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DISTRICT DISASTER MANAGEMENT PLAN

2019

District Emergency Operation Center

Collector Office - Kheda

ગુજરાત રાજય આપત્તિ
વ્યવસ્થાપન સત્તામંડળ

GSDMA

Message

Gujarat State has faced a cocktail of disasters such as Flood of 1978, Cyclone of 1998, Earthquake of 2001 and Flood of 2005-06. Government of Gujarat has set up a nodal agency Gujarat State Disaster Management Authority to manage disasters in the State.

Kheda District is vulnerable to natural disasters like earthquake, flood, cyclone and man-made disasters like road & rail accidents, fire, epidemics, riots. Many a time it is not possible to prevent disasters but awareness & sensitization of people regarding preparedness and mitigation of various disasters gives positive results.

Collectorate-Kheda have tried to include the district related information, risks and preparedness against risks, responses at the time of disasters as well as disaster management and strategy during the disaster etc. for Kheda District. This is updated periodically and also we are improving it through our draw, errors and learn new lessons. District Disaster Management Plan (DDMP) is in two parts. Part-1 includes District profile of various disasters, action plans including IRS (Incident Response System). And Part-2 includes detalied version of DDMP as per the guidelines provided by GSDMA.

Kheda - Nadiad
May - 2019

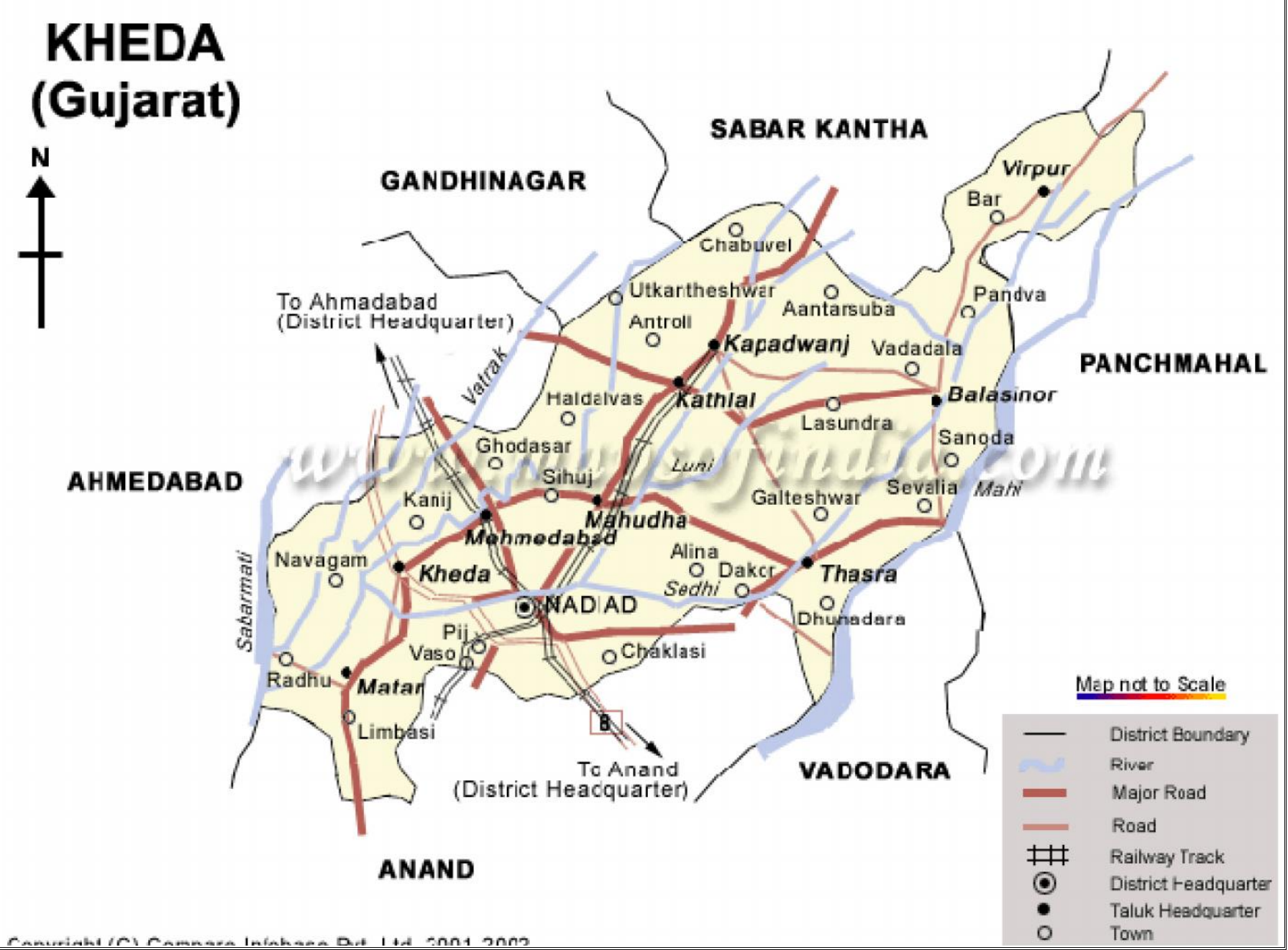
Shri.Sudhir.B.Patel IAS
Collector

Preface:

Gujarat State is prone to various types of natural hazards and grave disasters. Gujarat has faced a cocktail of disasters namely Flood of 1978, Cyclone of 1998, Earthquake of 2001 and Flood of 2005-06. After the Kutch earthquake in the year 2001, it was badly felt to create the permanent arrangements for long term disaster preparedness and mitigation. To meet this challenge, the Government of Gujarat constituted the Gujarat State Disaster Management Authority (GSDMA).

Gujarat State Disaster Management Authority (GSDMA) has used a comprehensive approach to deal with the issue of Disaster Management. It has not only been involved in relief, rehabilitation and recovery programs but also actively strategizing the preparedness plans. GSDMA has undertaken the program of Disaster Risk Management for the disaster which is the obstacles in the development of the state. This program involves many activities including preparation of disaster preparedness & response plans, awareness generation, training of trainers and capacity building of local governments.

