Centre for Public Policy Research

COMMUNITY RESILIENCE HANDBOOK FOR DISASTER PREPAREDNESS AND MANAGEMENT

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With inputs from the
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COMMUNITY RESILIENCE HANDBOOK FOR DISASTER PREPAREDNESS AND MANAGEMENT

INTRODUCTION

This Community Resilience Handbook for Disaster Preparedness and Management is prepared with inputs from the “America with Kerala” project that was jointly organized by the U.S. Consulate General in Chennai, the Centre for Public Policy Research (CPPR) in Kochi, and the Kerala State Disaster Management Authority (KSDMA) from June to October 2019. Organized in response to the devastating floods and landslides that ravaged Kerala in August 2018 and 2019, the “America with Kerala” project aimed to share key lessons and best practices from the U.S. experience with relevant agencies and stakeholders in Kerala while giving an opportunity for U.S. experts to learn from Kerala's experience managing the floods. The five-month campaign promoted an all-hazards approach specifically addressing the four phases of a disaster management cycle including mitigation/prevention, preparedness, response, and recovery.

Launched in June 2019 in Kerala's capital city of Thiruvananthapuram, “America with Kerala” ideated the development of a curriculum informed by Kerala's emergency management landscape while emphasizing American innovation and pedagogy regarding communication, critical thinking, and technical skills. Dr. Himanshu Grover of the University of Washington, Seattle, USA, served as the U.S. subject matter expert for multiple “America with Kerala” workshops. The Kochi workshop held in July 2019 focused on sustainable policy management and an all-hazards approach, emphasizing infrastructure and innovation. U.S. expert Amy Chester, the CEO of the New York-based NGO Rebuild by Design, underscored the importance of sustainable infrastructure development in the context of physical and social vulnerabilities. The Kozhikode workshops, held in October 2019, focused on grassroots community-based disaster risk mitigation. Dr. Samantha Montano of the University of Nebraska in Omaha, USA, offered best practices in building community resiliency with special reference to forming and preparing first responders, the role of non-profit organizations in recovery, and the field of disaster volunteerism.

This resource guide includes recommendations and inputs from the grassroots community leaders who led on-the-ground disaster responses during the 2018 and 2019 floods and landslides in Kerala; U.S. and Indian experts on disaster management; and other relevant sources including KSDMA and National Disaster Management Authority (NDMA) resources.

KEY RECOMMENDATIONS

1) Disaster Management

- Encourage higher educational institutions to offer a 40-hour elective course on All-Hazards Management. This could be incorporated into existing academic programs in universities, autonomous colleges, and other relevant governmental and non-governmental agencies.
- Introduce a disaster management module as a mandatory three-hour annual seminar for all university or college students. This could be facilitated by KSDMA and other expert agencies in the field.
- Encourage KSDMA to publish knowledge resources on Disaster Management as Massive Open Online Courses (MOOCs) across various online platforms. These would be available to students from various academic focus areas.
- Develop a common all-hazards framework that can be followed irrespective of the nature of disasters and invest in the community to make it stronger to respond to all disasters. A cost-benefit analysis of the American disaster management system has shown that investing in mitigation and preparedness reduces adverse impacts upon the economy and more importantly, saves human lives.
- Revise the disaster management framework after every disaster to keep the plan relevant and updated.
- Adopt a public-private partnership model for more efficient predictions and warnings. Send personalized text messages warning of a disaster to the public and promote early warning apps like *Damini: Lightning Alert*[1]. A public alarm system can be installed to warn people about impending disasters.
- Create disaster management cells in all institutions of higher education starting from the existing resources of the National Service Scheme (NSS), National Cadet Corps (NCC), student organizations, etc.

[1] *Developed by Indian Institute of Tropical Meteorology, Pune under the Ministry of Earth Sciences, GoI.*

2) Search, Rescue, and Evacuation

- Decentralize search and rescue operations to ensure timely responses to disasters. The equipment and labor necessary for rescue operations should be available with local government agencies at all times. Train and equip local government and community members to respond to such situations.
- Form teams that include citizens, community/peoples' representatives, and concerned authorities to ensure community participation in rescue operations.
- Integrate relevant institutions and agencies on a digital platform for better communication and operational efficiency. These may include Fire and Rescue, Police, Local Self Government Department (LSGD), Civil Defense Forces, Community Volunteers/NGOs, Dam Management Authorities, Medical Teams, the Revenue Department, etc.
- Develop an online platform for local-level disaster management for coordinating search-and-rescue activities. After verification and validation, information can be entered into this data portal through multiple sources including government departments, individuals, and NGOs.

3) Camp (Shelter) Management

- Follow a centralized and coordinated approach at the collection points in order to reduce the wastage of resources. To avoid the oversaturation of goods and materials at collection points for donated items for relief, establish an efficient mechanism to avoid false and duplicate information.
- Explore the possibility of channelizing distribution through the Public Distribution System (PDS).
- Explore the possibility of establishing permanent relief camps in districts. Such camps should be easily accessible and resistant to potential hazards.
- Construct relief camp infrastructure that is inclusive, keeping older people and people with special needs in mind.
- Equip potential relief camps, including schools, with diesel generators to provide a consistent source of electricity during disasters.

4) Housing and Infrastructure

- Disaster Management training/study modules should focus on creating a knowledge base on topics including: land use planning, Geographic Information System (GIS) tools and techniques, natural resource management, laws and regulations, large infrastructure development, micro issues, and integrating "green" accounting and ecological processes into the budget. Generate awareness about the resiliency of the built environment[2], lifeline structures, and basic repair and retrofitting.
- Emphasize sustainable practices of construction, land use planning, water resource management, and the regulation on building and land use, especially in coastal areas.
- Halt unregulated quarrying and construction activities that contribute to ecological imbalances. Construction should be well-planned and durable to render structures disaster-resistant and increase the chances of survival in the event of a disaster.
- Employ construction methods that incorporate rational land utilization, the development of control strategies, and disaster responsive building methods. This will help to manage the risks caused by disasters. These could be achieved by codifying and implementing master plans, building rules, and building codes.
- Plan and implement projects that harness and strengthen the usage of solar power.
- Conduct hazard mapping at micro- and macro-levels and make data publicly available.
- Standardize building codes, make regulations zone-specific, and integrate the vetting of structural design of all buildings into the approval process for construction.
- Promote awareness about traditional methods of construction in light of some examples of older structures withstanding natural disasters while newer ones suffered more damage or collapsed more easily.

5) Public Health

- The curriculum on public health, in the event of a natural disaster, should focus initially on a general first aid class. Promote awareness among students about local medical facilities and the use of basic equipment. Provide training on self-safety measures to all rescue volunteers.

[2] *Human-made structures, features, and facilities viewed collectively as an environment in which people live and work.*

- The State Health Department should devise a long-term disaster health risk mitigation plan. Increase institutional capacities and define the roles of medical officials and personnel.
- Create a comprehensive database including healthcare capacities, networks of health facilities, and means of emergency transport regardless of ownership to enhance response capacities.
- Develop a disease-surveillance software for reporting and monitoring diseases during disasters.

6) Basic Life Support (BLS) and First-aid Skills

- Triage the affected persons/patients at the earliest. After an initial assessment, categorize patients into Red (for immediate treatment/transfer to hospital), Yellow (delayed treatment can be given), Green (no treatment needed), and Black (for the deceased).
- Train Emergency Medical Health teams of nearby and accessible hospitals and put them on standby. Blood banks should be ready with an updated donor database of the locality or neighboring areas.
- Ensure interdepartmental coordination within hospitals and impart training to local ambulance drivers.
- Plan in advance for palliative care for terminally ill patients and care for the elderly and people living with disabilities.
- Provide mental health support to those affected by disasters.

Policy Changes recommended by the workshop participants:

- Basic Life Support (BLS) training to volunteers from NGOs, NSS, NCC, Kudumbashree[3], and college students, etc.
- A robust Integrated Child Protection Scheme (ICPS).
- Indian accreditation bodies including the Medical Council of India or Kerala University of Health and Allied Sciences should accredit certified courses for volunteers in BLS.
- Trauma care and infrastructure at local hospitals should be established by law.
- Strengthen the NGO sector for disaster relief work.
- Introduce BLS programs into school curricula.

[3] *Kudumbashree is the poverty eradication and women empowerment programme implemented by the State Poverty Eradication Mission (SPEM) of the Government of Kerala.*

Institutions that could be engaged in BLS and care:

- Government and private hospitals
- NGOs with adequate and quality training
- Ambulance services
- Student organizations including NCC, Scouts, Guides, NSS, etc.
- Religious and other community-based organizations

7) Community Resilience

- Enhance the role of Local Self Governments (LSGs) in disaster management. In most cases, search and rescue operations are guided by LSG officials before the arrival of other rescue services because they are located in closer proximity and more aware of the topography. The identification of vulnerable sections of the population is done primarily by local officials. They have a substantial resource base of personnel from health and agriculture departments, schools, veterinary hospitals, various working groups, Kudumbashree members, etc. for executing a plan. These officials can efficiently use programs including \ Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) for the conservation of riverbeds and watershed areas, wetlands, afforestation, etc.
- Offer targeted disaster management training to Revenue department officials, Panchayat members, students, and teachers.
- Train as master trainers those who are already actively involved in disaster management efforts.
- Educate and empower local volunteer organizations and individual volunteers during disasters. NGOs play a critical role before, during, and after disasters and their involvement is possible at various stages, including preparedness, emergency services, search-and-rescue operations, recovery, and rehabilitation.
- Build “green” schools to mitigate damage and huge losses to the education sector as a result of disasters, as recommended by the Post-Disaster Needs Assessment (PDNA) report on the 2018 Kerala floods.

- Conduct regular mock drills in schools to promote student safety. Each school should form emergency-response teams focused on awareness generation, first aid transportation, site security, evacuation, resources, and the preparation of hazard maps.
- Revise the idea of community resilience to make it more inclusive, including non-humans.

8) Rescue and Rehabilitation of Vulnerable Groups

- Create holistically resilient communities with inclusive planning for disaster mitigation and preparedness. The vulnerability of a community is defined by its ability to anticipate, cope with, resist, and recover from the impacts of a disaster. Age, gender, socioeconomic background, and the type of hazard exposure are all factors in determining the degree of vulnerability of an individual or group.
- Partner with organizations that have already developed an inclusive action plan. Empower and improve the capacities of these organizations through workshops and one-on-one sessions.
- Provide early warning mechanisms about impending disasters and foster better mobility for evacuees to reach safer places.
- Train rescuers and medical personnel to take care of people living with disabilities and people with special needs. Equip relief camps with facilities including accessible toilets, assistive devices, and supplies of medicines for specific conditions, e.g. insulin for diabetics.
- Conduct widespread vulnerability mapping to establish baseline data about the people living with disabilities in order to be adequately equipped to rehabilitate them during disasters. Vulnerability mapping should also incorporate social and economic vulnerabilities.
- Initiate research and development on devices to aid the search-and-rescue of people with disabilities. The Radio-Frequency Identification (RFID) tag model can be customized for this purpose.

9) Risk Communications

- Educate people about risks and foster crisis communications before, during, and after a disaster. The knowledge resources used in risk communication must be jargon-free to make it more accessible and understandable.
- The Kerala state government should consider using a decentralized communication system as the public considers it as a reliable source of information. The media should be instructed to broadcast only correct information and not exaggerate facts.
- The state government should also consider standardizing the procedure of risk communications and establish a common information platform. Only mandated/authorized agencies should disseminate information during emergencies and people must be aware of these agencies.

10) Water Supply, Waste Management and Sanitation

- Establish bio-toilets and dry sanitation systems during disasters. Follow scientific protocols and guidelines for waste management.
- Conduct watershed mapping and share the results publicly.
- Encourage water reserves and their conservation at the local level.

1

A BRIEF INTRODUCTION TO DISASTER MANAGEMENT

A disaster is the consequence of a sudden catastrophic event that seriously disrupts the normal functioning of a society or community, to the extent that it cannot subsist without outside help. A disaster is not just the occurrence of an event including an earthquake, flood, conflict, health epidemic, or an industrial accident; a disaster occurs if that event/process negatively impacts human populations. A disaster can be defined as any tragic event stemming from events including earthquakes, floods, catastrophic accidents, fires, or explosions. It is a phenomenon that can cause damage to life and property and destroy or severely damage the economic, social, and cultural life of people.

1.1. Hazards

A hazard may be defined as "a dangerous condition or event that threatens or has the potential to cause loss of life or injury and damage to property or the environment." A hazard may be any event that threatens life and property and disrupts normal life. Hazards can be both natural as well as human-made (unnatural).

