam.

Vulnerability: In 2020, the flooding in Sina River caused damages to crops and houses on the banks of river. The villages impacted were Pakhni, Shivni, Tirhe, Pathari, Telgaon.

Flash Floods

Hazards: The taluka is prone to flash floods.

Vulnerability: In the year 2020, flash floods were evident due to heavy precipitation causing damages to houses in the low-lying areas and in the dense pockets of the city though the risk is medium.

Cyclones : Cyclones are not very evident in North Solapur.

Drought

Hazards: The North Solapur taluka is vulnerable to droughts. In 2018, North Solapur experienced drought conditions damaging the crops.

Vulnerability: The risk to droughts is high.

Lightening

Hazard: Lightening is frequent in North Solapur with casualties in the year 2017, 2019 and 2021.

Vulnerability: The susceptibility to lightening is high in the monsoon season every year. There were human casualties as well as animal casualties in the year 2017, 2019 and 2021. The risk to lightening is high.

Heat Wave: The average temperature is 40 degree Celsius rising to 45 degree Celsius in peak summers and the susceptibility to heat waves is high.

Bio-Disasters

Hazards: There is a high susceptibility of epidemics mainly air-borne and water-borne. The Covid cases in all the 3 waves were fairly high. Covid-19 had a devastating impact on the taluka and the daily average reached its peak in April 2021 with cases recorded at 67,160 in a single day.

Vulnerability: The vulnerability to communicable diseases is high especially with the congregation of populations during the religious festivals. The Shree Siddheswar Devasthan Yatra which starts on 14th of January attracts the population of more than 15 lakh people in the premises during the 8 day festival. Similarly, the Khandoba Yatra in Bale village and the Yamai Devi yatra in Madi village in the month of December and April respectively attract population of 20,000 people.

Fire

Hazards: The events of fire are sporadic but the scale is low.

Vulnerability: the vulnerability of fire is attributed to storage of fire wood and cooking fuel. Though the scale is low and the susceptibility to fire is high especially in summer months. The vulnerability increases due to lack of awareness and low capacities.

Accidental Drowning: Accidental drowning is not evident in North Solapur taluka.

Road Accidents: Road accidents are frequent but the scale is low. In the year 2022 a major accident of truck and tractor was witnessed with the casualties of 4. The risk to road accidents is high.

The other man-made hazards such as rail hazards, industrial hazards, CBRN, stampedes and riots are not evident.

The major source of livelihood is farming and employment in the sugarcane factories. There are very few opportunities for other types of employment and enterprise. 28% of the total houses are “kaccha houses. Transport facilities preferred are mostly private. The city has its own water supply, drainage and waste management system and 24/7 electrical supply. The hazardous locations and low lying areas are comparatively less including very less densely congested area.

The educational and medical facilities are fairly good but needs upgradation. The environmental degradation is evident with medium levels of air, water and soil pollution.

Capacities

The administrative capacities in terms of infrastructure, transport, human resource, training and capacity building are medium and needs upgradation. The critical facilities like the healthcare systems are fairly good and more than 20 hospitals and over 100 healthcare centres and polyclinics and 2 multi-speciality hospitals. Quantitatively the fire stations and police stations perform well. Qualitatively these critical services need upgradation in terms of resources and equipment.

There are 13 identified emergency shelters all over the taluka with the capacity of hosting 10,000 people approximately in the emergency scenarios as per the disaster management report 2022 of North Solapur.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS OF NORTH SOLAPUR

	RISK ANALYSIS FOR NORTH SOLAPUR				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
3	FLASH FLOODS	MEDIUM	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	MEDIUM	MEDIUM	LOW	**HIGH**
7	HEATWAVE	MEDIUM	LOW	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**HIGH**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**MEDIUM**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	LOW	LOW	MEDIUM	**LOW**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**LOW**

2.2 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR SOUTH SOLAPUR

South Solapur tehsil is located in the south eastern side of district and is bordered by Osmanabad District to the northeast, North Solapur and Mohol Taluka to the north, Akkalkot Taluka to the southeast, Karnataka's Kalaburagi district to the south, and Mangalvedha Taluka to the west. The tehsil headquarters is located at Solapur, which is also the district headquarters and its largest city. Mandrup, Kumbhari, Valasang, Musti and Boramani are the biggest villages in South Solapur. The tehsil admeasures total area of 1,195.3 sq. km.

- Population: Total population of the tehsil is 260897, 134206 males and 126691 females. There are51230 households in the tehsil out of which 14710 households are below poverty line. Density of population 180/km2 and sex ratio of 933.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. The soil is medium to deep black and of rich quality. Jawar, Bajra and Pulses are the main crops of this zone.

- Climate: The climate of South Solapur is dry. Humidity increases in monsoon months. The average temperature is 36degree which increases up to 43 degrees in peak summers in the month of April and May and lowers down to 13 degrees in winters. The average rainfall is 436mm.
- Education: There are good number of schools and colleges in South Solapur with the rate of literacy as 80%, male literacy rate at 84% and female literacy rate at 62%.
- Health care: The health care facilities are good with hospitals, health care centres, and polyclinics.
- Transport: The tehsil is connected by road state highways and railways with the neighbouring towns. The locals prefer private transport system, due to inefficient public transport facilities.
- Environmental status: The tehsil is flanked by Bhima River. The level of air, water, and soil pollution is evident. The tehsil has waste management system in all the villages.

Hazards and Vulnerability

Earthquakes

Hazards: South Solapur lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: There were miscellaneous damages to the houses and cracks were developed on structures. The “kaccha houses”, which constitute 30% of the total built structures in the taluka incurred more damages due to the tremors.

Floods/Heavy Precipitation

Hazards: Floods were evident in South Solapur in August 2005, September 2006 and also in September 2018 on a small scale.

Vulnerability: Every flood has caused damages to crops on the banks of Bhima River and destroyed houses situated on the banks. The vulnerability to flooding is consistent which will keep on increasing due to the wet spells caused by the climate change impacts.

Flash Floods

Hazards: The city area is susceptible to flash floods due to heavy precipitation in monsoons.

Vulnerability: The city area is vulnerable to water logging due to the dense pockets and the lack of surface drainage system.

Cyclones: Cyclones are not very evident in South Solapur.

Droughts: The susceptibility to droughts exists, due to less rainfall and climate change impacts.

Lightening: The susceptibility to lightening is high in the months of monsoon though there are no casualties reported.

Heat Wave: The threat of heat wave is high in the months of summer particularly from April to May though the risk of heat wave is medium.

Bio-Disasters

Hazards: Epidemics like malaria, dengue, swine flu and chicken guniya have been evident in South Solapur. It has also reported fair amount of Covid cases with the highest number of cases reported in April 2021 in Solapur district.

Vulnerability: The vulnerability to communicable diseases is high especially at the religious places with crowd gatherings up to 1 lakh at the Harihar Mandir, Kudal Sangam and Malsiddha Devasthan, at village Mundruk with the gathering of more than 50,000 people in the month of Jan.

Fire: The incidences of fire are occasional; causes usually are cooking fuel and electric short circuits.

Road Accidents: The cases of road accidents are apparent on the Pune-Hyderabad Expressway resulting in casualties and damage to vehicles and crops.

Other hazards like rail accidents, accidental drowning, CBRN, riots, stampedes and Industrial Hazards are not very evident.

In South Solapur, the major source of livelihood is farming and small enterprises. The educational and healthcare facilities are good. There are more than 100 public and private hospitals, healthcare centres and polyclinics and approximately 10 multispecialty hospitals. The healthcare system though is in a good number is not affordable to general public. The taluka of South Solapur has 13 clusters of school with approximately 17 schools per cluster. The total number of schools, pre-primary, primary and high school exceed 150. The level of pollution is medium with evidence of water pollution and degradation of eco systems.

Capacities

The taluka has low administrative capacities in terms of infrastructural facilities, training and capacity building. The critical infrastructural facilities of the taluka are good. Medical facilities are good but the private facilities are unaffordable to many. The capacities of fire

station and police stations are sufficient but needs upgradation in terms of equipment's and resources. The task force for disaster management is identified and the updated disaster management plan for the taluka mentions the compiled list.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR SOUTH SOLAPUR

	RISK ANALYSIS FOR SOUTH SOLAPUR				
SI	LIST OF HAZARDS	HAZARDS	VULNERABILITIES	CAPACITIES	RISK
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	MEDIUM
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	HIGH	MEDIUM	MEDIUM
3	FLASH FLOODS	LOW	MEDIUM	LOW	MEDIUM
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	LOW
5	DROUGHTS	LOW	MEDIUM	LOW	MEDIUM
6	LIGHTENING	MEDIUM	MEDIUM	LOW	MEDIUM
7	HEATWAVE	MEDIUM	LOW	LOW	MEDIUM
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	HIGH
9	FIRE	MEDIUM	MEDIUM	MEDIUM	HIGH
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	LOW
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	HIGH
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	LOW
13	CBRN	LOW	MEDIUM	LOW	LOW
14	STAMPEDES/RIOTS	LOW	LOW	MEDIUM	LOW
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	LOW

2.3 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR AKKALKOT

The religious importance of Akkalkot is huge in Maharashtra due to the 'Shri Swami Samarth Temple ', a 19th-century saint who is believed by his devotees to be an incarnation of Lord Dattatreya.. Akkalkot is a City and a municipal council situated 40 km southeast of Solapur and very close to the border between Maharashtra and Karnataka states. The tehsil covers an area of 1,407 km2 and contains 138 villages, apart from the town.

- Population: The total population of the taluka is approximately 314,570 (2011 census), 161314 males and 153256 females giving a population density of 222 per sq km. There are 65260 households in the tehsil out of which 246024 households are below poverty line.
- Topography and Geography: Akkalkot taluka is bordered by South Solapur tehsil to the west and by Karnataka state on all other sides. Flat land with rocky terrain and shallow soil cover. Jowar, bajra and pulses are the main crops grown in the taluka. Akkalkot is routinely hit by drought as it falls in a rain shadow and also no major river pass through this taluka. Although the soil is classified as 'medium to deep black' and is of rich quality.
- Climate: The climate of Akkalkot is dry. Humidity increases in monsoon months. The average temperature is 38.09 degree which increases up to 44.03 degrees in peak summers in the month of April and May and lowers down to 17 degrees in winters. The average rainfall is 545mm.
- Education: Akkalkot has an average literacy rate of 63%, higher than the national average of 59.5%; with 59% of the males and 41% of females literate. 14% of the population is under 6 years of age. Shri Shahaji High School is a 125 years old school. Karnatak Lingayat Education Society's Mangrule High school & Kashiraya Kaka Patil High School are some of the large schools. C.B. Khedgi's Basaveshwar Science Raja Vijaysinh Commerce & Raja Jaysinh Arts College, Shri Vatavriksha Swami Maharaj Devashtan's Polytechnic offer higher education. Akkalakot taluka has large number of Kannada schools.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: It is served by Akalkot Road Railway Station which is 7 km away from the city. Chennai Mail and Udyan Express for Mumbai, Chennai Mail for Chennai, Tirupati, Mantralayam, Raichur, Gulbarga, Udyan express for Bangalore, Hyderabad Passenger for Hyderabad have stop here. It is also served by Tadawal railway station on Solapur -Hubli line around 20 km away, with trains to Bijapur, Hubli, Bagalkot, and Gadag. It is more convenient to board trains from these stations than Solapur station which is 40 km away as this saves time. There is a great demand to stop trains such as Hussainsagar Express, Dadar Chennai Egmore Express, Konark Express, Shatabdi

Express, Rajkot Express, and Karnataka Express. The nearest airport to Akkalkot is the Solapur Airport which is 31 km away. However, as of 2016 there is no scheduled commercial air service available

- Environmental status: The tehsil does not have river in proximity, though fed by river Bhima. The levels of soil, water and air pollution are low. The city claims to have its own water supply, drainage and waste management system, however they are inefficient in the rural areas.

Hazards and Vulnerability

Earthquakes

Hazards: Akkalkot lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: The built structure is susceptible to damage and failure due to earthquakes as it was evident in 1993 when the buildings developed cracks and the houses were damaged. The building construction and material adds to the vulnerability of earthquakes. There is less awareness regarding earthquakes resistant designs of structures.

Floods

Hazards: Akkalkot experienced flooding due to heavy precipitation in 2005, 2019, 2020 and 2021.

Vulnerability: Akkalkot has experienced damages to crops, cattle deaths and damage to houses and other buildings due to heavy precipitation. Due to the climate change impacts the frequency of wet spells have increased and heavy precipitation is observed consistently for the past 3 years. Lack of early warning system, lack of awareness in populations and the building technology add to the vulnerability of populations.

Flash Floods

Hazards: Flash floods are not very evident in Akkalkot though there are sporadic incidents of water logging in the city.

Vulnerability: The threat of flash floods cannot be overruled due to the dense pockets of built structures and choking of natural surface drainage system. The dense pockets add to the vulnerability of flash floods.

Cyclones: Cyclones are not very evident in Akkalkot.

Droughts: The susceptibility to droughts exists, due to less rainfall and climate change impacts.

Lightening: The threat of lightening is conspicuous though the risk is medium.

Heat Wave: The threat of heat wave is not very evident.

Bio-Disasters

Hazards: Epidemics are evident in akkalkot taluka. 2011-12 had peak epidemic cycles followed by covid-19 pandemic in 2019-20, 2020-21. The highest number of cases registered was in April 2021 where the daily numbers of cases registered were 68,547.

Vulnerability: The susceptibility to epidemics will be high in Akkalkot due to the floating population for pilgrimage and lack of hygiene and sanitation facilities. The communicable diseases would be high due to lack of awareness and concentration of populations.

Fire: The instances of fire are apparent attributed to cooking fuel and electrical short circuits. The vulnerability increases due to the density of population and inaccessibility to fire engines.

Road Accidents:

Hazards: The cases of road accidents are high, with casualties being mainly pilgrims.

Vulnerability: 2022 has witnessed 16 casualties in the span of 48 hours on the highway mostly pilgrims. The risk to road accidents is high in Akkalkot.

Other hazards like rail accidents, accidental drowning, CBRN, riots and Industrial Hazards are not very evident.

Stampedes: The susceptibility to stampedes is high owing to the concentration of population in the Shree Swami Samarth Temple with more than 50,000 pilgrims per day.

In Akkalkot, the major source of livelihood is farming, and temple based economy. There are very less employment opportunities with scope for enterprises. The environmental status is attributed to the climatic conditions comprising of degradation/erosion of soil due to rainfall and mining to a medium scale. The level of population of air and water is not very high and the damage to eco-systems is low but can aggravate with the anthropogenic activities.40% houses are “kaccha houses” likely to get damaged to the threats of any hazard. The city has water supply system, drainage system and waste management system. The surface drainage system is insufficient and needs upgradation. The electricity supply is hindered and inconsistent. 5% of the total of the city has hazard exposure with 1% as low-lying areas and

10% as densely congested areas. The vulnerability increases as 20% area of the city is inaccessible to ambulances and fire engines. The banks of Bhima River are encroached and almost 21,000 people of the taluka can get impacted due to the flooding of Bhima River.

Capacities

The taluka has low administrative capacities in terms of infrastructural facilities, training and capacity building. The critical infrastructural facilities of the taluka are good, medical facilities with 9 PHC's, more than 200 hospitals, healthcare centres, polyclinics and 1 multi-specialty hospital and 236 Asha workers. There are 2 fire-brigades with a staff of 3 fire-fighting personals. There are 2 police stations with the staff of 45 police men. There are 2 NGO's working in the taluka with more than 20 volunteers. The trained volunteers like swimmers, 5 in nos. 6 "Sarp-mitra", 4 "Police-mitra", 4 "Nisarg-mitra" are ready for support in emergency scenarios. There are 5 collages, 60 schools, 20 Mangal Karyalayas, 60 open grounds which could be used for temporary shelter in emergency scenarios.

The capacity for crowd management is very low and a team of trained experts is needed for maintaining the law and order situation in case of emergencies, especially in the Swami Samartha Temple premises. The capacities with the temple management are not available and a joint mechanism is required for the efficient disaster management response in case of emergencies.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR AKKALKOT

	RISK ANALYSIS FOR AKKALKOT				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	HIGH	MEDIUM	**HIGH**
3	FLASH FLOODS	LOW	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	MEDIUM	MEDIUM	LOW	**MEDIUM**
7	HEATWAVE	MEDIUM	LOW	LOW	**LOW**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**HIGH**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	**HIGH**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**LOW**

2.4 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR BARSHI

Barshi was established in 1865 and is second largest city in Solapur District. Barshi is famous for 'Bhagwant temple' which is dedicated to Shri Vishnu. It is a hub for business, industry and tourism, with a high number of lentil industries in particular. It is famous for powerloom and handloom industries. Barshi is forthcoming as medical, educational and agricultural market center for rural masses from the nearby Marathwada region.

- Population: Barshi has a population of 300000. Males constitute 51% of the population and females 49%. There are 79969 households in the tehsil out of which 5214 households are below poverty line.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. The soil is medium to deep black and of rich quality. Jawar, Bajra and Pulses are the main crops of this zone.
- Climate: The climate of Barshi is dry. Humidity increases in monsoon months. The average temperature is 36degree which increases up to 43 degrees in peak summers

in the month of April and May and lowers down to 13 degrees in winters. The average rainfall is 436mm.

- Education: There are good number of schools and colleges in Barshi with the rate literacy 87%, higher than the national average of 77.7%. 12% of the population is under 6 years of age. Primary education has been made compulsory in the town and is conducted by the municipal school board.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: Barshi is situated at East-Osmanabad, Latur, Tuljapur, Paranda, kallamb At West-Pandharpur, Madha, Pune. At North-Bhoom, Beed, Ahmednagar. At South-Solapur, Akkalkot, Dudhani. Barshi is connected with the NH65 and NH52 by NH63 and NH548C. At west NH65 and East NH52. NH65 is 60 km away at Tembhurni, Solapur District Itself. NH52 Is 30 km away at Yermala Cross, Osmanabad District as its neighbor district. The National Highway 63 and NH548C which goes through Barshi city will be upgraded to a 4 lane highway.
- Environmental status: The municipal council has six committees: the standing committee, the public works committee, the education committee, the sanitation, medical and public health committee, the water-supply and drainage committee and the planning and development committee to look after the various aspects of municipal administration. The underground drainage system has not been introduced in the town as yet. There are open and covered gutters and the arrangements are made by the municipal council for the removal of night-soil. Wells and the Pathari tank form the main sources of water-supply. Pumping sets have been installed on wells within the municipal area.

Hazards and Vulnerability

Earthquakes

Hazards: Barshi lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: Barshi has sporadic pockets of dense housing which would be susceptible to damage to earthquake tremors. The susceptibility of damage to critical services and facilities is high. The buildings complying to the earthquake resistant codes is low.

Floods

Hazards: Floods have been evident in 2020 and 2021. The vulnerability to floods from the Bhogawati River is low as the river has not reached high flood level in the past 10 years.

Vulnerability: The exposure to floods from the Bhogwati River is low.

Flash Floods

Hazards: Flash floods were evident in 2016 due to heavy precipitation.

Vulnerability: The areas vulnerable to heavy precipitation are Vairag, Pangaon, Surdi, Gaundgaon, Agalgaon and the low lying areas of Barshi City. There were damages to crops and houses.

Droughts

Hazards: A drought was witnessed in the year 2018 but the impact was low.

Lightening

Hazards: There are cases of lightening in monsoons. At least 1 case of lightning strike every year is witnessed though the risk is medium.