The devastation caused by various kinds of natural and man-mad hazards has posed a challenge before the Kheda district administration to analyze each and every decision making process to gear up the rescue and restoration during such situations as well as building up the capacity to face further calamities in future. The District Administration has realized the necessity to compile a plan to facilitate faster recovery during an emergency of this kind. This plan is more of a guidebook, which can help the administration, remains better prepared for both natural and man-made disasters to safeguard lives, livelihoods and property.



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Introduction

The Kheda district is situated at the middle of Gujarat State and is entry to the south Gujarat area. The existence of Kheda District is since formation of Gujarat State, In 1997-98, Anand District is bifurcated from Kheda District. After reconstitution of Kheda District, Nadiad become Head Quarter instead of Kheda. Kheda district is very much vulnerable to earthquake, flood, fire and road - rail accidents. Disaster management has been an evolving discipline particularly in India over last one decade. With increasing frequency and intensity of disasters and large number of people coming in their way, the subject needs a more systematic attention and a planned approach. Disaster is the occurrence of a sudden mishap/calamity/grave occurrence disrupts the basic fabric and normal functioning of a society or community.

As per the Gujarat State Disaster Management Act, 2003, "Disaster" means an actual or imminent event, whether natural or otherwise occurring in any part of the State which causes, or threatens to cause all or any of the following:

(i) Widespread loss or damage to property, both immovable and movable; or

(ii) Widespread loss of human life or injury or illness to human beings; or

(iii) Damage or degradation of environment;

And any of the effects specified in sub-clauses (i) to (iii) is such as to be beyond the capacity of the effected community to cope up with using its own resources and which disrupts the normal functioning of the community.

As we see in the above definition of disaster we could have some memories of the aftermaths of disaster which we have faced directly or indirectly in our past which could never be forgot. The major Earthquake of Bhuj in 2001 is the example of it that how disaster can ruins the development which we are undertaking.

However, in order to reduce the effects, Gujarat State Disaster Management Authority started Disaster Risk Management program, which endeavors in mitigating the risk of the various hazards, enhancing the coping capacity at the very local level, and its detrimental effects on population to be reduced, and the communities adequately protected**.**

With the establishment of Gujarat State Disaster Management Authority in Gujarat and implementation of its visionary Program, Disaster Risk Management a new ray of hope glistered in the field of Disaster Management. Prior to the evolution of DRM Program the activities for disaster management has been carried out, but that could not sufficient to mitigate the effects of disaster. After the implementation of DRM Program in Gujarat it has been emphasized that the initiatives taken under the Disaster Risk Management (DRMP) program have proven very

influential in building capacity of the inhabitants of Gujarat, especially who are vulnerable in such disasters and create resiliency amongst them to cop-up with such kind of situations.

1. Vision & Objectives of the Plan

Vision : the vision of this plan is to enable disaster resilient development in Kheda District and continuity of services essential for life and dignity of citizens during disaster and non-disaster situations.

The key objectives of developing this plan are :

- To analyse the geography, social, political and economic context of Kheda District from diaster management.
- To analyse current development problems and it's linkage with past disasters and hazards in the district.
- To identify areas vulnerable to different natural and manmade hazards.
- To build awareness among different stakeholders by their direct engagement with development of disaster management plan and establishing a process for regular up gradation of it in future.
- To introduce innovation and good practice in institutional mechanism at district level to make it an integrated and coordinated plan at all levels.

2. Evolution of the Plan

The disaster management planning process has evolved significantly and taken more importance in the last decade as a result of emergencies and disasters having a greater impact on government industry and agriculture. Today, organizations have an abundance of emergency planning resources and training options is available to them. Cooperation between government and industry in the planning process is also high. Consequently, there presently exists an excellent opportunity for organizations to increase their level of preparedness.

Most experts today advocate a comprehensive "all hazards" approach to emergency preparedness. A comprehensive emergency response plan that takes into account potential natural, technological and man-made threats and involves key personnel in the planning process can assist an organization to systematically manage emergencies in an effective and efficient manner. The planning process is a key element that forces District Magistrates and staff to explore viable option that can be employed in the event of an emergency or disaster. These contingencies can ultimately help to save lives, reduce property loss, as well as lessen an organization's potential liability.

(District Profile is given in the annexure)

3. Authority of the Plan

The requirement for district and subsidiary plan is set by the Gujarat State Disaster Management Authority (GSDMA) under the authority of the Gujarat State Disaster Management Act - 2003. The act authorizes the collector to secure cooperation and assistance from other parties in efforts to avoid or reduce the impact of disasters.

4. Stakeholders and their responsibilities

The collector and the government authorities are responsible for managing hazards and disasters which affect the district, with support from GSDMA, the relief commissioner and the other public and private parties as may be needed. The roles, responsibilities and obligations of the collector and other parties are set out in detail in the act and are considered as part of this plan.

5. Approval of the Plan

The District collector is the authority who approves the District Disaster Management Plan.

6. Plan review and updation

The District Collector and other departments of the district are responsible to prepare DDMP and to do necessary changes in it.

The plan is reviewed and updated whenever there is some major change in the type to disaster, or when disaster change the demography of the district or when some changes occur in the module plan or the officials changed.

The plan should be reviewed and updated two times in a year. The revised plan should be submitted to GSDMA and commissioner of relief.

Hazard Vulnerability and Risk Assessment

1. Matrix of Past disasters in the district (details can go to Annexure)

No.	Type of Disaster	Year & Month
1.	Flood	i. Aug - 1990 ii. 2005 iii. 2006
2.	Cyclone	June - 1998
3.	Earthquake (6.9 Scale)	Jan - 2001

2. Hazard Risk Vulnerability Assessment (HRVA) Authority that Carried out HRVA

GSDMA has prepared a comprehensive Hazard Risk and Vulnerability Atlas (HRVA) for the State covering six major hazards namely Earthquake, Tsunami, Flood, Cyclone, Drought and Chemical and Industrial hazards.