Natural Hazards: These are extreme events caused by physical forces working on or within the earth's surface. Examples include earthquakes, volcanoes, floods, cyclones, droughts, etc. Because natural hazards are created by physical forces, it is not possible to stop them. However, proper planning and policymaking can help reduce the risks associated with these hazards.

Human-induced Hazards (Unnatural Hazards): These hazards are caused by human actions, through negligence, short-sighted or ignorant actions, or for vindictive purposes. Examples of Unnatural Hazards include terrorism, arson, accidents, etc. These hazards can be addressed and removed by building awareness, providing better education, and practicing sustainable urban and rural management.

Disaster Management: "Disaster Management" can be defined as the range of activities designed to maintain control over disasters and emergency situations and to provide a framework for helping those who are at risk to avoid or recover from the impact of the disaster. This includes preparedness, response, and recovery, i.e., rebuilding and supporting society. Disaster management aims to reduce, or avoid, the potential losses from hazards, assure prompt and appropriate assistance to the victims of disaster, and achieve rapid and effective recovery.

An **All-Hazards Approach**: Where possible, Early Warning Systems (EWS) should link all hazard-based systems. Economies of scale, sustainability, and efficiency can be enhanced if systems and operational activities are established and maintained within a multipurpose framework that considers all hazards and the needs of end-users. All-hazards EWS will also be activated more often than a single-hazard warning system, and therefore should provide better functionality and reliability for dangerous high-intensity events including cyclones, which occur infrequently. All-hazards systems also help the public better understand the range of risks they face and these systems also reinforce ideal preparedness actions and warning response behaviors.

Figure 1: Disaster Management Cycle.

The four disaster management phases illustrated above do not always, or even generally, occur in isolation or in this precise order. Often phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster.

- Mitigation - Minimizing the effects of a disaster.
  Examples: building codes and zoning; vulnerability analyses; public education.
- Preparedness - Planning how to respond.
  Examples: preparedness plans; emergency exercises/training; warning systems.
- Response - Efforts to minimize the hazards created by a disaster.
  Examples: search and rescue; emergency relief.
- Recovery- Returning the community to normal.
  Examples: temporary housing; grants; medical care.

1.2. Types of Disasters

Disasters are caused by natural hazards or human-induced events or a combination of both. The Kerala State Disaster Management Plan of 2016 classifies disasters as Natural Hazards and Human-induced Hazards as given below.

Natural Hazards

1. Flood (riverine, urban, and flash floods)
2. Landslides (includes debris flows, rock avalanche, rockslide, landslips, and mud slips)
3. Drought
4. Coastal hazards (high waves, storm surges, *Kallakadal*[4], Tsunami, saltwater intrusion, coastal erosion)
5. Wind (cyclone, "gust-nados," gusty winds)
6. Lightning
7. Earthquakes

[4] *Occurrence of unusual high swell waves in normal weather. The term has been adopted by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO-IOC).*

8. Human epidemics
9. Plant disease epidemics and pest attacks on crops
10. Avian epidemics
11. Animal epidemics
12. Pest attacks of human habitations
13. Forest fires
14. Meteorite/asteroid impacts
15. Soil piping[5]
16. Heat wave/sunburn/sunstroke
17. Natural background radiation

Human-induced (Anthropogenic) Hazards

1. Stampedes
2. Firecracker accidents
3. Petrochemical transportation accidents
4. Industrial accidents
5. Dam breaks
6. Dam spillway operation-related floods and accidents
7. Oil spills
8. Road accidents involving civilian transport vehicles
9. Human-induced forest fires
10. Human-animal conflicts
11. Fire accidents in buildings and marketplaces
12. Boats capsizing
13. Accidental drownings
14. Buildings collapsing
15. Spurious liquor induced casualty
16. Air accidents
17. Rail accidents
18. Terrorism, riots, and Naxalite attacks

[5] *A process through which water erodes the soil beneath the ground surface leading to underground tunnels which can enlarge over a period of time*

19. Nuclear and radiological accidents
20. Space debris impacts
21. Biological accidents
22. Occupational- and recreational area-related hazards
23. Accidents on Armed Forces premises

1.3. Levels of Disaster

The High-Power Committee on Disaster Management, as mentioned in the National Disaster Management Plan (NDMP) 2016, has classified disasters in India into various levels to indicate the scale of destruction and the requirement of support from different levels of government for relief and rehabilitation. These are Level 0, Level 1, Level 2, and Level 3. See the boxes below for details.

The scale of the disaster is an important factor to assess the degree of preparedness and vulnerability. The disaster situations can be categorized into three levels: L1, L2, and L3. Level 0 indicates a period of normalcy that should be utilized for disaster risk reduction/preparedness activities.

Level - L0
Period of normalcy should be utilized for disaster risk reduction / preparedness activities.

Level - L1
The level of disaster that can be managed within the capabilities and resources at the district level. However, the State authorities will remain in readiness to provide assistance, if needed.

Level - L2
This signifies the disaster situations that require assistance and active mobilization of resources at the State level and deployment of state-level agencies for disaster management. The Central agencies must remain vigilant for immediate deployment, if required by the State.

Level - L3
This corresponds to a nearly catastrophic situation or a very large-scale disaster that overwhelms the State and district authorities and requires the mobilization of resources at the national level and involvement of national authorities.

2

DISASTER PREPAREDNESS PLANS

2.1. Planning for Different Types of Disasters

Each disaster needs separate types of preparation that will provide safety to individuals, families, and community members in general. Given below are disaster preparedness tips to better respond to events including earthquakes, cyclones, floods, and heat waves.

2.1.1. Earthquake

Earthquakes give no warning and no time to react. Therefore, it is essential to formulate a safety plan for yourself and for your family. Adopt the following safety measures. (refer section 2.2 on page no. 27)

Before the Earthquake

- Identify a safe location (safe haven) in the house to move to in the event of an earthquake.
- Always store the following items in a safe haven: bottled drinking water, dry food, first aid kit, torch (flashlight), and radio.
- Have contact numbers and addresses of friends who can help.
- Assess the earthquake safety capacity of your building. Reinforce the foundation and frame. *Kutcha* (mudbrick) buildings can be retrofitted and strengthened.
- Check whether the rooftop water storage tanks are properly anchored to the main structure.
- Do not keep racks or other items that may obstruct in exit passages.
- Make a family Disaster Preparedness Plan (refer Section 2.2 on page 27).
- Know what to do and where to meet your family after the earthquake.
- Identify at least one relative in another city to provide information about your safety.

During an Earthquake

- A loud rumbling sound might signal its arrival.
- Take cover; go under a table or sturdy furniture.

- If there is no cover nearby, then kneel or sit close to the floor next to a structurally sound interior wall. Place your hands on the floor for balance.
- Do not stand in doorways.
- Move away from windows, mirrors, bookcases, etc.
- Avoid touching loose electric wires.
- Switch off gas and electric connections.
- If you are living in a *kutcha* house, move to an open area where there are no trees or electric or telephone wires.
- If you are in the open, stay there until the shaking is over.
- Avoid being close to tall buildings, walls, power poles, and other objects that could fall.
- Do not enter damaged buildings and stay away from badly damaged structures.

After an Earthquake

- Wear shoes/chappals to protect your feet from debris.
- Be aware that aftershock tremors may follow the first quake within the next few minutes, hours, days, weeks, or even months.
- Check for fire hazards; use torch lights, not candles.
- Help the injured/trapped; give first aid and ask for expert help.
- Help the elderly who may require utmost care.
- Stay out of damaged buildings.
- Bring the family home only after checking the damage and verifying that conditions are safe.
- Check for electricity, gas leaks, and spilled inflammable liquids.
- Help douse fires.
- Do not go to damaged areas unless help has been requested.
- Use the telephone only in emergency in order not to burden phone lines.
- Relocate your family to an alternate location if needed.

2.1.2. Cyclone

Before the Cyclone Season

- Monitor media reports for weather updates. Be alert about community warnings.
- Do not spread rumors; always verify information.
- Keep an emergency kit with bottled water, dry food, warm clothing, essential medicines, valuables, important papers and documents, and waterproof bags ready.
- Keep important documents in a waterproof bag.
- Maintain a stock of food, water, and medicines in waterproof containers in a safe place.
- Keep emergency addresses and phone numbers readily available.
- Locate a safe shelter on higher ground to move your family and animals from a potential storm surge.
- Check the roof of your house for any leakage and fix it.
- Cut dead trees/dry branches and clear debris.
- Clear/fasten loose materials that may fly and cause damage or injury
- Update the vulnerability list and map of your area (please check the KSDMA website https://sdma.kerala.gov.in/).
- Conduct a cyclone drill, including components of search, rescue, and first aid activities with your family members.

On Hearing Cyclone Warning

- Monitor radio, television, and other local warning systems for the latest information.
- Do not venture into the sea.
- Prepare to move to a pre-identified shelter through a safe route.
- Prepare an asset list and known persons' (family/friends) address and share it with the community.
- Keep boats, bullock carts, bicycles, etc. ready.

- If evacuation becomes necessary, switch off electricity, gas, and water supplies.
- Carry an emergency kit and other essential materials with you.

During the Cyclone

- Turn off electricity and gas supplies.
- Listen to the radio for news updates.
- Protect yourself with a mattress/rugs/blankets.
- Stay under a strong table or other furniture if you fear that the roof may collapse.
- Do not venture out until safe; beware of the “calm eye” after which a cyclone may recur.
- Do not venture into flood waters; if you must, carry a stick with you.
- Beware of fallen power lines, damaged bridges, trees, and open drain hole covers.
- Take precaution to avoid snakebites.

After the Cyclone

- Do not go outside unless it is declared safe to do so by the authorities.
- Check for gas leaks and fallen live electric lines.
- Listen to the radio for advice/warnings and current information.
- Do not return home until advised to do so.
- Volunteer for rescue and relief operations.

2.1.3. Heat Wave

Safety Tips

- Avoid going out in the hot sun between 12:00 p.m. and 3:00 pm.
- Keep your home cool; use curtains, shutters, or sunshades, and keep windows open at night.
- Keep animals in the shade and give them plenty of water to drink.
- Drink sufficient water and enough fluids; carry water with you while traveling.

- Wear lightweight, light-colored, loose, porous, cotton clothes.
- Use protective goggles, an umbrella/hat, and shoes/chappals while going out.
- Avoid strenuous activities under the hot sun.
- Avoid alcohol, tea, coffee, and carbonated soft drinks, as these can dehydrate the body.
- Avoid high-protein foods.
- Use a damp cloth on head, neck, face, and limbs while going out.
- If you feel sick, immediately consult a doctor.
- Use oral rehydration salts (ORS) and homemade drinks including lassis, lemon water, or butter milk to rehydrate your body.
- Use fans, apply damp clothing (like wet towels) on the neck, wrist, groin and armpit areas, and take bath in cold water.

First Aid for a Sunstroke-affected Person

- Let the person rest in a cool place in the shade.
- Wipe the person with a wet cloth or wash the body frequently.
- Pour tepid water on the head.
- Try to bring down the body temperature.
- Give the person an ORS solution to drink to keep the body hydrated.
- Shift the person to a health unit as soon as possible.
- Be prompt as heatstroke can be fatal.

2.1.4. Floods

The first and foremost step to keep yourself safe from floods is to avoid building houses in flood-prone areas.

Preparations before Flood

- Keep an emergency kit ready with a portable radio, torch/flashlight, water, dry food, kerosene, candles, matchboxes, polythene bags to keep valuables, an umbrella, bamboo stick, salt and sugar (to prepare rehydration liquids).

- Keep a first aid kit, Disaster Management handbook/manual, and strong ropes ready.
- Know a safe route to the safest place identified by your panchayat / municipal authorities.
- Ensure your house is flood-resistant. Seal the walls in your basement with waterproofing compounds to avoid seepage.

On Hearing Flood Warning

- Monitor media reports for information.
- Watch for flood warnings given by local authorities.
- Contact authorities/officials to find out if they are planning to construct barriers (e.g. levees, beams, and floodwalls) to stop flood water from entering the houses in your area.
- Do not panic; verify rumors.
- Keep a first aid kit, dry food, drinking water, and clothes ready.
- Take bullock carts and animals to safer places and move boats to more secure places.
- Bind your belongings with each other so that they will not be washed away.
- Check entry points of water.
- Be aware of flash floods. If there is any possibility of a flash flood, move immediately to a higher ground. Do not wait for instructions to move.
- Be aware of streams, drainage channels, canyons, and other areas known to overflow suddenly. Flash floods can occur in these areas with or without such typical warnings as rain clouds or heavy rain.

During the Floods

- Always follow the instructions of concerned government authorities.
- In case you have to evacuate, promptly follow instructions from relevant authorities. Secure your home. If you have time, move essential items to an upper floor.