Vulnerability: There are cases of mortality of animals and damages to built structures.

Heat Waves: Heat waves are quite evident in Barshi

Cyclones: Cyclones are not evident in Barshi.

Bio-Disasters

Hazards: Events of epidemics are evident in the months of monsoon though the impact is low. Covid-19 created havoc on the 24th April 2021, 18th January 2022 and 22nd December 2020 with maximum number of cases reported in a day. It also proves that susceptibility to epidemics is high.

Vulnerability: Awareness on epidemics is low with populations. The hygiene and the sanitation conditions add to the threat of exposure to bio-disasters.

Fire

Hazards: There are sporadic cases of fire mostly accidental.

The cases of accidental drowning, CBRN hazards, stampedes, riots, and industrial hazards are not very evident.

Vulnerability: In most cases, material losses by far exceed the human life losses. The vulnerability increases due to dense population pockets and inaccessibility to fire brigades.

Road Accidents

There are sporadic events of road accidents but the risk from accidents is low.

Barshi has a fair amount of industries and the livelihood source is farming and industries with fewer opportunities in any other sector. The educational facilities are good with a good literacy rate. The overall living standards are medium. The city has 35% of “kaccha houses”. 5% land of the city has exposure to different hazards with 2% of the area is low-lying. 20% of the city has got densely congested pockets and almost 13% of the city area cannot be accessed by ambulances and fire engines. The city has its own water supply, drainage and waste management system. The vulnerability to hazards increases as these systems are susceptible to damage and failure in emergencies. It also has a 24/7 electrical supply.

The status of environmental issues is good with low levels air, water and soil pollution. The flatland geo-morphology reduces the risks from disaster like landslides. There is no forest cover and medium quantum of mining is observed.

Capacities

The administrative capacities are low with respect to infrastructural facilities and capacity building. The taluka has 297 hospitals and 11 PHC’s and 68 other healthcare centres. The city has 11 multispecialty hospitals and 38 number of Asha workers. There is one fire station with the staff of 9 personnel’s and 2 fire engines. The fire station is equipped with necessary equipment’s as per the list annexed. There are 4 police stations with the staff of 200 police. The trained volunteers’ task force is good with 35 trained swimmers, 5 “sarp-mitra”, 11 “police-mitra”, 7 “nisarg-mitra” to respond to any emergencies. There are 18 collages, 59 schools, 13 mangal-karyalas and 25 open grounds which can be used as temporary shelters in emergency scenarios. There are 6 NGO’s living in Barshi with over a 100 volunteers who can contribute in emergency scenarios.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR BARSHI

	RISK ANALYSIS FOR BARSHI				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
3	FLASH FLOODS	MEDIUM	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	MEDIUM	MEDIUM	LOW	**HIGH**
7	HEATWAVE	MEDIUM	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	LOW	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**LOW**

2.5 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR MANGALVEDHA

Magalwedha has religious and spiritual place in Maharashtra. Famous for Damajipant Temple. Mangalvedha is also known as the "Land of Saints" as Saint Jayatirtha, Saint Damaji, Saint Kanhopatra, Saint Basaveshwera, and Saint Chokhamela are said to have come from Mangalwedha during the 14th century. It is also famous for its Jowar cuisine.

- Population: Total population of the tehsil is 2,05,932, out of which 1,07154 males and 98778 females. There are 42140 households in the tehsil out of which 9555 households are below poverty line.
- Topography and Geography: The city of Mangalvedha is situated 55 km west of the district headquarters at Solapur and 25 km southeast of Pandharpur city. Mangalvedha shares its boundaries with Pandharpur, Sangola, Mohol, Jath, and Bijapur in Karnataka. The topography is flat land with rocky terrain and shallow soil cover. Moderate soil and uncertain rainfall marks this zone. Both Kharip and Rabbi crops are grown in this part.

- Climate: The climate of Mangalvedha is dry. Humidity increases in monsoon months. The average temperature is 35degree which increases up to 44degrees in peak summers in the month of April and May and lowers down to 18 degrees in winters. The average rainfall is 519.80mm.
- Education: There are good number of schools and colleges in Mangalvedha with the rate of literacy as 78%, male literacy rate at 80% and female literacy rate at 76.99%.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: The tehsil is connected by state highways to neighbouring towns of the district.
- Environmental status: The tehsil is fed by the rivers Bhima and Maan. The level air, water and soil pollution is evident. The levels of pollution in air, water and soil are evident due to various reasons like mining, burning, use of pesticides etc. There are 4 sugar factories in the tehsils contributing to the environmental issues as per the report.

Hazards and Vulnerability

Earthquakes

Hazards: Mangalvedha lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: The vulnerability to earthquakes is due to the densely populated pockets and the poor construction practices without the knowledge of earthquake resistant structures.

Floods

Hazards: Mangalvedha witnessed floods consistently in August 2019 and October 2020.

Vulnerability: The vulnerability is due to heavy precipitation and swelling of the rivers Bhima and Mand. The areas impacted by flood were Mundhavi, Brahmapuri, Bathan, Uchethan, Machanur, Rahatewadi, Taamdardi, Tandor, Sidhapur, Arali, and Borale. These villages are in the proximity of the river and their exposure to floods is high in the months of monsoons when the precipitation is high.

Flash Floods

Hazards: Flash floods are apparent during the monsoon months.

Vulnerability: The vulnerability of flash floods is due to the congested built structures. However the frequency and impact is low.

Cyclones

Hazards: High speed winds are evident however the frequency is low.

Vulnerability: The areas susceptible to high winds are Andalgaon, Bhose and Phooljanti.

Droughts: Mangalvedha experienced droughts in 2017 however the impact was low.

Lightening: There are sporadic events of lightening, evident with casualties observed.

Heatwave: Heat waves are quite evident in Mangalvedha

Bio-Disasters

Hazards: As the cases of epidemics such as dengue, malaria and swine flu has taken toll, covid-19 has also played a havoc on the 21st of April 2021 with record number of cases registered at 67,505. (https://github.com/CSSEGISandData/COVID-19)

Vulnerability: The vulnerability to bio-disasters is attributed to poor hygiene and sanitation and lack of awareness and also appalling medical facilities.

The other natural hazards like drought lightening and heat wave are evident but are less frequent and of low risk.

Fire: Sporadic events of fire at a very low and accidental level though the susceptibility of fire disaster cannot be denied.

Sporadic cases of accidental drowning, Road Accidents, CBRN, Rail accidents, stampedes and riots are not very evident and the impact is low.

Mangalvedha is a town of religious importance. The populations are engaged in faring for livelihoods and overall a very subtle living standards with very few opportunities for employment and enterprise. The educational facilities are good with 6 schools and colleges and 78% literacy rate. The healthcare facilities are mediocre.

Mangalvedha observes degradation and high levels of pollution due to the use of pesticides and fertilizers and mining. The green cover is comparatively less. The town has its own fire station, police station, public and private hospital and drainage system. There is no surface drainage system and waste management system and electric supply system in the town which can make It susceptible to the risk of waterlogging and epidemics.

Capacities

The administrative capacities are weak in terms of infrastructural facilities and human resource. Training and capacity building of administrative building and institutional buildings are required on top priority. The critical infrastructure facilities like 3 hospitals, healthcare centres and multi-speciality hospitals are low in number and require upgradation. There is one fire station which is ill-equipped in terms of equipment, resources and staff. Mangalvedha has one police station with the staff of 23 personnel. There are identified trained volunteers with 29 swimmers, 3 “sarpa-mitra”, 9 “police-mitra”, 2 “Nisarg-mitra” and others. It has 2 colleges 27 schools, 16 mangal karyalayas and one open ground which can be used for temporary sheltering in case of emergencies. Mangalvedha has 1 NGO and 42 volunteers who can contribute and support in disaster events.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR MANGALVEDHA

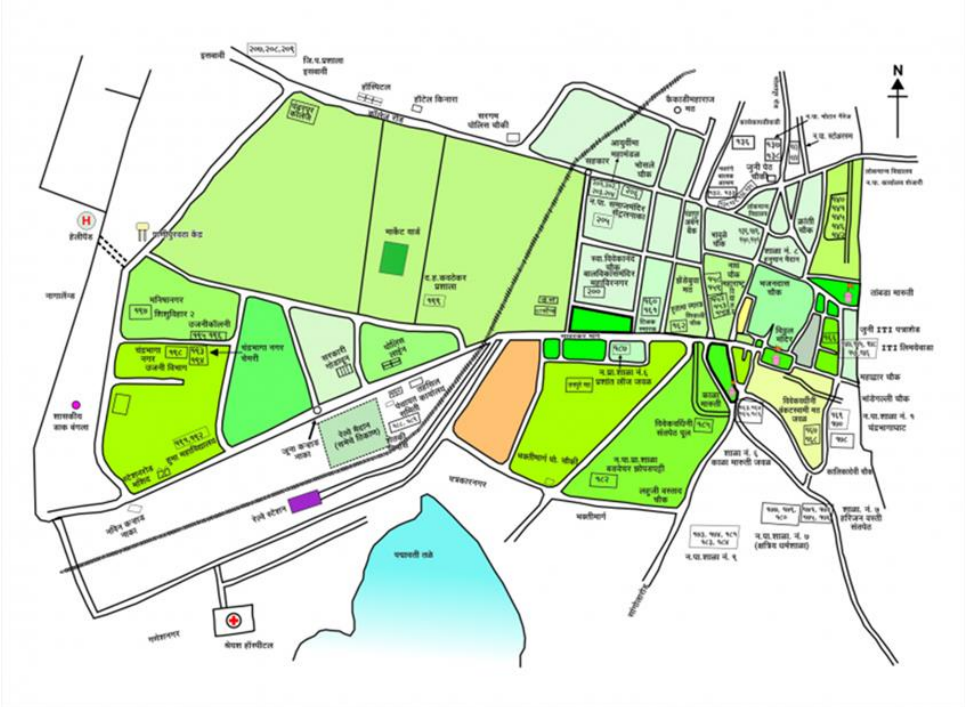
	RISK ANALYSIS FOR MANGALVEDHA				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
3	FLASH FLOODS	LOW	MEDIUM	LOW	**LOW**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	MEDIUM	MEDIUM	LOW	**MEDIUM**
7	HEATWAVE	MEDIUM	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**LOW**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	**HIGH**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**LOW**

2.6 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR PANDHARPUR

Pandharpur is the most important religious town of the state. It is also called South Kashi (Dakshin Kashi) in Maharashtra. It is famous for the Lord Vitthal temple situated on the bank of Bhima river. Bhima river is also known as Chandrabhaga as it takes shape like crescent moon near the town. There are 4 yatra's (wari- gathering of pilgrims/devotees) per year, Chaitri, Ashadhi, Kartiki and Maghi, of which Ashadhi and Kartiki are the main yatra's. Devotees comes from all over Maharashtra, Karnataka and some part of Tamil Nadu.

- Population: Total population of the tehsil is 402707, 210123 males and 192584 females. There are 76016 households in the tehsil out of which 19765 households are below poverty line. It admeasures the land area of 1296.52 sq km.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. Eastern part of Pandharpur has moderate soil and uncertain rainfall marks this zone. Both Kharip and Rabbi crops are grown in this part. Western part of Pandharpur has shallow and poor type of soil, not retentive of moisture marks this part. Scanty and uncertain rainfall. Rabbi crops are mainly grown in this part.

- Climate: The climate of Pandharpur is dry. Humidity increases in monsoon months. The average temperature is 32 degree which increases up to 42degrees in peak summers in the month of April and May and lowers down to 20 degrees in winters. The average rainfall is 452 mm.
- Education: There are good number of schools and colleges in North Solapur with the rate of literacy as 67.69%, male literacy rate at 74.06% and female literacy rate at 60.77%.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: The tehsil is connected by road state highways. Pandharpur is close to many larger towns including Kurduvadi, Solapur, Latur, and Pune. It has its own railway station. Other close by stations include Kurduvadi, Modnimb, Sangola, and Mohol railway stations.
- Environmental status: The situated on the banks of Bhima river called 'Chandrabhaga'. The level air, water and soil pollution is evident. The tehsil does not have appropriate waste management system. The city area has water supply system and underground drainage system. There are 3 sugarcane factories in the tehsil, which releases untreated solid and liquid wastes.



Map of Pandharpur

Hazards and Vulnerability

Earthquakes

Hazards: Pandharpur lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: There are pockets of dense population in the city and the organic development of the city makes it more vulnerable to earthquakes. Most of the structures do not comply with the earthquake resistant building codes. 30% houses are “kaccha” houses. There is a susceptibility of disrupting critical services like water supply and drainage systems. The damage would be very high at the time of religious festivals like “Waari” when the floating population in Pandharpur is more than 15 lakhs.

Floods

Hazards: Floods have been evident in 2005, 2019 and 2020. There is a risk of floods from river Chandrabagha in the Bhima basin. The is susceptibility of low and medium intensity of floods during monsoons.

Vulnerability: The low-lying areas of the city like old Pandharpur area, Vitthal mandir temple premises are prone to flooding due to proximity of the river. The slum areas which are exposed to flooding are the Vyas Narayan Zhopadpatti, Ambedkar Nagar, Sant Peth, Kalika Devi Chowk, Chambar Galli and Pradakshina Marg which are in the low lying areas of the river Bhima.

Flash Floods

Hazards: Flash floods were evident during heavy precipitation during 2019 and 2020 though the frequency of flash floods is less.

Vulnerability: The susceptibility of flash floods increases due to concretisation in the city and no appropriate surface drainage system. The densely populated areas of Koli galli, Juni Peth, Temple premises and old Pandharpur area are susceptible to flash flooding.

Cyclones

Hazards: High speed winds in the months of June, July, August and September but no risk of cyclones as such.

Vulnerability: Vulnerability to damage from high winds increases to the kaccha houses and the houses with tin roofs and poor construction practices which could be accidental.

Bio-Disasters

Hazards: There is a high susceptibility of epidemics mainly air-borne and water-borne. The Covid cases in all the 3 waves were fairly high.

Vulnerability: The susceptibility of communicable diseases is high due to concentration of floating population during events like “waari” and other religious festivals. The vulnerability increases due to insufficient healthcare systems and poor hygiene infrastructure in the city.

The other natural hazards like drought lightening and heat wave are evident but are less frequent and of low risk.

Fire:

Hazards: The cases of fire are high with one event per month but the scale is low.

Vulnerability: In most cases, material losses by far exceed the human life losses. The vulnerability increases due to dense population pockets and inaccessibility to fire brigades.

Accidental Drowning:

Hazards: Cases of accidental drowning are evident but the rate of mortality is low.

Vulnerability: Most of the religious festivals and public gatherings happen on the banks of the river which makes the accidental drowning cases high.

Road Accidents: The number of road accidents and other transport related accidents are low in number.

The susceptibility to CBRN disasters is negligent. The susceptibility to stampedes is high due to public gatherings and high density of floating populations. There are no cases reported of riots and industrial hazards.

Capacities

Pandharpur has a water supply system, drainage system, electric supply system, waste management system and fire-fighting system. The fire brigade station needs to be upgraded with the fire fighting equipment’s and other rescue equipment. The administrative system needs alternative communication systems in case of mobile network failure in emergency scenarios. The transport facilities in Pandharpur are mostly private with auto rickshaw as the main source of transport. The human resource available to volunteer in emergency scenarios is good with a good literacy rate and physical fitness. However there is a need for training and capacity building to respond in emergency scenarios. Public awareness on disaster safety is required on top priority.

The critical infrastructure in Pandharpur requires upgradation. Pandharpur has more than 100 hospitals, healthcare centres and clinics. There are more than 10 multi-speciality hospitals. There are more than 40 Asha workers.

There is one fire brigade station with the Pandharpur Municipal Council with only one full time staff. All the other positions are yet to be recruited. There are 2 fire engines, phone tender, fire tender, rescue boat, balloon lamp tower, wood cutter, B.A. Set and life jackets with the fire station. There are 3 police stations in Pandharpur. The trained human resource available is low except volunteers for “police mitra” there are very less number of trained volunteers to respond in emergency scenarios. There are 2 colleges and more than 15 schools, more than 25 mangal karyalas and 6 open grounds in Pandharpur which could be used in emergency scenarios for temporary shelters. There are a few NGO’s working in Pandharpur.

The capacities with the Pandharpur Municipal Council are low and disintegrated. There is a need of training and capacity building to the administrative systems and to create institutional mechanisms for disaster management.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR PANDHARPUR

	RISK ANALYSIS FOR PANDHARPUR				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	HIGH	HIGH	MEDIUM	**HIGH**
3	FLASH FLOODS	MEDIUM	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	LOW	MEDIUM	LOW	**MEDIUM**
7	HEATWAVE	LOW	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	MEDIUM	LOW	MEDIUM	**MEDIUM**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**MEDIUM**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	LOW	MEDIUM	MEDIUM	**MEDIUM**

2.7 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR SANGOLA

Sangola is famous for pomegranate production. Sangola pomegranates are exported to the United States, England, and several Middle Eastern countries. Sangola's economy is primarily driven by agriculture, with textile mills (including cotton), grape processing factories and sugar factories found in the area. It is situated near Holy city Pandharpur. It is located at the intersection of state highways SH-161, SH-3, and SH-71.

- Population: Total population of the tehsil is 343973, 125990 males and 117983 females. There are57277 households in the tehsil out of which 14358 households are below poverty line.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. Shallow and poor type of soil, not retentive of moisture marks this part. Scanty and uncertain rainfall. Rabbi crops mainly grown
- Climate: The climate of Sangola is dry. Humidity increases in monsoon months. The average temperature is 35 degree which increases up to 40 degrees in peak

summers in the month of April and May and lowers down to 30 degrees in winters. The average rainfall is 386mm.

- Education: There are good number of schools and colleges in Sangola with the rate of literacy as 72%, male literacy rate at 78% and female literacy rate at 63%.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: Sangola an important road and railway connection on the Pandharpur-Miraj Junction route. It is connected by broad-gauge railway through Miraj, Kurduwadi, and Solapur junctions to other routes throughout the region. Sangola has very good connectivity to other cities via roads. The Ratnagiri to Nagpur highway, also referred to as MSH-3, originates in Ratnagiri and passes through Kolhapur, Sangli, Solapur, Tuljapur, Ausa, Nanded, Hingoli, Yeotmal and Wardha before terminating in Nagpur. Land is being acquired to add extra lanes to this highway. Also, Sangole has two other highways, MSH71 connecting it to Akluj and Jat, and MSH161 connects the city to Pandharpur and Miraj. A new stretch of MSH161 from Sangole to Pandharpur is being built using concrete, will have 4 lanes and is expected to be ready by 31 July 2019. Sangola has a railway station. Sangole lies on the Miraj-Pandharpur railroad. Originally this railroad was narrow-gauge. Between 2009 and 2011, the old narrow gauge was converted to broad-gauge. Sangole railway station has stops by 11051/52 Solapur- SCSMT Kolhapur Express, 51438/39 Miraj-Kurduwadi Passenger, 22155/56 Solapur-Miraj Superfast Express, 16541/42 Yesvantpur – Pandharpur Weekly Express, 11403/04 Nagpur – Kolhapur Express (PT) and 51425/26 Parli Vaijnath – Miraj Passenger.
- Environmental status: The tehsil is fed by Mann river. The level air, water and soil pollution is evident. The city area has water supply, drainage system and waste management system. As per report.

Hazards and Vulnerability

Earthquakes

Hazards: Sangola lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes. There is no history of earthquakes apart from the tremors felt in 1993.