The Atlas can not only be used for hazard risk identification but also for risk reduction and activities related to future development planning in the State. The Atlas has been derived from one of the largest and most detailed digital GIS databases prepared in India and covers all the 226 talukas, and 25 districts of the State.

The Atlas covers the physical, social and economic vulnerability of its people, assets and economy at Taluka-level for six natural and man-made hazards. The hazards have been examined in detail using advanced computer assisted GIS models, probabilistic analysis and detailed field studies. The most vulnerable Talukas, possible areas of highest loss of human life, population concentrations, crops, buildings and lifeline infrastructure have been identified in a descending order of risk that enables planning, intervention and investments in a prioritized, phased manner – making effective use of scarce resources.

The purpose behind preparing the Atlas is to enable the process of reducing risk in all types of hazards and transform Gujarat into one of the lowest risk States in terms of disaster. The Atlas is basically for the use of Government and related agencies for disaster mitigation and management activities, land use planning, etc. The Atlas was prepared using the census data of 2001. On release of the latest census data of 2011, GSDMA would initiate the process of reviewing / updating the Atlas.

3. Risk and Vulnerability analysis:

Impact-Probability-Vulnerability- area- population with context to district specific hazards. The threat (risk) and possible impact (vulnerability) which can be actualized from

these hazards ranges from minor impacts affecting one village to events impacting larger than the state alone.

The table below summarizes the results of an analysis of hazard, risk and disaster impact in Kheda. This analysis indicates that disaster planning at the Kheda district level should first focus on the functional response to the Flood and Accident. Typical responses to these disaster events also can apply to fire, industrial accidents, failure of critical infrastructure and building collapse.

4. Risk and Vulnerability Analysis (Kheda District)

Hazards	Probability Rating	Impact Rating	Vulnerability Ranking	Vulnerable Areas/Talukas
Flood	4	4	16 (High)	Total 126 Villages nearby Sedhi, Vatrak, Mesvo, Luni, Sabarmati, Mahisagar, Khari, Varasi and Dhamani Rivers.
Earthquake	2	4	16 (High)	Zone- III : Entire District
Road Accident	4	4	16 (High)	Matar, Kheda, Mahemdavad, Nadiad, Mhudha, Kathalal, Kapadvanj, State Highway & Golden Corridor.
Fire	4	3	12 (Moderate)	Mostly in urban pockets and industrial areas (including rural areas)
Industrial Accidents	3	4	12 (Moderate)	Industrial Areas of Nadiad, Matar & Kheda Talukas
Epidemics	3	3	12 (Moderate)	Any Where in District
Drought	3	3	12 (Moderate)	Entire District
Building Collapse	1	2	2 (Low)	Any Where in District
High Wind	1	2	2 (Low)	Matar, Nadiad, Thasara
Civil Unrest	1	2	2 (Low)	Any Where in District
Food Poisoning	1	1	1(Low)	Any Where in District
Land Slides / Mud Flows	1	1	1(Low)	Any Where in District
Animal Disease	1	1	1(Low)	Any Where in District
Dam Failure	1	1	1(Low)	Any Where at Dam sites

5. List of hazards with probability (frequency and magnitude) to be addressed in this plan

No.	Type of Disaster	Frequency of Occurrence
1.	Cyclone	May, June, July
2.	Flood	July, August
3.	Heat loss	May - June
4.	Epidemics	September, October
5.	Earthquake	-

6. List of vulnerable Talukas and villages

No.	Risk Factor	Vulnerable Talukas	Vulnerable Villages
1	Vatrak River - Flood situation due to Water logging on Ratanpur and Gadwel Road	Matar	Asamali, Baroda, Koshiyal, Matar, Palla, Pipariya
		Kheda	Kathvada, Moti Kaloli, Nani Kaloli, Pathapura, Rasikapura, Radhu, Varsang
		Mahemdavad	Adboli, Barmuvada, Dhodali
		Kathlal	Bharkunda, Chelavat, Chhipadi
2	Flood due to Vatrak River Kheda Bridge N.H.no.8	Matar	Aantroli, Haijarabad, Koshiyal, Mahelaj, Matar, Pipariya, Ratanpur, Sandhana, Sokhada, Vansar
		Kheda	Hariyala, Vasana-Buzard
3	Flood Situation due to Subhash Bridge of Sabarmati River	Matar	Asamali, Baroda, Mahelaj, Palla, Pipariya
		Kheda	Chalindra, Chitrasar, Dharoda, Kathvada, Moti Kaloli, Nani Kaloli, Navagam, Nayaka, Pathapura, Radhu, Rasikpura, Varsang, Vasana - Buzarg
4	Flood effect due to Mahor and Shedhi River	Nadiad	Andhari Ambali, Alajada, Bilodara, Davapura, Erandiyapura, Manjipura, Nanavaga, Navagam, Valla, Vina
		Mahudha	Heraj, Nandgam, Sanali, Torania Undara
		Mahemdavad	Gadava
5	Flood effect due to Mahi river - Kadana Dam Vanakbori	Thasara	Aklacha, Bhadrasa, Chitlav, Galteshwar, Kotariya, Kuni, Malitadi, Pali, Raniya, Sangol,

			Vanoda
6	Flood effect due to Shedhi river Kheda - Matar road	Matar	Antroli, Haijarabad, Matar, Ratanpur, Sandhana, Sokhada, Vansar
7	Flood effect due to Mahor river & Shedhi river Dakor bridge	Kheda	Kheda, Kheda camp, Khumarvat, Samadaralat,
		Mahemdavad	Bavara, Gadava, Gothaj, Khambhali, Maganpura, Varsola
		Mahudha	Heranj, Sanali, Undara,
		Nadiad	Aerandiyapura, Andhari Ambali, Andhej, Arera, Alajada, Bilodara, Davapura, Hathaj, Nadiad (City), Navagam, Paladi, Sodpur, Vina
		Thasara	Debhali, Ekalvelu, Golaj, Jakhad, Khijalpur - Tadpad, Khijalpur - vata, Masra, Mithana muvada, Pipalvada, Pilol, Rasulpura, Vadad, Vaghroli, Vinjol, Vanoti, Vaso