- Turn off utilities at the main switches or valves, if instructed to do so. Disconnect electrical appliances/gas stoves. Do not touch electrical equipment if you are wet or standing in water.
- Keep an emergency with you; remember to carry assistive devices for persons with disabilities.
- Do not drive into flooded areas; if caught on a flooded road with rapidly rising waters, quickly get out of the vehicle and move to a higher ground.
- Avoid contact with floodwater because it may be contaminated with sewage or may have dangerous insects or reptiles; be careful to avoid snakebites.
- Do not walk through moving water. Six inches of moving water can make you fall. If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness of the ground in front of you.
- Avoid walking on beaches or riverbanks.
- Do not allow children to play in or near flood water.
- Stay out of areas prone to flooding (underpasses, low spots, canyons, etc.)
- Drink disinfected water.
- Consume enough water supplements in case of diarrhea.
- Keep food covered; do not take heavy meals.
- Do not take food drenched in flood water. Use bleaching powder and lime to disinfect the surroundings. Do not use wet electrical appliances.
- Help the officials/volunteers to distribute relief materials.

2.2. Disaster Preparedness Plan for the Family

Helping a family to be prepared for disasters is important, especially when the family has Persons with Disabilities (PwD), children, aged people, pregnant women, etc.

2.2.1. Four Steps in Disaster Preparedness

A disaster preparedness plan for families living in hazardous areas includes four steps:

First Step: Be Aware

1) Be aware of various hazards/disasters that have occurred in your locality. The occurrence of a disaster depends upon geographical, geological, environmental, and human-induced factors.
2) Recognize potential natural and human-induced hazards in your locality that can lead to a disaster or can increase the impact of a disaster.
3) Be aware of the geographical, social, economic, and weather-related conditions of your locality that can increase the risk of a disaster.
4) Provide specialized information to pregnant women, people living with disabilities, geriatric (aged), patients, and children in your family about the various difficulties they may have to face at the time of a disaster.
5) Gather information regarding what to do and what not to do during a crisis situation from the State/District Disaster Management Authority or other relevant departments.
6) Be aware of whom to contact in case of a disaster. If the first responders have not yet reached you, refer to important contacts in this handbook (refer page no. 74).

Second Step: Prepare a Disaster Management Plan for Your Family

1) At the time of a disaster, all family members should act in a coordinated manner; hence, a disaster management plan is necessary to decide what each family member should do and how each should respond.
2) Have an idea about how each family member should act during the disaster to save their own life and the lives of family members.
3) Each member should know two safe locations (a safe shelter in the neighborhood and a shelter away from home), so that they can assemble there after a crisis.
4) Each member should know the name, phone number, and address of persons whom they should contact during/after a crisis situation.

5) All important documents related to land, bank, insurance papers, and certificates of education should be kept in a safe place to protect them from damage.

6) Make special arrangements for PwDs in the plan.

Third Step: Prepare an Emergency Kit for Your Family

1) During a crisis, you and your family may have to live for a few days without access to basic supplies and facilities. So, it is better to prepare an emergency kit with all necessary supplies.

2) Make sure that your emergency kit is water-resistant and easy to carry. It should be kept in a safe place inside your house.

3) Each family member should know where the emergency kit is kept so that they can access it at the time of an emergency.

4) The details of an emergency kit are given in Section 2.3.

Fourth Step: Conduct Mock Exercises

1) After preparing a disaster preparedness plan, the family members should practice security and saving exercises in an organized manner. It would be practically difficult to evacuate physically challenged, aged, and small children. Mock exercises will help to prepare them to face an emergency.

2) Exercises like DROP—COVER—HOLD (during an earthquake) and STOP—DROP—ROLL (during a fire accident) should be practiced.

3) Practice (at least once in three months) how to reach the nearest safe shelter from your home during a crisis situation.

4) Periodically replace water and snack items from the emergency kit with new items to ensure quality.

5) Ensure that children know all emergency contact numbers and route maps to reach the nearest safe shelter.

6) Train yourself in first aid with the help of trained personnel and help spread awareness in the community.

2.3. Assembling a Disaster Preparedness Kit

A Basic Emergency Kit

An emergency kit should include the items shown in the illustration below. Gather the supplies and store them in a water-resistant container.

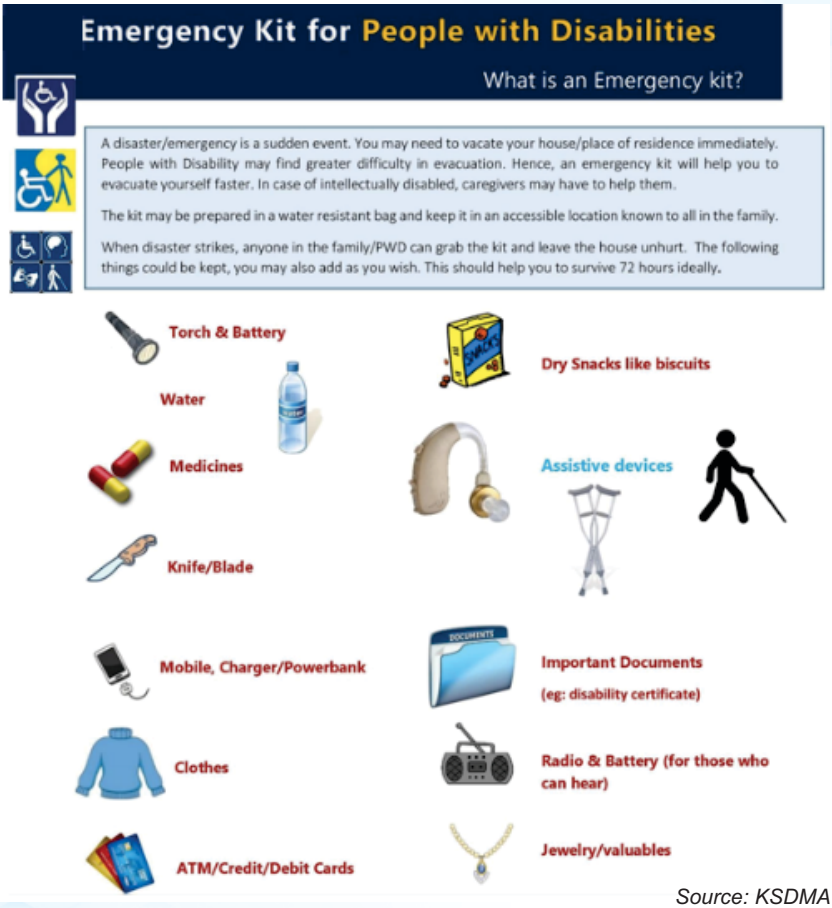
Figure 2: Things to Include in Your Emergency Kit.

Source: KSDMA

A Basic Emergency Kit for Persons with Disabilities (PwDs)

This kit is prepared with the intention of surviving for at least 72 hours.

Figure 3: Things to Include in Emergency Kit for PwDs.



Source: KSDMA

2.4. Disaster Preparedness Plan for Older Persons (OPs)

Given below are the needs of the Older Persons (OPs) and steps to be taken by the community and the family in the pre- and post-disaster stages:

2.4.1. Measures on Receiving Warning about a Disaster Steps to be taken by the Community at the Ward Level

1) Convene Rescue/First Aid Teams and finalize the plan of action.
2) Prepare a list of who's who and clearly identify the volunteers for the OPs.
3) The OPs should know who is going to do what for them.
4) Prepare a checklist of items to be taken to the shelter.
5) Store essential items in a common and accessible place.
6) Collect the latest information and coordinate with the government or NGOs to take appropriate action.
7) All volunteers should remain alert, take positions, and complete collection and storage of materials.
8) Prepare for evacuation; organize mode of transport, essential supplies, etc.
9) Communicate, supervise, and help execute the decision to shift to safer places.

Steps to be taken by the Family

1) Identify older people and list out their specific needs.
2) Help the volunteers organize and communicate with the OPs.
3) Decide on an evacuation plan to be taken in an emergency.
4) Families should be ready with materials catering to the specific needs of the OPs.
5) Families should be aware of the community's efforts for the care of the OPs.
6) Prepare the OPs mentally to face challenges and offer means of support.
7) Keep in touch with the Rescue and First Aid Teams and obey their safety instructions.
8) Give these teams information about your family members' position to facilitate early action.
9) Store the valuables in a plastic cover in a safe place. Take all the necessary things with you while moving to safe places as per the checklist prepared earlier.

2.4.2. Measures for Relief during a Disaster

Steps to be taken by the Community at the Ward Level

1) Keep informed with the most current information about the situation. The disaster may strike again. Be prepared to face the challenge and inform other people.
2) Collect information about missing and trapped persons and enlist volunteers to help.
3) Locate a proper place, food, drinking water, medicines, and sanitation facilities for the OPs in the shelter facility.
4) Do not panic; initiate appropriate timely action. Always prepare an alternative plan.
5) It is recommended that everyone use sticks and ropes to help each other in a water-filled area. The speed of water must be taken into consideration.
6) Ensure the proper management of the shelter houses.
7) Take the initiative to provide primary health care, a supply of medicines, a sanitation facility, carcass disposal, cleaning, loss assessment, and information gathering.

Steps to be taken by the Family

1) Collect the latest information; follow instructions and help in implementing decisions.
2) Give a helping hand to the OPs in all these activities.
3) Share the information with the OPs.
4) All the OPs should have a walking stick and torch/flashlight.
5) Ensure the fulfilment of specific needs of the OPs in the shelter facility. Prioritize their comfort and well-being.
6) List out the missing family members and help the rescue team take appropriate measures.
7) While returning home, first check if the house is ready for use by the OPs before bringing them in.
8) Provide trauma counseling to the OPs as needed.

2.5. Disaster Preparedness Plan for Persons with Disabilities (PwDs)

Responsibility of PwDs and other stakeholders in pre-, during, and post-disaster phases.

Responsibility	Pre-disaster	During disaster	Post-disaster
To be ensured by PwDs	-Prepare emergency kits -Have a disaster-preparedness plan at home -Ensure appropriate evacuation routes -Keep assistive devices ready -Know telephone numbers of first responders -Follow warnings from authorities and take appropriate actions	-Seek and receive help from others -If an evacuation is required, ensure that assistive devices are carried along -Carry your emergency kit and medicines (if any)	-Unless the threat has passed, do not get back to the house -Do not hesitate to take help from others
To be ensured by caregivers/ Panchayati Raj Institutions/ schools/local authorities	-Equip PwDs with training, capacity building programs, etc. -Conduct mock drills in frequent intervals	-Arrange emergency communication through available resources	-Ensure that PwDs get adequate facilities in the shelter homes
	-Create awareness among PwDs as well as others -Train first responders to handle PwDs and provide them with specific skills to identify them and communicate with them	-PwDs should be given preference during evacuation -Carry all assistive devices and medicines along with PwDs	-Shelter homes and amenities therein should be accessible to the PwDs -PwDs may have additional needs including privacy, medicines, interpreters, signages, etc. -Provide psychosocial support

2.6. Disaster Preparedness Plan for Pets and Domestic Animals

- The safest place for your pet is with you.
- Remember to include your pet in your disaster plans.
- If you have made arrangements to keep your pet elsewhere, ensure the facility is not in a flood or surge area and will be attended throughout the storm.
- Pets should be transported to safety in suitable carriers for both their protection and yours.
- Ensure that your pets have proper identity tags that are easily visible.
- Ensure an ample supply of food and water.
- Be sure to have the required medications and a first aid kit.
- Keep photographs of all the pets for identification purposes.
- If your pet goes missing during a storm or evacuation, immediately contact local authorities concerned. Photos will greatly aid in reuniting you and your lost pet.

3

WARNING SYSTEMS AND STANDARD OPERATING PROCEDURES

The competent agencies designated to issue early warnings are the following:

(1) Weather warnings: India Meteorological Department (IMD)

(2) Cyclone: India Meteorological Department (IMD)

(3) Drought: Ministry of Agriculture and Farmers' Welfare, Govt. of India (MoAFW)

(4) Earthquake: India Meteorological Department (IMD)

(5) Epidemics: Ministry of Health and Family Welfare, Govt. of India (MoHFW)

(6) Floods: Central Water Commission (CWC)

(7) Landslides: Geological Survey of India (GSI)/National Center for Earth Science Studies (NCESS)

(8) High Waves and Tsunami: Indian National Center for Ocean Information Services (INCOIS)/National Center for Earth Science Studies (NCESS)

(9) Avalanches: Snow and Avalanche Study Establishment (SASE)

- For any of the above incidents, warnings can be issued by the National/State Emergency Operations Center, and the Government of Kerala.
- For events without precursors (e.g., accidents/terror attacks), warnings and/or alerts can be issued by the District Emergency Operations Center/District Collector.