Vulnerability: The susceptibility of earthquakes cannot be denied as it lies in the zone 3 of earthquakes. The vulnerability increases due to the construction materials and un-engineered construction of structures. The risk however is medium.

Floods

Hazards: The cause of flooding is attributed to riverine flooding of Mann River which was evident in 2018 and heavy precipitation in the months of monsoon.

Vulnerability: The vulnerability to flooding is very low as it is a rain shadow area, hence the risk of flooding is very low.

Flash Floods: The hazards of flash floods, cyclones and lightening are not very evident and no such events are reported.

Drought: The susceptibility to droughts exists, due to less rainfall and climate change impacts.

Heat Wave: The susceptibility of heat wave is high during the summer months April to May when the average temperature is 35 to 40 degree Celsius and the climate is very dry.

Bio-Disasters

Hazards: Epidemics are evident in Sangola taluka with the cases of malaria, chicken guniya, dengue and swine flu. Covid-19 cases average fairly high in 2019.20 and 2020-21 with the highest cases reported on 24th April 2021 at 67,150.

Vulnerability: The susceptibility to communicable diseases increases during the religious festivals of Ashadhi and Kartiki Yatra. The vulnerability is also attributed to the poor hygiene and sanitation practices especially with the influx of floating population during the yatra's

Fire: The instances of fire are apparent attributed to cooking fuel and electrical short circuits. However, there is no compiled data available

Road Accidents: The road accidents are evident on the Solapur-Pune highway.

Vulnerability: The cases of road accidents are more during the Ashadhi and Kartiki Yatra.

Other hazards like rail accidents, accidental drowning, CBRN, riots and Industrial Hazards are not very evident.

Stampedes: The susceptibility to stampedes is high due to the Ashadhi and Kartiki yatra and during the other religious festivals.

The risk of hazards is low but the vulnerability to hazards exists due to the living conditions and the climatic impacts. The educational and the medical facilities are low and inefficient in

comparison. There are very few livelihood opportunities and the infrastructural facilities are medium.

Capacities

The taluka has good number of educational and medical facilities. It has 36 identified temporary shelter facilities all over the taluka. The taluka has schools, colleges, post offices, fire brigade station, blood banks; NGO's to respond in any emergency scenario.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS OF SANGOLA

	RISK ANALYSIS FOR SANGOLA				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
3	FLASH FLOODS	LOW	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	LOW	MEDIUM	LOW	**MEDIUM**
7	HEATWAVE	LOW	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**LOW**

2.8 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR MALSHIRAS

Malshiras is a very 'happening' taluka in the state of Maharashtra with many popular towns Malshiras such as Akluj, Natepute, Mahalung (for famous Yamai Devi temple), Malinagar,

Velapur (for famous Ardhnari Nateshwar temple) and popular Villages like Goradwadi, Bhamburdi, Medad and Palasmandal. Malshiras is one of the stops for Sant Dnyaneshwar Maharaj Palakhi which travels annually from Alandi to Pandharpur. Other towns in Malshiras taluka which are the stops for the Palakhi are Natepute and Velapur.

- Population: Total population of the tehsil is 485532, 252470 males and 233059 females. There are 86142 households in the tehsil out of which 16432 households are below poverty line.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. Shallow and poor type of soil, not retentive of moisture marks this part. Scanty and uncertain rainfall. Rabbi crops mainly grown
- Climate: The climate of Malshiras is dry. Humidity increases in monsoon months. The average temperature is 38 degree which increases up to 41degrees in peak summers in the month of April and May and lowers down to 28 degrees in winters. The average rainfall is 190mm.
- Education: There are good number of schools and colleges in Malshiras with the rate of literacy as 64%, male literacy rate at 71% and female literacy rate at 57%.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: Malshiras is on the road connecting Mahad- Pandharpur Pune-Pandharpur(Palkhi Mahamarg)]. Malshiras is well-connected by Maharashtra State Road Transport Corporation (MSRTC) buses to all the major cities in Maharashtra. The nearest train station is Pandharpur.
- Environmental status: The level air, water and soil pollution is evident. The tehsil has pit composting waste management system in the teshil. The city has water facility of 4MLD. The tehsil does not have rivers or dams, but are fed by rivers Nira and Bhima.

Hazards and Vulnerability

Earthquakes

Hazards: Malshiras lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: The building construction and material adds to the vulnerability of earthquakes. There is less awareness regarding earthquakes resistant designs of structures.

The built structure is susceptible to damage and failure due to earthquakes as it was evident in 1993 when the buildings developed cracks and the houses were damaged.

Floods

Hazards: The flooding is due to the river Bhima and Nira when water was released from the Vir dam in the river Nira. Heavy precipitation in the year 2005, 2006, 2019 and 2020 caused swelling in the river Bhima and caused flooding in 12 villages on the banks of river Bhima and 18 villages on the banks of river Nira.

Vulnerability: Due to heavy precipitation, crops were destroyed in 2005, 2006, 2019 and 2020 while there were damages to houses due to flooding in August 2019 and September 2020.

Flash Floods

Hazards: The susceptibility to flash floods increases during the monsoon months.

Vulnerability: There is water logging in the houses on the banks of river Bhima and Nira and some sporadic events in the dense pockets of the city.

Cyclones: Cyclones are not very evident however in February 2014, high speed winds and hail storms were experienced causing damages to crops, housing and crops.

Drought: The susceptibility to droughts exists, due to less rainfall and climate change impacts.

Lightening: The threat of lightening is high in the months of monsoon however no casualties are recorded.

Heat Wave: The susceptibility to heat wave is high during the summer months with average temperature of 45 degree Celsius.

Bio-Disasters

Hazards: Epidemics are evident in Malshiras taluka. 2011-12 had peak epidemic cycles followed by covid-19 pandemic in 2019-20, 2020-21.Epidemic outbreaks such as malaria, dengue, swine flu, chicken guniya etc. The highest number of cases registered was in April 2021 where the daily numbers of cases registered were 68,547 in the district.

Vulnerability: The susceptibility to epidemics will be high in Malshiras due to the floating population for pilgrimage and lack of hygiene and sanitation facilities. The communicable diseases would be high due to lack of awareness and concentration of populations. The susceptibility to communicable diseases is high during the religious festivals “jatra” of various deities in the months of February, March, April, June, July and December. The

causes of epidemics are also attributed to poor sanitation and hygiene facilities due to the congregation of populations during the religious festivals.

Fire: The instances of fire are apparent attributed to cooking fuel and electrical short circuits. However, there are no casualties reported.

Road Accidents: Road accidents are infrequent on the national highway which is 41 kms away and the state highway Kuruduwadi-Mhaswad road. There is a helipad available in Akluj.

Other hazards like rail accidents, accidental drowning, CBRN, riots are not very evident.

Stampedes: There are various "Jatras" all over the year which has a probability of stampedes due to congregation of populations.

Industrial Accidents: There are 7 industrial establishments comprising of sugar factories and mills with a combined workforce of 12,000 labourers. Hence the probability of industrial accidents cannot be denied. However there are no cases and casualties reported.

Malshiras has good living standards and opportunities of livelihood in farming, employment and enterprise. The educational facilities and healthcare facilities are good in quantum but needs upgradation in quality of services and infrastructural facilities. The levels of pollution are medium due to the release of industrial waste. However, there is no data available on the air, water and soil pollution. There are no fire stations in Malshiras which increases the risk in emergency scenarios.

Capacities

The educational facilities in Malshiras are good with more than 150 schools in the taluka. There are 5 schools and colleges identified as safe temporary shelters with a capacity of hosting over 4000 people. The medical facilities are good quantitatively with over 20 hospitals, healthcare centres and poly clinics, it requires qualitative upgradation. The administrative capacities are low in terms of infrastructural facilities, training and capacity building. The city has its own water supply system with a treatment facility of 4 MLD, serving about a population of 17,000. The city has solid waste management system with a pit composting method for the waste of about 5 tons generated every day.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR MALSHIRAS

	RISK ANALYSIS FOR MALSHIRIS				
SI	LIST OF HAZARDS	HAZARDS	VULNERABILITIES	CAPACITIES	RISK
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	MEDIUM
2	FLOODS/ HEAVY PRECIPITATION	HIGH	MEDIUM	MEDIUM	HIGH
3	FLASH FLOODS	MEDIUM	MEDIUM	LOW	MEDIUM
4	CYCLONE- HIGH WINDS	MEDIUM	LOW	LOW	MEDIUM
5	DROUGHTS	LOW	MEDIUM	LOW	MEDIUM
6	LIGHTENING	LOW	MEDIUM	LOW	MEDIUM
7	HEATWAVE	LOW	MEDIUM	LOW	MEDIUM
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	HIGH
9	FIRE	MEDIUM	MEDIUM	MEDIUM	HIGH
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	LOW
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	MEDIUM
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	LOW
13	CBRN	LOW	MEDIUM	LOW	LOW
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	MEDIUM
15	INDUSTRIAL HAZARDS	MEDIUM	LOW	MEDIUM	MEDIUM

2.9 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR MOHOL

Mohol is famous for its Nagnath Temple. Mohol shares it boundaries with Solapur city. It is also famous for its cuisines.

- Population: Total population of the tehsil is 276656, 144525 males and 132121 females. There are 50187 households in the tehsil out of which 10000 households are below poverty line.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. Mohol has moderate soil and uncertain rainfall marks this zone. Both Kharip and Rabbi crops are grown in this part.
- Climate: The climate of Mohol is dry. Humidity increases in monsoon months. The average temperature is 25 degree which increases up to 45 degrees in peak summers in the month of April and May and lowers down to 20 degrees in winters. The average rainfall is 664mm.
- Education: There are good number of schools and colleges in Mohol with the rate of literacy as 76%, male literacy rate at 77% and female literacy rate at 72%.

- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: The tehsil is connected by road state highways and railways, with the neighbouring towns. The locals prefer private transport system, due to inefficient public transport facilities.
- Environmental status: The tehsil is fed by rivers Sina, Bhima and Bhogwati. The level air, water and soil pollution is evident. The tehsil has water supply and sanitation system however there is no waste management system. There are 5 polluting industrial establishments in the tehsil as per the report.

Hazards and Vulnerability

Earthquakes

Hazards: Mohol lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: Dense pockets of "kaccha houses" and poor construction practices have increased the vulnerability of houses to earthquakes. The built structure is susceptible to damage and failure due to earthquakes as it was evident in 1993 when the buildings developed cracks and the houses were damaged. The building construction and material adds to the vulnerability of earthquakes. There is less awareness regarding earthquakes resistant designs of structures.

Floods

Hazards: Mohol has experienced floods in 2020-21 due to swelling of Sina river and in 2005-06, 2019-20 due to Bhima river.

Vulnerability: The houses situated on the banks of Sina and Bhima river partially got damaged and there were damages to crops. The risk due to flooding is medium.

Flash Floods

Hazards: The area is susceptible to flash floods due to flooding in the river or heavy precipitation.

Vulnerability: 90% of the area is a low lying area which makes it vulnerable to flooding. The densely congested areas increases the vulnerability to flash floods due to lack of an appropriate surface drainage system.

Cyclones: Cyclones are not very evident in Mohol.

Lightening: There are events of lightening every year though the risk to lightening is medium.

Heat Wave: The susceptibility to heat wave is high during the summer months with average temperature of 45 degree Celsius.

Drought: Mohol has experienced drought in 2004, 2016 and 2021. The risk to drought is high as perceived by the administrative system and populations.

Bio-Disasters

Hazards: Epidemics are evident in Mohol taluka. 2011-12 had peak epidemic cycles followed by covid-19 pandemic in 2019-20, 2020-21. The highest number of cases registered was in April 2021 where the daily numbers of cases registered were 68,547 in the district.

Vulnerability: The susceptibility to epidemics will be high in Mohol due to the floating population for pilgrimage and lack of hygiene and sanitation facilities. The communicable diseases would be high due to lack of awareness and concentration of populations.

Fire: The cases of fire hazard are witnessed every year owing to burning fuel and electrical short circuits.

Accidental drowning: With 2 Rivers Sina and Bhīma, the cases of accidental drowning are obvious. In the year 2021, the cases of accidental drowning were witnessed.

Road Accidents: The cases of road accidents form a part of routine risk with the state highways flanking the taluka. The risk from road accidents is high.

Vulnerability: The speeding of vehicles on the highways, the loitering of cattle on the highways and due to the parked vehicles on the highway as well as vehicles with missing tail lamps are some of the causes of the road accidents.

Other hazards like rail accidents, CBRN, riots, stampedes and Industrial Hazards are not very evident.

Riots: 2004 has witnessed riots due to political agendas. The volatile political scenario increases the probability of riots along with religious stresses.

Industrial Hazard: Industrial hazards are not very evident in Mohol.

The main source of livelihood in Mohol taluka is agriculture and employment in the industrial sector. The opportunities of enterprise and other sources of livelihood is less. The educational facilities are mediocre while the healthcare facilities are insufficient which increases the vulnerability of the populations. The pollution levels are medium and the degradation of ecosystems is medium due to the mining activities. 40% of the houses are

"kaccha houses" and building regulations are not followed increasing further the vulnerability to built-environment.

Capacities

The taluka has low capacity in terms of educational and healthcare infrastructural facilities. The administrative capacities are average in terms of infrastructural facilities, transport facilities, human resource and capacity building. Mohol has 2 "Garmin Rugnalaya", 8 PHC and 5 private hospitals with not more than 15 beds. There are 10 healthcare centres and polyclinics and 1 multispecialty hospital. There are 210 Asha workers. There is no fire station in Mohol. There are 2 police stations with 110 police personals. The task force for responding in emergencies is good with 21 swimmers, 5 "sarp-mitra", 550 "police-mitra", 2 NGO's with 50 volunteers. There are 15 schools, 6 mangal karyalayas, 1 college and 1 open ground which could be used as temporary shelter in case of emergencies.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR MOHOL

	RISK ANALYSIS FOR MOHOL				
SI	LIST OF HAZARDS	HAZARDS	VULNERABILITIES	CAPACITIES	RISK
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
3	FLASH FLOODS	MEDIUM	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	MEDIUM	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	LOW	MEDIUM	LOW	**MEDIUM**
7	HEATWAVE	LOW	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**LOW**

2.10 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR MADHA

It is located 70 km towards North-West from district headquarters Solapur. Madha is also known for the Madheshawari temple, situated near Mankarna river. Madha is famous for Rambhaji Nimbalkar who lived here and built a fort. The head-quarters of the Madha Panchayat Samiti are, however, located at Kurduwadi. Agriculture is the main source of income for the people of Madha.

- Population: Madha Taluka of Solapur district has total population of 324,027 as per the Census 2011. Out of which 169,430 are males while 154,597 are females. In 2011 there were total 66,795 families residing in Madha Taluka. The Average Sex Ratio of Madha Taluka is 912. As per Census 2011 out of total population, 6.9% people lives in Urban areas while 93.1% lives in the Rural areas. The average literacy rate in urban areas is 87.7% while that in the rural areas is 76.3%. Also the Sex Ratio of Urban areas in Madha Taluka is 956 while that of Rural areas is 909. The population of Children of age 0-6 years in Madha Taluka is 39646 which is 12% of the total population. There are 21673 male children and 17973 female children between the age 0-6 years. Thus as per the Census 2011 the Child Sex Ratio of Madha Taluka is 829 which is less than Average Sex Ratio (912) of Madha Taluka.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. Madha has moderate soil and uncertain rainfall marks this zone. Both Kharip and Rabbi crops are grown in this part.
- Climate: The climate of Madha is dry. Humidity increases in monsoon months. The average temperature is 36degree which increases up to 43degrees in peak summers in the month of April and May and lowers down to 13 degrees in winters. The average rainfall is 508.3mm.
- Education: The total literacy rate of Madha Taluka is 77.12%. The male literacy rate is 73.83% and the female literacy rate is 60.94% in Madha Taluka. There are more than 30 schools and colleges in Madha.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: The tehsil is connected by road national highway NH548C. It is connected by railway Madha Rail Way Station , Wadsinge Rail Way Station are the very nearby railway stations to Madha. Barsi Town Rail Way Station (near to Barshi) , Kurduvadi

Junction Rail Way Station (near to Kurduvadi) , Pandharpur Rail Way Station (near to Pandharpur) , Laul Rail Way Station (near to Kurduvadi) , Uplai Rail Way Station (near to Barshi) are the Rail way stations reachable from near by towns.

- Environmental status: The tehsil fed by rivers Nira and Bhima.

Hazards and Vulnerability

Earthquakes

Hazards: Madha lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: There are pockets of dense population in the city and the organic development of the city makes it more vulnerable to earthquakes. Most of the structures do not comply with the earthquake resistant building codes. 30% houses are “kaccha” houses. There is a susceptibility of disrupting critical services like water supply and drainage systems.

Floods

Hazards: Madha is flanked by rivers Bhima and Sina. Floods have been evident in 2020. There is a risk of floods from river Bhima during release of water from Ujjani Dam. The average rainfall of Madha is 542MM.

Vulnerability: The low-lying areas of the city and on the banks of the river are susceptible to flooding. There are over 15 villages on the banks of Bhima River and 16 villages on the banks of Sina River which get impacted by release of water from Ujjani Dam.

Following are the villages are susceptible to flooding.

Bhima river : Ujjani te, Shevre, Ranzani, Chandaj, Takli te, Malegoan, Phutajawalgoan, Rui, Alegoan Budruk, Alegoan Khurd, Bemble, Garakole and Mitkalwadi.

Sinna river : Mungshi, Naadi, Lahu, Ridhare, Tandulwadi, Daarphal, Nimgoan, Sultanpur, Kevad, Undargoan, Wakav, Khairav and Kumbhej

Flash Floods

Hazards: Flash floods were evident during heavy precipitation during 2018 when the average rainfall received was 1239MM.

Vulnerability: The susceptibility of flash floods increases due to concretisation in the city and no appropriate surface drainage system. The densely populated pockets would be more vulnerable to water logging due to wet spells caused by climate change impacts.

Cyclones: Cyclones are not very evident in Madha.

Hazards: Risk of cyclones is not very evident in Madha, though high speed winds are experienced during monsoon months.

Vulnerability: Vulnerability to damage from high winds increases to the kaccha houses and the houses with tin roofs and poor construction practices which could be accidental.

The other natural hazards like drought lightening and heat wave are evident but are less frequent and of low risk.

Bio-Disasters

Hazards: There is a high susceptibility of epidemics mainly air-borne and water-borne. The Covid cases in all the 3 waves were fairly high. Other epidemics like dengue, malaria, chicken guniya and swine flu has shown its presence

Vulnerability: The susceptibility of communicable diseases is medium. The vulnerability increases due to insufficient healthcare systems and poor hygiene infrastructure in the city.

Fire

Hazards: The cases of fire are high with one event per month but the scale is low.

Vulnerability: In most cases, material losses by far exceed the human life losses. The vulnerability increases due to dense population pockets and inaccessibility to fire brigades.

Accidental Drowning: Are in-frequent and of low impact.

Road Accidents: The number of road accidents and other transport related accidents are low in number.

The susceptibility to CBRN disasters is negligent. The susceptibility to stampedes is low. There are no cases reported of stampedes, riots and industrial hazards.

The most vulnerable villages to flooding in the taluka are Bemble, Shevre, Mtkalwadi, Garakole, Chandaz, Takli-te, wherein 48 families need to be evacuated in the emergency scenarios. The educational and medical facilities are low quantitatively and qualitatively which increases the vulnerability of the populations.