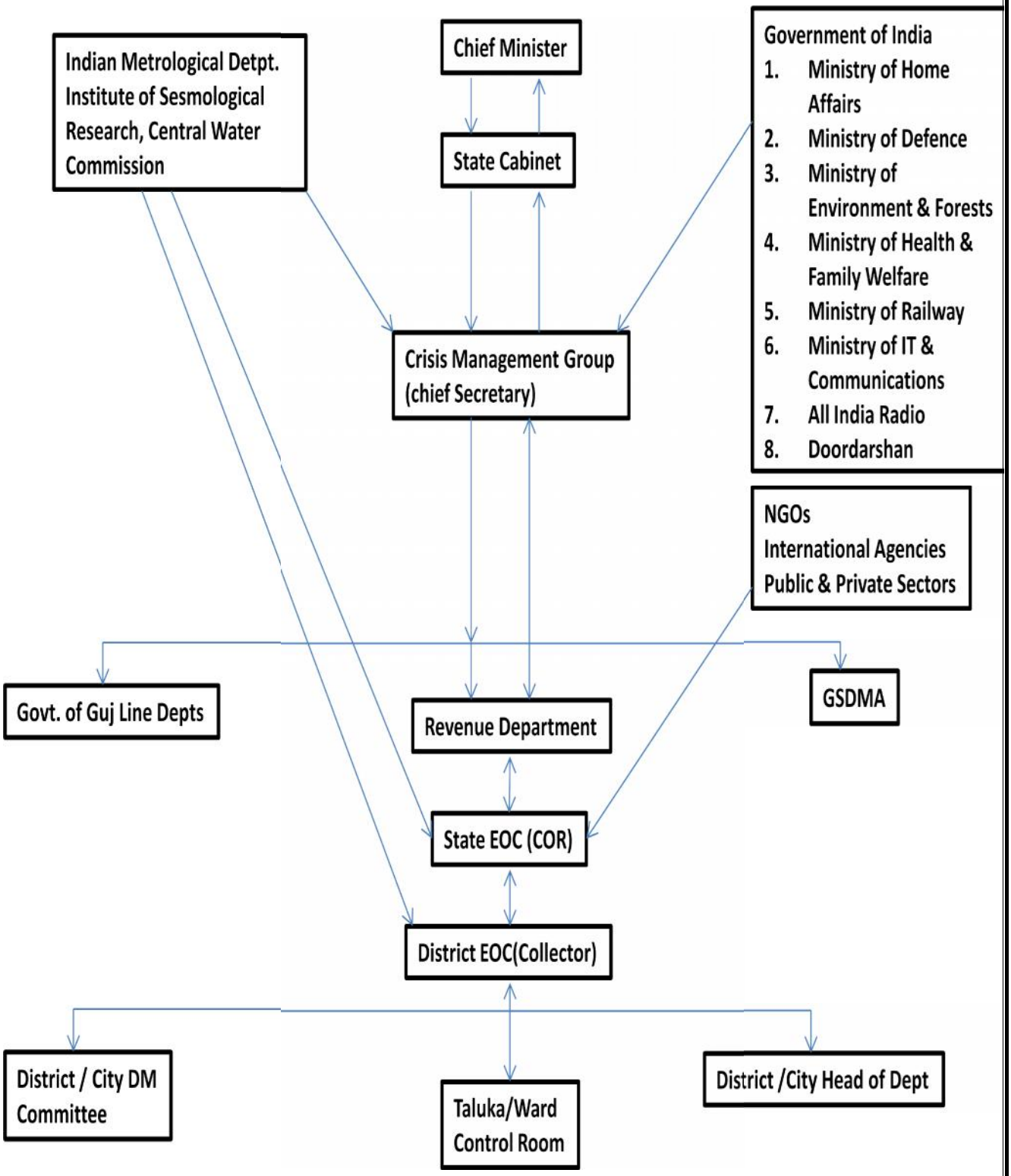
7. Monsoon Statistics from Year 1999 to 2013 of Kheda District

Sr.	Taluka	1999	2000	2001	2002	2003	2004	2005	2006
1	Nadiad	469	491	818	739	1992	746	1166	1080
2	Mahudha	503	398	785	408	1230	660	1601	1475
3	Kheda	695	519	715	469	1091	597	1207	1361
4	Matar	703	511	651	423	1066	1088	1329	1395
5	Mahemdavad	638	489	640	434	972	877	948	830
6	Thasara	565	600	761	561	898	759	1260	1435
7	Kapadvanj	661	521	535	430	1141	982	1671	1567
8	Kathalal	659	365	744	559	1071	789	1450	1738
9	Balasinor	469	443	671	611	981	833	1356	1594
10	Virpur	325	348	402	554	658	1077	722	1403
	Total	5687	4685	6722	5188	111000	8408	12710	13878