On their part, the relevant State Governments and District Administrations shall disseminate such alerts and warnings publicly through all possible methods of communication.

The information given below has been taken from the *Orange Book of Disaster Management 1 - Standard Operations Procedures & Emergency Support Functions Plan 2020* brought out by the Kerala State Disaster Management Authority (KSDMA) so that the citizens would get a better understanding of the responses and responsibilities of the various agencies involved in disaster management. It will also help one understand what each color-coded alert means in terms of preparedness and responses, and enable the community and individuals to respond in a better and responsible way when alerts are issued by the authorities.

Links to the handbooks can be found on the KSDMA's website -
https://sdma.kerala.gov.in/handbooks/

3.1. Rainfall and Flood

Alerts and Response Guidelines

- Follow the latest Annual Monsoon Preparedness And Response Guidelines (Orange Book 2) of KSDMA for more specific actions.
- Currently flood forecast is available for 39 points in the State, from the Central Water Commission (CWC). In other areas the Irrigation Department and Kerala State Electricity Board (KSEB) shall use rainfall prediction to monitor the water levels of the rivers closely, and update the District Emergency Operations Center about the water level at different locations.

YELLOW ALERT **Heavy Rainfall**	**Be updated —** Actions to be taken and sustained until the warning is withdrawn in the districts predicted to be affected by the rainfall. • **State Emergency Operations Center —** All state-level officers of the nodal departments informed. • **District Emergency Operations Center —** Emergency time functions activated. • **District Control Rooms of Revenue, and Police** —24 hours functioning. • **Tahasildar**—Ensure that shelters are available if needed; Ban activities such as quarrying until 24 hours after heavy rainfall and as evaluated and recommended by village officers. • **Transport Department —** Ensure that cranes and earthmovers in the district are ready for deployment in the event of major calamities. • **KSEB**[6] **& PWD**[7] **—** Ensure that emergency repair teams are formed and available to be deployed. • **Tourism & Forest Departments —** Advise tourists to avoid streams and rivulets that intersect *ghat* (hilly) roads and not to enter streams and bathing *ghats* when it is raining because these are possible tracts of landsli • **Irrigation Department & KSEB –** Closely monitor the water level of all rivers and dams and update the downstream District Emergency Operations Centers and advise them regarding the expected stage of water height and consequent areas that may be inundated and the area to be evacuated.
ORANGE ALERT **Very Heavy Rainfall**	**Be prepared —** Actions to be taken and sustained until the warning is withdrawn in the districts predicted to be affected by the rainfall. • **District Emergency Operations Center, District-Taluk Control Rooms of Revenue and Police —** Emergency time functions activated and functions 24 hours. • **State Disaster Response Force, and Fire & Rescue Service —** Pre-positioned as per the direction of the State Incident Commander • **Army, Navy, Air Force, and other central forces in the State** — Informed • **Hospitals, Community Health Centers and Public Health Centers in the districts predicted to be affected —** In addition to regular functioning, ensure that doctors, paramedical staff, and field staff are available on call for institutional activities and field-level disaster management.

[6] Kerala State Electricity Board

[7] Public Works Department, Government of Kerala.

	• **Tahasildar —** Take control of the identified relief shelters; Ban activities such as quarrying until 24 hours after the very heavy rainfall and as evaluated and recommended by village officers. • **Local Self Governments —** Restrain the public from standing near or crossing streams and advise against traveling through *ghat* roads. • **Transport Department —** Ensure that cranes and earthmovers in the district are ready for deployment in the event of major calamities. • **KSEB & PWD** —Get emergency repair teams ready for deployment. • **Police —** Regulate vehicular traffic other than that of emergency services via *ghat* roads prone to landslides and flash floods. Issue voluntary evacuation warnings to those living in landslide-prone hilly villages, low-lying areas, and areas of concentration of weaker sections such as colonies in River *Puramboke*[8] and Canal *Puramboke* land, housing colonies of the weaker sections, housing clusters in the low-lying areas, and other locally identified areas. • **Tourism & Forest Departments —** Advise tourists to avoid streams and rivulets that intersect *ghat* (Hilly) roads and not to enter streams and bathing *ghats* when it is raining as these are possible tracts of landslides. • **Public —** Voluntary evacuation of landslide-prone hilly villages, low-lying areas, and areas of concentration of weaker sections such as colonies in River *Puramboke* and Canal *Puramboke* land, housing colonies of the weaker sections, housing clusters in the low-lying areas, and other locally identified areas.
RED ALERT **Extremely Heavy Rainfall**	**Maximum vigil —** Actions to be taken and sustained until the warning is withdrawn in the districts predicted to be affected by the rainfall. • **State or District Authority** shall declare holiday for all educational institutions. • **State Emergency Operations Centre & District Emergency Operations Centre** — Emergency time functions activated. • **State/District/Taluk Control Rooms of Revenue and Police —** 24 hours functioning. • **National Disaster Response Force, State Disaster Response Force, and Fire & Rescue Service —** Pre-positioned as per the direction of the State Incident Commander. • **Army, Navy, Air Force, and other central forces in the State —** Readied to move into any location in the State. • **BSNL**[9] **and Police**— Deploy emergency communication systems. • **Hospitals, Community Health Centers (CHC) and Public Health Centers (PHC) in the districts predicted to be affected —** Be ready to function at full strength, 24 hours as required and make necessary human resource arrangements at district level. Medical teams are ready for field-level disaster management. Ensure that measures are in place for epidemic prevention. Evacuate low-lying PHC/CHC/Hospitals within 24 hours of receiving an Extremely Heavy Rainfall Warning. • **Tahasildar —** Start relief camps; Ban activities such as quarrying until 24 hours after the very heavy rainfall and as evaluated and recommended by village officers.

[8] *Puramboke* land means the area of land unassessed by the Revenue Department and hence can be allotted to the public.

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	• **Local Self Governments —** Relocate vulnerable populations to relief camps and other safe locations. • **Transport Department —** Take control of all cranes and earthmovers in the district for deployment in the event of major calamities. • **KSEB & PWD** — Emergency repair teams stand ready for deployment • **District Officers of KSEB, PWD, Health, Irrigation, & Transport** —Should be available at the respective district collectorates. • **Police —** Stop vehicular traffic other than that of emergency services via *ghat* roads prone to landslides and flash floods; ensure a strict one-way system for vehicle movement. Forceful evacuation of public living in the landslide-prone hilly villages, low-lying areas, and areas colonies in River *Puramboke* and Canal *Puramboke* land, housing clusters in the low-lying areas, and other areas locally identified as vulnerable. • **Tourism & Forest Departments —** Advise tourists to avoid streams and rivulets that intersect *ghat* (Hilly) roads and not to enter streams and bathing *ghats* when it is raining as these are possible tracts of landslides; close all hill stations and resorts in coastal and low-lying areas and evacuate the public to safer areas. • **Public —** Remain indoors. Those in landslide/flood-prone areas should move to safer locations. Avoid mass gatherings and social celebrations. Cooperate with the evacuation procedures from vulnerable areas as and when advised by concerned authorities.

3.2. Cyclone

Alerts and Response Guidelines With regards to cyclone alerts, please note that Kerala has developed its own rules or standard operating procedures that are different from the rules laid out by India Meteorological Department (IMD), based on the experiences and adverse consequences during Cyclone Ockhi. The responses given here are based on the rules issued by KSDMA.	
YELLOW ALERT • **Low Pressure** • **Depression**	Below are the actions recommended in case of a low pressure or depression warning pertaining to an area where the fishermen of Kerala venture into: • Convene **State Executive Committee** to which the Director, Met Centre Thiruvananthapuram also has to be invited. • Issue warning to fishermen in the areas notified by IMD. • All **District Emergency Operations Centers (DEOC)** should direct local fisheries officers to retransmit warnings through mic announcements and mass messaging to fishermen and coastal population. • **Fisheries Department** should ensure retransmission of warnings through mic announcements and mass messaging to fishermen and coastal population.

	• **Police** should ensure retransmission of warnings through mic announcements and mass messaging to fishermen and coastal population.
ORANGE ALERT • **Cyclonic storm** • **Deep Depression**	**Be prepared —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected by the cyclone. • **State or District Authorities** shall declare holiday for all educational institutions. Advise public living in *pakka* (solid and permanent) houses to remain indoors and those in the path of the cyclone or landslide/flood-prone areas to move to safer locations. Stop all mass gatherings and social events. • **State Emergency Operations Center & District Emergency Operations Center —** Emergency time functions activated; DEOCs direct local fisheries officers to retransmit warnings through mic announcements and mass messaging to fishermen and coastal population. • **State-District-Taluk Control Rooms of Revenue and Police —** 24-hour functioning. • **Police, State Disaster Response Force, and Coastal Police —** Deployed to the villages. • **Army, Navy, Air Force, Coast Guard,** and other central forces in the State — On high alert; stand by. • **Mobile Operators and Police —** Deploy emergency communication systems. • **Hospitals, Community Health Centers and Public Health Centers** in the districts predicted to be affected **—** In addition to regular functioning, ensure that doctors, paramedical staff and field staff are available on call for institutional activities and field-level disaster management. • **Tahasildar —** Relocate vulnerable population to the relief camps and other safe locations and start the relief camps; quarry blasting should be banned until the warning is lifted. • **Local Self Governments —** Relocate vulnerable population to the relief camps and other safe locations, particularly those living in *kutcha* houses, and tiled/sheeted roof structures. • **Transport Department —** Ensure that cranes and earthmovers in the district are ready for deployment in the event of major calar • **KSEB**[10] **& PWD**[11] **—** Emergency repair teams stand ready for deployment. • **District Officers of KSEB, PWD, Health, Irrigation, & Transport** should be available at the respective district collectorates. • **Fisheries Department —** Ban fishermen from venturing into sea in the areas notified by India Meteorological Department (IMD) as areas under the influence of the system or areas where IMD or Indian National Centre for Ocean Information Services (INCOIS) has only advised fishermen not venture into sea.

[10] Kerala State Electricity Board

[11] Public Works Department, Government of Kerala

	• **Police —** Regulate vehicular traffic other than that of emergency services to the area predicted to be affected. Ensure retransmission of warnings through mic announcements and mass messaging to fishermen and coastal population. • **Tourism & Forest Departments —** Advise tourists to avoid streams and rivulets that intersect *ghat* roads and to not enter streams and bathing *ghats* when it is raining as these are possible tracts of landslides and flash floods.
RED ALERT • **Super Cyclone** • **Extremely Severe Cyclonic Storm** • **Very Severe Cyclonic Storm** • **Severe Cyclonic Storm**	**Maximum vigil —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected by the cyclone. • **State or District authority** shall declare holiday for all educational institutions. • **Advise citizens** living in *pakka* houses to remain indoors and those in the path of the cyclone or landslide/flood-prone areas to move to safer locations. Citizens living in tiled/sheet roof structures should be moved to relief shelters. Stop all mass gatherings and social • **State Emergency Operations Center & District Emergency Operations Center —** Emergency time functions activated. All DEOCs should direct local fisheries officers to retransmit warnings through mic announcements and mass messaging to fishermen and coastal population. • **State-District-Taluk Control Rooms of Revenue and Police—** 24-hour functioning. • **National Disaster Response Force, State Disaster Response Force, and Coastal Police** Deployed to the villages. • **Army, Navy, Air Force, Coast Guard**, and other central forces in the State — Deployed in notified areas. • **BSNL**[12] **and Police** — Deploy emergency communication system • **Police —** Stop vehicular traffic other than that of emergency services to the notified areas; ensure strict regulations for vehicle movements. Forcefully move those in the path of the and landslide/flood-prone areas to safer locations. Citizens living in tiled/sheeted roof structures should be moved to relief shelters. • Ensure retransmission of fishermen warnings through mic announcements and mass messaging to fishermen and coastal population. • **Hospitals, Community Health Centers and Public Health Centers** in the notified districts **—** Function round the clock at full strength. Medical teams kept ready for field-level disaster management. Ensure control measures for epidemic prevention. • **Tahasildar —** Relocate vulnerable population to the relief camps and other safe locations, particularly those living in *kutcha* houses. Ban quarry blasting until the warning is lifted.