Capacities

Madha has a water supply system, drainage system, electric supply system, waste management system and fire-fighting system. The fire brigade station needs to be upgraded with the fire fighting equipment's and other rescue equipment. The administrative system needs alternative communication systems in case of mobile network failure in emergency scenarios. The transport facilities in Madha are mostly private with auto rickshaw as the

main source of transport. The human resource available to volunteer in emergency scenarios is good with a good literacy rate and physical fitness. However there is a need for training and capacity building to respond in emergency scenarios. Public awareness on disaster safety is required on top priority.

The critical infrastructure in Madha requires upgradation. Madha has more than 100 hospitals, healthcare centres and clinics. There are more than 10 multi-speciality hospitals. There is one fire brigade station with the Madha Municipal Council. There are 2 fire engines, phone tender, fire tender, rescue boat, balloon lamp tower, wood cutter, B.A. Set and life jackets with the fire station.

There are 9 boats in the taluka with 77 expert swimmers who are part of taskforce teams. The task force team for evacuation, shelter management, water supply and food, health care, road repair and transport management, electricity, hygiene and sanitation team, administrative team and early warning team is established, who would be responsible for responding in post disaster scenarios. The temporary shelters have been identified for each village and the town area, including the transport facility and safe passage way.

The capacities with the Madha Municipal Council are however low and disintegrated. There is a need of training and capacity building to the administrative systems and to create institutional mechanisms for disaster management.

RISK ANALYSIS FOR MADHA

	RISK ANALYSIS FOR MADHA				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	HIGH	MEDIUM	MEDIUM	**HIGH**
3	FLASH FLOODS	MEDIUM	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	MEDIUM	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	LOW	MEDIUM	LOW	**LOW**
7	HEATWAVE	LOW	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	LOW	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**MEDIUM**

2.11 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR KARMALA

Karmala is remote taluka in Solapur district. It came in limelight the film 'Sairat' being shot there. There are 123 villages and 1 town in Karmala Taluka. The total area of Karmala is 1593.01 sq.km with population density of 160 per sq.km.

- Population: As per the Census India 2011, Karmala Taluka has 53719 households, population of 254489 of which 132700 are males and 121789 are females. The population of children between age 0-6 is 31054 which is 12.2% of total population. The sex-ratio of Karmala Taluka is around 918 compared to 929 which is average of Maharashtra state. Out of total population, 90.88% of population lives in Urban area and 9.12% lives in Rural area. There are 13.84% Scheduled Caste (SC) and 1.7% Scheduled Tribe (ST) of total population in Karmala Taluka.
- Topography and Geography: Flat land with rocky terrain and shallow soil cover. Shallow and poor type of soil, not retentive of moisture marks this part. Scanty and uncertain rainfall. Rabbi crops mainly grown

- Climate: The climate of North Solapur is dry. Humidity increases in monsoon months. The average temperature is 36degree which increases up to 43degrees in peak summers in the month of April and May and lowers down to 13 degrees in winters. The average rainfall is 519mm.
- Education: The literacy rate of Karmala Taluka is 66.3% out of which 73.22% males are literate and 58.77% females are literate. There are number of schools and colleges in Karmala tehsil.
- Health care: The health care facilities are good with hospitals, health care centres and polyclinics.
- Transport: Karmala, Baramati are the nearby by towns to Karmala having road connectivity to Karmala. Nearest railway station to reached Karmala is Jeur railway station, 20 km away from Karmala city, 4-5 trains has halt at Jeur
- Environmental status: The tehsil is fed by Sina river. The level air, water and soil pollution is evident.

Hazards and Vulnerability

Earthquakes

Hazards: Karmala lies in the zone 3 with susceptibility of 4 to 7 Richter scale. Other than that, it does not have any history of earthquakes.

Vulnerability: The vulnerability to earthquakes is high due to 50% of the area being densely populated and congested. The organic growth of the city makes it susceptible to the threats of earthquakes due to the high density and poor constriction quality of the built environment. 50% of the city area cannot be accessed by ambulance or fire engine however the development is low.

Floods

Hazards: The Sina River and the Nira River flank the district of Karmala on its borders. There is no possibility of flooding due to less exposure to the rivers.

Vulnerability: The vulnerability is quite low due to low exposure to the rivers.

Flash Floods

Hazards: The area falls under the rain shadow region with average rainfall of 380mm. Heavy precipitation is sporadic.

Vulnerability: The events of flash floods are not very evident however susceptibility of flash floods exist due to the density of built structures in a haphazard way.

Cyclones: Cyclones are not evident in Karmala.

Droughts: Drought: The susceptibility to droughts exists, due to less rainfall and climate change impacts.

Lightening: There are events of lightening in the monsoon months. The awareness and preparedness to the impact of lightening is low.

Heat Waves

Hazard: The impact of heat wave is noticeable with temperature rising to more than 45 degrees in the months of April and May.

Vulnerability: The vulnerability to heat wave increases due to the heat gain from roofs which is generally constructed in RCC Slabs or tin sheets. The area has very less green cover which contributes to the heat wave. The concretization is further adding heat to the micro-climate.

Bio-Disasters

Hazards: Epidemics are observed during the summer months and the monsoon months. There are cases of malaria, cholera, gastro-enteritis, jaundice and typhoid. The other diseases observable are chickengunie and swine flu.

Vulnerability: The vulnerability of epidemics is due to poor hygiene and sanitation practices and inefficient infrastructural services. The diseases are air-borne and water-borne. The covid-19 situation was grievous.

Fire

Hazards: There are rare events of fire mostly due to the dry weather. The vulnerability to fire increases due to the congestion of built structures and inaccessibility of fire engines. Moreover the vulnerability to fire increases also due to the ineffective fire fighting infrastructure.

There are no conspicuous cases of accidental drowning, road accidents, rail accidents, CBRN hazards, stampedes, riots and industrial hazards.

Karmala taluka has a population of 45,000 is a small place with good education facilities and community structures. The people mostly are working in the near-by industries or employed in the small local ventures. It offers fewer opportunities for growth but has a stable community system.

Environmentally the taluka has low levels of degradation and pollution.

Capacities

The administrative capacities in terms of infrastructure and human resource are low. There is a need of training and capacity building to the administrative setup.

The critical infrastructure is good with almost 51 hospitals and healthcare centres and clinics. There are 2 ambulances available in the town. Karmala does not have any fire station. The nearest fire station. There is one police station in Karmala. There is no trained volunteer task force. There are 2 colleges 17 schools, 8 Mangal Karyalayas which can be used as emergency shelters which can be used in emergency situations. There are 3 voluntary groups which can contribute and support in emergency scenarios.

As per the disaster management plan of 2022, of the taluka, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

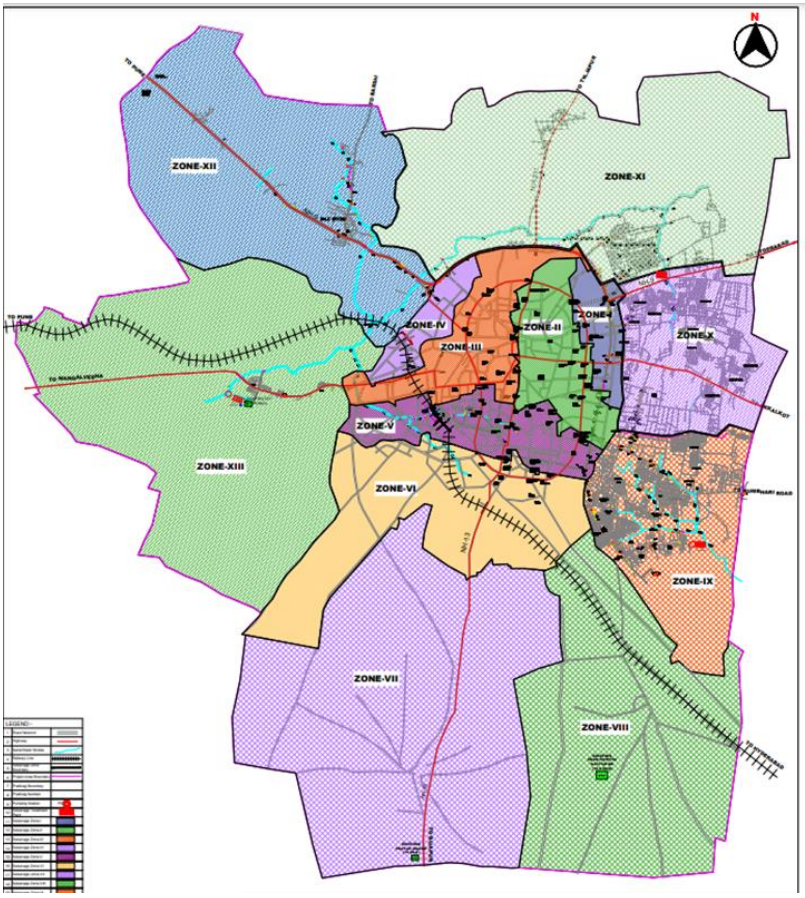
RISK ANALYSIS FOR KARMALA

	RISK ANALYSIS FOR KARMALA				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	LOW	MEDIUM	MEDIUM	**LOW**
3	FLASH FLOODS	LOW	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	MEDIUM	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	LOW	MEDIUM	LOW	**LOW**
7	HEATWAVE	LOW	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	LOW	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	LOW	LOW	MEDIUM	**MEDIUM**

2.12 HAZARD, VULNERABILITY CAPACITY ANALYSIS FOR SOLAPUR CITY

It is the seventh biggest Metropolis Urban Agglomeration and 11th most populated city in Maharashtra. The inscriptions of chief deity of Solapur Shivyogi Shri. Siddheshwar of the time of the Kalachuri (Basavakalyan) suggest that the town was called "Sonnalage" which came to be pronounced as "Sonnalagi".Solapur lies in the basin of river Bhima and the municipal jurisdiction of the city encompasses an area of 178.57 km2. The city is currently sub-divided into eight administrative zones and these eight zones are further sub-divided in to 51 wards.

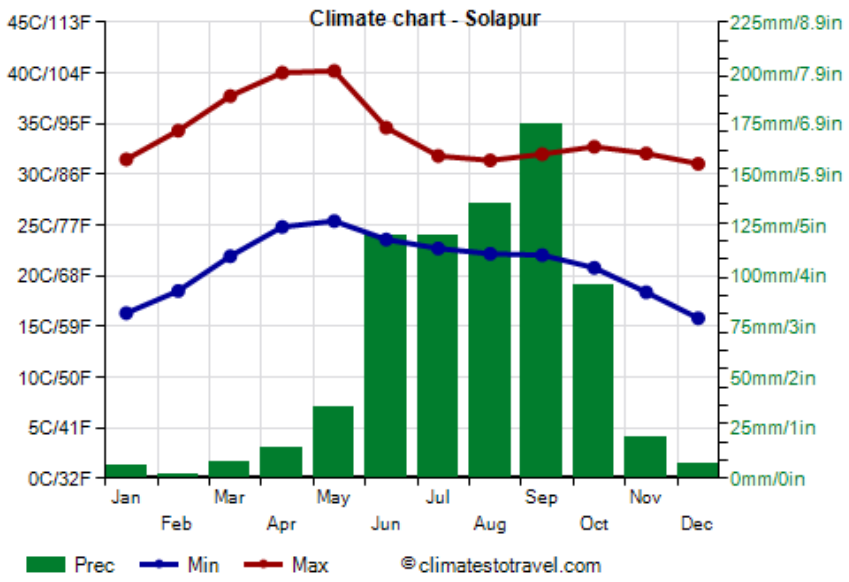
- Population: As per 2011 census of Solapur city and as per provisional reports of the Census of India, the population of Solapur in 2011 was 951,118. At the time of the 2011 Census of India, 73.13% of the population in the district spoke Marathi, 9.28% Kannada, 6.47% Hindi, 4.49% Telugu and 3.94% Urdu as their first language. Solapur's population, with the inclusion of its suburbs, increased to 1,250,000 reorganized in 2012.(http://www.censusindia.gov.in/2011census/C-16.html)



- Topography and Geography As per the gazetteer the city lies about 457 m above sea level on the water shed of the River Adila, a feeder of the River Sina which it joins at Nandur about eight miles to the south-west of the city.

The city stands in the center of a large plain, the nearest hill called Daval Malik being eight miles to the east, while on the north at a distance of twelve miles rises Savar-gaon hills and about ten miles further north-west is the Ekruk tank, or as it is generally called the Hipparga lake. Black cotton soil is found abundantly in the region. The depth of soil in different areas in the city varies from 7.5 cm to more than 90 cm. It is estimated that around 10% of the area has the shallow soil with the depth of 7.5 cm.

- Climate: Solapur falls under the category of dry (arid and semiarid) climate according to the Köppen climate classification. The city experiences three distinct seasons: summer, monsoon and winter. Typical summer months are from March to May, with maximum temperatures ranging from 30 to 45 °C (86 to 113 °F). The warmest months in Solapur are April and May. The typical maximum temperatures being 40 °C (104 °F) or more. The highest temperature ever recorded is 46.0 °C (114.8 °F) in May 1988. Although summer does not end until May or even the midst of June, the city often receives locally developed heavy thundershowers in May (although humidity remains high). The monsoon lasts from June to the end of September, with moderate rainfall. The city of Solapur receives an average rainfall of 545 mm (21.5 in) per year. Winter begins in November and lasts until the end of February, with the temperatures occasionally dropping below 10 °C (50 °F). Solapur lies very close to the seismically active zone around Killari, Latur District, about 100 km (62 mi) east of the city.



- Education: The city has sufficient educational facilities. Schools, Colleges and opportunities of education in various fields. In 2011, the total literates in Solapur city are 710,180 of whom 390,335 are males while 319,845 are females. The average literacy rate of Solapur city is 83.88 percent of which male and female literacy was 91.31 and 76.30 percent respectively.

- Health care: The health care facilities are good in Solapur city. Besides the government hospitals and primary health centres, there are several private super specialty hospitals, clinics, nursing homes etc in Solapur. The multispecialty hospitals consists of most advanced technologies and latest treatment options along with highly knowledgeable and long experienced doctors and other staff. Most of the big hospitals have their own ambulance services and blood banks that are very helpful in emergency situations.

- Transport: Solapur city is connected by road and railway transport. The local transport is combination of public and private transport, wherein locals prefer private transport system. Solapur internal city transport is managed by SMT (Solapur Municipal Transport), but the buses operated by SMC are limited to less than 100 buses.

- Built Environment: The city has organic planning and the built profile is low, with majority buildings G+4 structures. There are many dense pockets in the city especially in the older part of the city. The construction material used is conventional RCC and brick and very old buildings 'wada's' are in loading bearing structures. The building byelaws are followed for new constructions. The awareness on planning and design of earthquake resistant structures is low.

- Environmental status: Solapur is one of the most-polluted cities in Maharashtra due to the effluent chemicals produced as the waste products from the textile industries in its region.[67] As many vehicles in the city utilise diesel fuel, it also generates tremendous smog emitted by sugar factories and heavy textiles industries in the city's suburb.[68] Various efforts are being made by Maharashtra Pollution Control

Board (MPCB) to reduce air pollution and its environmental effects. The city has launched a GO-GREEN scheme by planting trees in the city and developing greenery with the help of various eco-friendly people in the city. CNG will be available shortly soon in MIDC Chincholi and some major area in Solapur .

Hazards and Vulnerability

Earthquakes

Hazards: Solapur city lies in the zone 3 with susceptibility of 4 to 7 Richter scale. It has witnessed tremors in 1993. Other than that, it does not have any history of earthquakes.

Vulnerability: the vulnerability to earthquake is attributed to the lack of risk knowledge, wherein the construction of the built environment does not follow the planning and design measures of earthquake resistant techniques. The city has 40% of kaccha houses which will not withstand the tremors. The vulnerability to earthquakes further increases due to non-adherence of building byelaws and other building compliances.

Floods

Hazards: Solapur city does not have river, hence there is no threat of riverine flooding .

Flash Floods

Hazards: The taluka is prone to flash floods, caused by sporadic heavy precipitation and water logging in dense pockets of the old goathan areas.

Vulnerability: The vulnerability to flash floods is medium, as heavy rains are sporadic events. Water logging could be a issue with organic development growth pattern of the city, causing dense pockets. The vulnerability increases due to the inefficient and inappropriate surface drainage system.

Cyclones: Cyclones are not very evident in Solapur city.

Drought

Hazards: The Solapur city taluka is vulnerable to droughts.

Vulnerability: The risk to droughts is high as the city lies in rain shadow with average rainfall of 200mm

Lightening

Hazard: Lightening is frequent in Solapur city with casualties in the year 2017, 2019 and 2021.

Vulnerability: The susceptibility to lightening is high in the monsoon season every year. There were human casualties as well as animal casualties in the year 2017, 2019 and 2021. The risk to lightening is high.

Heat Wave: The average temperature is 40 degree Celsius rising to 45 degree Celsius in peak summers and the susceptibility to heat waves is high.

Bio-Disasters

Hazards: There is a high susceptibility of epidemics mainly air-borne and water-borne. The Covid cases in all the 3 waves were fairly high.

Vulnerability: The vulnerability to communicable diseases is high especially with the congregation of populations during the religious festivals. The vulnerability to diseases increases due to lack of efficient health care system and awareness about health and hygiene among populations. Covid 19 had ill effects on the city, with high number of cases in all the three waves of covid.

Fire

Hazards: The events of fire are frequent but the scale is low.

Vulnerability: accidental fires are attributed to cooking fuel and electrical short circuits. The cases are more in lower economic communities and slums, mostly who store the fire wood. The vulnerability to fire increases due to the inaccessibility of fire engines in these dense pockets.

Accidental Drowning: Accidental drowning is not evident in Solapur city. Though there are lakes the banks are well guarded.

Road Accidents

Road accidents are frequent but the scale is low. However the susceptibility to road accidents is high due to the indiscipline of drivers.

The other man-made hazards such as rail hazards, industrial hazards, and CBRN are not evident.

Stampedes: Solapur hosts many religious and political gatherings, like ‘Gadda Jatra’, Warri and political rallies, wherein the congregation of population is high which increases the susceptibility of stampedes.

Riots: Solapur City has mix of religions mainly Hindus and Muslims, and religion stimulated riots are frequent. The religious riots in 2002 and 2006 and 2022 witnessed causalities making the susceptibility to riots high.

The major source of livelihood is farming and employment in factories and small enterprises. There are very few opportunities for other types of employment and enterprise. 40% of the total houses are 'kaccha houses' in the city area. Transport facilities preferred are mostly private the public transport system is ineffective and needs upgradation. The city has its own water supply is old and clogged, needing upgradation. The city has drainage system, waste management system and 24/7 electrical supply, these critical services needs upgradation to withstand emergency situations. The hazardous locations and low lying areas are comparatively less including very less densely congested area.

The educational and medical facilities are fairly good but needs upgradation. The environmental degradation is evident with medium levels of air, water and soil pollution.

Capacities

The administrative capacities in terms of infrastructure, transport, human resource, training and capacity building are medium and needs upgradation. The critical facilities like the healthcare systems are fairly good with more than 127 hospitals and over 200 healthcare centres and polyclinics and 2 multi-speciality hospitals. Quantitatively the 7 fire stations and 75 police stations perform well. Qualitatively these critical services need upgradation in terms of resources and equipment.

There are 53 identified emergency shelters in the city with the capacity of hosting more than 5000 people approximately in the emergency scenarios as per the disaster management report 2022 of Solapur city.

As per the disaster management plan, the task force has been identified for search and rescue, temporary shelter management, transport facilities, disaster management committee, first aid, water and sanitation facilities and communication and surveillance teams.