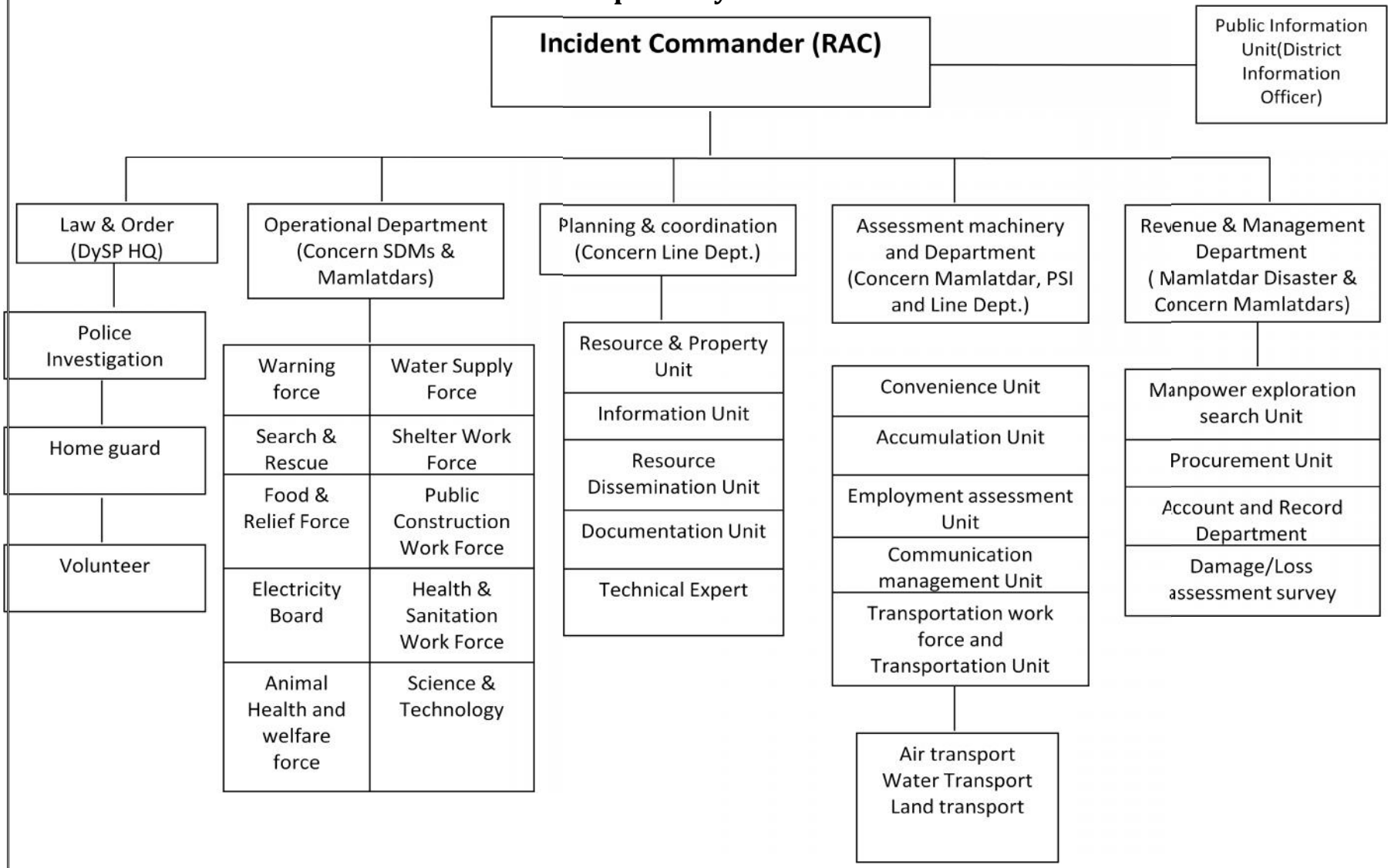
Sr.	Taluka	2007	2008	2009	2010	2011	2012	2013
1	Nadiad	910	843	431	679	510	483	1018
2	Mahudha	1119	938	517	941	544	651	1064
3	Kheda	1079	852	355	818	536	571	1141
4	Matar	1081	832	318	883	472	570	852
5	Mahemdavad	603	539	313	805	636	735	1123
6	Thasara	1172	649	479	793	436	629	720
7	Kapadvanj	1485	988	626	949	679	830	1175
8	Kathalal	1210	1009	491	844	566	679	1230
9	Balasinor	1547	593	505	771	652	836	1247
10	Virpur	930	440	347	564	786	550	723
	Total	11136	7683	4382	8047	5517	6494	10293

Institutional Arrangements:

1. D.M. organizational structure in the State



2. Incident Response System



Roles and Responsibilities of IC

The IC will:

1. obtain information on:
   a) Situation status like number of people and the area affected etc.;
   b) Availability and procurement of resources;
   c) Requirement of facilities like Staging Area, Incident Base, Camp, Relief Camp, etc.;
   d) Availability and requirements of Communication system;
   e) Future weather behavior from IMD; and
   f) Any other information required for response from all available sources and analyse the situation.
2. Determine incident objectives and strategies based on the available information and resources;
3. Establish immediate priorities, including search & rescue and relief distribution strategies;
4. Assess requirements for maintenance of law and order, traffic etc. if any at the incident site, and make arrangements with help of the local police;
5. brief higher authorities about the situation as per incident briefing form - 001 enclosed in Annexure-I and request for additional resources, if required;
6. Extend support for implementation of AC and UC if considered necessary by the RO;
7. vii. Establish appropriate IRS organisation with Sections, Branches, Divisions and/or Units based on the span of control and scale of the incident;
8. Establish ICP at a suitable place. There will be one ICP even if the incident is multijurisdictional.
9. Ensure that the IAP is prepared;
10. ensure that team members are briefed on performance of various activities as per IAP;
11. Approve and authorise the implementation of an IAP and ensure that IAP is regularly developed and updated as per debriefing of IRT members. It will be reviewed every 24 hours and circulated to all concerned;
12. Ensure that planning meetings are held at regular intervals. The meetings will draw out an implementation strategy and IAP for effective incident response. The decision to hold this meeting is solely the responsibility of the IC. Apart from other members, ensure that PSC attend all briefing and debriefing meetings;
13. Ensure that all Sections or Units are working as per IAP;
14. Ensure that adequate safety measures for responders and affected communities are in place;
15. Ensure proper coordination between all Sections of the IRT, agencies working in the response activities and make sure that all conflicts are resolved;
16. Ensure that computerised and web based IT solutions are used for planning, resource mobilisation and deployment of trained IRT members;
17. Consider requirement of resources, equipment which are not available in the functional jurisdiction, discuss with PSC and LSC and inform RO regarding their procurement;
18. Approve and ensure that the required additional resources are procured and issued to the concerned Sections, Branches and Units etc. and are properly utilised. On completion of assigned work, the resources will be returned immediately for utilisation elsewhere or to the department concerned;