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	• **Local Self Governments —** Relocate vulnerable population to the relief camps and other safe locations, particularly those living in *kutcha* houses. • **Transport Department —** Take control of all cranes and earthmovers in the district for deployment in the event of major calamitie • **KSEB & PWD —** Emergency repair teams should be ready for deployment. • **Fisheries Department —** Totally ban fishermen from venturing into the sea in the areas notified by India Meteorological Department (IMD) as areas under the influence of the system or areas where IMD or Indian National Centre for Ocean Information Services (INCOIS) has only advised fishermen not venture into sea. • **District Officers of KSEB, PWD, Health, Irrigation, & Transport** —Should be available at the respective district collectorates. • **Tourism & Forest Departments —** Advise tourists to avoid streams and rivulets that intersect *ghat* roads and not to enter streams and bathing *ghats* while raining as these are possible tracts of landslides and flash floods; close all hill stations and resorts in coastal and low-lying areas and move public to safer areas. • **Railway and Airport Authorities —** Stop all operations that are near the cone of influence of the cyclone.

3.3. High Waves (Swell waves, Storm Surges)

Alerts and Response Guidelines Follow the latest Annual Monsoon Preparedness And Response Guidelines of KSDMA for more specific actions.	
YELLOW ALERT **(Waves 1 to 3 meters)**	**Be updated (1 to 3 meters) —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected. • **SEOC & DEOC —** Keep checking the bulletins from Indian National Centre for Ocean Information (INCOIS). • **State-District-Taluk Control Rooms of Revenue and Police —** 24-hour functioning. All concerned district administrations and nodal departments should be on the alert.
ORANGE ALERT **(Waves >3 meters)**	**Be prepared (>3 meters) —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected. • **Citizens** within 250 meters from the coastline should be ready to move to a higher ground. • **State Emergency Operations Center & District Emergency Operations Center** — Be on the alert. • **State-District-Taluk Control Rooms of Revenue and Police —** Be on the alert. • **Coastal Police, Marine Enforcement** — Be ready to immediately respond.

	• **Army, Navy, Air Force,** and other central forces in the State — standby on high alert. • **BSNL**[13] **and Police —** Ready to deploy emergency communication systems along the coastline. • **Police —** If required, regulate vehicular traffic other than that of emergency services to the areas predicted to be affected. • **Hospitals** and **Public Health Centers** on higher ground, and at least 250 meters away from the coastline in the districts predicted to be affected — Medical teams kept ready for field-level disaster management. • **Tahasildar —** Be prepared to start relief camps and evacuate citizens to higher ground outside 250 meters from coastline. • **Local Self Governments —** Advise the public within 250 meters from the coastline to prepare for moving to a higher ground. • **Department of Ports and Harbor Engineering and Fisheries —** Move all seafaring vessels to the deep ocean. • **KSEB & PWD** — Emergency repair teams stand ready for deployment. • **District Officers of KSEB, PWD, Health, Irrigation, Transport, Ports and Harbor Engineering** should be available at the respective district headquarters. • **Tourism Department —** Alert all resorts within 250 meters of the coastline and low-lying areas in river-mouths/coastal estuaries that they may have to close down.

3.4. Tsunami

Alerts and Response Guidelines	
YELLOW ALERT • **Watch**	**Be updated —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected by the tsunami. • **State Emergency Operations Center & District Emergency Operations Center —** Keep checking the tsunami bulletins on the Indian National Centre for Ocean Information (INCOIS) website • **State-District-Taluk Control Rooms of Revenue and Police —** 24-hour functioning. All related district administrations and nodal departments should be on the alert.
ORANGE ALERT • **Alert**	**Be prepared —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected by the tsunami. • **State or District Authority** shall declare holiday for all educational institutions in the taluks predicted to be affected by the event

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	• **Citizens** within 250 meters from the coastline should be ready to move to a higher ground. All mass gatherings and social events in the taluks predicted to be affected by the event should be stopped. • **State Emergency Operations Center —** Telephonically verify the certainty of the warning from Indian National Centre for Ocean Information (INCOIS). • **State Emergency Operations Center & District Emergency Operations Center**— Emergency time functions activated. • **State-District-Taluk Control Rooms of Revenue and Police**—24-hour functioning • **State Disaster Response Force & Coastal Police —** Deployed to the coastline. • **Army, Navy, Air Force**, and other central forces in the State—standby on high alert. • **BSNL and Police —** Ready to deploy emergency communication systems along the coastline. • **Police —** Regulate vehicular traffic other than that of emergency services to the area predicted to be affected. • **Hospitals** and **Public Health Centers** on higher ground outside 250 meters from coastline in the districts predicted to be affected **—** function 24 hours at full strength as with necessary human resource arrangements made at district level. Medical teams kept ready for field-level disaster management. Ensure control measures for epidemic prevention. • **Tahasildar —** Be prepared to start relief camps and evacuate citizens to higher ground outside 250 meters from coastline. • **Local Self Governments —** Advise citizens within 250 meters of the coastline to prepare to move to a higher ground. • **Department of Ports and Harbor Engineering —** Move all seafaring vessels to the deep ocean. • **KSEB & PWD —** Emergency repair teams stand ready for deployment. • **District Officers of KSEB, PWD, Health, Irrigation, Transport, Ports and Harbor Engineering —** should be available at the respective district collectorates. • **Tourism Department —** Alert all resorts within 250 meters of the coastline and low-lying areas in river-mouths/coastal estuaries that they may have to close if the alert level rises.
RED ALERT • **Warning**	**Most vigil —** Actions to be taken and sustained until the warning is withdrawn in the villages/taluks/districts predicted to be affected by the tsunami. • **State or District Authority** shall declare holiday for all educational institutions in the taluks predicted to be affected by the event • **Citizens** within 250 meters of the coastline to move to a higher ground and further inland. All mass gatherings and social events in the taluks predicted to be affected by the event should be

	• **State Emergency Operations Center —** Telephonically verify the certainty of the warning from Indian National Centre for Ocean Information (INCOIS). • **State Emergency Operations Center & District Emergency Operations Center** — Emergency time functions activated. • **State-District-Taluk Control Rooms of Revenue and Police —** 24-hour functioning. • **National Disaster Response Force, State Disaster Response Force, and Coastal Poliee** Deployed to the coastline. • **Army, Navy, Air Force,** and other central forces in the State **—** Deployed in coastal areas. • **BSNL and Police —** Activate emergency communication systems • **Police —** Stop vehicular traffic other than that of emergency services to the area predicted to be affected; ensure strict one-way system for vehicle movement. • **Hospitals, Community Health Centers and Public Health Centers** in the districts predicted to be affected by the cyclone **—** Function round the clock at full strength with human resource arrangements made at district level. Medical teams kept ready for field-level disaster management. Ensure control measures for epidemic prevention • **Tahasildar —** Evacuate the public within 250 meters of the coastline to safe higher ground and start the relief camps. • **Local Self Governments —** Evacuate public within 250 meters of the coastline to higher ground and relief camps. • **Department of Ports and Harbor Engineering —** Move all seafaring vessels to the deep ocean. • **KSEB & PWD —** Emergency repair teams stand ready for deployment • **District Officers of KSEB, PWD, Health, Irrigation, Transport, Ports and Harbor Engineering —** should be available at the respective district collectorates. • **Tourism Department —** Close all resorts within 250 meters of the coastline and low-lying areas in river-mouths/coastal estuaries and evacuate people to safer areas.
THREAT PASSED	**State Emergency Operations Center —** Cross check with Indian National Centre for Ocean Information (INCOIS) that the threat has passed. **District Emergency Operations Center —** Cross check with State Emergency Operations Center that the threat has passed.

3.5. Landslide

Alerts and Response Guidelines

Criteria:

1. When India Meteorological Department (IMD) has issued Very Heavy Rainfall Warning
2. When two days of cumulative rainfall exceeds 8 centimeters in a rain station, landslide warning is issued to the respective districts.
3. Follow the Annual Monsoon Preparedness and Emergency Response Plan of KSDMA for more specific actions.

Landslide Alert	**Be prepared**—Actions to be taken and sustained till the warning time limit expires/until 2 days of cumulative rainfall is below 8 centimeters. • Advise the general **public** to remain indoors and those in landslide-prone areas to move to safer locations. All mass gatherings and social events should be stopped. • **State or District Authority** shall declare holiday for all educational institutions. • **State Emergency Operations Center & District Emergency Operations Center** — Emergency time functions activated. • **State-District-Taluk Control Rooms of Revenue and Police —** 24 hours functioning. • **National Disaster Response Force & State Disaster Response Force —** Alerted and stand by. • **Army, Navy, Air Force, Coast Guard,** and other central forces in the State — alerted and stand by. • **BSNL and Police** — Ready to deploy emergency communication systems • **Police** — Regulate vehicular traffic along *ghat* roads. • **Hospitals, Community Health Centers, and Public Health Centers** in the landslide-prone villages of the district **—** Function 24 hours at full strength with necessary human resource arrangements made from district level. Medical teams stand ready for field-level disaster management. Ensure control measures for epidemic prevention. • **Tahasildar —** Take control of the identified relief shelters; ban quarry blasting until after 24 hours of rain-free situation prevails in the quarry locality based on evaluation by the village officers. • **Local Self Governments —** Alert public living close to small rivulets and in hilly segments with >20° slope. • **Transport Department —** Ensure that cranes and earthmovers in the district are ready for deployment in the event of major calamities. • **KSEB & PWD** — Emergency repair teams stand ready for deployment. • **District Officers of KSEB, PWD, Health, Irrigation, & Transport —** Should be available on call to District Incident Commander. • **Tourism & Forest Departments —** Advise tourists to avoid streams and rivulets that intersect *ghat* roads and to not enter streams and bathing *ghats* when it is raining as these are possible tracts of landslides and flash floods.

4

EARLY WARNING AND PREPAREDNESS: ROLES AND RESPONSIBILITIES OF LOCAL SELF GOVERNMENTS (LSGS) REPRESENTATIVES, CITIZENS AND MEDIA

4.1. Role of Ward Members/Councilors of LSGs in Early Warning and Preparedness

Early Warning Systems and Local Communities

An Early Warning System (EWS) can be defined as a set of capacities needed to generate and disseminate timely and meaningful warning information of the possible extreme events or disasters (e.g. floods, drought, fire, earthquake and tsunamis) that threaten people's lives. The purpose of this information is to enable individuals, communities and organizations threatened to prepare and act appropriately and in sufficient time to reduce the possibility of harm, loss or risk[14].

People-centered EWS rely on the direct participation of those most likely to be exposed to hazards. Without the involvement of local authorities and communities at risk, government and institutional interventions and responses to hazard events are likely to be inadequate. A local, "bottom-up" approach to early warning, with the active participation of local communities, enables a multi-dimensional response to problems and needs. In this way, local communities, civic groups, and traditional structures can contribute to the reduction of vulnerability and strengthening of local capacities.

Ten Principles Common to Development of All-Hazards Early Warning Systems

1. There is a strong political recognition of the benefits of Early Warning Systems (EWS) reflected in national and local disaster risk management policies, planning, legislation, and budgeting.
2. Effective EWS are built upon four components:
   i. hazard detection, monitoring, and forecasting;
   ii. analyzing risks and incorporation of risk information in emergency planning and warnings;
   iii. disseminating timely and authoritative warnings; and
   iv. community planning and preparedness.
3. EWS stakeholders are identified; their roles and responsibilities and coordination mechanisms are clearly defined and documented within the national and local plans, legislation, directives, Memoranda of Understanding etc.

[14] *As defined by the National Institute of Disaster Management, New Delhi.*

4. EWS capacities are supported by adequate resources (e.g., human, financial, equipment, etc.) at the national and local levels, and the system is designed for long-term sustainability.
5. Hazard exposure and vulnerability information are used to carry-out risk assessments at different levels as critical input into emergency planning and development of warning messages.
6. Warning messages are
   i. clear, consistent, and include risk information;
   ii. designed with consideration for linking threat levels to emergency preparedness and response actions (e.g., using color, flags, etc.), and understood by authorities and the population; and
   iii. issued by a single (or unified), recognized, and authoritative source.
7. Warning dissemination mechanisms are able to reach the authorities, other EWS stakeholders, and the population at risk in a timely and reliable fashion.
8. Emergency response plans are developed taking into consideration the hazard/risk levels and characteristics of the exposed communities.
9. Training on hazard/risk/emergency preparedness awareness integrated with various formal and informal educational programs with regular drills to ensure operational readiness.
10. Effective feedback and improvement mechanisms are in place at all levels of EWS to provide systematic evaluation and ensure improvement over time.

Local Flood Early Warning System (LFEWS)

Local Flood Early Warning System (LFEWS) means a watershed-based system that can be managed by local government units and affected communities. LFEWS, as planned by the Thiruvananthapuram Municipal Corporation in their Early Warning System Plan 2016, shall have an integrated system of communication and can be successfully implemented in the LSG institutions. It should have an Operations Center working 24/7 to monitor data on rainfall and river water level and issue appropriate official alert signals to the communities. It is a tool for empowering communities in

partnership with their local governments. Affected communities co-own and participate in managing the system. LFEWS empowers local governments to make informed decisions where and when needed and under conditions when higher level guidance or advisory is not available. It also integrates indigenous knowledge systems.