RISK ANALYSIS FOR SOLAPUR CITY

	RISK ANALYSIS FOR SOLAPUR CITY				
SI	**LIST OF HAZARDS**	**HAZARDS**	**VULNERABILITIES**	**CAPACITIES**	**RISK**
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	LOW	**MEDIUM**
2	FLOODS/ HEAVY PRECIPITATION	LOW	LOW	LOW	**LOW**
3	FLASH FLOODS	LOW	MEDIUM	LOW	**MEDIUM**
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	**LOW**
5	DROUGHTS	LOW	MEDIUM	LOW	**MEDIUM**
6	LIGHTENING	LOW	MEDIUM	LOW	**LOW**
7	HEATWAVE	MEDIUM	MEDIUM	LOW	**MEDIUM**
8	BIODISASTERS-EPIDEMICS	HIGH	MEDIUM	LOW	**HIGH**
9	FIRE	MEDIUM	MEDIUM	MEDIUM	**HIGH**
10	ACCIDENTAL DROWNING	LOW	LOW	MEDIUM	**LOW**
11	ROAD ACCIDENTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
12	OTHER ACCIDENTS	LOW	MEDIUM	MEDIUM	**LOW**
13	CBRN	LOW	MEDIUM	LOW	**LOW**
14	STAMPEDES/RIOTS	MEDIUM	MEDIUM	MEDIUM	**MEDIUM**
15	INDUSTRIAL HAZARDS	MEDIUM	MEDIUM	LOW	**MEDIUM**

Chapter 3: Risk Analysis for Solapur District

Solapur district has medium risk to natural and manmade disasters. The risk is attributed hugely to the increasing vulnerabilities and lower capacities more than the exposure to hazards. The threats of natural hazards are less due to the geographical and climatic conditions, however there is ever growing vulnerabilities attributing to lack of appropriate infrastructural facilities, critical services, in-sufficient health care systems and lack of awareness in populations and institutional mechanisms.

Hazards – The district is prone to earthquakes of 4 to 7 Richter scale earthquakes. Floods are infrequent to the rivers Bhima and Sina, the reason being Solapur lies in rain shadow, but heavy precipitation in catchments of Bhima basin, release of water from Ujjani dam, floods the villages situated on the banks of river. The taluka is prone to flooding are South Solapur, Akkalkot, Malshiras, Mangalvedha, Mohol, Pandharpur and Madha. Biodisasters, mainly epidemics are frequent in the district. Covid-19 had gripped the district in 2019 and 2020. The other natural hazards like lightening, droughts and heat wave are evident, but the scale is medium. Manmade disaster, mainly fire and stampedes have more susceptibility.

Vulnerability – Vulnerability of the populations is attributed to their socioeconomic conditions. The vulnerability further increases due to in-accessibility to health care services and insufficient critical facilities. Lack of awareness and lack of sensitivity to public issues adds to the vulnerability of disasters.

Capacity – Solapur District has capacities to handle the disasters, these capacities need to be upgraded. Capacities required in pre disaster phase for prevention, preparedness, and mitigation needs, a focussed and dedicated approach with the structural and non-structural measures. Capacities for disaster and post disaster phase, early warning, search and rescue, response and relief, recovery and rehabilitation needs to be strengthened, with risk knowledge and resources.

Risk - The overall disaster risk to the district is medium.

RISK ANALYSIS

FOR SOLAPUR DISTRICT

SI	LIST OF HAZARDS	NORTH SOLAPUR	SOUTH SOLAPUR	AKKALKOT	BARSHI	MANGALVEDHA	PANDHARPUR	SANGOLA	MALSHIRS	MOHOL	MADHA	KARMALA	SOLAPUR CITY	RISK AGGREGATION
1	EARTHQUAKES - ZONE III	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	HIGH
2	FLOODS/ HEAVY PRECIPITATION	HIGH	MEDIUM	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	HIGH	MEDIUM	LOW	LOW	LOW	MEDIUM
3	FLASH FLOODS	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
4	CYCLONE- HIGH WINDS	LOW	LOW	LOW	LOW	LOW	LOW	LOW	MEDIUM	LOW	LOW	LOW	LOW	LOW
5	DROUGHTS	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
6	LIGHTENING	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	MEDIUM
7	HEATWAVE	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
8	BIODISASTERS-EPIDEMICS	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
9	FIRE	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
10	ACCIDENTAL DROWNING	LOW	LOW	LOW	LOW	LOW	MEDIUM	LOW	LOW	LOW	LOW	LOW	LOW	MEDIUM
11	ROAD ACCIDENTS	HIGH	HIGH	HIGH	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
12	OTHER ACCIDENTS	MEDIUM	LOW	LOW	LOW	LOW	MEDIUM	LOW	LOW	LOW	LOW	LOW	LOW	LOW
13	CBRN	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
14	STAMPEDES/RIOTS	LOW	LOW	HIGH	HIGH	HIGH	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
15	INDUSTRIAL HAZARDS	LOW	LOW	LOW	LOW	LOW	MEDIUM	LOW	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	LOW

Chapter 4 Institutional Arrangements of District Disaster Management

The arrangements and interconnectivity of the Solapur District Disaster Management Authority (SDDMA) shall be understood for the functioning of disaster Management structure.

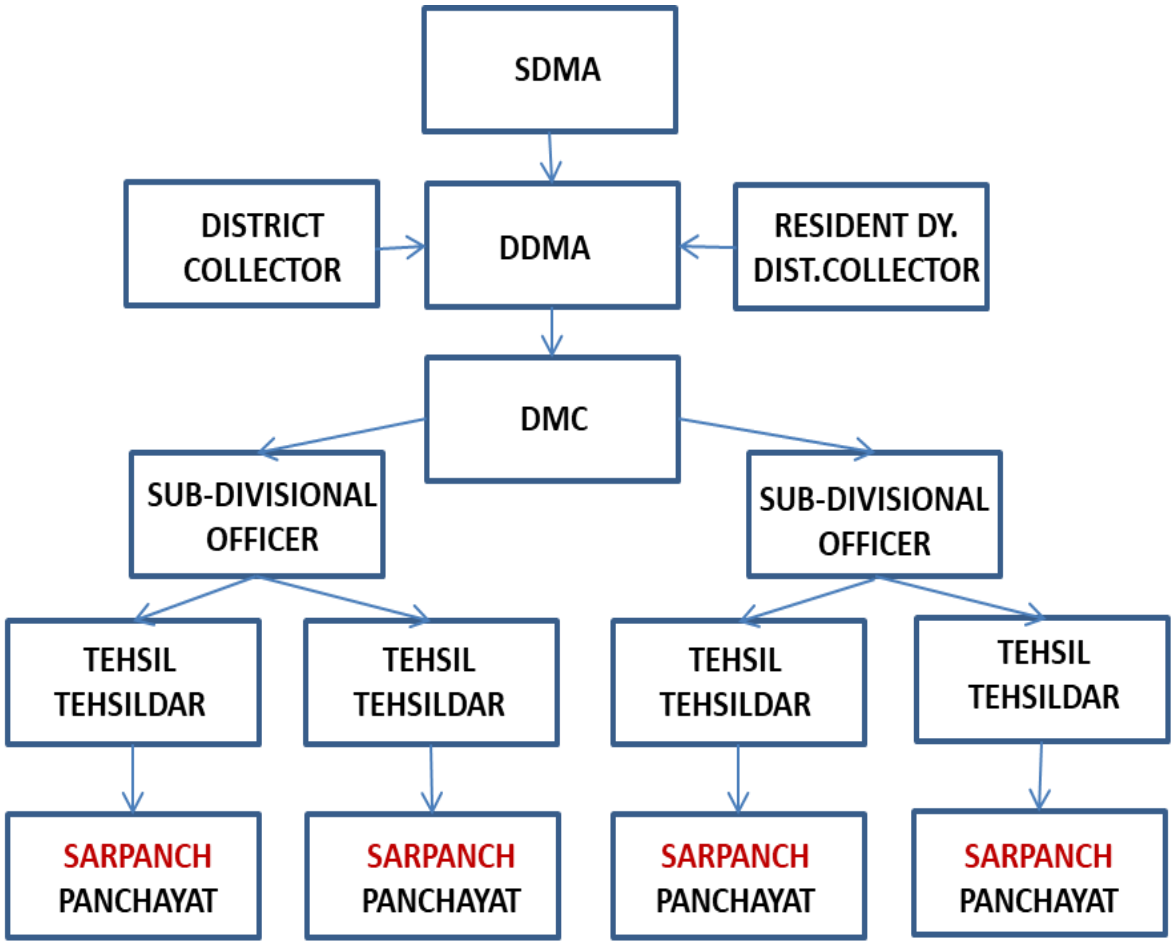


Diagram shows functioning of Disaster management structure and flow of orders

Disaster Management continuum requires a strong organisational structure during all phases of management – namely, Pre- Disaster, During Disaster and Post Disaster phases. The responsibility of the management rests mainly on the government stakeholders within the immediate jurisdiction of whom any emergency occurs. Hierarchy of authority and responsibility further gets distributed to various departments and functionaries who bear the accountability to ensure that the prevention and mitigation are in place, the preparedness levels are high, the response is speedy and effective recovery process is

smooth and efficient. The following organisational structures have been accepted at national level and for any district, these are highlighted in this part:-

(a) ESF (Emergency Support Functions): These are operative during all phases of any disaster. It is a joint responsibility of all the functionaries. ESF is mainly identified for municipal corporations.

(b) IRS (Incident Response System): This system is pre-formatted and operates during the "Active Disaster" phase. Here, the response forces created for the purpose of "response" become active and operate under the overall functional umbrella of the IRS. The ESF functions support the IRS for decision-making by supplying all the data and information. The IRS terminates to function when any disaster that it handles is overcome and the further 'Recovery' phase is again handled by the concerned departments and functionaries of the government.

(c) EOC (Emergency Operations Centre): This is a node that has a dual responsibility of acting as a coordinating platform for the ESF functionaries and upgrades all the essential data fields on continuous basis and is also the Node from where the Command and Control Functions of the IRS are executed during any emergency. Thus, an EOC is a node that is functional 24 x 7 and is well staffed that has to be trained.

(d) Tools for Command and Control: An ESF or IRS can function through all the layers, only on the basis of a defined multi facet communication and computerised systems for dynamic upgrades, decisions and execution as well as monitoring.

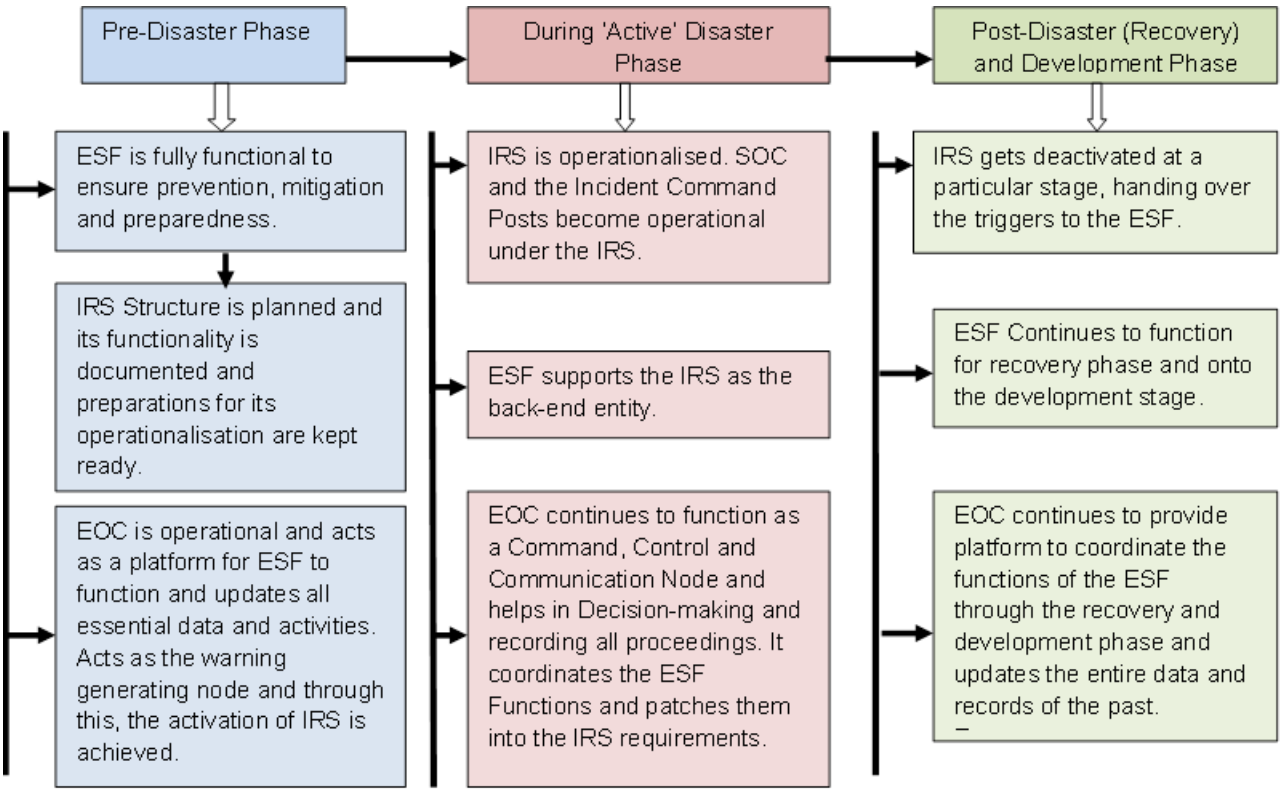
(e) At the level of affected sites, Site Operation Centres may function on the same lines as the Incident Command Post of the IRS. This aspect has been explained later in this part.

4.1 Conceptual Connectivity of the Organisations:

The diagrammatic representation of the organisations is depicted below for better understanding.

It is important to understand that the ESF and EOC are continuously functioning entities while the IRS is operational only during the 'active phase' to take care of Evacuation, Rescue

and Immediate Relief Functions and transcends into the initial administrative portion of the Recovery phase and it disengages (becomes inactive) as it passes on the long-duration further functions of relief, recovery, rehabilitation as well as financial in/out flows.



a.) It is also important to understand that as per the DM act 2005, the main functionaries in a state are the SDMA and DDMA at the state and district levels. The divisional headquarters act as the coordinating agencies and also act as the agencies that accord financial sanctions and also process demands and coordinate the resource mobilization within the divisional jurisdictions. It is important to understand that even when there is a major disaster within the district jurisdiction, the legal and executive authority to deal with it rests with the District Collector. The collector acts as the 'Responsible Officer' and has the right to appoint an Incident Commander. The District Collector (DC) appoints the Municipal Commissioner as the Co-Chairman of the Incident Response System, particularly when a disaster affects the Municipal area as well as other areas of the district. The DC may also appoint the Municipal Commissioner (MC) as the incident commander within the municipal jurisdiction and appoints other functionaries of the district as the Incident Commanders for the areas outside the municipal jurisdiction. The resources could then be logically shared and recycled

between them as there are many resources commanded by each of them within their administrative jurisdictions. Co-opting the Police Commissioner in the system is also logical and prudent. However, the discretion to decide on the options entirely rests with the DC. The system here is well thought out and recommended as it works beyond the personal considerations and takes care of the Disaster Management aspects holistically.

b.) The EOCs and ESF functions have to be carried out by the DC and the MC, concurrently, with the EOC of the district being positioned as the 'Master EOC" for the entire district. Notwithstanding the option exercised by the DC, the ESF functions of both, the district as well as the Municipal Corporation (or any Municipal council) should always be functional.

Chapter 5 Prevention and Mitigation Measures

As per the HVCR conducted and study undertaken for Solapur district, the risk is multiple. Unlike man-made disasters, natural disasters like floods and earthquakes cannot be avoided. However the mitigation measures along with proper planning of on-going and future developmental work can reduce the impacts of hazards and prevent hazards from turning them into disasters.

The district is susceptible to majorly three natural hazards, earthquakes, floods in some parts and biodisasters. There are events of lightening, heatwave, and droughts. Fire, stampedes, riots are few man- made disasters which are highly susceptible in various parts of the district due to the local conditions.

Solapur district lies in earthquake zone III with a susceptibility of 4-7 Richter scale earthquakes. It has experienced the tremors in 1993 during Latur earthquake with some amount of physical damage. Hence it is necessary to taken all the preventive actions for the earthquakes, especially with the infrastructural projects and future investments. The earthquake resistant strategies should percolate in planning and making informed decisions for the district at policy level. The study shows each taluka has almost 40% of buildings which will not withstand earthquakes of above 5 Richter scale. SDDMA shall ensure the earthquake prevention strategies are incorporated at policy level and integrated in all the institutional mechanisms.

Solapur district is in rain shadow and lies in Bhima basin. Few taluka's are susceptible to flooding, which are situated on banks of river Bhima and Sina mainly, South Solapur, Akkalkot, Malshiras, Mangalvedha, Mohol, Pandharpur and Madha. Floods cannot be prevented but could be managed well with the necessary preventive measures. The first step of preventive measures begins with marking the blue and red lines and acknowledging it. The flood management strategies should be adopted and integrated at the policy level, which should be percolated in all the development 'decision making system' and further administrative processes and regulations. No developmental decision, infrastructural project or future investment should be planned in flood prone areas. The river basins shall be kept free from any kind of planned or unplanned encroachments. Communities susceptible to flood risks shall be made aware about of the preventive and preparedness measures to be undertaken.

Solapur district houses many religious festivals and gatherings, especially the 'WAARI' wherein 15 lakh people gather in Pandharpur. These religious festivals increase the susceptibility of biodisasters like epidemics. Covid-19 has played havoc in Solapur district in 2019-2020, and 2021 with high number of positive cases and casualties. The district has also experienced the epidemics chicken- guniya and malaria. These incidences make the district highly susceptible to biodisasters, wherein all the epidemic control strategies needs to be adopted at policy level and in all the developmental decisions. There is need to give special attention to hygiene and sanitation practices and infrastructure. Health care needs to be re-strengthened with accessibility to facilities and services to cross section of population.

The susceptibility to other hazards like drought, lightening, and heat wave exists, for which the most effective tool would be awareness of populations and behavioural practices.

Manmade hazards like fire are evident in all the places. Solapur district is vulnerable to fires due to two reasons, partly due to the negligence and unawareness of people and partly due to the insufficient fire fighting capabilities with Solapur District, in terms of resources and man- power. The other manmade hazards are sporadic and accidental in nature. Institutional awareness mechanisms can help in preventing such events.

5.1 Following are the general pointers for all types of hazards:

(a) Allot different Safe Areas and assembly Points where the public can reach in emergency after vacating their houses or places of work during an emergency. Assembly points could be in the closer vicinity of the residential or work premises (like a small plot/ garden/ traffic islands or space outside own building/ factory/ office/ school etc). Inform the population about the safe areas and assembly points. Safe Places for different hazards would be different, keeping in mind the following aspects-

(b) For earthquakes, the safe places have to be in the open and away from building structures. Assembly areas could be the roads adjoining strong buildings.

(c) For floods, the safe places have to be outside the 'Red Line' and in buildings that are strong and spacious – like Marriage halls, schools, Colleges and Stadia. Assembly areas could be even on top of a building structure (it may get endangered later, but as immediate measure the upper floors could be used before evacuation).

(d) In case of bomb blasts or terrorist attacks, the safe places should be strong houses, at least 500 metre away from the place of incidence and not in the line of blast/ fire. The

assembly areas could be the rooms away from the explosion or behind compound walls.