19. If required, establish contact with PRIs, ULBs, CBOs, NGOs etc. and seek their cooperation in achieving the objectives of IAP and enlist their support to act as local guides in assisting the external rescue and relief teams;
20. Approve the deployment of volunteers and such other personnel and ensure that they follow the chain of command;
21. Authorize release of information to the media;
22. Ensure that the record of resources mobilised from outside is maintained so that prompt payment can be made for hired resources;
23. Ensure that Incident Status Summary (ISS) is completed and forwarded to the RO xxiv. Recommend demobilization of the IRT, when appropriate;
24. Review public complaints and recommend suitable grievance redressal measures to the RO;
25. Ensure that the NGOs and other social organisations deployed in the affected sites are working properly and in an equitable manner;
26. Ensure preparation of After Action Report (AAR) prior to the demobilisation of the IRT on completion of the incident response.
27. Perform any other duties that may be required for the management of the incident;
28. Ensure that the record of various activities performed

Roles and Responsibilities of Information and Media Officer (IMO)

The IMO will:

1. prepare and release information about the incident to the media agencies and others with the approval of IC;
2. Jot down decisions taken and directions issued in case of sudden disasters when the IRT has not been fully activated and hand it over to the PS on its activation for incorporation in the IAP;
3. Ask for additional personnel support depending on the scale of incident and workload;
4. Monitor and review various media reports regarding the incident that may be useful for incident planning;
5. Organize IAP meetings as directed by the IC or when required;
6. Coordinate with IMD to collect weather information and disseminate it to all concerned;
7. Perform such other duties as assigned by IC.

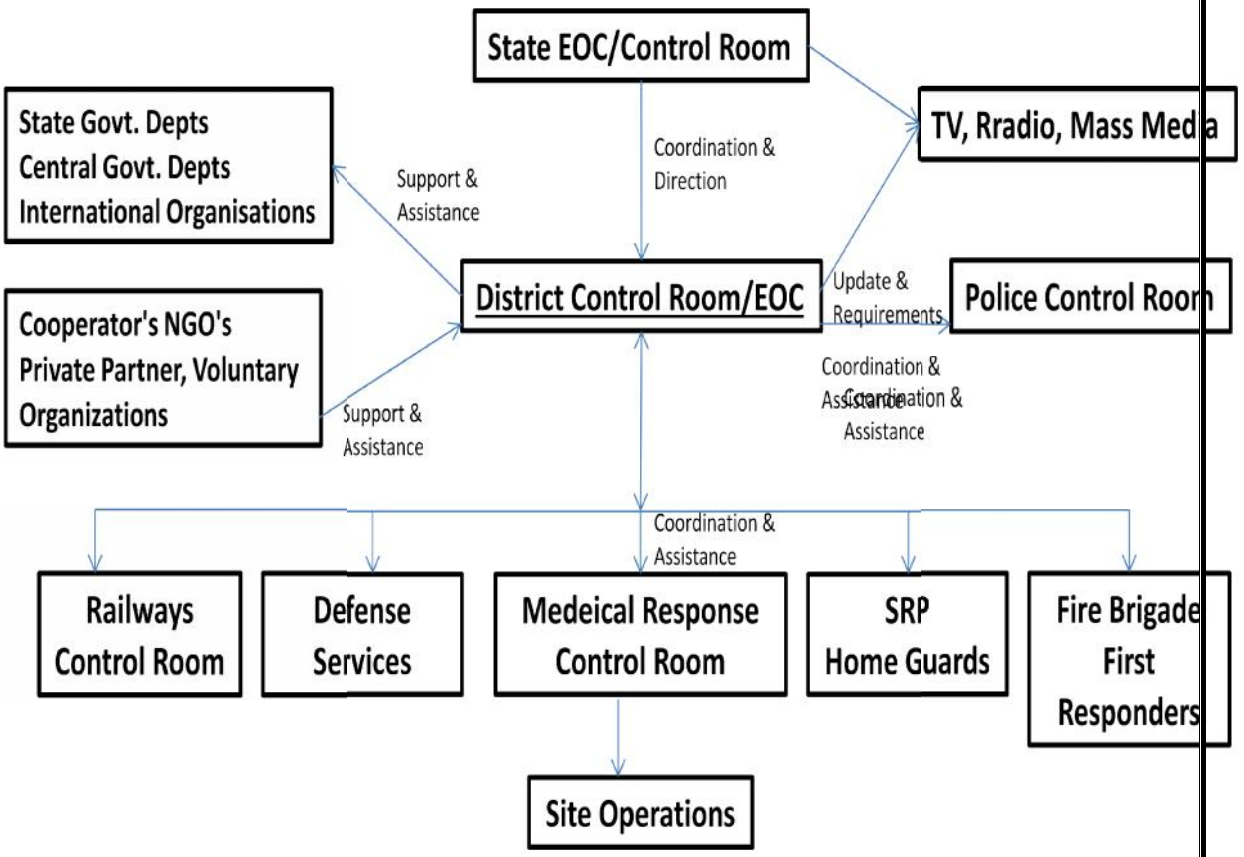
3. Responsibility matrix of response functions