Three colors can be used to communicate warning and alert levels:

- Yellow for Flood Level 1 and Standby
- Orange for Flood Level 2 and Preparation
- Red for Flood Level 3 and Evacuation

An Emergency Operations Center (EOC) at the Corporation/ Municipality/ Panchayat should be established at all LSGs that shall function as the communication hub for receiving data on water level and rainfall and for sending alert signals. It shall be a two-way communication channel where the Local Volunteer Observers and telemeters will send rainfall and water level data to the operation center 24/7 and where the EOC sends back corresponding alert signals through mobile phones, sirens, megaphones, and electronic display boards. The most common medium that can be used is amateur radio on the Very High Frequency (VHF) channels, complemented by mobile phone and short messaging services (SMS). At the ward level, support personnel can use motorbikes to disseminate information in cases where mobile telephony and radio fail to reach out to the intended targets. At the community level, communities can activate indigenous media such as bells (acoustic signal) or word-of-mouth communication.

Institutions/Agencies in the Early Warning System Framework

National Agencies	State Emergency Operations Center	District Emergency Operations Center	Disaster Management Cells of Municipal Corporation/Town/ Panchayat
Ward Members/ Councilors	Community Task Force Members	City/Town/ Panchayat-level Response Teams	

4.2. Responsibilities of the Individual Citizen

- Always heed warnings issued by competent authorities.
- Be prepared for emergencies and follow the instructions of first responders.
- Be aware of the risk factors in your area of residence.
- Do not spread rumors or unverified news. The spread of 'fake news' and/or inaccurate information presents a big challenge for Emergency Responders and authorities around the world, and Kerala is no different.
- Know whom to contact in times of emergencies (refer page no. 74).
- Keep handbooks/manuals like this with you for ready reference.

4.3. Role and Responsibilities of the Media

- Media plays a critical role when it comes to community resilience. There is an urgent need to create channels of communication to deliver content in the language/dialect used at the local level to make information broadcasting more efficient during disasters.
- One of the biggest challenges that journalists face while covering disasters is obtaining official information regarding the scale of the disaster. It is imperative that there are channels set in place by the State to disseminate correct and timely information among media personnel as this is a vital source of information for disaster-affected people.
- Media is a very critical link between rescue agencies and the general public and it is essential to ensure the safety of media personnel who voluntarily go into disaster-affected regions.
- One of the risks associated with information dissemination through informal channels such as social media is the spread of misinformation that can lead to panic or undue stress, and actions resulting from this incorrect information can affect victims of disasters. There should be a mechanism in place to verify information that is circulated on social media during times of disasters and, as needed, a procedure to correct this information in a timely manner.

5

DISASTER RESPONSE

Response measures are those taken immediately after receiving early warning from the relevant authority or in anticipation of an impending disaster, or immediately after the occurrence of an event without any warning. The primary goal of response to a disaster is to save lives, protect property and the environment, and meet basic needs of human and other living beings after the disaster. Its focus is on rescuing those affected and those likely to be affected by the disaster.

The UN Office for Disaster Risk Reduction (UNDRR) defines 'response' as “the provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected.”

The immediate response in the event of a disaster lies with the local authorities with the support of the State Government. The Central Government supplements its efforts through providing logistic and financial support and deploying the National Disaster Response Force (NDRF), Armed Forces, Central Armed Police Forces, and other specialized agencies, for example in case of a Chemical, Biological, Radiological and Nuclear (CBRN) disaster. The Central Government will depute experts to assist the State Government, upon its request, in planning and implementation during severe natural or human-induced disasters.

5.1. Institutional Framework for Response

The institutional arrangements for the response system consist of the following elements:

a) Nodal Central Ministries with disaster-specific responsibilities for national-level coordination of the response and mobilization of all the necessary resources

b) Central agencies with disaster-specific responsibilities for Early Warning Systems (EWS) and alerts

c) National Disaster Response Force (NDRF)

d) State Disaster Response Force (SDRF)

5.2. Major Tasks and Responsibilities

While there are disaster-specific aspects to the post-disaster response, the emergency functions are common to all disasters and there are specific ministries, departments, or agencies that can provide emergency response. Besides, very often, there are multiple hazards and secondary disasters that follow a major disaster. Hence, response intrinsically follows a multi-hazards approach. Therefore, all the response activities have been summarized in a single matrix applicable to all types of disasters. The response responsibility matrix specifies the major theme of response and the agencies from the Central and State Government responsible for it.

All the agencies responsible for response should follow the Incident Response System (IRS) guidelines of the National Disaster Management Authority (NDMA) that will help in ensuring proper accountability and the division of responsibilities. Various ministries and departments have to provide specialized emergency support to the response effort. Certain agencies of the Central Government will play a lead role, while others will be in a supporting role. The State Disaster Management Authority (SDMA), Commissioner of Relief (CoR), or the Department of Revenue is the nodal agency at the State level for coordination of response. The District Disaster Management Authority (DDMA) is the nodal agency for coordination of response at district level. Various central ministries, departments, agencies, and State Governments have to prepare their own hazard-specific response plans as per the guidelines of the NDMA and in line with the National Disaster Management Plan (NDMP). They need to ensure preparedness for response at all times, and must carry out regular mock drills, and conduct tests of readiness periodically. The ministries/departments must report the status to the NDMA.

The major tasks of responses are as given below. The responsibilities matrix can be viewed in detail in the *Orange Book of Disaster Management 1 - Standard Operations Procedures & Emergency Support Functions Plan 2020* published by the Kerala State Disaster Management Authority (KSDMA).

This can be assessed at https://sdma.kerala.gov.in/handbooks/

(1) Command and Control

(2) Communication

(3) Medical Care and Public Health

(4) Sanitation/Sewerage Disposal

(5) Power

(6) Transport

(7) Search and Rescue

(8) Public Works and Engineering

(9) Relief Supplies

(10) Food and Supplies

(11) Drinking Water

(12) Relief Camps

(13) Media

(14) Helplines

(15) Animal Care

(16) Law & Order and Traffic Management

(17) Removal of Trees

(18) Flood Water Control

6

DISASTER MANAGEMENT COMMUNICATION AND INFORMATION SYSTEM

This chapter is intended to give citizens a general and basic understanding of the information flow within the emergency communications network. The Disaster Management Act, 2005, reiterates that maintaining an emergency communication network is the responsibility of the State Disaster Management Authority (SDMA) and District Disaster Management Authority (DDMA). Accordingly, routine maintenance is needed at the district- and state-level to ensure the proper functioning of the emergency communication network. This has to be strictly followed by all DDMAs.

6.1. Emergency Operations Centers (National, State, and District)

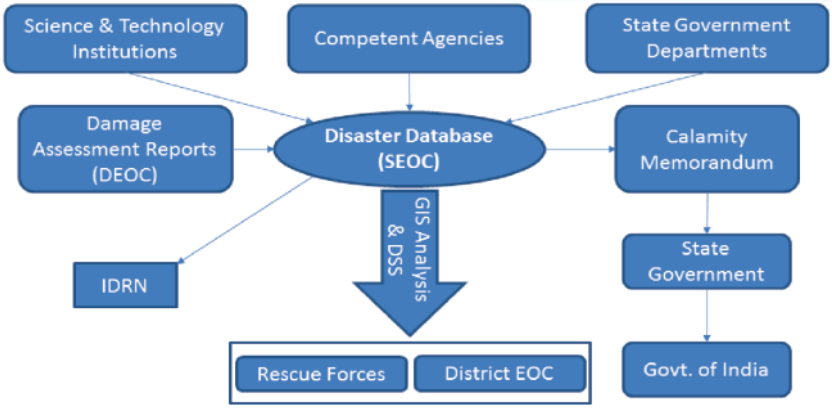
The Emergency Operations Centers (EOCs) have specific roles in each stage of the disaster management cycle (Figure 4). Section 38, 2 (h) of the Disaster Management Act, 2005, states that it is the responsibility of the State Government to "establish adequate warning systems up to the level of vulnerable groups." Early Warning Dissemination is one of the most important roles of the EOC. Figure 4 shows the flow of early warning in the State. The EOC utilizes Information and Communication Technology (ICT) tools and various other modes available for the transmission of early warning to vulnerable groups and also activate the responders. During normal times, it maintains a systematic database of the resources available — important phone numbers, names, and addresses of important government and non-government officials, international bodies, and Non-Governmental Organizations (NGOs).

During a crisis, it is expected to function as a center for decision-making and help direct the flow of information horizontally and vertically to the respective departments and districts for smoother relief operations. In the EOC, all the major activities will be distributed among the officials of the nodal departments responsible for emergency support functions to ensure accountability, proper information, assimilation, and record keeping. This will also help in easy coordination with and reporting to the State Incident Commander (SIC)/District Incident Commander (DIC).

The activities of EOCs can be classified as normal time and emergency time activities. However, the chain of command and control shall be preserved through EOCs and it shall be the nerve center of decision-making.

Every instruction issued and action taken against each instruction shall be compiled by the respective EOCs after the crisis situation passes off and these event reports shall be documented and reviewed by the authority at the appropriate level: by the State Executive Committee (SEC) at the State level and by the DDMA at the district level. All emergency operations facilities in the State have normal time functions.

Figure 4: Flow of Early Warning Dissemination in the State.



Source: KSDMA

National Emergency Operations Center (NEOC)

There will be a National Emergency Operations Center known as NEOC-1 under the Ministry of Home Affairs, Government of India, and NEOC-2 under the National Disaster Management Authority (NDMA). It will be connected to the following control rooms:

- All agencies designated to provide early warning information about hazard events
- State Emergency Operations Center
- District Emergency Operations Center
- National Disaster Response Force
- Integrated Defense Staff
- Ministry of External Affairs
- Central Armed Police Forces

State Emergency Operations Center (SEOC)

The Kerala SEOC functions at the headquarters of Kerala State Disaster Management Authority (KSDMA), Observatory Hills, Vikas Bhavan, P.O. Thiruvananthapuram - 695033.

The SEOC is headed by the State Relief Commissioner (SRC), who is *inter alia* Principal Secretary, Disaster Management, as prescribed in the *National Disaster Management Guidelines - National Disaster Management Information and Communication System, 2012*. The administrative and financial functions of the SEOC are regulated by the State Executive Committee (SEC) through the Principal Secretary, Disaster Management as defined vide GO (Rt) No. 2167/2016/DMD dated 19-03-2016. S/He is *inter-alia* the State Incident Commander (SIC) in times of disasters. The SRC is assisted in his functions by the General Staff of the SEOC. The day-to-day functions of the SEOC are managed by a Head, a Hazard and Risk Analyst, and a trained team of Hazard Analysts. In peacetime, staff of the SEOC are engaged in the *normal time objectives* of the center; while in times of emergencies the staff are engaged in the *emergency time objectives* of the center.

The State Emergency Operations Center is also the data fusion center and has high-end Geographic Information System (GIS) and Satellite Image Processing facilities, satellite-based communication, satellite phones, and multi-channel terrestrial communications systems including GSM, 4G, and broadband Internet connectivity. The State Disaster Management Control Room functions 24 hours and is entrusted with the following functions:

- Communication of early warnings issued by competent agencies to the State Police Control Room.
- Communication of early warnings issued by competent agencies to the District Control Rooms of Revenue and Disaster Management, and Police via email, telephone, fax, and/or SMS.
- Compilation of daily calamity reports from districts and communication of the same to the NEOC and SEOC via email.
- Communication of specific directions issued by the SEOC to the District Control Rooms.

District Emergency Operations Center (DEOC)

The DEOC is under the direct control of the District Incident Commander (DIC). The day-to-day administration of the DEOC is delegated to the Deputy Collector (Disaster Management) [Deputy Collector (DM)] in Thiruvananthapuram, Pathanamthitta, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode, and Kannur districts and to the Additional District Magistrate (ADM) in Kollam, Kottayam, Idukki, Palakkad, Wayanad, and Kasaragod.

Location: All the DEOCs shall be within the District Collectorates and in close proximity to the office of the District Collector.

Disaster Management Committees at Corporation / Municipality / Panchayat Level

Some Local Self Government (LSG) institutions in Kerala have formed Disaster Management (DM) Committees/Cells to coordinate efforts at the local level. Listed below are some suggested roles for local-level DM Committees.