(e) Keep rescue and relief inventory ready for the population that may get affected by any hazard. The inventory should be in palletized form for a lot of 500 personnel. The rescue and relief equipment should be kept at each Divisional office and a store be established for the same. The equipment has to be maintained regularly and accounted for.

The following inventory is suggested for Rescue and Relief for 500 victims:-

I. Rope Carnamental – 100 metre - quantity 4

II. Harnesses - 20

III. Shovels, Pick Axe and crow bar sets - 20

IV. Water cans 500 ltr capacity - 10

V. Tents for living (20' X 16' dimension) - 30

VI. First Aid Boxes with bandages, cotton, gauze and scissors and anti-septic lotions - 50 boxes.

VII. Medical kits for crush injuries, drowning related episodes, fires and explosions and chemical hazards and must contain ambulatory bags also (about 10 per 500 victims). A list of such medicines for immediate use should be drawn and the material should be kept handy.

(f) Identify and prepare the list of volunteers. Train the volunteers of 'Ganesh Mandals' and other NGOs in rescue and relief operations. There is huge requirement of training for the volunteers. The requirement is to have about 50 volunteers for every 500 likely victims.

(g) Revive the siren system instituted by the Civil Defence indicating different notes for different emergencies and practice the same periodically. The sirens and hooters should be kept in each division taluka office and panchayat office and ward office, suitably installed and connected. The notes should be regularly practiced and information should be disseminated to the public regarding the meaning of all the notes.

Following are the notes for warnings and they should be as under for the following emergencies:-

I. Flood warning will be given on the hooters – A long note - gap – long note – gap (and so on) to be repeated after every five minutes. This should indicate to the public that a flood is eminent and they should move to a safe place earmarked earlier, without panic.

II. Earthquake – A siren with short wailing and waxing notes. This should indicate to the public to move to an open space immediately.

III. Other emergencies – This should be given only in the area (ward) that suffers from the hazard – continuous short notes on the hooter.

IV. Use of technology and social media in emergencies.

(e) Work out the evacuation routes and routes/ channels for the movement of the response forces. Where the roads are broader, a separate channel for movement of response forces should be immediately earmarked by the traffic police, indicating it with the red and white striped tape.

(f) Instruct the public not to crowd around any place of emergency. The minimum distance should be 500 m or one block away.

5.2 Passing of the Laws by the Elected Body:

Review of Municipal Regulations

In the view of the construction and urbanisation in Solapur, SDDMA should review the development control rules, building bye-laws and structural safety measures. These regulations shall be reviewed periodically to identify safety gaps from seismic, flood, and other disaster and suitable modifications will be made to align them to revised building codes of BSI and disaster safety measures. Undesirable practise's compromising safety during disasters that tend to crop up from time to time need to be addressed in the regulations. This process will involve an inclusive exercise involving due sensitization of governmental organizations at all levels, local authorities and the community at large to accrue maximum results thereof.

Land Use Planning

SDDMA shall involve central ministries and departments concerned in consultation with scientific institutions to carry out analysis of environmental and hazard data for formulation of alternative land use plans for geographical and administrative areas with holistic approach for the overall district. SDDMA shall ensure review of master plans and their compliance is conducted on priority by the responsible authorities. The future land use shall be assessed keeping in view the anticipated intensity of development.

Safe Construction Practises

SSDMA shall review that building laws and safe construction practices of new buildings and retro fitting of critical buildings as given in earthquake guidelines. The design and specification of houses being constructed under IAY, RAY, SRA and other government welfare and develop schemes shall be re-examined to ensure hazard safety.

Compliance Regime

SDDMA shall put in place a sound compliance regime with binding consequences to ensure the effective ness of techno-legal provisions. It will be the responsibility of all the stake holders concerned to implement these provisions. Adoption of best management practises like self-certification, social audit and an external compliance regime including audit by professional agencies need to be encouraged through development and design of tools such as IT enabled, monitoring software to suit the DM systems.

Some pointers regarding passing the laws

a. Building Codes as directed by the BIS (Bureau of Indian Standards).

b. Law regarding retrofitting/ demolition of dangerous structures.

c. During Earthquakes (EQ), if the distance between two buildings is lesser, there is likely to be a collateral damage. To prevent this, a safe distance should be maintained between structures. This law should be strictly be adhered to.

d. Law regarding compulsory training of able bodied volunteers of all NGOs (irrespective of the purpose of the NGO), teachers of all school and colleges (public, government aided and private), all workers in the industries, all people in the public and private offices and all permanent staff of hospitals, auto-rickshaw drivers, truck drivers and police in First Aid, Casualty Carriage and Fire Fighting. Similar workshops should be held for NSS and NCC students of all colleges. Similarly, separate workshops should be held for all teachers of public and private schools and all government departments in management of relief camps. The SDDMA will also pre-earmark accredited and registered organisations for this purpose and funds will be catered for over a period of two financial years, without any encumbrance.

e. Pass a law under DM act 2005 that all dilapidated structures that cannot be retrofitted should be removed by giving due notice and in which the waiver of a stay for demolition is taken in advance. Similarly, declare all structures within ‘Blue Line’ as unauthorised and in case of structures that are already existing with ownership rights, due compensation at market rates be given and the structures by demolished. Such structures should be declared as potentially dangerous.

f. Upgrade the District EOC and ensure that it is active round the clock and connected to the Municipal Council, Municipal Corporation and the State EOC as well as the control rooms established by the Police and the FES. Train the EOC staff extensively.

g. Sanction immediate upgrades in the Fire and Emergency Services Capability in terms of the following:-

i. Immediate upgrades in the pay structure in line with the current pay commission.

ii. Sanction additional man-power to make up the man power reflected in the Response and Mitigation Plans of the FES that has already been accepted. Pending allocation of monetary provisions, at least 20% increase in man-power should be resorted to and budgeted.

iii. Sanction establishment of at least one fire stations at each tehsil and the necessary equipment for the same. The necessary budget provisions should be demanded from the state government on emergency basis.

h. The roads shall be divided along the dividers and one channel will be exclusively kept for two way movements of response forces like the FES, Police, Ambulances, Home Guards and Civil Defence vehicles, Cranes and Dozers and vehicles bringing provisions/ stores bearing banners issued by the Government and the other channel will be kept for movement of the victims:-

(a) All internal city roads

(b) All the state highways connecting the villages

5.3 Steps taken as prevention and preparedness measures

1. Risk assessment and Vulnerability Mapping

Hazard zonation, mapping and vulnerability analysis in a multi hazard framework shall be carried out utilising Geographic Information System (GIS). Hazard and Consequence Mapping on the GIS platforms will be prepared for different hazard prone areas.

2. Understanding the increasing trend of disaster in Solapur district

With the changes in climatic conditions and local situations there is increasing trend of natural hazards and manmade disasters. The district planning authority and the SDDMA shall acknowledge these trends and carry our there developmental proposals accordingly.

3. Protecting the critical infrastructure

SDDMA shall separately compile list of critical infrastructure like dams, roads bridges, flyovers, railway lines, power stations, water storage towers, irrigation canals, water distribution networks, natural drains, embankments, and other civic utilities. SDDMA should also compile list of vital facilities like important administrative buildings and public facilities like hospitals, fire stations, police headquarters, educational infrastructure etc. These facilities shall be constantly monitored for safety standards in consonance with worldwide safety benchmarks and strengthened for deficiency and authorities concerned would ensure the requisite actions and measures to ensure this.

4. Ensuring Environmentally Sustainable development and Eco-system Management

Environmental considerations and developmental efforts need to go hand in hand for ensuring sustainability. Restoration and preservation of environmentally critical elements like, rivers, riparian zones of rivers, lakes, hills, trees, natural habitat etc. needs to be incorporated in detailed DM plans.

5. Climate Change Adaptation

Climate change is impacting our water balance, agriculture, forestry, ecology, biodiversity and human and animal health. There are definite indications that climate change would increase the frequency and intensity of natural disasters like floods and droughts in the coming years. In order to meet these challenges in a sustained and effective manner, synergies in our approach and strategies for climate change adaptation and disaster risk reduction shall be encouraged and promoted.

5.4 Mitigation Measures

These are generic pointers for the mitigation measures to be adopted for the disasters the district is more susceptible to. SDDMA should ensure that these mitigation measures are acknowledged and integrated at the policy level by the responsible authorities.

Earthquakes

Earthquakes cannot be prevented. However, damage and losses could be prevented through certain mitigation measures.

Mitigation Measures: The following general measures are suggested:-

(a) Identify and empanel structural engineers to help the city engineer to study and publicise the Earthquake resistant structural norms as laid down by the Bureau of Indian Standards (BIS) as applicable to the soil and rock structure obtainable in and around Solapur district jurisdictional areas. These norms should be published in the leading national and local newspapers and also displayed at prominent places in the city.

(b) Survey should be undertaken through independent agencies to identify unsafe structure

(c) Ensuring the populations know about the safety of their houses/buildings.

(d) Ensuring the demolition of unauthorized and unsafe structures in the district jurisdiction from the responsible authorities.

(e) Spread awareness among the population regarding indications of an earthquake and actions to be taken in case of a earthquake.

(f) Sirens and Hooters should be fixed at all the police stations, railway station, Divisional office Buildings.

Floods

a) SDDMA should proactively get information about rains from concerned department like meteorological department for weather, irrigation department for level of water in dams etc.

b) SDDMA shall ensure from the responsible authorities that all the water channels in the district jurisdiction should be cleared before monsoon to avoid logging of water and creating flash flood situation.

c) Media like TV, radio, internet, social media and mobile should be used effectively to send messages and information 72 hours prior to the actual hazard.

d) SDDMA shall ensure from responsible authorities, all the people residing in the flood line zone should be shifted to safer places. There should be appropriate and timely warning system before discharging water from the dam.

e) The EOC and task forces, first aid team should be ready with all the equipment and resources and all the concerned departments shall be informed to be in ready status.

f) SDDMA shall ensure from responsible authorities, the locations identified for sheltering victims of floods should be equipped with all the necessary facilities for providing food, shelter, clothing, and medicines.

g) The health department should take care of all the probable epidemics and carry out vaccination programs if necessary.

h) The police department shall help in shifting the victims to safer locations and maintaining law and order situation shall be their first priority in the district jurisdiction.

Fire

SDDMA shall ensure the fire safety audits are planned at important places and buildings from the responsible authorities. SDDMA shall ensure that responsible authorities will prepare the list of the places like the public buildings administrative buildings, amenity areas to understand the measures of fire. Such information shall be updated and shared with the fire department and also other concerned stakeholders. This should be persistent effort and in every six monthly meeting it should be reviewed.

Biological Hazards

In Solapur district, the congregation of people is high due religious importance. The celebrations of Ganapati festivals, Durga festival, Waari attract large crowds. Measures should be taken for controlling the spread of contagious diseases. Vaccination programs should be done frequently. Check should be there on drinking water facilities. Keep check on all unauthorised vendors of food items. Carry out checks of kitchens of all restaurants and hotels. Solid waste management should be handled more sensitively. Create more capacity for safe waste disposal. There is a need to vigorously carry out cleaning the dense pockets and undertake fumigation and disinfectant sprays. Critical facilities like water reservoirs, filtration plants should be checked and monitored for quality.

Stampedes and riots

Solapur district and city area is susceptible to stampedes and riots owing to its location on the border of the state and the mix of culture and different religions. The high percentage of congregation of pilgrims also adds to the susceptibility of stampedes and riots. SDDMA shall ensure effective crowd management at such places with the responsible authorities. SDDMA shall ensure a festival calendar is in place with the resource mapping done for managing the crowd. There will joint meeting with the police and other concerned stakeholders every 6 months to review the situation.

A simple rumour or a hoax can create chaos leading to many casualties. Mock drills should be conducted in schools, colleges, offices, malls and other such type of gathering places. Critical facilities like water reservoirs, filtration plants should be checked and monitored for safety.

Chapter 6 Preparedness Measures

Preparedness measures are needs to be planned with utmost care and sensitivity, especially when there are no effective prevention measures. The district authority needs to be proactive and holistic in its approach to prepare for disasters. Eventually building resilience is the only way to achieve effective disaster management. This chapter gives recommendations on preparing the district for the disaster risks identified by HVCA process.

6.1 Preparedness of the Community

Community is the last unit of the social setup. Prepared communities are resilient communities; hence putting efforts in preparing communities go a long way in bringing effectiveness disaster management. The SDDMA shall ensure the following things from the responsible authorities in community preparedness.

Preparedness of the community could be considered in the following areas:-

(a) Improving Awareness:

(i) Placing information boards' at all public places regarding prevention, mitigation, and response during Fires, Earthquakes, Floods and Terrorist Activities/ Security issues.

(ii) The awareness could also be upgraded by holding exhibitions where a clay model of the city could be prepared and the evacuation plans and actions could be explained for major disasters and hazards on different such models. The exhibitions could be organised for students and teachers, general community and all government and non-government stakeholders. Actions during any event for personal safety could be explained; different siren notes denoting different requirements could be demonstrated, and also safety aspects of educational institutions, prevention of industrial accidents, and prevention of biological hazards could be narrated with demonstrations, slide-shows, and short films during the exhibition.

(b) SDDMA shall appeal the education institutions, corporate offices, industries and even public sector undertakings and the government to prepare their own DM Plans with stress on preventive and mitigation measures, evacuation plans and preparedness for response.

(c) The Ganpati mandals are the important stakeholders, hence SDDMA shall appeal responsible authorities to coordinate with the Ganpati mandals for their preparedness measures. There should be strategy between these Ganpati mandals and Disaster

Management cell of the respective jurisdiction authority on the preparedness measures. As the congregation of people is high during Ganpati festivals and Waari's, the mandals should look into safety audits and mock drills.

(d) All the Ganpati mandals, waaari organisers and other stakeholders shall share their celebration calendar with the SDDMA. The details of the festivals, type of celebration, number of people, preparation planning and resources used shall be informed to the SDDMA.

6.2 Preparedness in Terms of Creation and Upgrades of Response Forces

FES: The capacity of Fire and Emergency services are inadequate in Solapur District as reported in the workshop. The FES requires an upgraded control room connected to the EOC of the SDDMA and the Police Control Room.

Home Guard: The present capacities of Home Guards and civil defence are inadequate. The following is required to be done:-

(a) Home Guards' capacity needs to be improved through training. They also need to be divided into rescue teams with each team having about 40 personnel. They need to be trained in operating boats with OBM and debris clearance, apart from the training mentioned above.

(b) Both the organisations need to be trained to operate in conjunction with the FES and the police. Thus, they require at least one 'walkie-talkie' set per rescue team and connected to their own control rooms. Their control rooms need to be connected to the EOC of the district and also with the police control room and with the control room of the FES.

(c) One team per tehsil/panchayat/ward should be kept ready as part of the Task Force 24 X 7.

Creation of Response Teams: Task force response teams from the community, need to be created to operate in conjunction with the FES and the Civil Defence/ Home Guards. The teams must comprise of volunteers of Ganesh Mandals/ Durga Pooja Mandals, NSS and NCC volunteers.

6.3 Early Warning and Surveillance Systems:

(a) Early Warning System

An early warning system for floods should be established between the irrigation Dept. And the Collector's EOC as well as the EOC of the SDDA. Similarly, in case of Industrial accidents, earthquakes and any other major episodes, siren and hooter systems should be activated. These shall be operated through the EOC of the SDDMA. Technology can play important role in Early warning system. Mobile Apps and information dissemination system through mobile and social media should be established. Bulk SMS, SMS through service providers, Mobile, Radio, TV etc. should be connected and integrated for Early Warning System.

Task Force Concept: A Task Force concept suggested whereby Police Force/ Home Guards, the FES and the medical teams established in each tehsil/panchayat/ ward and these react together at the place of incidence. These task force elements are required to be connected through the Police Stations on radio and line. The command of the task force would be handled by any of the three elements depending upon the type of emergency. For Solapur district, six such teams are required kept ready all the time. The teams should be self-sufficient for rescue equipment, transport, and communications.

(b)Surveillance System – Manned security system and CCTV camera system shall be integrated for surveillance system. CCTVs have to be fixed with monitoring screens at the Police Control Room, Disaster Management cell of SDDMA and SMC and Fire Department.

The CCTVs are required as under:-

(i) CCTVs at the Solapur Railway Station.

(ii) CCTVs system at every major bus depots

(iii) CCTVs system at the SDDMA, Divisional Officer, District Court, the Collectors' office and other important administrative buildings.

(iv) CCTVs at the major road crossings and select public places, where congregation of people is high.

(v) CCTVs are required to be affixed at all the major hospitals with their monitoring screens within the hospitals.

(vi) All Three star and above hotels, commercial establishments, IT organisations, Malls should have CCTV on each floor to cover the corridors, lifts and the entrances.

(vii) CCTVs should be fitted in all the major buildings wherein there is congregation of people or any important locations.

(viii) CCTV's should be fitted in all the major religious places, like temples, mosques, churches, gurudwara's and darga's.

(ix) CCTVs should be fitted on the path of processions of any religions.

6.4 Communications and IT support

Communication and sharing of upto date information state of art IT infrastructure remain at the heart of effective implementation of disaster management strategy.

Reliable up to date and faster sharing of Geo spatial information acquired from the field or the affected areas is a prerequisite for effective implementation of disaster management strategies. Efforts should be made for setting up IT infrastructure consisting of required IT processes, architecture, and skills for quick upgradation of data sets from the PRIs or the ULBs. A national emergency communication network involving contemporary space and terrestrial- based technology in a highly synergistic configuration and with considerable redundancy, will be developed. This network will ensure real time dissemination of warnings and information to the affected community and local authorities.

Strengthening of the Emergency Operations Centres : The establishment of emergency operations centres, equipping them with contemporary technologies and communication facilities and their periodic upgradation, will be accorded priority. For mile connectivity and control of the operations as the disasters hit areas, availability of portable platforms will be created for the integration of Ham radios and such other innovative facilities, into DM communication system, will be advantageous.

6.5 Preparedness in Terms of Pre-planned Administrative Aspects of Hospitals and PHCs upgrades and FES

Medical preparedness and Mass casualty Management: Medical preparedness is a crucial component of any DM plan. DM plans for hospitals will include developing and training of medical teams and paramedics, capacity building, trauma, psycho-social care, mass casualty management and triage. The surge and casualty handling capacity of all hospitals at the time of disasters will be worked out and recorded through a consultative process, by all the districts in the pre-disaster phase. The State and District Authorities will formulate appropriate procedures for treatment of casualties by private hospitals during disasters. These plans will also address post disaster diseases surveillance system, networking with

hospitals, referral institutions and accessing services and facilities such as availability of ambulances and blood banks.

Creation of mobile surgical teams, mobile hospital, and heli-ambulances for evacuation of patients is a crucial component of DM efforts. The Accident Relief Medical Vans (ARMVs) of the ministry of Railway stabled at stations every 100 km will be utilised for emergency medical response by the state and district authorities in consultation with the railways. There is a need to focus on creating adequate mortuary facilities. Proper and speedy disposal of dead bodies and animal carcasses deserves due weightage.

Hospital and Medical facilities Upgrades:

Plans should be made to include the following:-

(a) Upgrades of bed capacities and overall facilities in all government and private hospitals.

(b) Arrangements to attach private practitioners to various hospitals during emergencies.

(c) Identification of places where adhoc hospitals are established to cater to mass casualties. These places could be in the form of senior colleges. The college management will be given intimation regarding the use of their premises in emergency scenario. Additional equipment and scaling of staff and organisation of such hospitals needs to be decided and mock rehearsals of establishing such hospitals should be held.