Time Frame	Activities
Normal time	Establish a early warning system reaching to last mile preferably through use of oral and non-electronic means
	Build village level contacts including mobile numbers for early warning dissemination
	Train officials / volunteers to operate early warning message dissemination
	Continuous awareness of people about potential risk, preparedness and precaution measures
	Formation of the task force, capacity building, listing of equipments and machineries required and developing the contacts with other agencies to support evacuation
	Hold regular meetings on disaster management involving government, NGOs and private sectors to share strategy for search and rescue and evacuation plan
	Ensure identification of buildings and spaces to be used as rescue shelters for people and animals
D-72 to 48 hours (Before 3 days of Disaster)	Release Warning
	Verify functioning of communication and warning systems at City, Taluka, Panchyat and village level
	Put all evacuation personal on allot with necessary equipment and machineries at place for action
	Form teams for evacuation with skills and equipment and allot clusters for evacuation.
	Ensure transportation facility for evacuation of affected people
	Identify buildings / spaces to be used as evacuation shelters for people and animals.
	Inform the State and District EOC, Information Department
	Preparation of warning messages
	Dispatch warnings until the last mile in local language, preferably verbal messages through mobile, TV, radio, newspaper, including mechanisms that do not rely on electricity. (repeat the warning with frequent interval)
	Ensure telecommunication inventory and SOPs are updated task force
	Coordinate with other task forces(search and rescue, public health, law and order, food and water supply etc)
	Inform district and state level authorities about impending hazard
	Monitor readiness at local level and report to Incident commander (i.e., based on proper acknowledgment from local teams)
D-48 to 24 hours (Before 2 days of Disaster)	Hold District level disaster management committee and emergency response management committee
	Dispatch warnings messages as mentioned in the previous section giving updates about next 24 hours
	Position officials for different clusters for ensuring early warning and feedback

Time Frame	Activities
	about local situation
	Monitor readiness at local level and report to Incident Commander (i.e., based on proper acknowledgment from local teams)
	Make a note on the need for evacuation (if required)
	Seek information about the latest situation about the hazard and inform the evacuation team
	Mobilize resources to be positioned at the rescue shelters and at vulnerable points depending on type disaster (boat, swimmers, first aid, baby food, nursing support for the elderly and sick, drinking water, food, sanitation and solid waste disposal)
	Develop alternate route with the evacuation team to reach the locations in case there is chance of damage to the roads, bridges etc.
	Report on effective communication of early warning to the vulnerable groups like fisher folks, dalits, tribals, pastoralists etc.
D-24 to 12 hours	Develop/update about ensuing hazard
	Dispatch warnings in local language about the latest situation using mediums as mentioned above.
	Provide detailed information about the hazard situation to rescue task force and other task forces
	Ensure that the latest early warning has reached the last mile
	Put the rescue teams in position for action, ensure that all rescue teams have full information about the local situation, route chart and location where people are to be rescued
	Create support mechanisms for food, shelter and safety of the rescue team
	Monitor the movements and the activities of each rescue team and report to the higher authority in every six hours
D-12 to 0 hours	Ensure continued dissemination of warning messages
	Monitor the situation and provide latest report to the higher authorities including the District Collector and GSDMA
D+ 1 to + 12 hour	Monitor the activities of the rescue team and develop a list about new requirements in terms of machinery, skilled persons, medicines etc.
	Mobilize the needed requirements and dispatch to the designated locations
	Authorize officials to coordinate with the police and local leaders for disposal of dead bodies (panchanama, autopsy, burying/cremation as per customs)
	Liaise with DEOC for additional requirements for food and water supplies and other requirements
	Create multiple teams so that the earlier team can be relieved from duty for rest
D+12 to D + 24 hour	Continue search and rescue, and arrange transit service for affected population to evacuation centers/ hospitals or at relief camps
	It there is a need for higher level care and requirement for sophisticated treatment, prepare a report and send to District EOC for support. Make a call to reassure the support.

Time Frame	Activities
	If required organize aerial reconnaissance
	Establish Information/ reception centers and setting up telephone help line numbers
	Organize cluster level meetings with local people to monitor the status and send report to District Head Quarter every evening.

4. D.M. organizational structure in the District.



Fire Brigade	Police Control Room	Medical Response	Nagarpalika	Railway Control Room	Civil Defense Services
• Evacuation • Fire Fighting • Rescue •Salvage	• Cordoning of Area • Rescue • Law & Order • Corpse Disposal • Traffic Management • Rumor Control	• Transport Seriously Injured • Emergency on Site • Treatment (Mobile Hospital) • Corpse Disposal • Preventive Measures • Health Monitoring	• Emergency water & Food • Salvage • Corpse Disposal • Clearance of Debris • Emergency repairs • Coordination • Transport • Temporary Shelters	• Transport • Rescue • Salvage • Railways Hospitals	• Evacuation • Rescue • Salvage

5. EOC setup and facilities available with the location

The SEOC is supposed to help the members of District Emergency Operation Centre (DEOC) to understand the structure and functioning of District Control Room. Following the important Three C's i.e. **Command, Control** and **Communication** for effective response in an emergency, we will be able to minimize the hardships of the community and improve the quality of the process of recovery. This control room will be able to provide timely, supported and well thought of interventions to the grass root staff as well as volunteers as it will be the hub of three C's.

6. Forecasting and warning agencies

- **INDIA METEOROLOGICAL DEPARTMENT, Meteorological Centre, Ahmedabad.**

Issue of Weather Forecast, Severe Weather Warnings and Climatological Services to: General Public and Press, State Government, Agriculture, Power, Irrigation, VVIP Visits, Research Institution, Railways, Aviation, Ports and Fisheries, Sport and Tourism, Industries

- **Institute of Seismological Research**

The Institute of Seismological Research (ISR) under the Science and Technology Department, Government of Gujarat is functioning from 2006. ISR is the only institute in India fully dedicated to seismological research and is planned to be developed into a premier international institute in few years time.

Earthquake Monitoring Program: Gujarat seismic network of 60 Broadband Seismographs and 50 Strong Motion Accelerographs is operated since 2006. Data of 36 broadband stations is processed in real-time through VSAT and Auto location software round the clock to determine the epicenter and magnitude of earthquakes within minutes of arrival of the seismic waves and the information is disseminated to administrators for taking appropriate mitigation measures. Space-time pattern of seismicity gives information about newly active faults. One Earthquake Research Center has been started at Bhachau in Kachchh.

- **Central Water Commission**

Central Water Commission is a premier Technical Organization of India in the field of Water Resources and is presently functioning as an attached office of the Ministry of Water Resources, Government of India. The Commission is entrusted with the general responsibilities of initiating, coordinating and furthering in consultation of the State Governments concerned, schemes for control, conservation and utilization of water resources throughout the country, for purpose of Flood Control, Irrigation, Navigation, Drinking Water Supply and Water Power Development. It also undertakes the investigations, construction and execution of any such schemes as required.