1) Coordinate, supervise, and monitor activities of the DM program at the local level.
2) Assist NGOs to form Emergency Response Teams (ERTs) and coordinate their training.
3) Support NGOs to mobilize the local community for Disaster Risk Reduction (DRR) program.
4) Facilitate and support NGOs in preparing Local Self Government (LSG) level DM plans.
5) Present DM plan in the Corporation/Municipality/Panchayat council for approval.
6) Update the DM plan annually.
7) Engage ERTs in disaster response activities.
8) Evaluate the performance of ERTs.

9) Integrate other development activities with DM plans to reduce vulnerability.

10) Conduct periodic meetings to review the activities of the DRR program.

11) Liaise with government departments including health, revenue, police, fire force, and other agencies for assistance before, during, and after a disaster.

12) Ensure people submit relief applications/requests to the government and ensure they get the benefits.

13) Manage all other DRR activities at the LSG level.

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7

DISASTER RECOVERY AND REHABILITATION

Globally, the approach towards post-disaster restoration and rehabilitation has shifted to one of betterment reconstruction. While disasters result in considerable disruption of normal life, enormous suffering, and loss of lives and property, global efforts consider the recovery, rehabilitation, and

The Sendai Framework was the first international agreement adopted within the context of the post-2015 development agenda. Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015 (UNISDR 2015a) as the successor instrument to the Hyogo Framework for Action 2005-2015.

The four priorities for action under the Sendai Framework are:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation, and reconstruction.

reconstruction phase as an opportunity to "Build Back Better" (BBB), integrating disaster risk reduction into development measures and making communities resilient to disasters. The Sendai Framework expects that after a disaster, the stakeholders will be prepared for BBB. Existing mechanisms may require strengthening in order to provide effective support and achieve better implementation. Disaster recovery tends to be very difficult and lengthy. The eventual reconstruction will vary depending upon the actual disaster, location, pre-disaster conditions, and the potentialities that emerge at that point of time. The National Disaster Management Plan provides a generalized framework for recovery since it is not possible to anticipate every likely element of betterment reconstruction.

7.1. Recovery Process

The disaster recovery process is not a set of orderly actions triggered by the impact of a disaster upon a community. It will consist of several related activities such as the following:

- Damage assessments
- Debris clearance, removal, and its environmentally safe disposal
- Restoration and even upgrading utilities including communication networks
- Re-establishment of major transport linkages
- Temporary housing
- Detailed building inspections
- Redevelopment planning
- Environmental assessments
- Demolition
- Reconstruction
- Integrating Disaster Recovery and Rehabilitation (DRR) into various development initiatives
- Financial management
- Economic impact analyses

According to the United Nations Office for Disaster Risk Reduction [UNISDR (now UNDRR)] (2009), recovery is "the restoration, and improvement where appropriate, of facilities, livelihoods, and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors." The UNDRR notes that recovery programs coupled with heightened public awareness and engagement after a disaster provides a valuable opportunity to develop and implement disaster risk reduction measures and to apply the 'Build Back Better' principle. It is an important component of risk reduction strategy and if implemented systematically, the recovery process prevents the affected community from sliding into further poverty and deprivation. While the Disaster Management Act, 2005, mandates the government to carry out rehabilitation and reconstruction activities, it does not explicitly refer to recovery as a component to be used as a part of disaster management strategy. However, the National Policy on Disaster Management, 2009, recognizes recovery as one of the six elements within the disaster management continuum where it is linked to

physical, social, and economic assets within the overall context of safe development. The disaster recovery programs usually proceed in three distinct stages to facilitate a sequenced, prioritized, and flexible multi-sectoral approach.

The salient provisions of the recovery framework include:

(1) Institutional arrangements: Ensuring institutional mechanisms at the national, state, district, and local (urban and rural) levels that clearly define roles and responsibilities in recovery.

(2) Coordination: There is considerable interdependence between stakeholders - government, international agencies, the private sector, and civil society organizations - in realizing the objectives of recovery and inter-agency coordination is extremely important.

(3) Public-Private Partnerships (PPPs): Participation of the private sector has to be leveraged for larger public good and the PPPs is one effective way to facilitate the private sector involvement in recovery.

(4) Information and Communication Technology (ICT): Effective use of ICT in recovery programs for disseminating messages among all stakeholders and providing information on all aspects of the recovery program.

(5) Decision Support System (DSS): Setting up an adequate DSS that includes Management Information System (MIS), databases, and the deployment of spatial data management technologies.

(6) Pool of Expertise: Pooling of professional skills and expertise in diverse areas.

(7) Community Participation: Ensuring the proactive involvement of communities, proper community outreach, empowerment, and gender equity in program formulation and implementation.

(8) Monitoring and Evaluation (M&E): M&E is an important component required for promoting transparency in the recovery processes and it should include technical and social audits.

7.2. Rehabilitation

Rehabilitation - an integral part of disaster recovery, other being reconstruction - could be defined as an overall dynamic and intermediate strategy of institutional reform and reinforcement, reconstruction, and improvement of infrastructure and services aimed at supporting the initiatives and actions of the affected populations in the political, economic, and social domains, as well as reiteration of sustainable development. Generally, rehabilitation packages include total reconstruction of damaged physical and psychological infrastructure, as well as economic and social rehabilitation of the people in the affected region.

The rehabilitation is classified into the following:

(1) Physical

(2) Social

(3) Economic

(4) Psychological

(1) Physical Rehabilitation

Physical rehabilitation is a very important facet of rehabilitation and it includes:

- Reconstruction of physical infrastructure including houses, buildings, railways, roads, communication network, water supply, electricity, and so on.
- Short-term and long-term strategies towards watershed management, canal irrigation, social forestry, crop stabilization, alternative cropping techniques, job creation, employment generation, and environmental protection.
- Rehabilitation of agriculture, artisan work, and animal husbandry.
- Adequate provision for subsidies, farm implements, acquisition of land for relocation sites, adherence to land-use planning, flood plain zoning, retrofitting or strengthening of undamaged houses, and construction of model houses.

Relocation is a very sensitive part of the physical rehabilitation process and it must be ensured that need-based considerations and not extraneous factors should drive the relocation policy. The local authorities, in consultation with the affected population and under the guidance of the State Government shall determine relocation needs taking into account the criteria relevant to the nature of the calamity and the extent of damage.

(2) Social Rehabilitation

Social rehabilitation is also an important part of disaster rehabilitation. Vulnerable groups including artisans, the elderly, orphans, single women, and young children would need special social support to survive the impact of disasters. The rehabilitation plan must have components that do not lose sight of the fact that the victims have to undergo the entire process of re-socialization and adjustments in a completely unfamiliar social milieu. Thus, this type of rehabilitation would include these activities :

- **Revival of Educational Activities**

Educational facilities may suffer greatly in a major disaster placing considerable stress on children. Therefore, the following steps will be useful in helping children to cope with and recover from the situation.

- Give regular counseling to teachers and children.
- Encourage children to attend school regularly.
- Provide writing material and workbooks to children.
- Make children participate in all activities pertaining to resurrection of normalcy in the school.
- Try to inculcate conducive attitudes to enable the students to play a positive role in self-development.
- Establish village-level education committees.
- Identify local groups that could conduct smooth functioning of education activities.

- **Rehabilitation of Vulnerable Groups (Women, Elderly, Children, Persons with Special Needs, etc.)**

The elderly, women, and children are more vulnerable after a major disaster. Hence, the following measures will help in their rehabilitation.

- Identify familiar environs to rehabilitate elderly, women, and children.
- Make efforts to attach destitute widows and orphans with their extended family; if not possible, identify foster families for them.
- Organize regular counseling to strengthen the mental health of women and children.
- Initiate various training programs to make women economically self-sufficient.
- Give due attention to health, nutrition, and hygiene in the long-term rehabilitation package for women and children.
- Activate/reactivate the *anganwadis* (day-care centers) and old-age homes within the shortest possible time.
- Set up at least one multi-purpose community center per village.
- Make efforts to build residential female children homes at the block level.
- Set up vocational training camps to improve the skills of orphans and children.
- Promote self-help groups.

(3) Economic Rehabilitation

The major components of economic rehabilitation are livelihood restoration and ensuring the continuity of businesses, trade, and commerce. Restoring employment and income generating opportunities to disaster-affected communities is a vital component of post-disaster reconstruction. Livelihood opportunities are severely disrupted by the destruction or loss of essential assets, with the result that people are unable to engage in normal income-generating activities and become demoralized and dependent on humanitarian aid.

Economic recovery should be based on:

- Analysis of existing livelihood strategies and sustainability of businesses
- A comprehensive analysis of existing and future risks
- The vulnerabilities of the affected families
- The accessibility of linkages to external influences and institutions including skills and knowledge
- Access to functioning markets

As per the Para 9.5.1 of the National Policy on Disaster Management 2009, the State Governments will have to lay emphasis on the restoration of permanent livelihood of those affected by disasters and give special attention to the needs of women-headed households, artisans, farmers, and people belonging to marginalized and vulnerable sections of the population.

(4) Psychological Rehabilitation

Another crucial dimension of disaster rehabilitation is psychological rehabilitation. Dealing with victim's psychology is a very sensitive issue and must be dealt with caution and concern. The psychological trauma of losing relatives and friends, and the scars of the shock of disaster events, can take much longer to heal than the stakeholders in disaster management often realize. Thus, counseling for stress management should form a continuous part of a disaster rehabilitation plan.

Efforts should be made to focus more on:

- Psychotherapeutic health programs
- Occupational therapy
- Debriefing and trauma care
- Tradition, values, norms, beliefs, and practices of disaster-affected people

8

PREVENTION AND MITIGATION: ESSENTIAL AWARENESS FOR THE CITIZEN

Earlier, the approach to Disaster Management (DM) was primarily reactive and relief-centric. A paradigm shift has now taken place at the national level from the former response-centric approach to a new holistic and integrated approach to the management of disasters with an emphasis on prevention, mitigation, and preparedness. These efforts are aimed at conserving developmental gains and also minimizing losses to lives, livelihood, and property. Prevention and mitigation contribute to lasting improvement in safety.

Risk Assessment and Vulnerability Mapping

Hazard zonation, mapping, and vulnerability analysis in a multi-hazard framework can be carried out utilizing Geographic Information System (GIS) and remote sensing data. This process needs to mandatorily include a ground check component. Hazard and Consequence Mapping on GIS platforms have to be prepared for all chemical accident-prone districts.

Monitoring Critical Infrastructure

It is of utmost importance that critical infrastructure including dams, roads, bridges, flyovers, railway lines, power stations, water storage towers, irrigation canals, delta water distribution networks, river and coastal embankments, ports and other civic utilities are constantly monitored for safety standards in consonance with worldwide safety benchmarks and strengthened where deficient.

Environmentally Sustainable Development

Environmental considerations and developmental efforts need to go hand in hand for ensuring sustainability. Ecosystems of forests, islands, coastal areas, rivers, and the agricultural, urban and industrial environment are also to be considered for the restoration of ecological balances and sustainable development. Zonal regulations must ensure the preservation of natural habitats.

Land Use Planning

A review of master plans and their compliance, on priority, is essential and should be regarded as the paramount responsibility of the States/Union Territories. At the macro-level, there is a need for preparation of land use planning based on the inventory database of various uses. As far as urban settlements are concerned, the future land use is to be assessed keeping in view the anticipated intensity of development.

Safe Construction Practices

Hazards including earthquakes and cyclones do not kill people, but inadequately designed and badly constructed buildings do. Ensuring the safe construction of new buildings and the retrofitting of selected lifeline buildings, as given in the Earthquake Guidelines of the National Disaster Management Authority (NDMA), is a critical step to be taken toward earthquake mitigation. Building codes should be updated periodically as a mandatory requirement and put in the public domain. Observance of the National Building Code should be made mandatory in all the State/Municipal building bye laws.