FES: There is a need to immediately upgrade the FES and also possess smaller vehicle based Fire Tenders to negotiate the narrow lanes in congested areas and dense pockets, as an immediate measure. FES should be upgraded for the resources and equipment needed for safeguarding the victims and the working of the staff.

A Crisis Management Group (CMG) should be formed to include the Collector, the additional Collector, the representatives of the industries, railways and the representatives of the Solapur Chapter of the Indian Medical Association. Meetings of this group should also be attended by the heads of the Health and Medicine, the Chief Fire officer of the FES, a Deputy Police Commissioner and the President of the Ganesh Mandals association(such an association needs to be formed in Solapur) All instructions and exchange of ideas and feedback on preparedness should be placed on the table. It is also recommended that the areas of responsibilities of the Police should coincide with the areas of the tehsils. This will help better coordination.

6.6 Preparedness in Terms of Liaison with Other Co-opting agencies

There is a need to have a yearly 'Civil-Military liaison meeting where data and information exchange must take place. The meeting should be attended by the Police Commissioner, the Dy. Controller of the Civil Defence, and Commandant of the Home Guards, the Additional Deputy Collector the Commandant / Station Commander of the Military Cantonment (with their staff) the Solapur Municipal Commissioner, Disaster management officer and staff and FES officers . DM Plans under different contingencies and mutual aid schemes should be formulated and discussed during these meetings.

SDDMA shall be liasioning with following Co-Opting Agencies:

NDRF- There should be sharing of data and information with NDRF through meetings and workshops on regular basis. Familiarisation Workshop should be jointly conducted. NDRF shall facilitate the training and capacity building programs for SDDMA staff. There shall be knowledge and technology sharing between NDRF and SDDMA in emergency scenarios.

Ganesh Mandals and NGOs - The Ganesh Mandal volunteers and NGO's working in different sectors can provide help in emergency scenarios. Such volunteers and task force groups shall be identified and shall be part of regular meetings and strategy planning.

Other co-opting agencies - SDDMA shall laision with other co-opting agencies like BSNL, Railways, Petroleum companies and depos, Jaal Sampada and Solapur Airport authority on preparedness measures, by sharing their disaster management plans and preparedness information. SDDMA shall have six monthly meeting to review the situation and preparedness measures with the co-opting agencies

Chapter 7 Capacity Building and Training Measures

Training and capacity building measures are the key interventions in building a resilient community. SDDMA should invest in training and capacity building measures at all the levels. A strategic approach to capacity development can be addressed effectively only with the active and enthusiastic participation of stakeholders. This process comprises awareness generation, education, training, Research and Development (R & D), etc. It further addresses putting in place appropriate institutional framework, management systems, and allocation of resources for efficient prevention and handling of disasters.

This chapter elaborates the importance and requirement of the training and capacity building programs as required in the district jurisdiction. SDDMA shall ensure such system is derived and the capacity building is achieved. This part elaborates only awareness, disaster education, and training.

The approach to capacity development will include:

- According priority to training for developing community based DM systems for their specific needs in view of the regional diversities and multi-hazard vulnerabilities.
- Conceptualization of community based DM systems at the National level through a consultative process involving the States and other stakeholders with the State and Local level authorities in charge of implementation.
- Identification of knowledge-based institutions with proven performance.
- Promotion of International and Regional co-operation.
- Adoption of traditional and global best practices and technologies.
- Laying emphasis on table-top exercises, simulations, mock drills and development of skills to test the plans.
- Capacity analysis of different disaster response groups at State/District/Local levels.

Disaster Management training and orientation of professionals like doctors, engineers, and architects will be given due importance. Further, expansion of DM training in schools, with orientation towards practical requirements will be given due weightage.

Training of Communities

Building the capacity of communities, as they are the first responders to disasters, is a significant part of the capacity development process. It will include awareness, sensitization, orientation, and developing skills of communities and community leaders. Assistance from NDRF, Civil Defence and NGOs/other voluntary organizations such as the Red Cross and Self-Help Groups will be encouraged. The overall responsibility to give impetus to leadership and motivation will rest with local authorities, PRIs and ULBs under the overall guidance of State and District authorities.

Professional Technical Education

The curricula of graduate and postgraduate level courses in architecture, engineering, earth sciences, and medicine will be reviewed by the competent authorities to include contemporary knowledge related to DM in their respective specialized fields. The role of the NCC and Boy scouts may also be included in schools and colleges for disaster management related work, at National level, the Ministry of Human Resource Development of DM as a distinct academic discipline, in the universities and institutes of technical excellence.

DM Education in Schools

The introduction of the subject of DM, by the ministry of Human Resource Development, in the curriculum through the Central Board of Secondary Education, will be extended to all schools through State School Boards. The education content will inculcate skill based training, psychological resilience and qualities of leadership. The role of their NCC and Boy Scouts may also be included in school and colleges for disaster management related work. Disaster education will aim at developing a culture of preparedness and safety, besides implementing school DM plans.

Training of Artisans

The upgradation of the skills of artisans is another crucial component of the capacity building process. The Central Ministries and Departments concerned will ensure the

availability of resources for sustainable programmes to train artisans. The States will be encouraged to promote this activity vigorously. The guidance of Indian Institutes of Technology (IITs) and National Institutes of Technologies (NITs) will be sought to plan these programmes. The implementation will be assisted by industrial Training Institutes. To ensure widespread participation, these programmes will be made available. Private builders, contractors, and NGOs are expected to play a significant role in utilizing trained artisans.

Training of Other Groups

Other professional groups such as paramedics, social workers, plumbers, sanitary fitters and safety auditors also play a very important role in community based DM. These groups will also be provided training through suitable programmes.

There should be measures taken specifically for the taluka's which host larger gatherings for people for religious or any other activities. Talukas like Pandharpur and Akkalkot should devise specific capacity buildings measures in addition to the stipulated disaster management trainings. These capacity building measures should incorporate the overall management of the taluka due to additional stress created by the congregation of people may it be religious or political.

	CAPACITY BUILDING TRAININGS	
SI NO	**STAKEHOLDERS**	**NO. OF TRAININGS**
1	TRAININGS TO GRAMPAMCHAYTS	4
2	EARLY WARNING	2
3	DISASTER MANAGEMENT	4
4	POST DISASTER MANAGEMENT	2
5	FLOOD MANAGEMENT	2
	COMMUNITY TRAININGS	
1	FLOOD RESPONSE	4
2	DISASTER MANAGEMENT	4
3	HEATWAVE	2
	TEACHERS TRAINING	
1	EARLY WARNING	2
2	DISASTER MANAGEMENT	6
3	DISASTER PSYCHOLOGY	2
4	SCHOOL SAFETY	3
	ARTISANS TRAINING	
1	EARTHQUAKE RESISTANT	4
2	FLOOD RESISTANT	2
	TRAININGS TO PROFESSIONALS	
1	DISASTER MANANGEMENT	4
2	FIRST AID	3
3	SAFE STRUCTURES	2
4	DISASTER PSYCHOLOGY	2
	ACADEMIA	
1	EARLY WARNING	2
2	DISASTER MANAGEMENT	4
3	SAFE STRUCTURES	2

Chapter 8 Response and Relief measures

8.1 Response Mechanism

Response is most important part of the disaster management cycle. Prompt and effective response minimises loss of life and property. The existing and the new institutional arrangements need to ensure an integrated, synergised, and proactive approach in dealing with any disaster. This is possible through contemporary forecasting of early warning systems, Fail-safe communication, and anticipatory deployment of specialised response forces. A well informed and prepared community can mitigate the impact of disasters. A caring approach for special needs of vulnerable sections is also important.

8.2 First and Other Key Responders

The local people from the communities are the first responders. The importance and contribution of first responders is humongous. For the immediate support there are other important key responders like the Police, Fire and Medical services and NDRF. They shall facilitate and provide the search and rescue teams, medical services and if required shall deploy all NDRF battalions as per seriousness of situation. The key responders however will be supported by the local volunteers.

8.3 Search and Rescue team

As per the Incident Command System, the Incident Commandant shall order the operation chief to carry out search and rescue on the disaster site. The search and rescue team of shall go equipped with all the required and appropriate resources. In most cases the fire brigade department carries our search and rescue work depending upon the seriousness of the situation. The incident commander / district collector can call in the help of NDRF or other co-opting agencies as per the requirement of the situation for search and rescue.

8.4 First Aid Team

The search and rescue team shall always be accompanied with the first aid team comprising of doctors, nurses, paramedical staff, medicines, appropriate equipment, ambulances, and skilled personals. SDDMA shall ensure the first Aid teams are in place and are deployed

where necessary. It is their responsibility to ensure the first aid teams are prepared by training and capacity building as a part of Disaster preparedness.

8.5 Armed forces and paramilitary Team

If the scale of the disaster is such that it is beyond the capacity of the state to handle the situation, Collector and SDMA can call armed forces or paramilitary for help.

8.6 Local NGO's NCC and NSS team

During disasters the first outside help is offered by the NGO's. In the areas more susceptible to disasters groups of volunteers should be formed. This group should be trained to handle response in order to reduce the loss to life and property.

Ngo's shall work in the following way

a) During disasters NGO's should act as facilitators between the government and public. They should help people in advising people to get help/aid from various government departments.

b) They should help to reduce rumours and hoaxes and help people in building confidence.

c) They should help to move people at safe places, help building shelter, distributing food, and medical facilities and guiding people.

d) Help the disable people, sick, old, women, and children.

e) Helping in guarding the property until it is handed over to the safe hands.

8.7 Establishing a Public Grievance Bench

After the disasters there is loss to life and property. Compiling and providing information about the missing, the dead and injured persons to the relatives and to general public.

8.8 Temporary shelter management

SDDMA shall ensure all the tehsils and its villages have identified safe locations for temporary shelters in case of disasters. The buildings selected for temporary shelters should be disaster resistant with all the facilities to cook food, store water, appropriate sanitation facilities etc. All the data and information about the temporary shelters should be shared with SDDMA.

8.9 Establishing Law and Order

During disasters the cases of theft and robbery are high; hence to maintain peace, police department should move the people to safe places. It is also the responsibility of police to safeguard the property and maintain law and order. This will help the NCC, VTF and NGO's to carry out the search and rescue work easily. The police department should also strategise its policy to guard the aid material storage and distribution in the Relief camps.

8.10 Managing dead bodies of human beings and animals

This is one of the important and sensitive issues in Response mechanism. Due to dead bodies the possibility of pollution and epidemics increases.

Following things should be considered while disposing the dead bodies

a) All the dead bodies should be photographed.

b) The relative should be informed before disposing the dead body or the body should be handed over to the relatives

c) The Panchanama should be done in presence of responsible and important personalities of the society.

While doing so the safety of the officers and volunteers should be ensured.

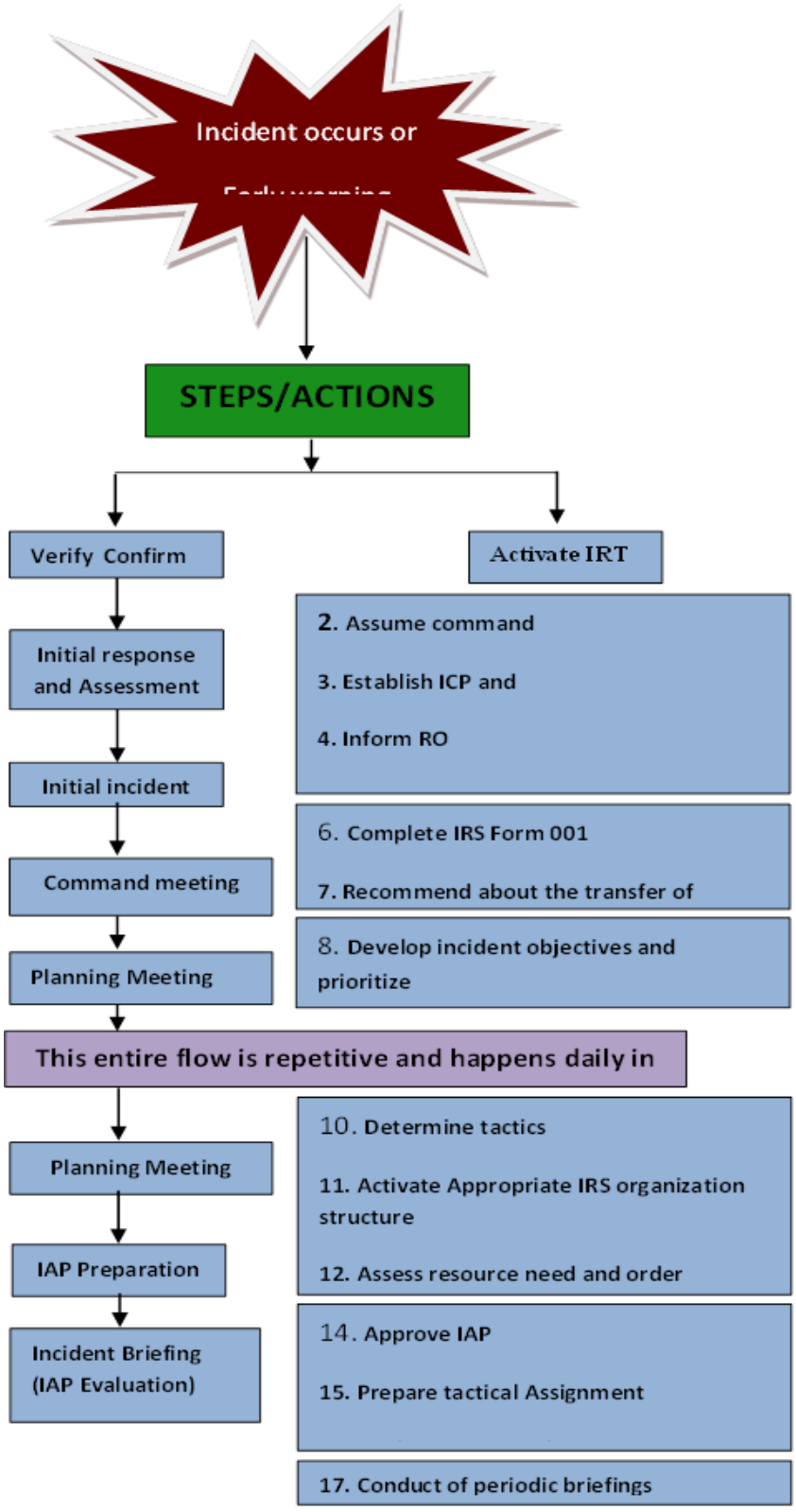
8.11 Managing the Aid

After the disasters the aid material is received from the government or other sources, which is necessary to be stored and distributed efficiently. SDDMA should appoint a committee for acquiring the aid and distributing it properly, so that the beneficiary gets the right amount of aid at right time. Pregnant Women, children, old, handicapped and sick people should be given special consideration while distributing aid. The committee should take help of Police department and NGO's.

8.12 Information and Media Management

During disasters situations, the dissemination of accurate information through electronic and print media is very important. SDDMA shall deploy a trained disaster management official if essential for regular press briefing. Training in information management and accurate reporting will be undertaken at all levels.

8.13 Incident Command System (ICS)



Following flow chart explains the ICS system for Solapur District Disaster Management Authority

Steps and actions for Response under IRS System

Diagram Showing Overall Sequence of Action when an Incidence is imminent or Actually Occurs

SDDMA has command structure in administrative hierarchy which manages disasters. The ICS is essentially a management system to organise various emergency functions in standardise manner while responding to any disaster. SDDMA shall draw and strengthen its command system with

specialist incident management teams with an incident commander and officers trained in different aspects of incident management, such as logistics, operations, planning, safety, media management etc. The emphasis will be on the use of technologies and contemporary systems of planning and execution with connectivity to the joint operations room to all levels.

8.14 Response Mechanism during active Disaster Phase and Mutual Aid Scheme

During any large scale disaster, there would be a requirement of enmeshing the resources and facilities of different agencies. This could be achieved through mutual aid schemes.

The Mutual Aid Schemes need to be worked out separately between the following:-

i. Between SDDMA and Solapur Municipal Corporation
ii. Between the SDDMA and the railways.
iii. Between the SDDMA and the Armed Forces
iv. Between the SDDMA and the Airport Authority of Solapur.
v. Between the SDDMA and Industrial Sector
vi. Between the SDDMA and BSNL
vii. Between the SDDMA and Jaal Sampada

For each Mutual Aid Scheme, the following aspects have to be worked out:-

a) Manpower availability for rescue and relief.
b) Material and Services to be tied up mutually – Fire Services, Medical Services, Sheltering material etc.
c) Mutual communication for issuance of Early Warning and Coordination.

In the IRS pattern of response system, the mutual aid partners are always required to be the second respondents when called for help. For example, during an industrial accident, it is expected that the industry that experiences an episode, becomes the first responder and gives a call to the nearest mutual aid partner as well as the SDDMA/Municipal Corporation's responders. The mutual aid partner, if prepared and well-rehearsed, is expected to react immediately and add to the available manpower and material of the 'caller" partner to undertake further rescue, evacuation, and medical aid and relief duties. In case of the armed forces, the armed forces are called upon as the third responder only if the situation is so grave that the first and the second responders are unable to control the situation. This

principle should always be adhered to. In case where the episode is of 'Law and order' nature, the police would become the first responders and other agencies, if called upon, would act in supportive role.

All the responders are required to maintain a 24 x 7 vigil and mutual aid partners should exchange important Tele Nos and frequencies (if radio sets are operated) to one another. The railways have a telephone connectivity sockets within themselves at each km length of track and are also connected through a fibre glass communication network. In case of emergency the same could be made available.

The Mutual Aid scheme partners are expected to jointly conduct mock practices and records should be maintained in their respective agencies. The SOC will be provided by the parent agency that gives a call for help.

8.15 Response Mechanism in Conjunction with Solapur Municipal Corporation

When there is an incidence that involves the Solapur city jurisdictions, following actions will be taken:

(a) The Solapur Divisional Commissioner will have a greater role to play.

(b) A Unified Command structure may have to be established (to coordinate the Operational Issues more efficiently). It is possible that there would be Incidence Response systems at multiple places.

(c) The resources are likely to fall short and a major resource requirements at all the places will have to be met from outside the District jurisdictions and the other tehsils of Solapur Division may have to be activated for pooling in the resources. These resources will be logically distributed by the Divisional Commissioner.

(d) Major resource demands will have to be raised on the State machinery, through the SDMA.

(e) Communication networks will have to be enhanced and frequency management will have to be worked out.

It is recommended that the estimation of the resources be done during 'Pre-Disaster' phase, as soon as possible and such contingencies to be worked out. The main resource requirements will be as under:-

(a) Induction of the NDRF and also additional NDRF battalions from other zones.

(b) Additional Home Guards and Civil Defence resources.

(c) Additional response forces under the State (State Disaster response force).

(d) Medical resources – manpower, equipment, and blood.

(e) Transportation.

(f) Relief camp resources for sheltering, hygiene, and sanitation.

(g) MSEB and MSEDCL resources for restoration of power.

(h) Personnel – technical and non-technical – from water and sewage depts.

(i) Labour force.

(j) JCBs, bulldozers and Cranes.

(k) Experts from the field of DM should be contracted to advice on the needs analysis and specific rescue requirements.