Prevention and Mitigation Measures

1. Prevention measures in development plans and programs

- List of on-going and proposed development projects and programs addressing disaster prevention - both directly and indirectly

The mitigation strategy of the district plan can be linked to the Indira Awas Yogna to ensuring that all new houses that are built contain seismic safe features and the mason's building these houses are trained in seismic safe construction. This is one example, other examples are: flood and cyclone shelter to be constructed from the existing developmental Programme, rising of the plat form of school building etc. some of them are listed:

1. Raising platform for new building in low lying or flood prone areas.
2. Alternate income generation activities to the risk group through District Panchayat's Sakhi Bachat Mandal and Self help Groups.
3. Raising the platform of tube well in flood and cyclone areas.
4. Strengthening and abiding the local coping mechanism.
5. Construction of high raised platforms from Forest for animal resources.
6. Road & bridges to be constructed and repair based on to reduce the vulnerability.
7. Provision of communication facility to the vulnerable areas.
8. Provision and promotion of grain bank facilities and alternative storing facility for food grains.
9. Developing the skill and capacity of various DMTs to meet the disasters.

Linking of the departmental plans with long term developmental activity in the district as well as regular updating and mock drills can ensure long term sustainability.

2. Hazard-wise mitigation measures

For disaster prevention and mitigation, both structural and non-structural interventions can be planned. Structural interventions include construction of physical engineering and non engineering structures to reduce hazard risks. Non structural mitigation includes awareness and capacity building at official and community level, formulation of new plans and overall promoting a commitment for safety.

Mitigation measures can be divided in two categories:

i) Structural measures: On site works, construction, and engineering works and
ii) Non-structural measures: Which include studies, research, regulations, policy changes and capacity building activities that support the structural measures.

The disaster management plan includes hazard specific structural and non-structural mitigation plans in consultation and convergence with various Departments. For example, the MGNREGA work can take up activities on construction of embankment for flood safety or

the forest department may take up mangrove plantation in the coastal areas, while the water supply department can construct hand pumps on raised platforms. (These are some of the examples of convergence.) Departments shall draw out its own plan, goals and milestones and review it annually for its achievements and planning for next year.

3. Hazard-wise non-structural mitigation measures (Both structural and nonstructural measures should be given in responsibility matrix)

- **Structural Mitigation Measures for Flood**
  - Cleaning and deepening of water channel (kaans)
  - Construction of embankments/ protection wall
  - Repair and maintenance of flood channels, canals, natural drainage, storm water lines
  - Repair of embankments/ protection wall
  - Construction of Safe houses (new construction through Indira Awaas, Sardar Awaas and Ambedkar Awaas)
  - Protection wall and mangroves and vegetative cover against sea level intrusion and land erosion
  - Cleaning of water bodies like river and ponds
- **Non-Structural Mitigation Measures for Flood**
  - Safety audit of existing public buildings in risk prone areas
  - Capacity building of volunteers and technicians
  - Awareness generation on health and safety of livestock
- **Structural Mitigation Measures for Cyclone**
  - Plantations (mangroves) and Shelter Belt in the Coastal Area
  - Identification and repair/ retrofitting of public buildings unsafe for cyclone
  - Construction of safe cyclone shelters
  - Improve access/ escape roads
- **Non-Structural Mitigation Measures for Cyclone**
  - Strengthening of Early warning mechanisms
  - Training and awareness generation for use of safety jackets/rings/buoys /rope etc. for fisher folks
  - Enforcing strict compliance to coastal regulation zone
  - Registration of fishing boats
  - Regulate and issue orders for poor quality hoardings/ buildings or any other objects
- **Structural Mitigation Measures for Earthquake**
  - Safety assessment/audits of public buildings
  - Retrofitting (if required) of public utility buildings like offices, schools/ banks/ markets etc.
  - Identifying and safely dismantling unsafe structures
- **Non-Structural Mitigation Measures for Earthquake**
  - Capacity building of architects, engineers and masons on earthquake resistant features
  - Registration of trained and certified mason

- Strict enforcement of guideline pertaining to seismic safety for government rural housing under IAY, Sardar Awaas, Ambedker Awaas
- Mock-drills for Schools, Hospitals and, Public Buildings and trainings for mason, engineers and architects

- **Structural Mitigation Measures for Drought**
  - Development of Pasture land in common property, seed farms and trust land
  - Rain Water Harvesting storage tanks at household level and public buildings
  - Structures for water harvesting and recharging like wells, ponds, check-dams, farm ponds, etc
  - Development of fodder plots /banks
  - Repair and maintenance, de-silting of water sources.

- **Non-Structural Mitigation Measures for Drought**
  - Listing/ developing shelf of work for drought proofing/ scarcity works including Identification of potential sites of water bodies
  - Farmer education to practice drought resistant crops and efficient water use
  - Set up control mechanism for regulated water use (ponds, small dams, check dams) on the early unset.
- **Structural Mitigation Measures for Industrial and Chemical hazard***(in coordination with LCG, DCG district and state level authorities)*
  - Safety assessment of Industrial unit
- **Non-Structural Mitigation Measures for Industrial and Chemical Hazard**
  - Planning
    Prepare and check an offsite and onsite and emergency plan Ensure that unsafe electrical conditions do not trigger chemical accidents Conduct mock drills as per the regulations
  - Update the plan as per the requirement
    - Capacity Building
    - Develop IEC material for Publication & Distribution
    - Awareness generation to general public and medical professional residing near MAH factories for immediate steps
    - Organize training programmes, seminars and workshops (e.g. for drivers of HAZMAT transport, line departments officers, Mamlatdar etc.)
    - List of experts/ resource person/ subject specialist (District emergency Off site plan)
  - Encourage disaster insurance

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District Emergency Operation Center

Collector Office - Kheda-Nadiad