APPENDICES

A1. Important Emergency Contact Numbers

National Emergency Number	112
Nearest Police Station	100
Nearest Fire & Rescue	101
Ambulance Service	108
Police Helpline	0471 324 3000/4000/5000
Police Message Centre	9497 900 000
Police Highway Helpline	9846 100 100
Railway Helpline	9846 200 100
Crime Stopper	1090
Women Helpline	1091/181
Nirbhaya Toll Free Number	1800 425 1400
Child Helpline	1098
Traffic Helpline	1099
Kerala Coastal Police Helpline	1093
Indian Coast Guard Helpline	1554
KSEB[15]	1912
Indian Railway Call Center	139
Kerala Government Call Center	155 300/0471-155300 / 0471- 2335523
DISHA[16] Health Helpline	1056
District Disaster Control Room	1077
KSDMA[17] Control Room	1070/0471 2331639
NDMA[18] Control Room	011 1078

Source: https://kerala.gov.in/helpline (Accessed on 1 June 2020)

[15] *Kerala State Electricity Board*

[16] *Direct Intervention System For Health Awareness (a project by National Health Mission and Government of Kerala)*

[17] *Kerala State Disaster Management Authority*

[18] *National Disaster Management Authority*

A2. NDMA and KSDMA on Social Media

National Disaster Management Authority (NDMA)
Website: https://ndma.gov.in/en/
Facebook: https://www.facebook.com/NDMA.in/
Twitter: @ndmaindia

Kerala State Disaster Management Authority (KSDMA)
Website: https://sdma.kerala.gov.in/
Facebook: https://www.facebook.com/KeralaStateDisasterManagementAuthorityksdma/
Twitter: @KeralaSDMA

A3. District Emergency Operations Centers (DEOC)

District	Phone number	Mobile Number
Thiruvananthapuram	0471 2730045	94977 11281
Kollam	0474 2794004	94476 77800
Pathanamthitta	0468 2222515	85476 10039*
Alappuzha	0477 2238630	94950 03640
Kottayam	0481 2304800	94465 62236
Idukki	04862 232242	94463 03036*
Ernakulam	0484 2423001	85476 10077*
Thrissur	0487 2362424	94470 74424
Palakkad	0491 2505309	85476 10093*
Malappuram	0483 2736320	94476 78662*
Kozhikode	0495 2371002	94465 38900
Wayanad	04936 204151	80784 09770
Kannur	0497 2713266	85476 16034*
Kasaragod	04994 257700	94466 01700

Source: KSDMA, Websites of the district collectorates

*Deputy Collector/ADM (*Administration of DEOC is by the Deputy Collector (Disaster Management) in Thiruvananthapuram, Pathanamthitta, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode and Kannur, and by the Additional District Magistrate (ADM) in Kollam, Kottayam, Idukki, Palakkad, Wayanad and Kasargod.)*

A4. Contact Numbers of District Collector, District Medical Officer, District Fire & Rescue Officer

District	Collector	Medical Officer (Health)	Fire & Rescue Officer
Thiruvananthapuram	0471 2731177	0471 2473257	0471 2333109
Kollam	0474 2794900	0474 2797609	0474 2748101
Pathanamthitta	0468 2222505	0468 2228220	0468 2222001
Alappuzha	0477 2251720	0477 2252329	0477 2251211
Kottayam	0481 2562001	0481 2562778	0481 2567442
Idukki	04862 233101	04862 233030	0486 2236100
Ernakulam	0484 2372902	0484 2369567	0484 2206131
Thrissur	0487 2361020	0487 2333242	0487 2420183
Palakkad	0491 2505266	0491 2505264	0491 2505702
Malappuram	0483 2734355	0483 2737857	0483 2734788
Kozhikode	0495 2371400	0495 2370494	0495 2322101
Wayanad	04936 202230	04935 240390	04936 203101
Kannur	0497 2700243	0497 2700194	0497 2701092
Kasaragod	04994 256400	04672 209433	0499 4231101

Source: Websites of the district collectorates

[19] *Source - http://www.fire.kerala.gov.in*

A5. Contact Numbers of District Police Chiefs

District	Office Number	Mobile Number
Thiruvananthapuram (City)	0471 2320579	94979 96991
Thiruvananthapuram (Rural)	0471 2300303	94979 96985
Kollam (City)	0474 2764422	94979 96984
Kollam (Rural)	0474 2450168	94979 96908
Pathanamthitta	0468 2222636	94979 96983
Alappuzha	0477 2239326	94979 96982
Kottayam	0481 2564700	94979 96980
Idukki	04862 233006	94979 96981
Ernakulam (Kochi-City)	0484 2385000	94979 96990
Ernakulam (Rural)	0484 2623550	94979 96979
Thrissur (City)	0487 2423511	94979 96909
Thrissur (Rural)	0487 2361000	94979 96978
Palakkad	0491 2534011	94979 96977
Malappuram	0483 2734377	94979 96976
Kozhikode (City)	0495 2722911	94979 96989
Kozhikode (Rural)	0496 2523100	94979 96975
Wayanad	04936 202525	94979 96974
Kannur	0497 2763330	94979 96973
Kasaragod	04994 257401	94979 96972

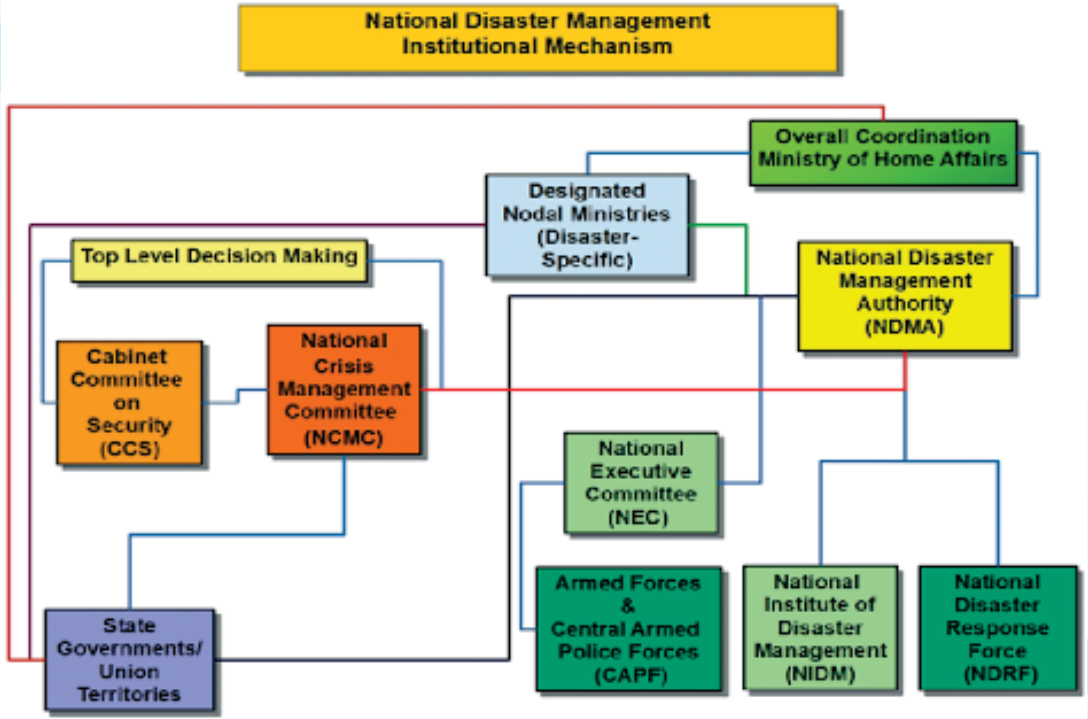
Sources: Websites of the respective district police offices

A6. District Social Justice Offices

District	Phone number	Email
Thiruvananthapuram	0471 2343241	dswotvmswd@gmail.com
Kollam	0474 2790971	dsjosjdklm@gmail.com
Pathanamthitta	0468 2325168	dsjopta@gmail.com
Alappuzha	0477 2253870	dswoalpy@gmail.com
Kottayam	0481 2563980	dsjoktm@gmail.com
Idukki	0486 2228160	dswoidkswd@gmail.com
Ernakulam	0484 2425377	dsjoekm@gmail.com
Thrissur	0487 2321702	dswotsrswd@gmail.com
Malappuram	0483 2735324	dsjompm@gmail.com
Palakkad	0491 2505791	dswopkdswd@gmail.com
Kozhikode	0495 2371911	dsjokkd@gmail.com
Wayanad	04936 205307	dsjowyd@gmail.com
Kannur	0497 2712255	dswoknrswd@gmail.com
Kasaragod	0499 4255074	dswokgdswd@gmail.com

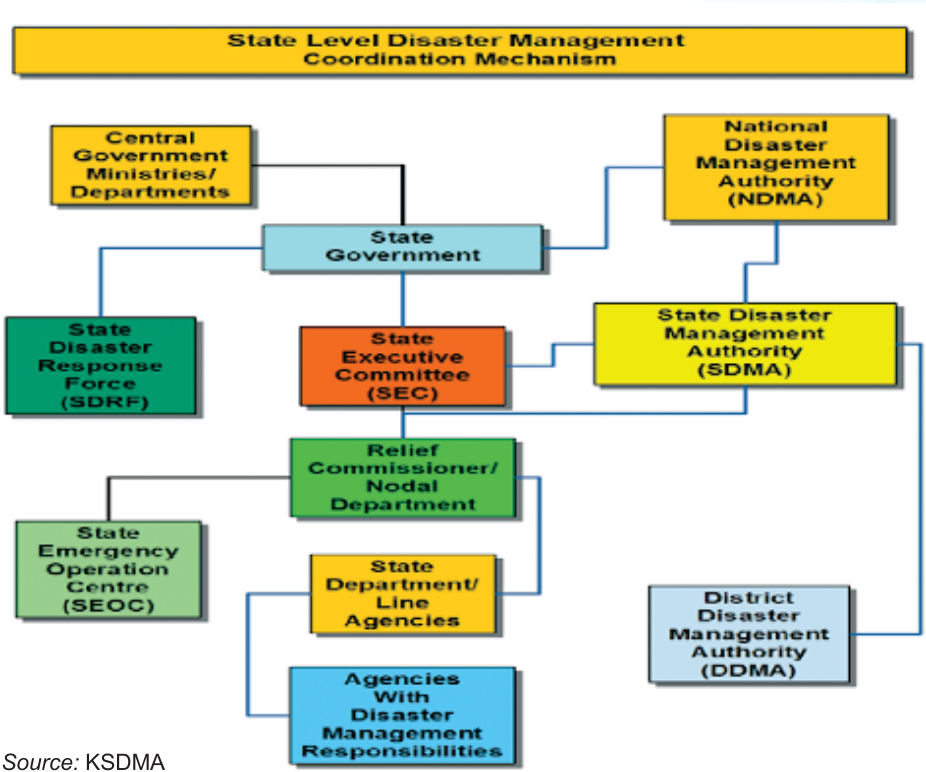
This is useful for Persons with disabilities, older persons, etc.
Source: http://swd.kerala.gov.in (Accessed on 30 June 2020)

A7. Organizational Structure of Disaster Management in India



Source: KSDMA

A8. Organizational Structure of Disaster Management in Kerala



Source: KSDMA

ABBREVIATIONS

BSNL	:	Bharat Sanchar Nigam Ltd
CAPFs	:	Central Armed Police Forces
CBRN	:	Chemical, Biological, Radiological and Nuclear
CCS	:	Cabinet Committee on Security
CHC	:	Community Health Center
CoR	:	Commissioner of Relief
CPWD	:	Central Public Works Department
CWC	:	Central Water Commission
DDMA	:	District Disaster Management Authority
DEOC	:	District Emergency Operations Center
DIC	:	District Incident Commander
DM	:	Disaster Management
DMP	:	Disaster Management Plan
DRR	:	Disaster Risk Reduction
DSS	:	Decision Support System
EOC	:	Emergency Operations Center
EWS	:	Early Warning System
GIS	:	Geographic Information System
GSI	:	Geological Survey of India
GSM	:	Global System for Mobile Communication
ICT	:	Information and Communication Technology
IDRN	:	Indian Disaster Resource Network
IDS	:	Integrated Defense Staff
IMD	:	India Meteorological Department
INCOIS	:	India National Centre for Oceanic Information Services
IRS	:	Incident Response System
KSEB	:	Kerala State Electricity Board
KSRTC	:	Kerala State Road Transport Corporation
KSWTC	:	Kerala State Water Transport Corporation

LPG	:	Liquefied Petroleum Gas
LSG	:	Local Self Government
MEA	:	Ministry of External Affairs
MHA	:	Ministry of Home Affairs
MIS	:	Management Information System
MoAFW	:	Ministry of Agriculture and Farmers' Welfare
NCMC	:	National Crisis Management Committee
NDMA	:	National Disaster Management Authority
NDMP	:	National Disaster Management Plan
NDMS	:	National Disaster Management Services
NDRF	:	National Disaster Response Force
NEOC	:	National Emergency Operations Center
NGO	:	Non-Governmental Organization
NPDM	:	National Policy on Disaster Management
OEM	:	Original Equipment Manufacturers
PHC	:	Public Health Center
PPPs	:	Public-Private Partnerships
PWD	:	Public Works Department
SASE	:	Snow and Avalanche Study Establishment
SDMA	:	State Disaster Management Authority
SDRF	:	State Disaster Response Force
SEC	:	State Executive Committee
SEOC	:	State Emergency Operations Centre
SIC	:	State Incident Commander
SMS	:	Short Messaging Service
SOP	:	Standard Operating Procedure
SRC	:	State Relief Commissioner
UNISDR	:	UN Office for Disaster Risk Reduction (currently UNDRR)
VHF	:	Very High Frequency

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