8.16 Response Mechanism in Conjunction with Pune District

Solapur District and Pune District are neighbouring districts hence, there has to be a mutual aid system established. When all the two district areas are affected by a common disaster, invariably, the District Collector would have to act as the Responsible Officer and the Divisional Commissioner would have to act as the Superior Officer. Both the Municipal Commissioners would act as the Incident Commanders within their areas of jurisdiction. However, the resource requirements would have to be coordinated by the District Collector. In case of earthquakes, all the gross shortage of resources and hence, mutual aid between them would be unlikely except for information exchange and some help in terms of traffic control as the major roads are common and pass through both the jurisdictions. Some fringe areas may have to be provided help from the other jurisdiction, through coordination at District level.

8.17 Response Mechanism in Conjunction with the BSNL

There should be shared information and action plan with the co-opting agencies. SDDMA and BSNL together will prepare an action plan to respond in emergency scenarios. BSNL share share all the required information, its action plan and its disaster management plan to SDDMA to plan joint response. The role and responsibilities as per the disaster management act and the NDMA guidelines shall be fixed by BSNL internally to respond in emergency scenarios and the same shall be shared with SDDMA. There will be atleast one meeting every six months to update and evaluate the situation and action plan.

8.18 Response Mechanism in Conjunction with the BPCL/HPCL/Petroleum Depo's

It is mandatory for the petroleum companies to have their disaster management plan, studying the local situations. These organisations will share their emergency response plan with SDDMA for joint response when required. There will be atleast one meeting every six months to update and evaluate the situation and action plan.

8.19 Response Mechanism in Conjunction with the Jaal Sampada

Jaal Sampada will prepare its organisational disaster management plan. The data about the role and responsibilities of the coordinating officer will be shared to SDDMA as a part of joint action required. Jaal Sampada will share their action plans time to time with SDDMA for the joint response mechanisms required. There will be atleast one meeting every six months to update and evaluate the situation and action plan. A joint mock drill exercise is recommended.

8.20 Response Mechanism in Conjunction with the MIDC/MPCB/DISH

These autonomous organisations will prepare their own disaster management plan taking into account their susceptible risks and the available resources within, for response. The data of resources for disaster management will be shared to SDDMA. The role and responsibilities of the responsible officer coordinating the disaster management activity will be shared to SDDMA for planning a joint response activity in case of emergency. There will be atleast one meeting every six months to update and evaluate the situation and action plan. A joint mock drill exercise is recommended.

8.21 Response Mechanism in Conjunction with Railway

Railway department will prepare its organisational disaster management plan. The data about the role and responsibilities of the coordinating officer will be shared to SDDMA as a part of joint action required. Railway department will share their action plans time to time with SDDMA for the joint response mechanisms required. There will be atleast one meeting every six months to update and evaluate the situation and action plan. A joint mock drill exercise is recommended.

Chapter 9 Recovery Measures, Rehabilitation, and Reconstruction

The efficiency of the recovery measures depends on the efforts put in the preparedness planning and allocation of resources. If a disaster occurs, response and relief have to take place immediately. Rescue of affected people, distribution of basic supplies such as food water, clothing, shelter, and medical care become urgent need of the hour. Delays will occur if government departments and municipalities have no clear plans to manage such events. It is therefore important to have plans in place.

The recovery process involves Relief and Rehabilitation. A good relief helps recovery process and rehabilitation brings the society back to complete normalcy. For better relief, a methodical relief management process is essential. Rehabilitation necessitates offering permanent alternate shelters and restoration of means of livelihood.

A) Relief Function: The relief function can be divided into the following:

I. Immediate relief.

II. Deliberate relief.

Immediate relief

Solapur District Disaster Management Authority (SDDMA) should ensure a complete strategy on relief system for its jurisdiction else the whole effort shall be chaotic. Relief entails offering immediate medical aid, provision of food and water and essential commodities to revive the victims from initial shock and regenerate the physical normalcy in life processes. The victims are also temporarily retained at holding camps/ temporary relief camps and are given immediate financial compensation. The immediate relief is conducted on the heels of Rescue and Evacuation functions. The following are suggested to the SDDMA as relief function:-

(a) The identified Task Forces will evacuate the victims either to pre-allocated hospitals if a victim requires medical attention beyond first aid. Holding the victim at the site of incident for a longer time is counterproductive. Thus, each Task Force must have at least one ambulance at the time of response. Further modes of evacuation should be made available as soon as possible. The SDDMA will ensure at least 3 to 4 ambulance vehicles earmarked to react in each taluka and these must be ordered by the EOC immediately. The FES of

SOLAPUR DISTRICT AUTHORITY also has some troop carrying vehicles that can be used initially for the carriage of injured victims (later, these could be used for the disposal of the dead). It is important to ensure that the Task Force personnel are well trained in First Aid so that the victims could be stabilized at the site itself.

(b) The other victims who do not require medical attention should be immediately evacuated to a holding area, away from the incident site and where they should be given water, food, and hot beverages for bringing them out of shock. Relief camps should be established as soon as possible where the victims should be sheltered and their food, water, sanitation and requirements of essential commodities like clothes and other essential items of toiletries should be taken care of. These relief camps should be pre-planned and organised. Each relief camp must have the following organisation:-

The camp Commandant will ensure that a record of all the distribution of commodities is maintained. The ward officer will ensure that cooked food or cooking arrangements with rations are made available in adequate quantum (refer to Resource management Part for scaling). Water is supplied initially on a hard scale and as normalcy is restored, the same is increased. The drinking water should be purified with chorine tablets and distributed. The Administrative team will be responsible for recording the details of the inmates of the camp, provide essential commodities like clothing, bedding, plates and glasses and also essential items that the female inmates require and feeding bottles for the children. The administrative team should also be responsible for ensuring visits by the clinical psychologists and the medical team once a day. The administrative team also ensures that the inmates are kept busy in entertainment and some activities for better psychological recovery. It will also announce from time to time the facilities that the government offers.

The food and water management team should be responsible for preparation of food and its distribution and ensuring that the food is cooked in hygienic condition and that there are neither shortages nor wastages. It should be ensured that water is stored in sufficient quantum and water for consumption is purified.

The sheltering team will be responsible to erect shelters and logical distribution of the family members in the shelter accommodation. It will also ensure creation of toilet blocks and that the toilets are hygienically clean.

The camp commandant will send daily “feeding strength” reports to the Divisional Office through the liaison officer. Any requirements should be projected through the liaison officer. It should be ensured that electricity is provided to the camp as soon as possible and even Tele communications should be restored within about 48 to 72 hours.

(c) Damage and Need Assessment (DNA): SDDMA will order the following DNA teams to operate in each taluka. The team will have the following composition for assessing the damage and ascertaining the needs of the society. The assessment should be done within 24 hours of an incident and the team should also talk to the affected victims in the relief camps. Multiple teams will be formulated under a central control of nominated officers. It is recommended that the central team may be comprised of a Dy Collector /RDC and senior officers of the SDDMA. Formats for reporting of the DANA feedback will have to be formulated whereby, damages to infrastructure, property – private and public, loss of lives and injuries to humans and animals, material needs, psychological needs, medical help, requirement of essential commodities, need for repair and restoration of certain facilities and services and estimation of economic cost of the damage and compensation would be reflected. DNA is not a one-time activity. The needs will have to be estimated repeatedly for each phase of the response and relief, periodically as the needs do change and they have to be prioritised:-

(i) Officers from city engineer’s office for assessing structural damage or from the PWD.

(ii) Officer from the concerned taluka/block.

(iii) Officials from Social Welfare department of the district.

(ii) A lady constable from police or home guards.

(d) Compensation: Invariably, cash compensation is announced by the government to the next of kin of the dead people and those to the injured. Past experience suggests that this compensation is distributed with nearly complete lack of control and the compensation lands into wrong hands. To avoid this, administrative officers/ panchayat members, social workers and the tehsildars have to be present to identify the persons receiving the compensation. This process of distribution will take place in presence of an impartial witness from the public who should be a highly educated and respected person from the same locality. This person must sign as an independent witness and retain a copy of the

proceedings and supply his residential address and identity proof with the official documents. Each recipient of the compensation will be photographed in presence of the official distributing the compensation and these photographs will be authenticated by the independent witness. Compensation to the minor children of the deceased will not be distributed in cash. Instead, the same will be invested in their names in a nationalized bank and the documents will be submitted to the government treasury. The investment will also be authenticated by a witness similar to the one mentioned above.

(e) Aid by the NGOs: Many NGOs approach the community directly to provide aid in kind. They should be disallowed because the distribution of the aid is likely to become imbalanced and essential items do not get distributed evenly. The SDDMA will put up instructions that any aid will be centrally received. A cell will be opened at the SDDMA office and the aid giving agency will list out the items on a voucher and the officer in charge of the aid will sign it. Two to three honourable member of the public (retired judges or a civil servants or educationists will be invited as members to attend the functioning of this cell. The items will be taken on ledger charge and immediately stored and sent to relief camps on need basis. The issues will also be recorded. Full accountability system will be exercised and the system will be transparent. Accounting ledgers of the stocks will be maintained. The stocks will be verified against the ledger and till the first one month the cell will function. The balance stock will be disposed off in accordance with the written directions of the district collector.

(f) Animal Shelters: SDDMA shall ensure the animal shelters are established under the care of Animal Husbandry department of the district. These shelters will be away from the population centres and outside the city. Fodder and medical attention will be catered for. Identification of the animals poses a problem for handing over the animals to their owners later. A special system like tagging shall be worked out for identification of animals. The animals will be photographed while handing over and the handing over will be on a document where the photograph will be affixed.

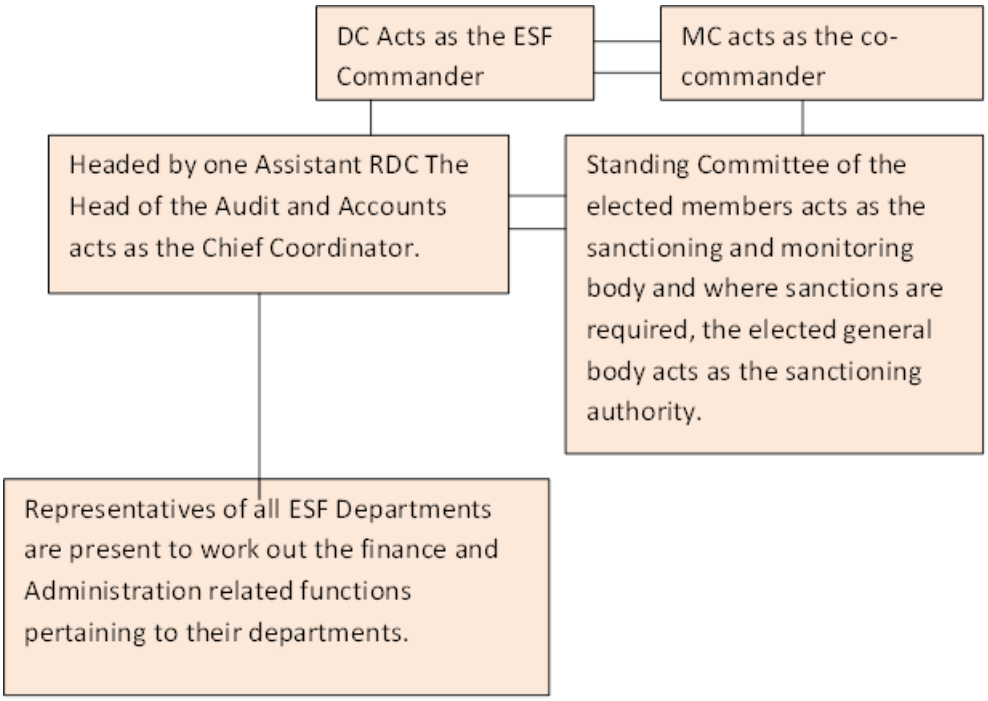
h) Rehabilitation: Rehabilitation is a lengthy process involving a complex system and multiple stakeholders. Rehabilitation involves different aspects like shelter, livelihoods,

education, health, and infrastructure. This is a long drawn function which is quite intrinsic. This issue is basically within the realm of the district collector. However, partly, as far as alternative accommodation for rehabilitation is concerned the SDDMA and SMC may have to decide location(s) for construction of alternative houses, where required. Land acquisition, identification of location and financial impacts have to be considered while deciding upon the location and size of the houses offered. Another sensitive issue is about finding means of livelihood for those who have lost it due to the incident. This again is within the realm of the district administration.

Chapter 10: 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, as per relevant Government Orders (GOs) issued.

(a) Organisation: The following organisation is suggested:-



(b) Functions: The broad outline functions are as under:-

(i) Grant sanctions to various demands proposed for the ESF capacity upgrades, expense for development, risk reduction, response and relief and recovery functions as well as compensations.

(ii) In conjunction with the Logistics Function, finalise rate contracts.

(iii) Advice the Logistics Function to finalise legal contracting of material, Services and Manpower for utilisation during various phases of disaster management.

(iv) Disbursal of compensation to dead, injured, property damage/ loss and even services rendered through contracts.

(v) Coordinate with the state authorities for projection of budgetary demands.

Accounting and auditing of all financial transactions shall be ensured by SDDMA.

Following are the sources mentioned by NDMA to generate funds

- National Disaster Mitigation Fund (NDMF) is constituted under section 47(1) of the DM Act, 2005
- National Disaster Response Fund

  State Disaster Response Fund (SDRF), constituted under Section 48 (1) (a) of the Disaster Management Act, 2005 will create:
- State Disaster Response Fund
- District Disaster Response Fund
- State Disaster Mitigation Fund
- District Disaster Mitigation Fund
- The State Disaster Mitigation Fund needs to be conceptualized as a mechanism which can support risk reduction and mitigation measures and hence, it has the potential for developing into a full-fledged Social Fund that generally use community-driven development approaches to ensure the active participation of local actors.
- As a Social Fund, State Disaster Mitigation Fund may also have the flexibility to receive donations from Government Departments, Panchayat Raj Institutions, Corporate entities, individuals etc., as in the case of Chief Minister Disaster Relief Fund (CMDRF).
- State Budget/Plan funds
- District Planning Fund
- District Response Fund: (Pre- authorization of DC to draw money from treasury in the event of an immediate emergency)
- Disaster Risk Insurance
- Other financing options for restoration of infrastructure / livelihoods.

The state and district administration, Municipal Corporation and Municipal Councils shall allocate sufficient funds for preparedness, mitigation, relief, and rehabilitation. The funds shall be allocated for all the phases of Disaster Management cycle from response to recovery and preparedness.

Chapter 11: Procedure and methodology for monitoring, evaluation, updating and maintenance of DDMP

The updation and monitoring of the disaster management plans forms an important part of the procedure of maintenance of DDMP. The efficiency of the plan is based on how well it is updated and the decisions are taken based on the updated information in the plan. SDDMA shall identify the authority for maintaining and reviewing the DDMP.

Following are the methods to maintain the DDMP:

- Monitoring and Evaluation of the DDMP in all phases of disasters
- Post-disaster evaluation mechanism for DDMP
- Schedule for updation of DDMP: Regular updation process for the DDMP, reflecting sections that need updation at various intervals
- Uploading of updated plans at DDMA/ SDMA websites
- Conducting of 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 stakeholders understand their roles and responsibilities clearly. It would also help to test the efficacy of the plans prepared. Based on feedback from such simulation exercise, the plan will have to be revised and capacity build to fill the gaps. While indicating the mock drill plan of action it is essential to list down
- The Responsible parties for organizing district drills,
- Schedule for organizing drills and
- Resources for organizing drills.
- Monitoring and gap evaluation
- 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

Chapter 12: Coordination Mechanism for implementation of DDMP

Coordination of stakeholders is important for the efficiency of the implementation; coordination with other stakeholders forms the genesis of the DDMP. The coordination required in the response and relief measures are mentioned in the above chapters.

Following are the pointers for the coordination required at various stages of planning and implementation stages of DDMP.

- Intra and inter-Department coordination with horizontal linkages
- Coordination mechanism with NGOs, CBOs, Self Help Groups (SHGs), Industries, private schools and hospitals with horizontal and vertical linkages
- Coordination with block/ village level Task Force(s) with vertical linkages as also inter-block and inter-village coordination with horizontal linkages
- Coordination system with state departments and training institutes at state and district level
- 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); hence the need for a vibrant coordination system at these levels.
- Linkage with DDMPs of neighbouring districts
- Linkage with SDMP

Chapter 13: Recommendations

The disaster risk aggregated as per the study is medium. The focus areas are for the disasters primarily are floods, biodisasters, stampedes, and fire. The secondary layer of disasters is drought, heatwave, and lightening. The overarching disaster is earthquakes. Accordingly following are some recommendations in each phase of disasters.

Pre disaster phase – Prevention preparedness and mitigation

- Creating a 'Vision' of disaster safety and management
- Integrating disaster management in all the developmental works holistically, spatial planning, building regulations, policies and programs, future investments
- Adapting 'Informed Decision System' using technology
- Creating 'Inclusive Approaches'
- Initiating 'Good governance' systems and approaches
- Initiating 'Joint Activities' with stakeholders

Disaster phase – Early warning, search and rescue, response and recovery

- Identification of resources (technological intervention)
- Allocation of resources (transparent systems)
- Establishing institutional association (regular mechanisms)
- Positioning (readiness)
- Funding (Provision)
- Incentivisation (Appreciation, acknowledgement)

Post disaster phase – reconstruction and rehabilitation

- Identification of resources
- Innovative approaches
- Integration in future development and spatial planning

Some additional recommendations

- Institutional capacity building should be made top priority at all the levels.
- Integration of technology for informed decisions at all levels
- Crowd management trainings for Mohol, Malshiras, Pandharpur, Akkalkot
- Separate Detail Disaster Management Plan for Temple Samiti of Pandharpur and Akkalkot is recommended, including joint exercises and mock drills.
- Flood preparedness activities, including dedicated funding for all the flood prone talukas comprising of transport for evacuation, early warning system etc.
- Disaster Management should not be treated as independent activity, should be integrated in development planning and capacity building should be done accordingly at district, taluka and panchayat level.
- Joint activities, exercises, drills and data sharing mechanisms should be established for all the institutional stakeholders, inter department, intra department with vertical and horizontal hierarchal linkages
- Disaster documentation should be enhanced. Real time data of disasters should be made available on all media platforms

Abbreviations

CBO - Community Based Organisations

CFO - Chief Fire Officer

CSR - Corporate Social Responsibility

DC - District Collector

DDMA - District Disaster Management Authority

DDMP - District Disaster Management Plan

DM - Disaster Management

DMC - Disaster Management Committee

EOC - Emergency Operation Centre

ESF - Emergency Support Functions

FES - Fire Emergency Services

GOI - Government of India

GOM - Government of Maharashtra

IAY - Indira Aawas Yojna

IRS - Incident Response System

IT - Information Technology

MC - Municipal Corporation

NDA - National Defence Academy

NDEM - National Database for Emergency Management

NDMF - National Disaster Mitigation Fund

NDRF - National Disaster Response Force

NGO - Non Government Organisation

PHC - Primary HealthCare Centre

SDDMA- Solapur District Disaster Management Authority

SMC - Solapur Municipal Corporation

PPP - Private Public Partnership

PRO - Public Relation Officer

PWD - Public Works Department

RAY - Rajiv Aawas Yojna

RDMP - Regional Disaster Management Plan

RO - Responsible Officer

SDMA - State Disaster Management Authority

SEC - State Executive Committee

SHG - Self Help Group

SOP - Standard Operating Procedures

SOC - Security Operations Centre

SRA - Slum Rehabilitation Authority

References

Disaster Management plan of North Solapur 2022

Disaster Management plan of South Solapur 2022

Disaster Management plan of Akkalkot 2022

Disaster Management plan of Barshi 2022

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Books-CEOP,

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